

*Coastal Wetlands: Mangrove Conservation and Management*

# Joint Mangrove Management in Tamil Nadu: Process, Experiences and Prospects

## Part 1: Situation Analysis - Pichavaram and Muthupet Mangrove Wetlands



M.S. Swaminathan Research Foundation  
Chennai, India



*Project staff and field staff of the Forest Department meet the Pichavaram mangrove community.*



*Aerial view of young mangrove forest.*



*Non-traditional fishermen from MGR Nagar capture crabs from Pichavaram mangrove waters with a gear known as nandu kachcha.*

# **Joint Mangrove Management in Tamil Nadu: Process, Experiences and Prospects**

## *Part 1: Situation Analysis: Pichavaram and Muthupet Mangrove Wetlands*

V. Selvam  
K.K. Ravichandran  
V.M. Karunagaran  
K.G. Mani  
G. Evanjalini Jessie Beula

**M.S. Swaminathan Research Foundation  
Chennai, India.**

**M.S. Swaminathan Research Foundation**  
3<sup>rd</sup> Cross Street, Institutional Area  
Taramani, Chennai 600 113, India

**Telephone** : + 91 (44) 2254 1229  
                  + 91 (44) 2254 1698

**Fax** : + 91 (44) 2254 1319

**E-mail** : msswami@mssrf.res.in  
          executivedirector@mssrf.res.in

**MSSRF / MA / 03 / 08**

*Front Cover: The mangrove community leads an arduous life. Centre: Non-traditional fishers in Pichavaram catch prawns by the 'groping' method. Bottom: Fishing in Muthupet mangrove canals with trapping devices.*

**June 2003**

**This publication has been made possible with support from  
the India-Canada Environment Facility (ICEF), New Delhi.**

## Foreword

One of the earliest activities undertaken by the M S Swaminathan Research Foundation after it started its work in 1990 was the conservation and sustainable management of Mangrove Wetlands. The initial site for this work was the Pichavaram Mangrove Ecosystem. Later this work was extended to the Muthupet Mangrove Wetland of Tamil Nadu and further to the Godavari and Krishna mangrove wetlands of Andhra Pradesh; Mahanadi and Devi mangroves of Orissa; and the Sundarbans of West Bengal. The major objectives of this programme are:

- Conservation and documentation of mangrove ecosystems
- Rehabilitation of degraded mangrove ecosystems
- Monitoring of the state of mangrove wetlands using remote sensing techniques
- Linking the ecological security of mangrove forests with the livelihood security of mangrove wetland-dependent communities
- Promotion of participatory mangrove forest management and formation of Village Mangrove Councils
- Understanding the role of women and men in the conservation and sustainable and equitable use of mangrove forests
- Ensuring that the children of the mangrove forest communities have opportunities for education and health care
- Spreading mangrove literacy for fostering public understanding of the significance of this unique ecosystem in the context of potential changes in sea level as a result of global warming.

During the last 10 years, this work had been supported by the International Tropical Timber Organisation, the Canadian International Development Agency and the India-Canada Environment Facility, and the Ministry of Environment and Forests, Government of India. The project ended on 31 May 2003.



Some of the significant work done under this project has been written up in a series of manuals under the generic title, "Joint Mangrove Management in Tamil Nadu: Process, Experiences and Prospects".

I am indebted to Dr. V. Selvam, who has been involved in this project right from the beginning, and all the staff of the project for their dedicated and socially and ecologically meaningful work. I am also grateful to Mr. S. R. Madhu for editing this series of manuals with devotion and competence.

I hope these publications will be found useful by the staff of the Forest Department, local communities and civil society and academic organisations engaged in the conservation of the unique mangrove ecosystem. In view of the possibilities of sea level rise as a result of global warming, the mangrove ecosystem will grow in importance in the coming decades. I therefore hope that the work initiated by MSSRF will be continued through a joint mangrove management procedure. Joint Mangrove Management will help to maximise the power of partnership among professional and local communities.

*M. S. Swaminathan*  
M. S. Swaminathan

*MSSRF seeks to link the ecological security of mangrove forests with the livelihood security of mangrove communities.*



## Acknowledgements

We are grateful to Prof. M.S. Swaminathan, Chairman, MSSRF for conceptualising the concept of Joint Mangrove Management and for his inspirational guidance; and to Prof. P.C. Kesavan, Executive Director, MSSRF for his unfailing encouragement and support. We would like to thank Dr. K. Balasubramaniam, Director, Ecotechnology, MSSRF for his active participation, particularly during the initial phase of the project, and his continuous support.

We are thankful to the Tamil Nadu Forest Department, Government of Tamil Nadu, for permitting us to demonstrate Joint Mangrove Management models in Pichavaram and Muthupet mangrove wetlands. We are indebted to Mr. J.C. Kala, Principal Chief Conservator of Forests (PCCF), Mr. V.R. Chitrapu, IFS, and Mr.K.K. Somasundaram, IFS, former PCCFs, for their encouragement. Our thanks are also due to Mr.R.P.S. Katwal, IFS, former Chief Wildlife Warden, and Dr. Sukhdev Thakur, IFS, Chief Wildlife Warden, for kindly approving the JMM proposals and micro plans.

We are grateful to Mr.C.K. Sreedharan, IFS, Chief Conservator of Forests, for being with us throughout our work. His constant direction and guidance and his contribution to refining the approach of JMM through a mid-term assessment, are thankfully acknowledged.

We are thankful to Dr. G. Kumaravel, IFS, Chief Conservator of Forests (Research), Mr. K. Chidambaram, IFS, Conservator of Forests (Trichy Circle) and Mr. P. Subramanian, IFS, Conservator of Forests (Dharmapuri Circle) for their keen interest and co-operation in implementing JMM activities in the demonstration hamlets.

We are grateful to the India-Canada Environment Facility (ICEF), the Canadian International Development Agency (CIDA), the Government of Canada and the Ministry of Environment and Forests, Government of India, for their continuous financial support.

We express our heartfelt gratitude to Mr. Peter Walton, Mr. Allen Ferguson, and Mr. Bernard Boudreau (former Directors of the ICEF), and Mr. Ujjwal Choudhury (Director, ICEF), New Delhi, for their support and whole-hearted commitment to the cause of mangrove conservation and management, which made our project possible.

Our special thanks to Dr. Jaya Chatterjee, Senior Project Officer, ICEF, New Delhi, for constant interaction with the project team and for timely advice on operationalising the JMM concept.

We are very thankful to Dr. E.V. Mulley, Joint Director, Ministry of Environment and Forests (MoEn), Government of India, and the Sub-Committee of the MoEn, for appraising the JMM models and incorporating them in the National Action Plan for Mangroves.

We are grateful to Mr. S.R. Madhu for his painstaking effort in editing this series of publications.

We are grateful to the International Institute of Development Studies, Sussex, UK, for providing resource materials such as the PRA Tool and Technical Pack which were used extensively to conduct various PRA exercises.

We thank the traditional village leaders, Panchayat leaders, fishers and farmers and the Presidents of Fishermen Co-operative Societies in Killai and Muthupet villages, for their active participation.

*The traditional wisdom of mangrove communities will be invaluable for Joint Mangrove Management.*



## Contributors to this Publication

### *M.S. Swaminathan Research Foundation*

Mr. S. Sankaramurthy, IFS	-	Former Project Director
Mr. K. Johnson	-	Former Project Officer
Dr. V. Selvam	-	Project Director and Mangrove Ecologist
Mr. K.K. Ravichandran	-	Mangrove Ecologist
Dr. V.M. Karunagaran	-	Mangrove Ecologist
Dr. R. Somasundaram	-	Botanist
Mr. K.G. Mani	-	Agronomist
Mr. Y. Anzari	-	Agronomist
Mr. N.R. Babu	-	Agricultural Specialist
Mr. J. Raju	-	Fishery Biologist
Dr. B. Subramanian	-	Social Worker
Mr. R. Anbalagan	-	Social Worker
Dr. P. Thamizoli	-	Social Anthropologist
Ms. L. Gnanappazham	-	GIS Specialist
Ms. M. Navamuniyammal	-	GIS Specialist

### *Tamil Nadu Forest Department*

Mr. S. Mahapatra, IFS	-	District Forest Officer
Mr. S.K. Niraj, IFS	-	Wildlife Warden
Mr. A.D. Baruah	-	Wildlife Warden
Mr. K. Vaidyanathan	-	Range Officer
Mr. R. Venkatachalapathy	-	Range Officer
Mr. R. Munusamy	-	Forester
Mr. S. Manickam	-	Forester

### *Local NGO representatives*

Mr. G. Ramamurthy	-	ENCONS, Muthupet
Mr. P. Arul	-	PEACE, Chidambaram

# Contents

	<i>Page</i>
Foreword .....	3
Acknowledgements .....	4
Contributors to this Publication .....	5
List of Tables and Figures .....	8
Introduction .....	9
<i>Situation Analysis: Pichavaram Mangrove Wetlands</i> .....	14
<b>1.0 Process and Methods of Data Collection</b> .....	<b>14</b>
1.1 Study team .....	14
1.2 Identification of user villages and hamlets .....	14
1.3 Background information on user villages and hamlets .....	14
1.4 Rapid Rural Appraisal .....	15
1.4.1 RRA on fishery resources .....	15
1.4.2 RRA on forestry resources .....	17
1.5 Review of literature .....	18
1.6 Discussion with field staff of Fisheries Department, Tamil Nadu .....	18
<b>2.0 Mangrove Resources</b> .....	<b>19</b>
2.1 Fishery resources .....	19
2.1.1 Species composition .....	20
2.1.2 Other aquatic resources .....	20
2.1.3 Catch per unit effort .....	20
2.1.4 Monthly variations in total catch .....	20
2.1.5 Perceptions of local fishers on fish and fishery resources .....	21
2.2 Forestry resources .....	26
2.2.1 Timber and Non-Timber Forest Produce (NTFP) .....	26
2.2.2 Medicinal plants .....	26
2.2.3 Fodder and firewood .....	26
<b>3.0 Mangrove Resource Utilization Pattern</b> .....	<b>27</b>
3.1 Mangrove user hamlets, communities and population .....	27
3.1.1 Fishing community .....	27
3.1.2 Farming community .....	28
3.2 Utilisation patterns and practices: fishery resources .....	28
3.2.1 Traditional fishing community .....	28
3.2.2 Fishing methods of traditional fishers .....	28
3.2.3 Traditional community-based fishery management .....	31
3.2.4 Fishing timings .....	32
3.2.5 Fish preservation .....	33
3.2.6 Marketing .....	33
3.2.7 Credit sources .....	33
3.2.8 Non-traditional fishing community .....	33
3.2.9 Fishing methods of the <i>Irulars</i> .....	34
3.3 Utilisation patterns and practices: forestry resources .....	35
3.3.1 Cattle grazing .....	35
3.3.2 Perceptions of local people on cattle management .....	36
3.3.3 Ethno-ecology of the Pichavaram mangrove wetlands .....	37
<b>4.0 Major Concerns of Traditional and Non-traditional Fishers</b> .....	<b>38</b>
4.1 Major concerns of traditional fishers .....	38
4.2 Major concerns of non-traditional fishers .....	38



*(Contents continued)*

<i>Situation Analysis: Muthupet Mangrove Wetlands</i> .....	39
<b>1.0 Process and Methods of Data Collection</b> .....	<b>39</b>
1.1 Study team .....	39
1.2 Stakeholders' meeting .....	39
1.3 Group meetings with local NGOs .....	39
1.4 Group meetings with staff of government institutions .....	39
1.5 Review of literature .....	40
1.6 Rapid Rural Appraisal .....	40
1.6.1 RRA on fishery resources .....	40
1.6.2 RRA on forestry resources .....	41
<b>2.0 Mangrove Resources</b> .....	<b>42</b>
2.1 Fishery Resources .....	42
2.1.1 Species composition .....	44
2.1.2 Other aquatic resources .....	45
2.1.3 Catch per unit effort .....	45
2.1.4 Perceptions of local fishers on fishery resources .....	45
2.2 Forestry Resources .....	45
2.2.1 Timber and Non-Timber Forest Produce (NTFP) .....	45
2.2.2 Medicinal plants .....	45
2.2.3 Fodder and firewood .....	45
<b>3.0 Mangrove Resource Utilisation Pattern</b> .....	<b>48</b>
3.1 Mangrove user communities .....	48
3.1.1 Traditional fishing community .....	48
3.1.2 Farming community .....	48
3.2 Utilisation patterns and practices: fishery resources .....	51
3.2.1 Fishing in the lagoon, bays and creeks .....	51
3.2.2 Canal fishing .....	55
3.2.3 Traditional fishing practices .....	55
3.2.4 Fisheries management .....	55
Free fishing in the lagoon and tidal creeks .....	56
Traditional pen culture of wild prawn and fish .....	56
Family fishing in the man made canals .....	56
3.2.5 Marketing .....	56
3.2.6 Fishermen co-operative societies .....	58
3.3 Utilisation patterns and practices: forestry resources .....	60
3.3.1 Cattle grazing .....	60
3.3.2 Firewood collection .....	60
Collection of mangrove firewood for own use .....	60
Collection of firewood for marketing .....	60
3.3.3 Land use pattern around the Muthupet mangrove wetland .....	60
<b>4.0 Major Concerns of the Local People</b> .....	<b>63</b>
4.1. Major concerns of fishing community .....	63
4.2 Major concerns of farming community .....	64
<b>Annexure 1: Canal Fishing in the Muthupet Mangrove Wetlands</b> .....	<b>66</b>

## List of Figures and Tables

### *Situation Analysis: Pichavaram Mangrove Wetlands*

Fig. 1.1	Estuarine Complex showing the Vellar Estuary, the Pichavaram Mangrove and the Coleroon Estuary .....	16
Fig. 1.2	Monthly Variations in Quantity of Finfish, Prawns and Crabs Harvested in Pichavaram .....	20
Fig. 1.3	Mangrove Wetland Resources – 25 Years Ago and Today – as seen by local fishers .....	22
Fig. 1.4	Status of Estuarine Mouth during Different Seasons – as Observed by Local Fishers .....	25
Fig. 1.5	Community-based Traditional Fisheries Management System .....	31
Fig. 1.6	Marketing Channels .....	32
Fig. 1.7	Population of Cattle, Goats and Sheep of Mangrove-Dependent Hamlets in Pichavaram .....	35
Fig. 1.8	Grazing System in Traditional Method of Cattle Management Followed in the Past in Mangrove User Hamlets .....	36
Table 1.1	Local Fishers' Perceptions on Fishery Resources of Pichavaram Mangroves .....	23
Table 1.2	Different Types of Nets Used by the Traditional Fishing Community in the Mangrove Waters .....	30

### *Situation Analysis: Muthupet Mangrove Wetlands*

Fig. 2.1	Map of Muthupet Mangrove Wetlands .....	43
Fig. 2.2	Villages and Hamlets Which Utilise the Resources of Muthupet Mangrove Wetlands .....	49
Fig. 2.3	Traditional Fishing Crafts Used in the Muthupet Mangrove Wetland and Adjacent Waters .....	52
Fig. 2.4	Muthupet Mangrove Wetlands, showing Free Fishing Area, Area on Lease and Canal Fishing Area .....	57
Fig. 2.5	Organisational Structure of Fishermen Co-operative Societies .....	58
Fig. 2.6	Land Use Pattern in Areas Close to the Muthupet Mangrove Wetlands .....	61
Table 2.1	Different Categories of Wetlands found Within Each Reserve Forest of the Muthupet Mangrove Wetland .....	42
Table 2.2	Perceptions of Local Fishers on Fishery Resources of Muthupet Mangrove Wetlands .....	46
Table 2.3	Revenue Villages and Hamlets in Muthupet, with Statistics of Households, Population, Fishing and Farming Families, and Major and Minor Use of Mangrove Wetlands .....	50
Table 2.4	Non-Mechanised and Mechanised Crafts Owned by Fishers in Muthupet .....	52
Table 2.5	Fishing Sequence for Various Types of Nets (During the Peak Season) .....	53
Table 2.6	Fishermen Co-operative Societies Operating around Muthupet Mangrove Wetlands .....	59
Table 2.7	Families that Depend on Mangrove Forests for Their Livelihood .....	60

### *Annexure 1: Canal Fishing in the Muthupet Mangrove Wetlands*

Fig. A-1	Remote Sensing Imagery of the Western Part of the Muthupet Mangrove Wetlands .....	66
Fig. A-2	How Man-Made Canals Integrate Development of Mangroves and Fisheries .....	68
Fig. A-3	Fish Harvesting in Man-Made Canals .....	70
Table A-1	Families that Traditionally Utilise Canals for Fishing .....	70
Table A-2	Families that Utilise Fishing Canals – by Caste .....	71

## Introduction



Mangrove wetlands are prominent features of the coastal zone of tropical countries. A mangrove wetland consists of a mangrove forest and its associated water bodies. A mangrove forest harbours a group of plant species that grow well in the estuarine areas – where salinity undergoes constant changes due to freshwater flow and where the substratum is composed of accumulated deposits of river-borne sediment. A mangrove forest is intersected by a number of tidal canals, channels and creeks and large open water bodies, where the water level varies daily due to tidal inflow and outflow, as well as seasonally due to freshwater discharge.

The mangrove wetland is a multiple-use ecosystem that performs a number of protective, productive and economic functions to sustain the ecological and livelihood security of the coastal communities. Mangrove forests and associated wetlands

- i) act as a barrier against cyclones and prevent entry of saline water inland during storm surges.
- ii) act as a buffer against floods and prevent coastal erosion.
- iii) provide nursery grounds for a number of commercially important fish, prawns, crabs and molluscs.
- iv) enhance fishery production of nearby coastal waters by exporting nutrients and detritus.
- v) provide habitats for wildlife ranging from migratory birds to estuarine crocodiles.

The economic value of the mangrove wetlands stems from

- i) availability of wood products ranging from timber, poles, posts to firewood.
- ii) availability of non-wood products such as fodder, honey, waxes, thatching materials etc.
- iii) availability of aquatic products such as fish, prawns, crabs, mussels, clams and oysters

The coastal zone of India's mainland and of the Andaman and Nicobar islands harbours extensive and diverse mangrove wetlands. According to the Forest Survey of India (1999), the total area of the Indian mangrove wetland is about 4,87,100 ha of which 56.7% (2,75,800 ha) is on the east coast, 23.5% (1,14,700 ha) on the west coast and the remaining 19.8% (96,600 ha) on the Andaman and Nicobar islands.

### Mangrove wetlands of Tamil Nadu

Tamil Nadu has a coastline of 950 km. Extensive mangrove wetlands are located in two places – in Pichavaram, Cuddalore district and Muthupet in Thiruvavur and Thanjavur districts. Small patches of mangroves have also been found along the Palk Strait as well as in some of the islands of the Gulf of Mannar Biosphere Reserve. All these mangrove wetlands have been declared as Reserve Forests (absolute property of the government) and are managed by the Tamil Nadu Forest Department.

The Pichavaram mangrove wetland is located in the northern extreme of the Cauvery delta, near the mouth of River Coleroon. Its total area is about 1,350 ha, its many small islands are colonised by 13 true mangrove species. Presence of *Rhizophora* species in large numbers is one of the important features of this mangrove wetland from the standpoint of biodiversity. The Pichavaram mangrove wetland is also rich in fishery resources. Annually about 245 tons of fishery produce is harvested from this mangrove wetland, of which prawns alone constitute 208 tons (85% of the catch). The people belonging to 17 hamlets of five revenue villages utilise the fishery and forestry resources of the Pichavaram mangrove wetlands. A total number of 1,900 fishers are annually dependent on the fishery resources for their livelihood; some 1,000 fishers fish seasonally in the mangrove waters. Some 800 to 900 cattle graze the mangrove wetlands seasonally. (Reports at one time indicated that about 3,000 cattle grazed in these mangroves).



The number of cattle has gone down drastically in mangrove user villages of Pichavaram in recent years for various social and economic reasons. According to remote sensing data, nearly 54% of the mangrove forest of Pichavaram (total forested area 700 ha, excluding water bodies, sand dunes etc) was in a degraded state in 1986.

The Muthupet mangrove wetland is located in the southern most end of the Cauvery delta and occupies an area of approximately 12,000 ha, including a 1,700 ha lagoon. Unlike in Pichavaram, the species diversity in Muthupet is dominated by a single species, *Avicennia marina*. Though five other species have been reported from this mangrove wetland, their population is very limited. A preliminary estimate indicates that about 106 tons of fishery produce is harvested every year from this mangrove wetland. Further detailed study is needed to assess the fishery potential of the Muthupet mangrove wetland.

One of the interesting aspects of the Muthupet mangrove wetland is the practice of the traditional fishing method known as canal fishing (*vaiikkal meenpidippu*), which integrates mangrove and fishery development. This is an example of the traditional wisdom of local communities in sustainable management of mangrove wetlands. The people belonging to 26 hamlets of 16 revenue villages with a total population of about 35,900 depend on the fishery and forestry resources of Muthupet. A benchmark survey indicates that about 53% of this population is dependent on fishing, but most of them fish in the Palk Strait nearby rather than in the mangrove wetland. Fishing in the mangrove waters is only seasonal. The problem of cattle grazing in the mangrove forest is very limited, but about 73 families, mostly headed by women who are widows and destitutes, collect mangrove wood and sell it in the market for livelihood. According to 1996 remote sensing data, out of 9,033 ha of forested area (excluding lagoon and water body and other vegetation), only 1,855 ha (20.5%) had healthy mangroves; the remaining 7,178 ha (79.5%) was degraded.

### Causes of degradation

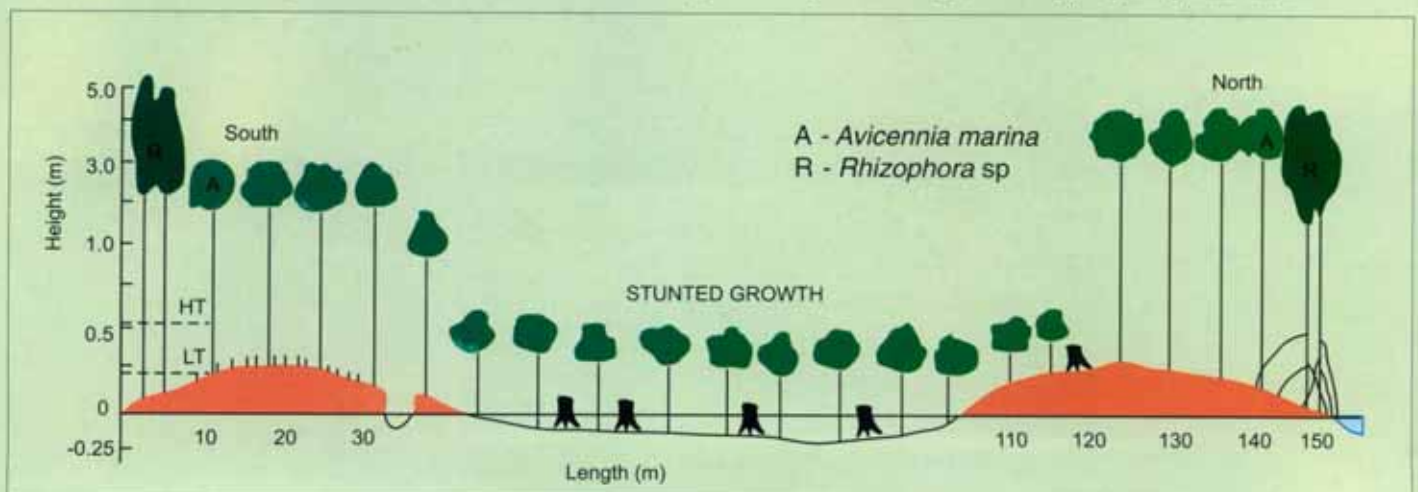
Ecological studies carried out in the Pichavaram and Muthupet mangrove wetlands by MSSRF between 1993 and 1995 show that unscientific management practices followed in the past are the main causes of degradation. In the Pichavaram mangrove wetland, a system of management called "coupe-system" was followed from 1935 to 1970. Under this system of management, healthy mangrove forest was clear-felled in coupes by rotation every 20 to 25 years for revenue generation. This triggered a chain reaction, leading to development of hyper-saline conditions in the coupe-felled area, and preventing natural regeneration of mangroves. Since nearly 80% of the volume of the mangrove surface soil is made up of water, exposure of this soil to the sun due to clear felling caused evaporation of soil water. This in turn led to subsidence of sediment in the clear felled area, on account of which the topography of the coupe-felled area became trough shaped. As a result, tidal water entering into these "troughs" during high tide became stagnant; evaporation of stagnant tidal water led to increase in salinity, which is lethal to any mangrove plant.

An estimate indicates that coupe-felling is responsible for nearly 65% of degradation in the Pichavaram mangroves. Grazing is another important factor. As indicated earlier,



Sketch below illustrates the stunted growth of trees and the coupe system of mangrove forest management.

Above: A canal system has been introduced that restores degraded mangrove areas by facilitating free flow of tidal water.



about 800 to 900 cattle graze in the peripheral areas of mangrove wetland during the rainy season when new seedlings are coming up, and growth of young mangroves is at its peak. Cattle grazing at this time leads to poor regeneration and poor growth of mangrove vegetation in the grazing areas.

As in Pichavaram, coupe-felling is the main cause of degradation of the Muthupet mangrove wetland. The then Raja of Tanjore owned the Muthupet mangrove wetland between 1750 and 1840; British rulers managed this mangrove wetland between 1840 and 1945. During management by the Raja of Tanjore, selected areas of the Muthupet mangrove forest were clear-felled to generate revenue to maintain the rest houses (*Chatrams*) constructed by the king for pilgrims to south India from north India (one of the large beats of the Muthupet mangrove wetland is still known as *Chatram* beat). Later, during the British period, clear-felling was systematised by a rotational coupe-system over 20 to 25 years. This practice continued till the early 1970s. As a result, large areas of mangrove forest were clear-felled and changes in the biophysical condition in these areas (as explained in the case of Pichavaram mangrove wetland) caused nearly 80% of the degradation of the Muthupet mangrove wetland.

#### **Development and demonstration of restoration technique**

Development and demonstration of a restoration technique by MSSRF began late 1995 in the Pichavaram mangrove wetlands. A clear-felled area of 8 ha, where topography had become trough-shaped, was selected to demonstrate the restoration technique. This technique is simple. The trough-shaped area was connected to a natural canal nearby, through a long and deep artificial canal from which a number of feeder canals were dug to cover the entire degraded area. This enabled tidal water to freely flow in and out of the degraded area. Result: the salinity of the degraded area fell drastically and soil moisture increased sharply. Propagules of *Rhizophora* sp and *Avicennia marina* seedlings were

planted along main and feeder canals respectively at a distance of 1 x 1 m. A total number of about 80,000 seedlings were planted in the demonstration site during December 1995. More than 80% survived as of 2003.

#### **Joint Mangrove Management in Tamil Nadu**

Joint Mangrove Management (JMM) was introduced late 1997 in Pichavaram and Muthupet mangrove wetlands and in other mangrove wetlands of Andhra Pradesh, Orissa and West Bengal by MSSRF in partnership with the concerned State Forest Departments and local communities. The main aim of this programme is to enhance the capacity of the local community, Forest Department and other interested



*85 self-help groups (above) of both men and women promote self-reliance in the mangrove villages. The active co-operation of local communities is basic to the success of Joint Mangrove Management (JMM).*





*The JMM approach is process-oriented and people-centred.*

parties to restore, conserve and sustain mangrove wetlands through participatory analysis and action. This programme was implemented in eight hamlets of Tamil Nadu (4 in Pichavaram and 4 in Muthupet) till May 2003, covering traditional and non-traditional fishers and farming communities. The following are the major achievements of JMM in Tamil Nadu.

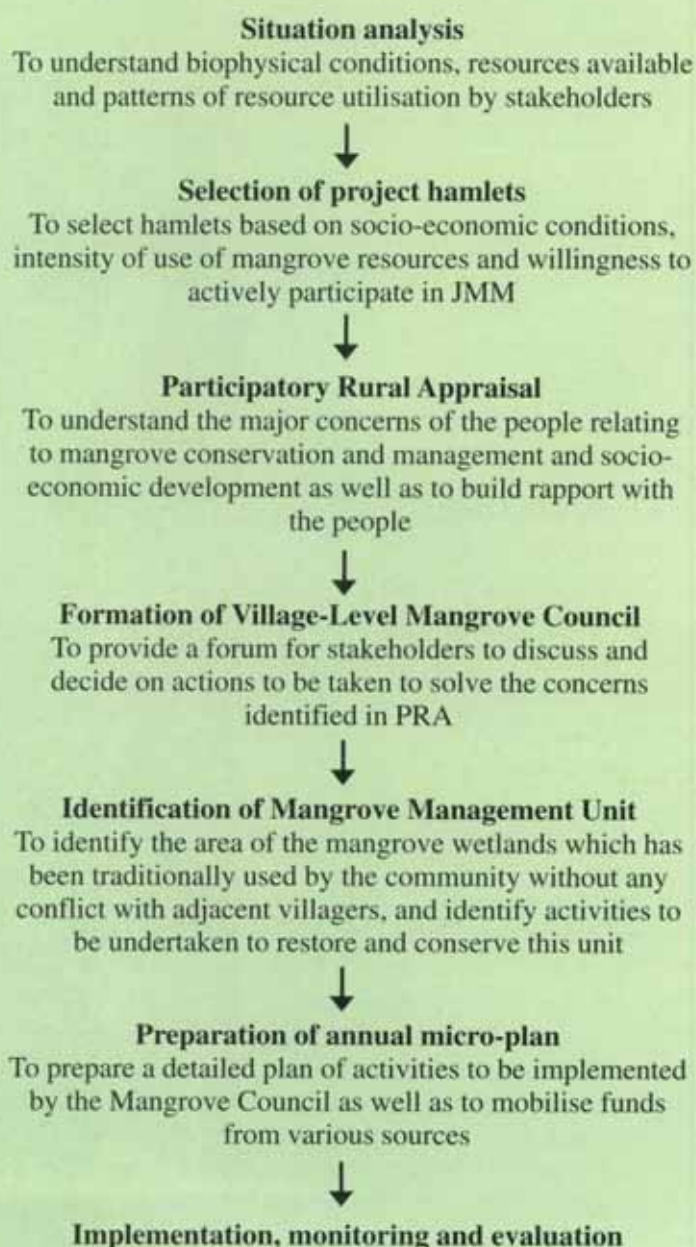
- Eight village-level institutions have been formed with 885 families as members to plan and implement JMM and socio-economic development programmes
- A total area of 675 ha has been restored, and healthy mangroves in 2,720 ha are being protected by the above village-level institutions
- A total number of 5.5 million saplings (4.8 million of *A. marina* and 0.7 million of other species) have been planted by the local community; average survival is 68%
- A total number of 85 self-help groups (50 of women and 35 of men) have been formed with 815 members belonging to the poor and the poorest sections of the mangrove-dependent community. These SHGs mobilised Rs.16 lakhs through savings as well as through financial assistance under Swarnajayanthi Gram Swarozgar Yajona (SGSY) schemes from the District Rural Development Agency.
- 16 types of micro-enterprises – both group-based and individual-based – covering 402 families, have been initiated.
- Some 560 members of the village-level institutions and SHGs have been trained in leadership and membership qualities, functional aspects of SHGs, mangrove restoration, and in a number of micro-enterprises as well as agriculture and fisheries-related activities.

The Tamil Nadu Forest Department has recognised all the village-level institutions and accorded permission to the Range Officer of the concerned range to function as Secretary of these grassroot institutions. It has also recognized the JMM model; it seeks to replicate the model

in other mangrove areas. The Ministry of Environment and Forests (MoEF), Government of India, formed a sub-committee which examined the JMM models implemented in Tamil Nadu and other states and observed that this was the best available model. The MoEF has now included this JMM model as one of the strategies for conservation and sustainable management of mangrove wetlands envisaged in its National Mangrove Action Plan.

### Approach of JMM

The process-oriented, people-centred and science-based approach followed in preparation and implementation is the main cause for the success of current JMM programmes. The approach consists of the following steps:



In order to share the experiences and lessons learned in implementing JMM programmes in Tamil Nadu, MSSRF is bringing out a series of publications under the title "Joint Mangrove Management in Tamil Nadu: Process, Experiences and Prospects". Three different communities – traditional fishers (Veerankoil village in Muthupet), non-traditional fishers (MGR Nagar in Pichavaram) and the farming community (Vadakku Pichavaram in Pichavaram) – are covered in the case studies presented in this series. The series consists of the following publications

- Part 1: Situation Analysis: Pichavaram and Muthupet Mangrove Wetlands
- Part 2: PRA in Mangrove User Villages
- Part 3: Village Mangrove Councils
- Part 4: Mangrove Management Units
- Part 5: Micro-planning and Implementation
- Part 6: Gender and Mangrove Conservation and Management
- Part 7: Results, Achievements and Prospects

Part 1, Situation Analysis in Pichavaram and Muthupet Mangrove Wetlands, deals with i) fishery and forestry



*Communities in Muthupet (above) and Pichavaram now help implement Joint Mangrove Management (JMM).*

resources ii) utilisation of these resources by the local community including details of the dependent population, and traditional and improvised methods of utilising these resources iii) land use pattern around these mangrove wetlands and iv) major concerns of the fishing and farming communities living around the Pichavaram and Muthupet mangrove wetlands. It also details the methodology followed in situation analysis.

*This old couple has seen many changes in mangrove villages. They now look forward to the success of JMM.*



# *Situation Analysis: Pichavaram Mangrove Wetlands*

## **1.0 Process and Methods of Data Collection**

### **1.1 Study team**

A study team collected information on fishery and forestry resources of the Pichavaram mangrove wetlands, the user communities, utilisation patterns and related issues; as well as the perceptions of local communities on the mangrove ecosystem and its resources. All these describe in detail the current situation in the Pichavaram mangrove wetland. The study team:

Dr. V. Selvam	– Team Leader and Mangrove Ecologist
Dr. B. Subramaniam	– Fishery Scientist
Mr. K.G. Mani	– Agronomist
Mr. K.K. Ravichandran	– Mangrove Ecologist
Dr. V.M. Karunagaran	– Mangrove Ecologist
Dr. P. Thamizoli	– Anthropologist
Mr. R. Anbalagan	– Social Worker
Mr. Y. Ansari	– Agronomist

### **1.2 Identification of user villages and hamlets**

Before initiating data collection, the team identified i) the user villages ii) the user hamlets and iii) the population of the hamlets. The field staff of the Forest Department (FD) was first approached to identify the user villages, since they had been managing mangrove resources through a Range Office at Chidambaram. During an informal meeting with the Ranger, Forester, Guard and Watcher, it emerged that the following are the major revenue villages from the standpoint of Pichavaram mangrove resources:

1) Killai 2) Pichavaram 3) Thandavarayan Sozhagan Pettai (T.S. Pettai) and 4) Thillaividangan

The FD field staff also gave the names of the user hamlets in each revenue village. To confirm this, the team visited each village and met its Panchayat and traditional leaders. Several others helped the team to identify, locate and confirm the mangrove user hamlets. These included Mr. R. Arul, Secretary of the Tamil Environment Movement, since renamed the Centre for Peace and Action; the VAOs (Village Administrative Officers) of each village; the Special Officer of the Killai Town Panchayat; leaders of fishermen co-operative societies; and people employed in the MSSRF mangrove nursery and mangrove restoration demonstration work.

### **1.3 Background information on user villages and hamlets**

In order to assess the situation in the mangrove user hamlets, some basic statistical information – such as the number of households, population, community groups (caste groups), and major occupations – was collected. To begin with, VAOs and other revenue officials were approached for data on households and population of mangrove user villages and hamlets. In response, they provided voter lists of each user village, prepared for the Panchayat election, as household information. They advised the team to contact the headmasters of schools in each hamlet for accurate population information. Mr. R. Anbalagan, social worker, suggested that very recent population data could also be got from *Balwadi* (child care centre) heads in each hamlet since they collect this information regularly for a monthly report submitted to district authorities.

Consequently, school officials as well as *Balwadi* heads in each hamlet were met and information obtained. On the basis of this information, a list was prepared of user villages and hamlets, households, population and major occupations.

Information about the fishery and forestry resources of the Pichavaram mangrove wetland, their utilisation patterns and practices, and perceptions of user communities, were collected by the following methods:

- i) Rapid Rural Appraisal
- ii) Transect boating in the mangrove waters
- iii) Literature review
- iv) Discussion with field staff of the State Fisheries Department



*Background information on mangrove user villages was obtained through interviews and discussions with local communities.*



## 1.4 Rapid Rural Appraisal (RRA)

Before conducting the RRA, a preparatory workshop was held in which the “golden rules” and methods of RRA were discussed in detail. A checklist of information to be collected was prepared. The roles and responsibilities of each member were decided.

### 1.4.1 RRA on fishery resources

The study team conducted a RRA on fishery resources and fishing activities and related issues in the following fishing hamlets: i) Chinnavaikkal ii) Killai Fishers’ Colony iii) T.S. Pettai and iv) Pillumedu and v) MGR Nagar.

The traditional fishing community lives in the first four hamlets. The residents of the fifth hamlet, MGR Nagar, are non-traditional fishers locally known as *Vedars*. (But when the project team met them, they disowned the *Vedars* label – they said they are *Irulars*.)

Women participation was limited in all the hamlets except MGR Nagar. Information was obtained mostly through informal interviews and group discussions with eight to 12 experienced fishers. Interviews were also held with key informants; they were requested to organise a transect in the mangrove wetland by boat.

Key informants from fishing hamlets:

Mr.R.C.Kathavaraya Swamy -	Vice President, Killai Fishermen Co-operative Society	Mr. K. Dayalamurthy	- T.S. Pettai
Mr. M. Sambandam	- Chinnavaikkal	Mr. P. Arumugam	- T.S. Pettai
Mr. N. Kuttiyandiswamy	- Chinnavaikkal	Mr. S. Kaliyaperumal	- T.S. Pettai
Mr. T. Dhanapal	- Chinnavaikkal	Ms.G. Kanakaraj	- T.S. Pettai
Mr. S. Govindan	- Secretary, Traditional Fishermen Society, T.S.Pettai	Mr. R. Govindan	- MGR Nagar
		Mr. G. Kothandam	- MGR Nagar
		Mr. P. Kannimuthu	- MGR Nagar
		Mr. T. Arumugam	- MGR Nagar
		Mr. A. Mathi	- Pillumedu
		Mr. K. Karuthakannu	- Pillumedu

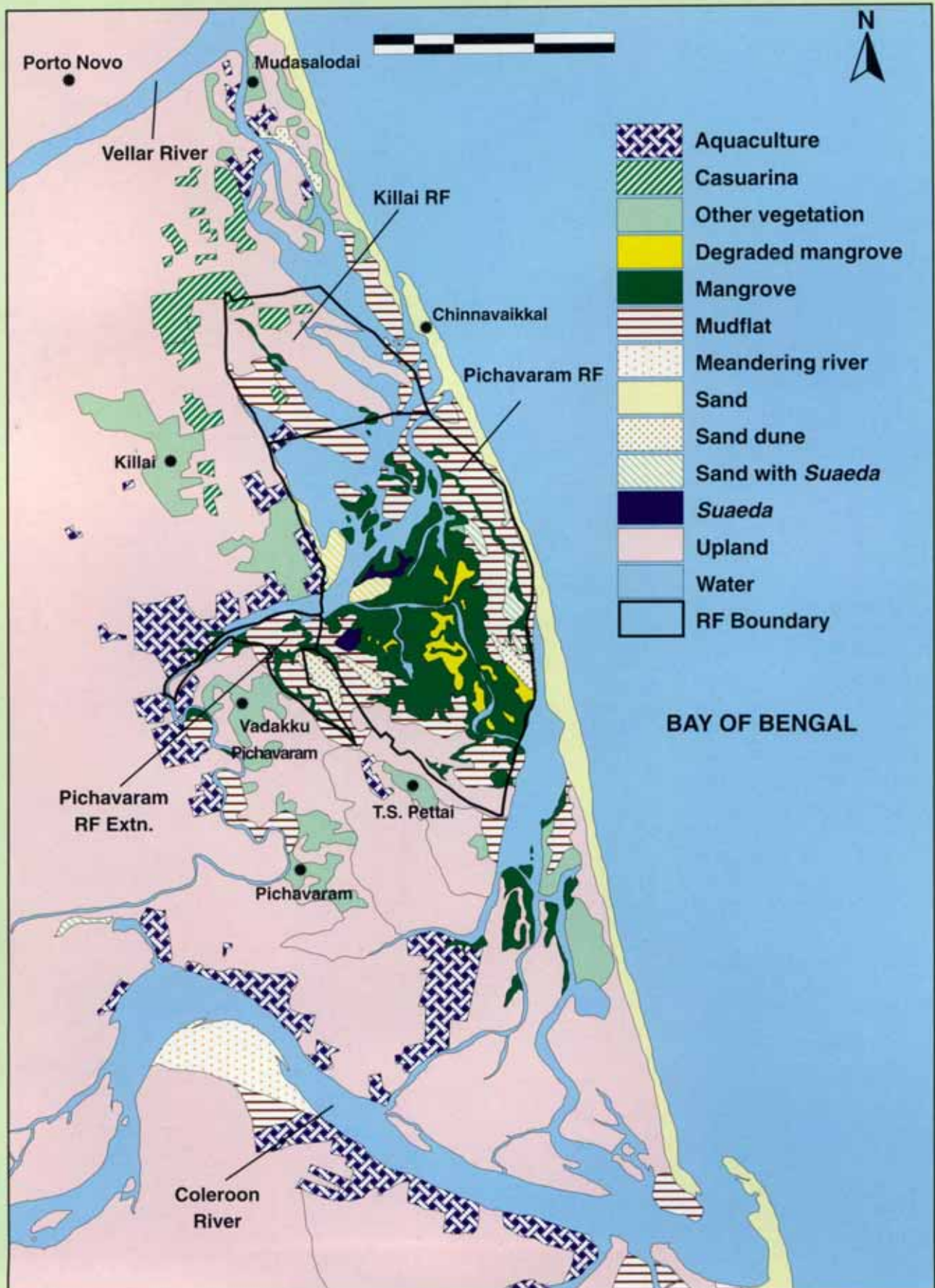


The study team obtained information about non-traditional fishing methods such as bunding...



... and traditional fishing methods such as cast nets to catch fish and prawn.

Fig. 1.1 Estuarine Complex Showing the Vellar Estuary, the Pichavaram Mangrove and the Coleroon Estuary



*Transect boating in the mangrove waters:* The first RRA was held in Chinnavaikkal, a hamlet of Killai situated on the seashore near the mouth of the mangrove estuary (Fig. 1.1).

On the first day, interviews were held only for about four hours with a group of eight fishers. The fishes in the mangrove waters in different seasons and localities, changes in species composition, and causes for such changes were discussed. On return to the village by boat, the village leaders and a few elders joined the RRA team. The team used this opportunity to clarify some doubts and collect supplementary information.

On the second day, the team transected the mangrove waters with two active fishermen for about four hours and reached the Chinnavaikal settlement for further discussion. Many fishers on the shore were at that time sewing nets or repairing boats; team members discussed with the fishers the crafts and gears and resources harvested. Some fishermen demonstrated net operations. A group discussion was later held in a temple; traditional management issues and practices and the perceptions of villagers about the mangrove ecosystem were discussed.

Another full day was spent with fishers of T.S. Pettai village on a boat transecting in the mangrove waters. The southern part of the mangrove forest and associated water bodies were covered. In the evening, the RRA team visited the Pillumedu fishing hamlet located on the seashore opposite to T.S. Pettai, and held a group discussion.

A full day was also spent with the *Irulars* (non-traditional fishers) of MGR Nagar in the mangrove waters. The transect started from the boat landing centre located at Killai Fishers' Colony and travelled through Neduodai, the deepest canal found in the Pichavaram mangroves up to Palayar, near the mouth of the Coleroon River. The *Irular* fishers in the boat were fishing crabs. The team discussed with them their lifestyle, when *Irulars* started fishing and why, fishing methods, problems faced by these fishers etc. The next day, the team accompanied two cast net fishers to the mangrove waters close to the settlement, and observed operations. The species caught, the availability of fish, the locations and the catch quantities were noted down.

#### 1.4.2 RRA on forestry resources

The RRA on forestry resources was conducted by the study team in both fishing and farming hamlets. During the RRA, data was collected on the livestock population, its management system, grazing in the mangroves, sources of firewood, and collection of firewood from the mangroves. In addition, problems relating to the above activities and the perceptions of villagers relating to their main occupation were also discussed.

Both men and women, about 15 in all, took part in the RRA. A group discussion was held, also detailed interviews with key individuals. No village transect walk was resorted to for data collection, as was done for fishery resources. In almost all hamlets, traditional leaders and elected Panchayat members helped organise group discussions, and facilitated interviews. Traditional cattle grazers were interviewed in Killai and Radhavilagam in harvested paddy fields. This was done in the evening after the cattle had been driven back into pens. Information was obtained about cattle management during different seasons.

#### *Key informants from fishing hamlets:*

Mr. K. Mahalingam	–	MGR Thittu
Mr. K. Kuttiyandiswamy		
Mr. C. Sigamani	–	Muzhukkuthurai
Mr. G. Selvaraj		
Mr. G. Gopal		
Mr. A. Ilamaran	–	Killai Fishers' Colony
Mr. N. Vaidhyanatha swamy		
Mr. N. Sivagnanam	–	Mudasaloodai
Mr. K. Palaniswamy		
Mr. M. Muthu		
Mr. D. Kaliyamurthy	–	Ponnanthittu
Mr. Sethumanickam		
Mr. S. Govindan	–	T.S.Pettai
Mr. G. Natarajan		

#### *Key informants from farming hamlets:*

Mr. K. Subramaniam	–	Thaaikkal
Ms. N. Seeni Vasaki		
Mr. G.M. Usman		
Mr. T. Ramakrishnan	–	Kuchipalayam
Mr. M. Shanmugam		
Mr. K. Kumar	–	C.Manambadi
Mr. S. Kalyan	–	Singarakuppam
Mr. V. Thilagam		
Mr. R. Vairakkannu	–	Therku Pichavaram
Mr. K. Kuppusamy		
Mr. M. Kaliyamurthy		
Mr. G. Selvaganapathy	–	Manalmedu

## 1.5 Review of literature

Only a few publications – popular, academic or scientific – are available about fishery resources and fishing in the backwaters of the Pichavaram mangroves. The following are some of the important publications consulted during this study.

a) *Small-scale fishery of Pichavaram mangrove swamp* by Chandrasekaran and Natarajan (1992)

b) *A report on pen culture in the backwaters of Killai, Tamil Nadu* published by the FAO's Bay of Bengal Programme, Chennai, India (1985)

c) *Fishes of Pichavaram waters, Pichavaram mangroves as nurseries of fishes and aquaculture potential of the mangrove backwaters* by Krishnamurthy and Prince Jayaseelan (1981)

## 1.6 Discussion with field staff of Fisheries Department, Tamil Nadu

The State's Fisheries Department has two field officers near the Pichavaram mangrove wetland, at Chidambaram and Porto Novo, just five km north of Pichavaram. Inspectors of Fisheries at both places said they have no data on fishery resources and fishing activities in the Pichavaram mangroves since their job is only to disburse socio-economic loans. However, they advised the project team to meet the Research Assistant of the Fisheries Department stationed at Porto Novo. But the team could not meet him even after several attempts.



*Fisherman discusses fishing nets, operations and catches with Dr. V. Selvam, leader of the study team.*



## 2.0 Mangrove Resources



Fishery resources tapped from the Pichavaram mangrove wetland support the livelihood of hundreds of fishers.

The renewable natural resources available in the Pichavaram mangrove wetlands can be divided into i) fishery resources and ii) forestry resources. The forestry resources can be further divided into i) resources associated with the mangrove forest and ii) resources associated with sand dunes and other dry lands found within the administrative forest boundary.

### 2.1 Fishery resources

The Pichavaram mangrove wetland has vast areas of open but shallow brackishwater bodies and a number of tidal creeks and canals. According to the local people, at one time there were some 3,000 creeks in the mangrove wetland; siltation has reduced this number to barely 100 or 150. The average depth of the open water associated with mangrove forest varies from 0.8 m during summer to about 1.5 m during the peak monsoon season.

The Pichavaram mangrove receives freshwater from the Uppanar River, a irrigation canal originating from Veeranam Lake and Coleroon River, which is one of the major distributories of the Cauvery riverine system. Seawater flows in and drains out of the mangrove ecosystem through a mouth close to the Chinnavaikal hamlet, and also from Coleroon estuary through the backwater system. Water salinity varies from about 8 ppt during the post-monsoon period to 36 ppt (parts/1,000 or gm/litre) during summer.

During the peak monsoon season, the freshwater condition prevails in the mangrove for about a month. The water bodies of the Pichavaram mangrove wetland receive about 8 tons/ha/year of plant detritus from the mangrove forest (Chandrasekaran and Natarajan, 1992). These detritus (decayed particles of the plant material, microscopic in size) form the basis for the food web. Most fishery resources, especially prawns, depend on the amount of detritus reaching the mangrove water. Finfish and shellfish (prawns and crabs)

#### Common species of finfish, prawns and crabs in Pichavaram mangrove wetland

Common species of finfish, prawns and crabs in Pichavaram mangrove wetland		
<i>Finfish</i>		
Local name	Common name	Scientific name
Madava	Mullet	<i>Mugil cephalus</i>
Kendai	Mullet	<i>Liza dussumeri</i>
Kendai	Mullet	<i>Liza macrolepis</i>
Motta kendai	Mullet	<i>Liza tade</i>
Vishakedutha	Catfish	<i>Tachysurus thassinus</i>
Vishakedutha	Catfish	<i>Tachysurus arius</i>
Panni (kalava)	Reef cod	<i>Epinephelus malabaricus</i>
Keluthi	Catfish	<i>Mystus gulio</i>
Kural/kodava	Seabass	<i>Lates calcarifer</i>
Setha kutty	Pearl spot	<i>Etroplus suratensis</i>
Selanthan	–	<i>Ambassis sp</i>
Sankarah	Threadfin bream	<i>Nemipterus sp</i>
Kilangan	Silver sillago	<i>Sillago sihama</i>
<i>Prawns</i>		
Vella ral	White prawn	<i>Peneaus indicus</i>
Karunvandu ral	Tiger prawn	<i>Peneaus monodon</i>
Vellicha ral	Brown shrimp	<i>Metapeneaus monoceras</i>
Chemaka ral	Brown shrimp	<i>Metapeneaus sp</i>
Vazumphu ral	Flower prawn	<i>Peneaus semisulcatus</i>
Mottu ral	Scampi (freshwater prawn)	<i>Macrobrachium sp</i>
<i>Crabs</i>		
Kal or Kali nandu	Mud crab or Mangrove crab	<i>Scylla serrata, Scylla oceanica</i>
Kadal nandu	Sea crab	<i>Portunus pelagicus</i>
Kadal nandu	Sea crab	<i>Protunus sanguinolantu</i>

form an important renewable aquatic resource for the local population.

### 2.1.1 Species composition

Although Krishnamurthy and Prince Jayaseelan (1981) recorded about 195 species of finfish in the Pichavaram mangroves, Chandrasekaran and Natarajan (1992) recorded only 22 species as the most common (see box).

In addition to these 22 species, prawns like *Metapeneaus affinis*, *Metapeneaus brevicornis* are also found in the mangrove water. Except the scampi, almost all other prawns are found throughout the year.

Among the three species of crabs, the mud crab is the most common, and available throughout the year. Local fishers said that the mud crab is the permanent inhabitant of mangrove waters, where it breeds and feeds.

### 2.1.2 Other aquatic resources

Apart from fish, prawns and crabs, oysters, locally known as *aazhi* (*Crossostrea madrasensis*) are also found in large beds, particularly near the mouth. This species is of an edible oyster, but the local people do not consume it. In addition, green mussels, *Perna viridis*, are found in small quantities in some localities and are consumed by the *Irulars*.

### 2.1.3 Catch per unit effort

Chandrasekaran and Natarajan (1992) conducted a study on the monthly variations in the total amount of fish, prawns and crabs harvested from the Pichavaram mangroves from April 1981 to March 1982. According to their estimate, a total quantity of 245 tons of fish, prawn and crab was harvested from the Pichavaram mangroves within a period

of one year, of which prawn alone contributed 208 tons (85%). The amount of fish and crab caught was 19.6 tons (8%) and 9.8 tons (4%) respectively. This clearly indicates that prawns are the most important source of livelihood for the local people. This is not surprising, since prawns are primarily detritivores (detritus eaters) and large quantities of detritus are annually imported into the mangrove waters from adjacent mangrove forest.

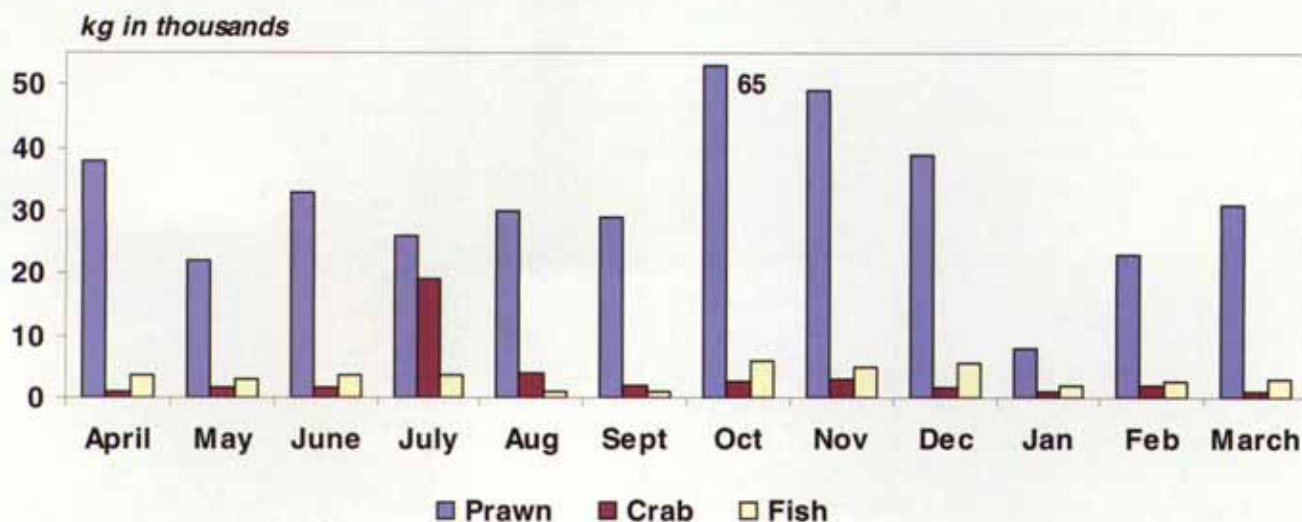
The above study also clearly indicates that among the prawns, brown shrimp (*Metapeneaus* spp.) are the most important species – since they alone contributed nearly 47% of the prawn harvested. Of the total fish catch, mullets accounted for nearly 50%.

### 2.1.4 Monthly variations in total catch

The monthly variations in the quantity of finfish, prawn and crab caught from the Pichavaram mangroves are shown in Fig. 1.2 (redrawn from Chandrasekaran and Natarajan, 1992, with the authors' permission). The figure indicates that the quantity of prawn caught from February to August was more or less similar, ranging from a maximum of 13,950 to a minimum of 9,480 kg/month. However, during the northeast monsoon (October-December), the catch was high. During October alone, the prawn catch was 68,460 kg.

As in the case of prawns, finfish too were available in large quantities only during the monsoon season, but the catch was comparatively low. The maximum and minimum amount of fish caught during 1981-82 was 2,510 and 250 kg/month respectively. The crab catch during the same year varied from 120 to 2,170 kg during the monsoon. All these clearly indicate that the period October to December

**Fig. 1.2 Monthly Variations in Quantity of Finfish, Prawns and Crabs Harvested in Pichavaram**



constitutes the peak season for fishing in the Pichavaram mangrove waters.

### 2.1.5 Perceptions of local fishers on fish and fishery resources

During the RRA, a wealth of information was collected from local fishers about species composition, seasonal availability of various species, quantitative variations in fish catch between seasons and over a period of time, the catch locations of fish, prawn and crab etc.

According to local fishermen, approximately 26 species of finfish, seven species of prawns and four species of crabs are important for subsistence and marketing (Table 1.1). Of the 25 species, it is only five species that have not showed any reduction in catch over a period. In all other cases, catch has gone down, compared to the amounts harvested 20 to 25 years ago (Fig. 1.3). According to them, the catch of *Koduva* (sea bass), which is highly priced, has gone down by 80% whereas the catch of fish like *Kendai* (mullet), *Katta kezhuthi* (cat fish), *Pileecha* and *Oora* has gone down by 50%. In the case of prawn, fishers said that 10 to 15 years ago, one or two boats full of prawn (weighing about 200 kg) were caught by a group of four or five fishermen. But today only 2 to 10 kg is harvested.

The fishers said that the following are the major causes for the decline in catches over a period.

#### i) Seasonal closure of the mouth of the estuary

Some 25 to 30 years ago, the mouth of the mangrove estuary remained open throughout the year. As a result, large quantities of tidal water along with adult fish and its juveniles and prawn juveniles moved into the mangroves along with the high tide. The large inflow of tidal water ensured high water depth – a factor that favoured growth of fish and prawn juveniles. But today, the mouth of the estuary is open only during the monsoon season (October to December), that too if the rainfall is high. Otherwise it's only partially open, even during the monsoon.

The fisherfolk said that currently the sand bar in the mouth region "grows" (*valarnthukonde poguthu*) constantly after the monsoon. Around the end of April or early May, it completely closes the mouth of the estuary, and it remains closed till October. Result: the water level in the mangroves falls, and the water temperature goes up sharply (*thanni soodu kodhuthu vidum*). The overall catch of fish and prawns goes down.

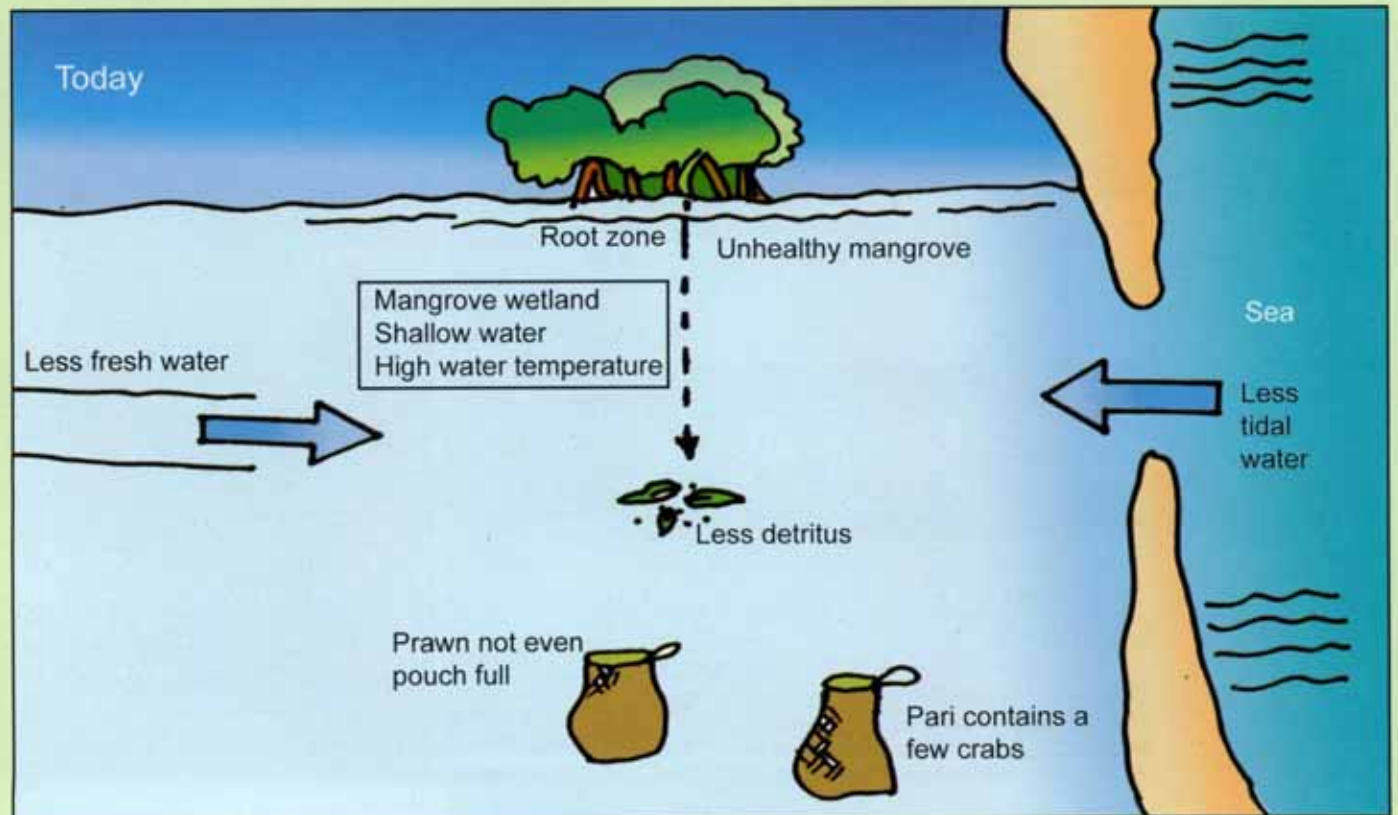
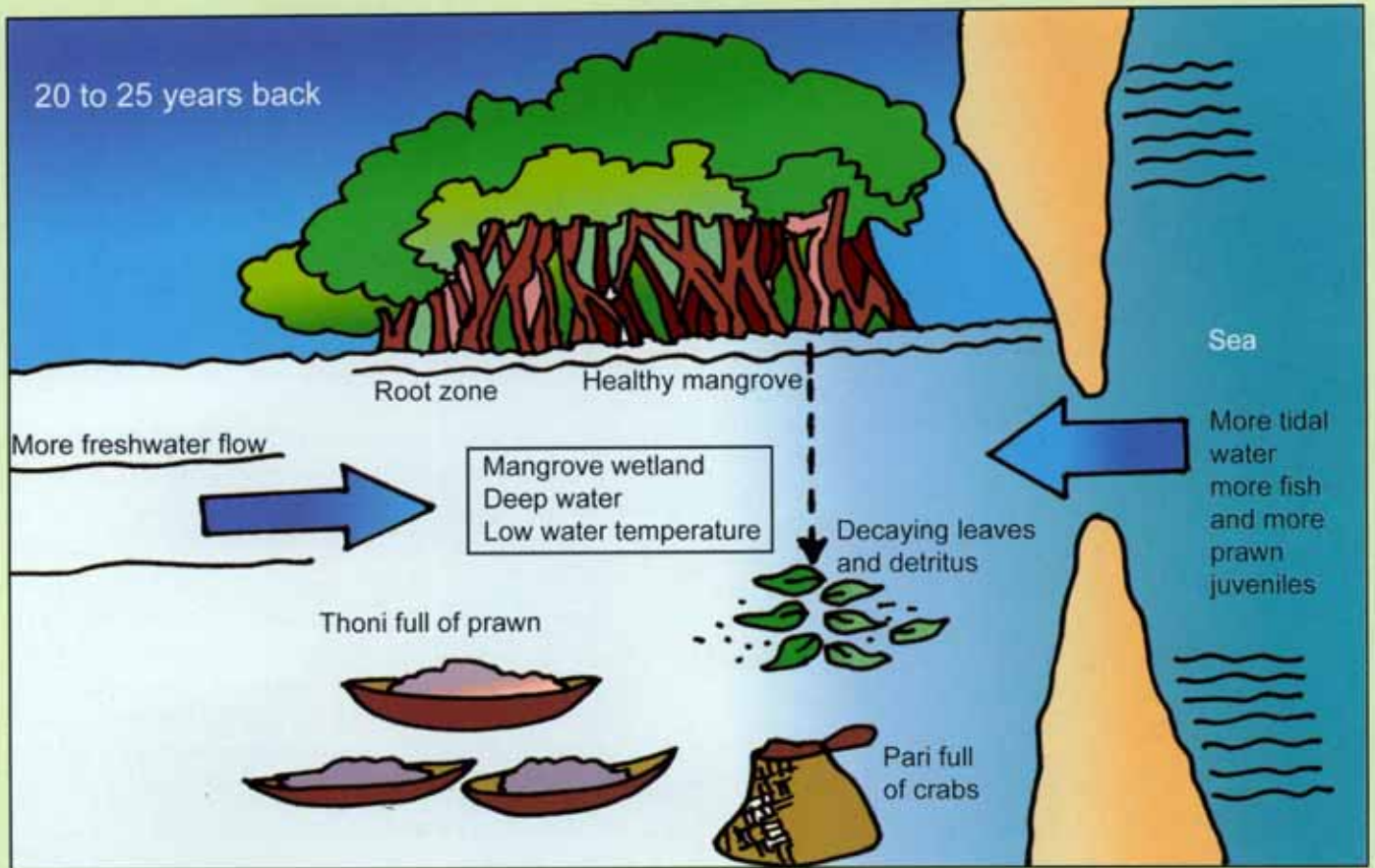
The fishers also said that in summer (particularly April-July), many highly priced marine fish migrate to the mangrove waters. Due to the closure of the mouth, these species are not at all available for capture, barring a small quantity that migrates from the Coleroon estuary into the mangroves via the backwaters.

The villagers explained diagrammatically to the RRA team the condition of the mouth during different seasons (Fig. 1.4).



Pichavaram fishers say the catches of most fish species have gone down, compared to catches about 25 years ago.

Fig. 1.3 Mangrove Wetland Resources – 25 Years Ago and Today – as Seen by Local Fishers





**Table 1.1 Local Fishers' Perceptions on Fishery Resources of Pichavaram Mangroves**

*Finfish*

No.	Species (Local name)	Seasonal variation in availability	Quantity	Location	Changes over the years in availability of species, and causes for changes
1	Madava (mullet)	Middle of November to middle of January	Abundant	In all areas of the mangrove wetland	During the monsoon season, species migrates from the sea into the mangroves; if the estuarine mouth is wider, more of this species will be found.
2	Kendai (mullet)	Throughout the year; high during summer	Medium	In all areas of the mangrove wetland	Species moves to forest areas during the monsoon. The catch has declined to half of what it was 10 years ago.
3	Koduva (seabass)	Throughout the year	Rare; at times medium	Around the roots of <i>Rhizophora</i> sp. Prefers to stay around mud bunds	Highly priced; today's catch is 80% less than what it was 15 years ago; the species requires deep water. More easily available in Coleroon estuary.
4	Kalava (panni)	Throughout the year	Rare; at times medium	In turbid areas, moves very close to the floor	No decline
5	Sankara	Throughout the year	Always medium	Around the roots of larger mangrove trees	A little decline in the recent past
6	Paranda	Throughout the year. Peak season is mid-April to mid-June	High during the peak season; medium in all other seasons	All areas in mangrove waters, but prefers deep waters	Migration from the sea to mangrove has reduced considerably; but the species is still available in large quantities in the Coleroon estuary (deep water)
7	Vishakezhuthi (kedutha) (cat fish)	Mid-March to mid-June	High during the peak season; medium in all other seasons	Found in mud burrows as well as in areas where seaweeds are abundant	Quantity has reduced drastically in the last 10 years due to increase in water temperature, which in turn is due to shallowness and limited flow of tidal water
8	Kezhuthi (Cat fish)	Throughout the year	High	Found everywhere, but prefers to stay close to seaweeds	Species has low economic value, the catch is now 30% of what it was about 20 years ago
9	Katta kezhuthi	Throughout the year	Medium	sandy soil	Catch has fallen by half during the past five years
10	Pileecha	Throughout the year; peak period from mid-May to mid-September	Medium	The species always moves towards clear water	The catch has halved during the past 10 years; during <i>Kachchan</i> , a large quantity moves into the backwaters.
11.	Setha Kutty (Pearl spot)	Throughout the year; peak period from mid-March to mid-June	High during the peak season; medium in all other seasons	Abundant around the roots of mangrove trees, seaweeds and oyster beds	At one time, a school of this fish could be seen covering an area of about an acre. During the last 10 years no such school has been noticed, because of high water temperature
12	Oora	Mid-March to mid-June	High during the peak season	Around the roots of <i>Rhizophora</i>	The catch has halved during the past 10 years
13	Kilangan	Throughout the year; peak period from mid-March to mid-April	High during the season; rare at all other times	Abundant where the soil is sandy. Moves up to water surface during ' <i>Konda kathu</i> ' season to capture prey	Ten years ago, 10 to 15 kg of fish was easily caught; today catch is limited to one or two kg, because of increase in water temperature, shallow water and narrow estuarine mouth
14	Ootan	Throughout the year	Medium	Around the oyster beds	No decline
15	Udupathi	Throughout the year; peak season during summer	Medium during the season; rare at other times	Abundant close to the shore where the soil is sandy	No decline in quantity, but today's catch has less economic value than it did some years ago

No.	Species (Local name)	Seasonal variation in availability	Quantity	Location	Changes over the years in availability of species, and causes for changes
16	Selanthan	Throughout the year	Rare; just one or two	This species prefers shady areas	Catch has reduced to 25% during the past five years
17	Kuliri (marine eel)	Throughout the year; peak period from mid-April to mid-June	Rare; just one or two	Found in muddy areas, deep water	Catch has fallen to 30% of what it was about 15 years back
18	Cheetta kavala	Mid-April to mid-August	Medium	Found in deep sandy soil, close to the sea	Catch has fallen to 30%, the decline started 10 years back
19	Ullam	Mid-April to mid-August	Rare	All areas	Catch has fallen to 25% of what it was many years ago; decline has been drastic during the past five years
20	Mutlees	Throughout the year; peak period from mid-April to mid-August	Medium	Everywhere	No decline
21	Narikendai	Throughout the year; peak period from mid-April to mid-May	High during the peak period	Around oyster beds	No decline
22	Kaala	Throughout the year; peak period from mid-April to mid-May	Medium during the peak season; just one or two at other times	Deep water	This species migrates into the mangroves during summer. About 20 years ago, huge quantities used to be harvested. Now the catch is poor. Reason: increase in water temperature and narrow mouth.
23	Sena	Throughout the year	Medium	Mud burrows	Catch has fallen to 50% of what it was many years ago. Has more medicinal than food value. Used as a bait
24	Uluva meen	–	No more available in the mangroves	–	Once seen in abundance around the root zone of <i>Acanthus ilicifolius</i> , the fish can't be seen today since the population of <i>A. ilicifolius</i> has fallen drastically
25	Aathu kathalai	From April to May	Very rare; just one or two	Deep waters	Was abundant about 10 years ago; because of increased water temperature, very rare today
26	Keechan	Throughout the year	Very rare; just one or two	Everywhere in the backwaters	No decline, but the species has poor economic value

**Prawns**

No.	Species	Seasonal variation in availability	Quantity	Location	Changes over the years in availability of species, and causes for changes
1	Karuvandu ral (tiger prawn)	Throughout the year	8 to 10 kg during the monsoon season	Everywhere	In general, the quantity of prawns has been gradually decreasing. At one time, one or two boats full of prawns used to be harvested. Now no one catches such huge quantities. It is weighed only in kilograms. Decline in catch started about 10 years ago.
2	Vella ral (white prawn)	Throughout the year	2 to 5 kg during the monsoon season	Everywhere	
3	Vellicha ral (brown shrimp)	Peak season from mid-October to mid-December	Abundant (20 kg)	Everywhere	
4	Chemakka ral (brown shrimp)	Peak season from mid-October to mid-December	2 to 3 kg during the peak season	Everywhere	
5	Paasi ral	From mid-April to mid-July	4 to 6 kg	Around seaweeds	
6	Mottu ral (scampi)	Only during November	A small quantity	Around the bushes of <i>Acanthus ilicifolius</i>	Freshwater availability will improve catch
7	Chennakunni	–	–	–	No more available in the mangroves

**Crabs**

No.	Species	Seasonal variation in availability	Quantity	Location	Changes over the years in availability of species, and causes for changes
1	Kal nandu (mud crab)	Throughout the year	5 to 10	In deep waters and also among oyster beds	At one time about 40 to 50 were caught per haul. Now the catch is much lower. Higher quantities are available near Pazhaiyar
2	Seevali nandu	From mid-December to mid-August		Everywhere	Available in large numbers in Pazhaiyar
3	Vher nandu	Throughout the year		Everywhere	No decline
4	Thillai nandu	Throughout the year		Land areas, lives in burrows	No decline in catch. Little food value, but some medicinal value

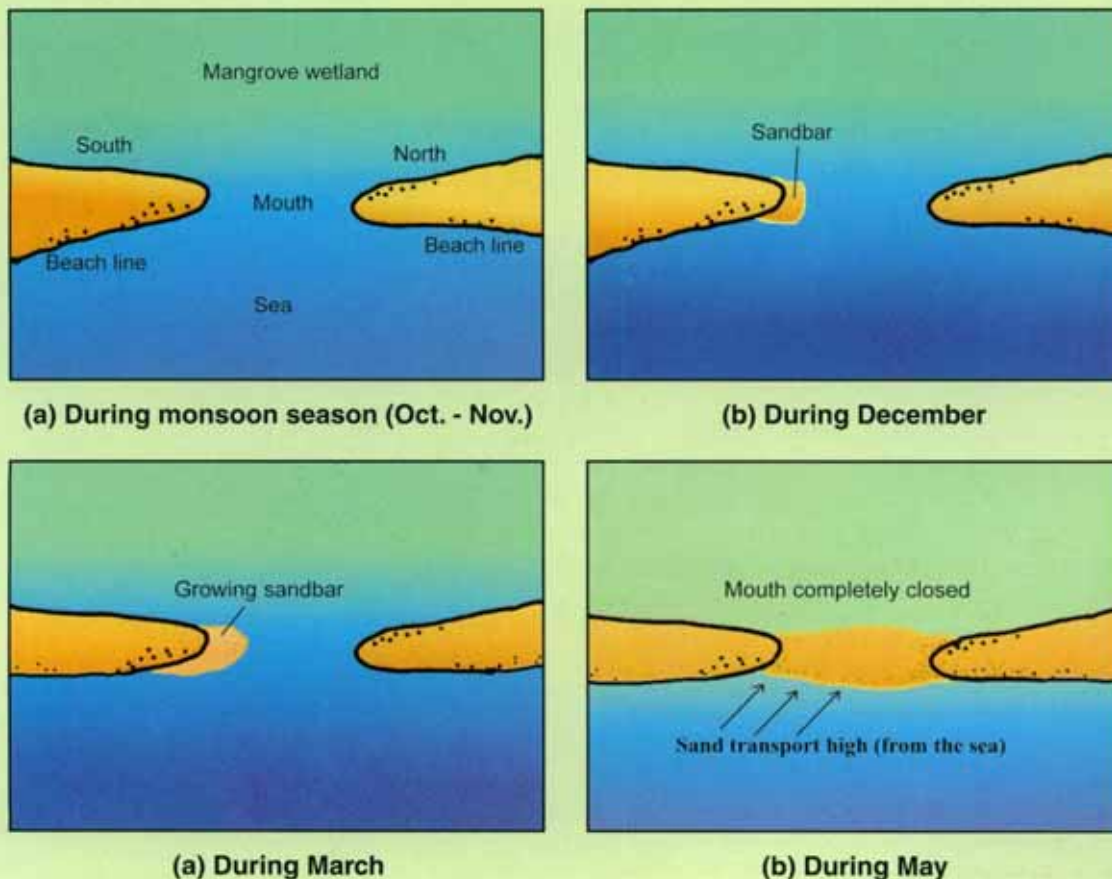
When the RRA team tried to assess the causes for the closure of the mouth, the fishers said that the sand bar grows very fast only when a wind, known locally as *kachchan kaththu* – which blows from the sea to the shore – sets in. They said that during this time, the waves are very forceful and deposit a huge quantity of sand on the shore when they break.

**ii) Reduced inflow of freshwater**

The fishermen said that an inflow of large quantities of fresh water is required to keep the mouth of the estuary open. If the fresh water flow is heavy, it will force the sand back into the sea (*uthaithu thalli vidum*). They also said that the

width of the mouth open during the monsoon season depends on the amount of fresh water inflow into the sea. During October 1996, they said, the mouth opened very wide because of torrential rain in the surrounding area. By comparison, the mouth opening during the 1997 monsoon was narrow because of the low rainfall. The data available with the Public Works Department, Government of Tamil Nadu, clearly shows that the amount of water discharged from the Lower Anicut into the Coleroon River, which supplies freshwater to the mangrove wetland through a backwater canal, has gone down drastically in recent years.

**Fig. 1.4 Status of Estuarine Mouth During Different Seasons – as Observed by Local Fishers**





*Reduction in mangrove forest cover is mainly responsible for reduced fish and prawn catch, according to fishers.*

### iii) Reduction in the forest cover

The RRA team tried to understand from fishers the relationship between the mangrove forest and fish catch in mangrove-associated waters. During this discussion, five out of seven fishers asserted that it is the reduction in the mangrove forest cover that is mainly responsible for reduced prawn catch, since prawn breeds (*puzuthu pogum*) only in decaying mangrove leaves. They said that if a bunch of decaying mangrove leaves is taken out of water, one can see thousands and thousands of young prawns clinging to it. They said that from 1910 to 1970, mangrove forest trees were cut in large numbers by contractors, since the government allowed it. Prawn catch has started declining ever since. Some of the village elders said that healthy mangrove forests with tall and huge trees were systematically felled in "coupes" identified by government agencies. This practice continued till the early 1970s.

During this conversation, one of the RRA members explained that prawn breeds only in the open sea. Young ones which cannot be seen by the naked eye, migrate to the mangroves where they feed on decaying mangrove leaves and grow into juveniles. He also explained that when it is ready for breeding, it would migrate back to the sea. Sensing the fishers' skepticism, the RRA member promised to show them a booklet that explains the life cycle of prawns. A copy of a small pictorial booklet on prawns published by the FAO's Chennai-based Bay of Bengal Programme was given to them the next day.

### iv) Increased mechanised fishing along the shore

Some fishers said that during the last five years, the number of mechanised boats fishing in the inshore waters near the Pichavaram mangroves has gone up tremendously.

This might be one reason for the reduction in fish and prawn catch – since these boats prevent the movement of fish from the deep sea to the shoreline and from shoreline to the mangroves.

The perceptions of local fishers about fish and fishery resources in the mangrove wetlands are detailed in Table 1.1. Figure 1.3 illustrates the condition of the mangroves and the mangrove fishery some 20 to 25 years ago and the condition today. The RRA team drew the figure on the basis of these perceptions; it was later shown to the local fishers.

## 2.2 Forestry resources

### 2.2.1 Timber and Non-Timber Forest Produce (NTFP)

No timber and NTFP are available in the Pichavaram mangrove wetlands. The local people said that at one time, the wood of a tree called *maramamaram* (*Sonneratia apetala*) was used as timber. However, this tree has become very rare.

### 2.2.2 Medicinal plants

No medicinal plant species are available in the Pichavaram mangrove wetlands.

### 2.2.3 Fodder and firewood

*Avicennia marina* (*ven kandal*) is considered one the best fodder trees and has been used from time immemorial. The authorities at one time allowed grazing in the mangrove wetlands. But now, both collection of fodder and grazing in the mangrove wetlands have been banned. Likewise, *Avicennia* spp is regarded as good firewood by the local people; but collection of firewood from the mangroves has also been declared illegal.

## 3.0 Mangrove Resource Utilisation Pattern

### 3.1 Mangrove user hamlets, communities and population

Seventeen hamlets belonging to four revenue villages – Killai, Pichavaram, Thandavarayan Sozhagan Pettai (T.S. Pettai) and Thillaividangan – utilise the resources of the Pichavaram mangrove wetlands. Among the 17 hamlets, nine depend mainly on fishing, eight others mainly on farming. There are about 4,400 households in these hamlets, and their total population is about 16,600. The box below details the household and population break-up in each hamlet.

#### 3.1.1 Fishing community

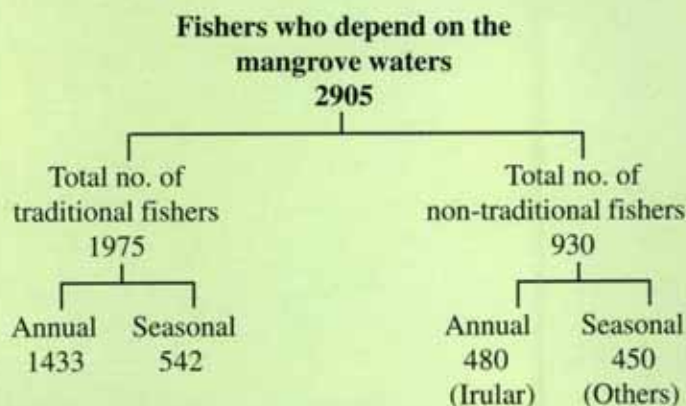
Some 2,905 fishers depend on the mangrove wetlands for their livelihood (box on next page). Of these, 1,975 (68%) are traditional fishers (belonging to the *Periapattinavar* community) the remaining 930 (32%) belong to the non-traditional fishing community. Among the traditional and non-traditional fishing communities, two groups could be identified

- i. fishers who fish in the mangrove waters throughout the year

- ii. fishers who fish in the mangrove waters only during the monsoon (peak) season

Of the non traditional fishing community, *Irulars* constitute 480, the others are landless wage labourers from the Vanniyar community (most backward class) and the Scheduled Castes.

The populations of all groups are detailed below:



### Mangrove User Hamlets, Households and Population around Pichavaram Mangrove Wetlands

Killai		Pichavaram		T.S. Pettai		Thillaividangan	
Fishing hamlets	Farming hamlets	Farming hamlets		Fishing hamlets		Farming hamlets	
Meenavar colony H-241; P-1439	Thirunalthoppu H-370; P-976	Vadaku Pichavaram H-196; P-976		T.S. Pettai H-225; P-1124		Keezhachavadi H-194; P-934	
MGR Nagar H-150; P-494	Thaikkal H-265; P-945	Therku Pichavaram H-331; P-2004		<b>TH-225; TP-1124</b>		<b>TH-194; TP-934</b>	
Muzhukkuthurai H-114; P-539	Kuchchipalayam H-133; P-550	<b>TH-527; TP-2980</b>					
Mudalsalodai H-1500; P-3000	Singarakupam H-173; P-920						
Chinnavaikkal H-45; P-200	Ponnanthittu H-306; P-1747						
Kannagi Nagar H-10; P-50	<b>TH-1247; TP-5138</b>						
Pillumedu H-40; P-150							
MGR Thittu H-109; P-561							
<b>TH-2209; TP-6433</b>							

**Total household in all the hamlets – 4,402**  
**Total population in all the hamlets – 16,609**  
**H – Household; P – Population;**  
**TH – Total Households; TP – Total Population**

## Fishing Population of Hamlets Dependent on Pichavaram Mangrove Wetlands

Traditional fishing community									
Meenavar Colony	Muzhukkuthurai	Chinnavaikkal	Kannagi Nagar	Pillumedu	MGR Thittu	T.S. Pettai	Total		
Annual 750	Annual 280	Annual 15	Annual Nil	Annual 8	Annual 60	Annual 320	Annual 1433	Seasonal Nil	Seasonal 542
Seasonal Nil	Seasonal Nil	Seasonal 98	Seasonal 19	Seasonal 35	Seasonal 360	Seasonal 30	Seasonal 542	Seasonal Nil	Seasonal Nil
Non-traditional community									
Kalaingar Nagar	MGR Nagar	Thaikkal 1	Singarakupam	C.Manampadi	Keezhachavadi	T.S.Petti	Pichavaram	Total	
Annual 30	Annual 250	Annual Nil	Annual 105	Annual Nil	Annual Nil	Annual 0	Annual 95	Annual 480	Annual 480
Seasonal Nil	Seasonal Nil	Seasonal 95	Seasonal 150	Seasonal 75	Seasonal 45	Seasonal 30	Seasonal 55	Seasonal 450	Seasonal 450

### 3.1.2 Farming Community

Traditionally, the farming community depends on land and cattle, the major resources in any rural area, for subsistence and income generation. Cattle are essential for land preparation and manuring. In addition, cattle are considered a "fixed deposit" that can be cashed at critical times. They are allowed to graze in the mangroves during the agricultural season. Once paddy and other crops are harvested, the cattle are brought out of the mangroves to graze in large herds in cultivable lands and penned in the same fields at night for manuring.

During the monsoon, cattle from all the eight farming hamlets are let into the Pichavaram mangroves for grazing. Details of cattle grazing and management systems are found in Section 3.3 on "Utilisation patterns and practices: forestry resources" (page 35). As for utilization of mangrove wood as firewood, a few landless families do so for sale in the local market. Otherwise, only twigs and dead trees from the mangrove forests are collected as firewood by a small number of families from seashore hamlets.

### 3.2 Utilisation patterns and practices: Fishery resources

#### 3.2.1 Traditional fishing community

Traditional fishers have been fishing in the water bodies associated with the mangrove wetlands since time

immemorial, both for subsistence and marketing. Traditional fishing is still a family enterprise. All adults in the family take part in fishing. They have also developed a traditional management system, which ensures sustainability of fishery resources and an equitable share of available fish catch. Besides traditional fishers, the *Irulars* (who are non-traditional fishers) also fish intensively in the mangrove waters. The *Irulars* started intensive fishing only recently; before that, they were hunters and gatherers. The fishing methods of *Irulars* are different from those of traditional fishers.

#### 3.2.2 Fishing methods of traditional fishers

Traditional fishermen harvest the fishery resources of the Pichavaram mangroves using various crafts and gears. None of these fishing methods affect the health of the mangrove ecosystem.

##### *Fishing crafts and gears*

*Crafts:* The main fishing craft used in the Pichavaram mangrove waters is a small boat, the *thoni* (canoe). There are three types of canoes, depending on length and breadth. Local fishers say that at one time these boats were bought from Kerala, but since such boats are no longer made there, it's difficult to acquire new *thonis*. The price of these boats varies with the size and quality of the wood. Some time

ago, the *thonis* were made with inexpensive Eucalyptus wood, but hardly lasted a year or two. A few *Irular* fishers fish in the backwaters with *kattumarams* (catamarans).

Fishermen who do not own a boat sometimes fish with a borrowed boat; this is a common practice. No fee or rent is charged for this boat. However, if the boat suffers damage, it has to be set right or paid for. Usually, carpenters from the neighbouring town of Parangipettai (Porto Novo) are hired for boat repair. No borrowing or lending is done with nets. But everyone pitches in to help repair a neighbour's net when that's necessary.

**Gears:** The following types of gears are used commonly by traditional fishers for fishing in the mangrove waters (Table 1.2).

- i) cast net (*veechu valai*)
- ii) stake net (*oonu valai*)
- iii) drag net (*ko valai*)
- iv) gill net (*mithapu valai*)
- v) crab trap (*nandu kachcha*)

The size, structure, weight of the net and mesh size vary. Different mesh sizes are meant for catching different species of fish. Hook and line and scoop nets are also in use, but less frequently than the five gears listed above.

**Cast net (*Veechu valai*):** It is widely used in mangrove waters by traditional fishers (and sometimes by non-traditional fishers). There are three types of cast net, based on net size and operations. The first type is huge in size, about 7 kg in weight, and thrown into the water by a fisherman standing in his boat; the second type is relatively smaller (4 kg in weight) and operated by adults standing in the water; the third type of cast net is the smallest, normally handled by children. The net is thrown in such a way as to form a bell-like structure that plunges into the water. The yarn is normally of nylon. A chain of small cast-lead rings act as weights on the outer margin of the net. The catch normally consists of prawns and small fishes.

**Stake net (*Oonu valai*):** Stake nets are used only to fish prawns in traditionally demarcated areas. In these areas, four wooden poles are driven into the mud in a straight line across



*Cast nets (above) are used widely by traditional fishers in mangrove waters. Stake nets (below) are used to capture prawns in traditionally demarcated areas.*



*Gill nets (below) are used to capture mullet and catfish.*





Nandu kachcha, used by non-traditional fisherwomen, are effective in trapping crabs.

the middle portion of tidal creeks and canals. The net is operated during low tide when the prawn moves along the tidal water to the sea, and removed with catch just before high tide. The stake net is used only during the night. During community fishing (*Paadu*), a series of stake nets are tied across the waterways one after the other, leaving a narrow gap on either side of the net close to the canal banks for boats to move. The local fishers say that stake nets can trap a large number of prawns. Non-traditional fishers are not allowed to use a stake net.

An aged fisherman pointed out that before plastic floats, only the root of a mangrove tree called *maramamaram* (*Sonneratia apetala*) was used as a float. At one time, the population of this species was very high and huge trees were seen, but mostly in places where fresh water flows.

*Crab trap (Nandu kachcha)*: Each crab trap consists normally of 36 traps at intervals of about 2 m, tied together by a single long nylon rope. The trap is made of a circular ring, around which a coarse net is meshed. Preserved eel meat (*kuliri*) is fixed to the centre of the net as bait.

*Drag net (Kovalai)*: Drag nets are used mainly to catch prawns during low tide. They are operated only in shallow water. Each drag net is about 10 m in length, supported by five poles, and periodically dragged by its cod ends by two men for about 60 to 80 m till the deep portion emerges.

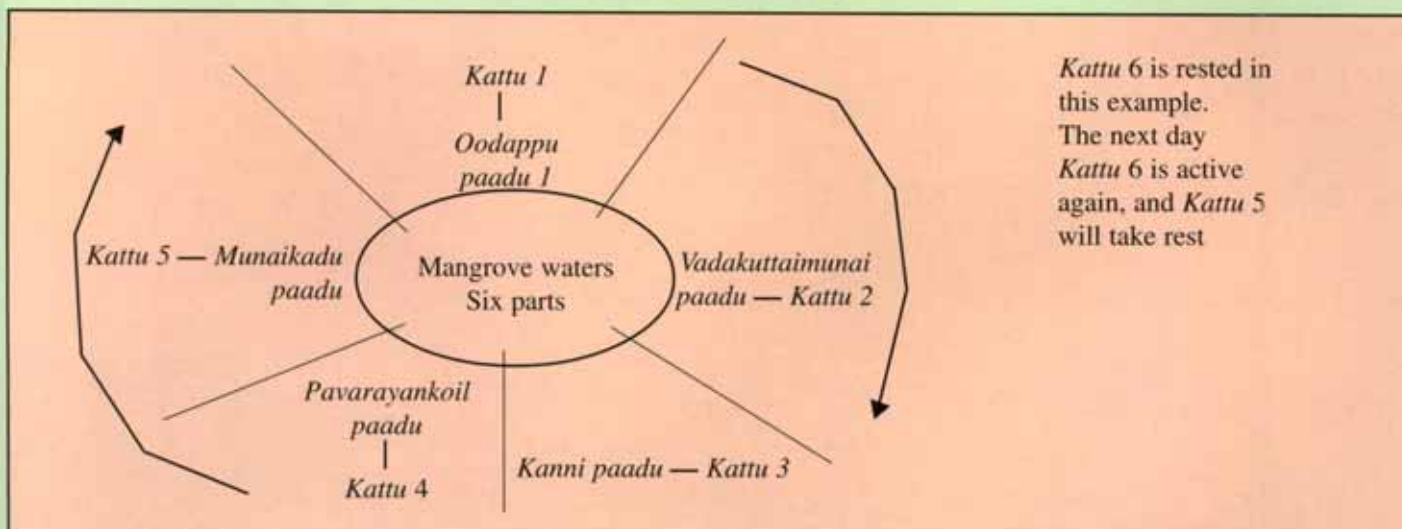
*Gill net (Mithapu valai)*: Gill nets of different mesh sizes are used in the Pichavaram mangrove waters mainly to catch mullet and catfish. Each gill net measures about 100 m in length and is suspended in the waters with float and sinkers. Gill nets are operated either from a boat or by standing in waist-deep water.

Table 1.2 Different Types of Nets Used by the Traditional Fishing Community in the Mangrove Waters

No	Type of net	Fish caught	Mesh size	Weight	Remarks
1.	<b>Cast net</b>				
	Peria valai	Prawn and fish	15 to 16 points	Net 5kg; lead -5kg	Used from the boat by well-built fishers
	Irangu valai	Prawn and fish	28 points	Net 2kg; lead -2kg	Used by standing in the water at waist height
	Iral valai	Prawn	28 points		Used by children to learn fishing
2.	<b>Gill net</b>				
	Poodu valai	Prawn	28 points	Weight varies	Used across the tidal canal
	Sala valai	Mullet and cat fish	50 points	Weight varies	Used across the tidal canal
	Kendai valai	Mullet (large size)	70 points	Weight varies	Used across the tidal canal after watching the fish movement
3.	<b>Drag net</b>				
	Izzuphu ko valai	Prawn and fish	15 to 20	Net 2kg; lead -4kg	Dragged along the floor; more catch during the night
	Nattu ko valai	Prawn and fish	15 to 20	Net 2kg; lead -4kg	
Salangai valai	Prawn and fish	15 to 20	Net 2kg; lead -4kg		
4.	<b>Stake net</b>				
	Oonu valai	Prawn	15 to 20	Net 2kg; lead -4kg	Used during the low tide across the canal, only at night; catch per unit effort very high



**Fig. 1.5 Community-based Traditional Fisheries Management System: An example of how a particular portion of the mangrove wetland is divided into different parts, and how the fishing community utilises the fishery resources by rotation.**



The traps are suspended serially in the water with floats and pulled out after two or three hours; the crabs trapped in are collected. Two persons deploy the traps from the boat – sometimes two traps are joined together and operated. Crab capture is usually undertaken as the tide rises, and ceases just when the low tide begins. Large-sized crabs are available near the root zone of mangrove trees and in the deep waters. Crab traps are also normally used by *Irular* fishers who are considered experts in crab fishing.

Table 1.2 shows different types of nets (cast, stake, drag and gill nets), the size and weight of each, the use of these nets and the types of species caught with different nets.

### 3.2.3 Traditional community-based fishery management

#### The Paadu system

A very flexible and dynamic traditional system of community fishing is practised by traditional fishers in Pichavaram mangroves (Fig. 1.5). The system ensures resource access to all and equal benefits to all households, and is a collective and co-operative effort that ensures sound fishery resource management. This community-based fishery resource management system is known locally as *Oonuvai kattu* (*oonu* – stake, *vai* – net, *kattu* – group).

Fishing intensity in the Pichavaram mangroves is related to the seasons. The traditional fishers refer to fishing during summer (mid-February to September) as *Kodainaal* (*kodai* – summer, *naal* – days). Summer is the lean fishing season, when catch per unit effort is low. There are no community – based restrictions on fishing during summer, and any fisherman can fish anywhere in the mangroves. Fishing during the northeast monsoon is referred to as

*Vadainaal* fishing. During this season, prawns are available in abundance; fishers are expected to adhere strictly to management procedures.

Every fishing village in Pichavaram has its own traditional system of management. In this system, an area of the Pichavaram mangrove water is allotted to a particular fishing village, which is further divided into smaller areas or zones known as *paadu*. Similarly, the fishing population of that village is divided into many groups, each of which is called a *kattu*.

Traditionally, members of a single group descend from the same ancestors. Each *kattu* goes to fish in a particular *paadu* on one day and moves on to the next *paadu* the following day. The cycle has a fixed direction; once a *kattu* exhausts all *paadus*, it returns to the first *paadu* after taking a day's rest. The cycle continues.

This system can be explained by the following example. The fishing population of the Killai village is divided into six groups (*kattus*): 1. *Mania kattu*, 2. *Karaiyorukki kattu*, 3. *Najathani kattu*, 4. *MGR thittu kattu*, 5. *Keelatheru kattu* and 6. *Nedungalvai kattu*.

The area of the mangrove water allotted to this Killai village is divided into five zones (*paadu*): 1. *Odappu paadu*, 2. *Vadakuttaimunai paadu*, 3. *Kanm paadu*, 4. *Pavarayan koil paadu* and 5. *Munaikaadu paadu*.

On the first day of a fishing season, *kattu 6* will be rested. The other five *kattus* will go for fishing in the five *paadus*. On the second day *kattu 5* will be rested, while *kattu 6* will go fishing in *paadu 1*.

In this way, on a given day, five *kattus* will engage in fishing on five *paadus* and one *kattu* will be rested. This practice



*Middlewomen give loans to traditional fishers; marketing of fish through them is not always mandatory.*

of rotation is strictly adhered to by all the *kattus*. The following schematic diagram shows the fishing *paadus* and *kattus* in a day of fishing for fishermen belonging to Killai village.

In each *paadu*, members of a *kattu* should fish together and the catch divided equally among the fishers. If an adolescent boy also participates, he gets three fourths of the adult share provided he carries a net. This system is followed to avoid overcrowding of prawn areas and avert over-exploitation. Second, this system ensures equitable sharing of the fishery resources of the mangrove waters.

Nowadays, the *kattu* is no longer restricted to descendants of a single ancestor. Entry into the *kattu* is not very difficult. To become a member of a group or a *kattu*, an aspirant has to buy a net and two poles and persuade the seniors of the group – through a drink and meal sponsored by him, an expenditure of approximately Rs.3,000. A member is suspended from the group if he misbehaves with other members or cheats on catch. The mischief-maker gets punished in the local Panchayat. If a member is ousted from a *kattu*, it is not easy to get admitted into some other *kattu*.

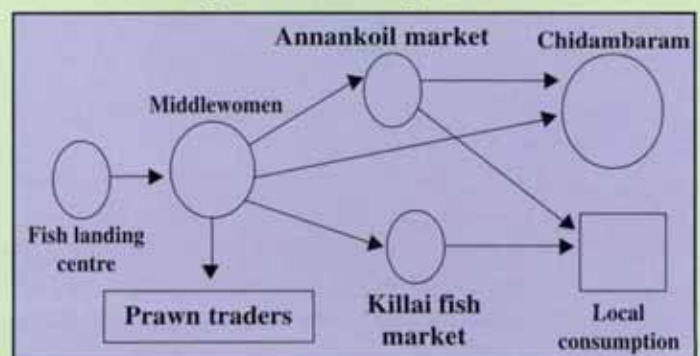
In this management system, if the speed of the water current declines and depth falls, that *paadu* is no more considered suitable for community fishing. It would be converted into a secondary *paadu*. It would get cancelled from the list in due course.

### 3.2.4 Fishing timings

People fish in the mangroves throughout the year, including monsoon days. Individual fishers or a husband-wife pair go fishing in the mangrove waters both day and night, but traditional community fishing (*Paadu*) is done only at night. The starting time for community fishing depends entirely on the tidal movement. 'Slack' water is considered the most appropriate time for both individual and community fishing. During this time, more fish enters the mangroves from the sea, and operating the crafts and gears is also easy.

Normally the fishing duration varies from six to eight hours but sometimes it gets reduced to three or four hours. The sharpness of the flood and ebb tide is directly linked to the

**Fig. 1.6 Marketing Channels**



waxing and waning of the lunar month; so is the quantity of fish entering the mouth of the estuary. The fishers have a rich knowledge of the timing of the flood and ebb tide, season by season.

### 3.2.5 Fish preservation

The fish catch is normally sold the next morning itself. To preserve the catch, small ice boxes are used. All households own such boxes, whose capacity ranges from 15 to 20 kg. A box lasts two years. On very rare occasions, if the catch exceeds the capacity of the box, the households use a small bamboo basket to store and preserve the fish. Ice is bought from the Killai fish market itself. A portion of the ice cut from a huge bar is offered for Rs.10. The other traditional method of preservation is to dry fish. In the past, almost all the catch was dried and sold in weekly markets. But nowadays it's very rare to find dried fish in the market.

### 3.2.6 Marketing (Fig. 1.6)

Women are mainly responsible for marketing fish catch in traditional fishing communities. Prawns are normally sold to big traders who buy them for export. Finfish catch on the other hand is marketed at two places – the Killai fish market and Annan koil, a place nearby. Normally, Annan koil is preferred for larger quantities. Fish traders-cum-middlemen fix the price; sellers attempt to increase it through bargaining; if the price is not suitable, the seller is free to approach some other buyer. If the price is very low, the women hire a van and carry the fish to the Chidambaram market. At Annan koil, the price is fixed through auction; merchants from Chidambaram and other places visit the market to buy the catch.

Taking a small loan from a middlewoman is a common practice among traditional fishers; selling the catch to the same middlewoman is fortunately not mandatory. The proximity of the market renders dried fish superfluous. But fisherfolk remember and recall the days not so long ago, when their fathers organised dried fish in large quantities and marketed them every week in Bhuvanagiri, Sethiathoppu and Mayiladuthurai.

### 3.2.7 Credit sources

For fishers, fish merchants from the same village are the main source of credit, middlemen from Porto Novo and



*Non-traditional fisherwomen make a living by "groping" for prawns (above) in the mangrove waters. A husband-wife team (below) resorts to another non-traditional fishing method, "bundling".*



Chidambaram are other major sources. Loans are taken mainly to buy or repair fishing craft or gear; loan amounts range from Rs. 2,000 to 10,000; the rate of interest varies from a minimum of 5% to a maximum of 10% per month.

### 3.2.8 Non-traditional fishing community

The *Irulars* tap the fishery resources of the Pichavaram mangroves. Historians tell us that the ancestors of the *Irulars* migrated from Andhra Pradesh and engaged mainly in rat hunting and gathering of paddy from rat burrows. Later, some of them served in the casuarina and coconut plantations of local farmers – almost functioning as bonded labour. They then gradually developed their own method of fishing – which they now use to harvest fishery resources of the Pichavaram mangrove wetlands.

### 3.2.9 Fishing methods of the *Irulars*

Most fishers from the *Irular* community suffer from very low incomes; they may be described as poverty-stricken. Few of them own any fishing craft or gear – which should be regarded as the basic economic asset of fishers. Their main fishing methods are groping for prawns, trenching (groping for prawns in narrow, shallow man-made trenches), and bunding.

“Groping” is the unique fishing method of the *Irular* community – almost the entire *Irular* population pursues this difficult and unconventional method of fishing. Only a few families who own a second-hand boat/catamaran and net practise the bunding method.

#### i) Groping for prawns

Both men and women capture prawns by “groping,” a method of fishing that aims at capture of prawns in shallow water during low tide when the water level is low.

Sitting on their knees in the mud in the shallow mangrove backwaters, they keep their head above the water level. Their teeth hold a small pouch made of palm leaves. The pouch has to be kept submerged in the water so that the catch isn't spoiled through exposure to the sun while the fishers grope for prawns. The catch is thus preserved in a very unconventional fashion till it is marketed.

How do the *Irular* fishers grope for prawn? They stretch their hands in the water at right angles to their body, bring them down to the floor, and slowly move their hands on the surface of the mud from the sides to the front. If they feel they have made contact with the prawn, they hold it tightly, bring it to the surface, wash it and deposit in the pouch between their teeth.

Repeating this action steadily, the fishers move forward till they are in the deep water. Thus sitting on their knees, they grope for prawns for five to six hours till the end of the low tide period (usually six hours), with a break in the middle. They cannot grope for prawn during the high tide because of the high water level then. Almost all *Irulars* living in MGR Nagar and surrounding areas apply the groping method to catch prawn. Children do the same in areas close to the shore.

#### ii) Groping in the trench

This method of prawn fishing is also practised in shallow mangrove waters during low tide. But only skilled *Irular* practitioners do it. They fix a pole into the mud, keeping the top of the pole out of water, and tie a *dhoti* (waist cloth) around the top. Starting from one side of the pole, they drag their feet around in the soft mud to make a small trench of rough circular shape. They repeat the exercise two or three times till a trench about 5 to 6 inches deep is formed. The exercise takes about 45 minutes to complete. Prawn in surrounding waters like to settle in the trench to rest and

feed. After a short while, the fishers catch the prawns by groping for them.

The groping method of prawn capture – both in the open waters and in the trench – causes various health problems. The *Irulars* complain of severe neck and back pain, numbness in hands and feet. Holding the pouch in between the teeth causes tooth decay. Women say they are the worst sufferers since after fishing for 5 to 6 hours every day, they come ashore and spend nearly 2 to 3 hours to collect firewood for cooking. Apart from this, both men and women suffer cuts in hands and feet due to sharp-edged oyster shells.

Unfortunately, fishers who suffer oyster shell cuts do not realize it until they come out of the water, and lose a lot of blood. To describe their suffering from such wounds, one of the *Irular* women said, “We are eating our own blood.” Another major occupational hazard from the groping method of fishing is stings by marine catfish. This is described as the “ultimate pain” which can last a whole month. There's no antidote for catfish sting poison; no known medicine can reduce the pain.

#### iii) Bunding method of fishing

This method of fishing is practised by the *Irulars* in the mangrove forest to catch both fish and prawns. In the past it was done for subsistence, now the catch is marketed and sold. In this method, mud embankments of about 30 to 40 cm height, covering an area of about two or three acres, are constructed within the mangrove forest around the tidal creek, normally 6 to 10 m inside from the edge. Small openings to the embankment are made at three or four places. The tidal water, along with fish and prawns, enters the embankment during the high tide. When the water begins to recede during the low tide, openings in the embankments are closed with a traditional (*Padal*) net or thin cloth, which allows only the water to pass through.

All the fish and prawns that entered the embankment are thus trapped and later handpicked. This method is normally practised during the late monsoon when the water level in the backwaters is high. During summer, when the water level is low, the method is not practised. The Forest Department feels that the bunding method affects mangrove forest growth by obstructing free flushing of mangrove forest.

The *Irulars* say they always sell their catch to traditional fisherwomen from whom they take an advance. These middlewomen take this opportunity to exploit the *Irulars* by paying them only half of the price for their catch. The middlewomen grab their pound of flesh (the catch) on the shore as soon as the *Irulars* emerge from the water. If the *Irulars* manage to catch large-size crabs, they take them to Chidambaram town without the knowledge of the middlewomen, and sell them there at a higher price.

The *Irular* fishers said during discussion that their catch per day is too meagre for any practical or profitable self-marketing effort.

### 3.3 Utilisation patterns and practices: Forestry resources

The local farming community that lives in eight hamlets around the Pichavaram mangrove wetlands rears livestock for various purposes such as milking, manuring, and ploughing as well as for pulling carts. Besides, cattle are a "fixed deposit," an important and reliable source of hard cash at critical times. Cattle growers utilise the mangrove forest mainly for livestock grazing. The user hamlets have some 6,460 heads of livestock, of which 45% (2,924) are cattle, 41% (2,653) are goats and 14% (879) are sheep. Figure 1.7 shows their distribution in the 8 hamlets.

#### 3.3.1 Cattle grazing

The villagers said during group interviews that they manage their livestock in the following way:

1. They keep milch and plough animals with them throughout the year. For about seven months (February to August), these animals graze in harvested agriculture fields. Family members take charge of grazing, or a person is hired for the purpose, depending on the number of cattle. During September, when the agriculture season starts, the livestock are either stall-fed or let to graze around paddy fields and common lands if any. In October, when the agriculture fields are flush with seedlings, the cattle are let into the mangroves every morning – to graze in the peripheral areas – and taken

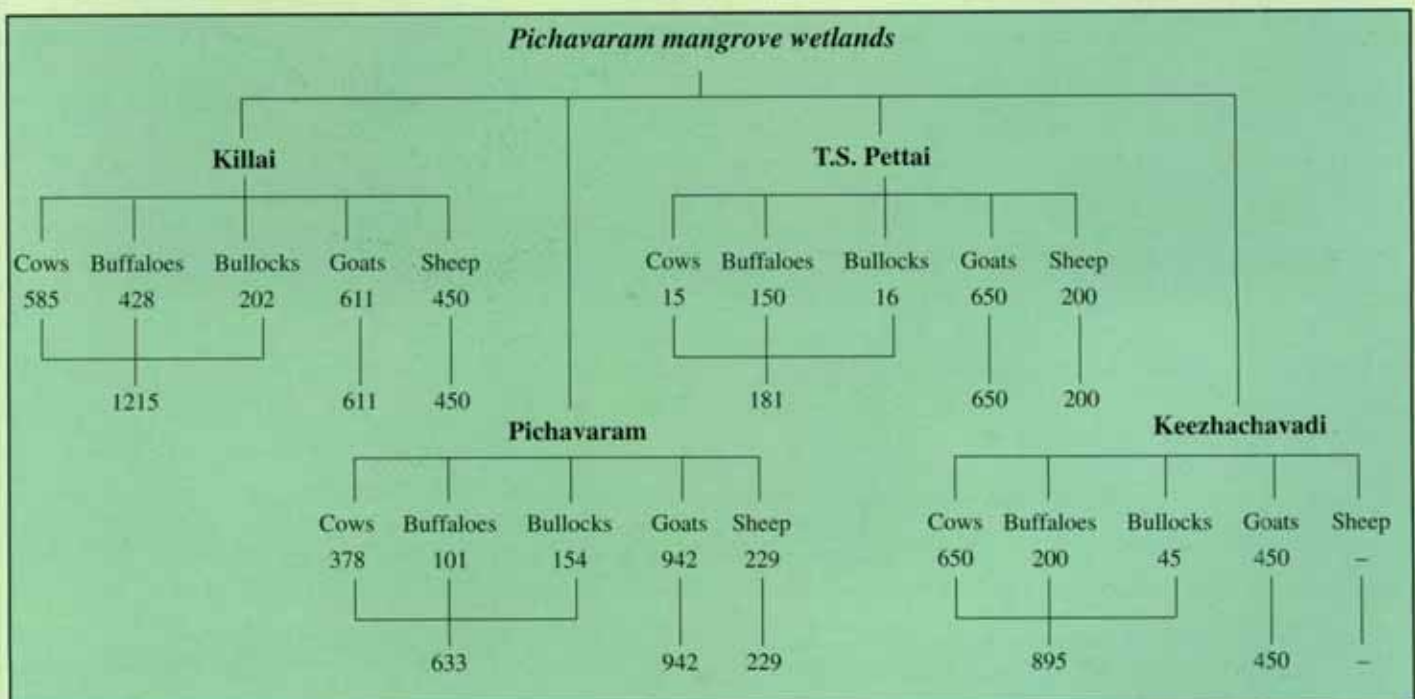


*Cattle grazing in the mangrove peripheral zone stunts the growth of mangrove plants.*

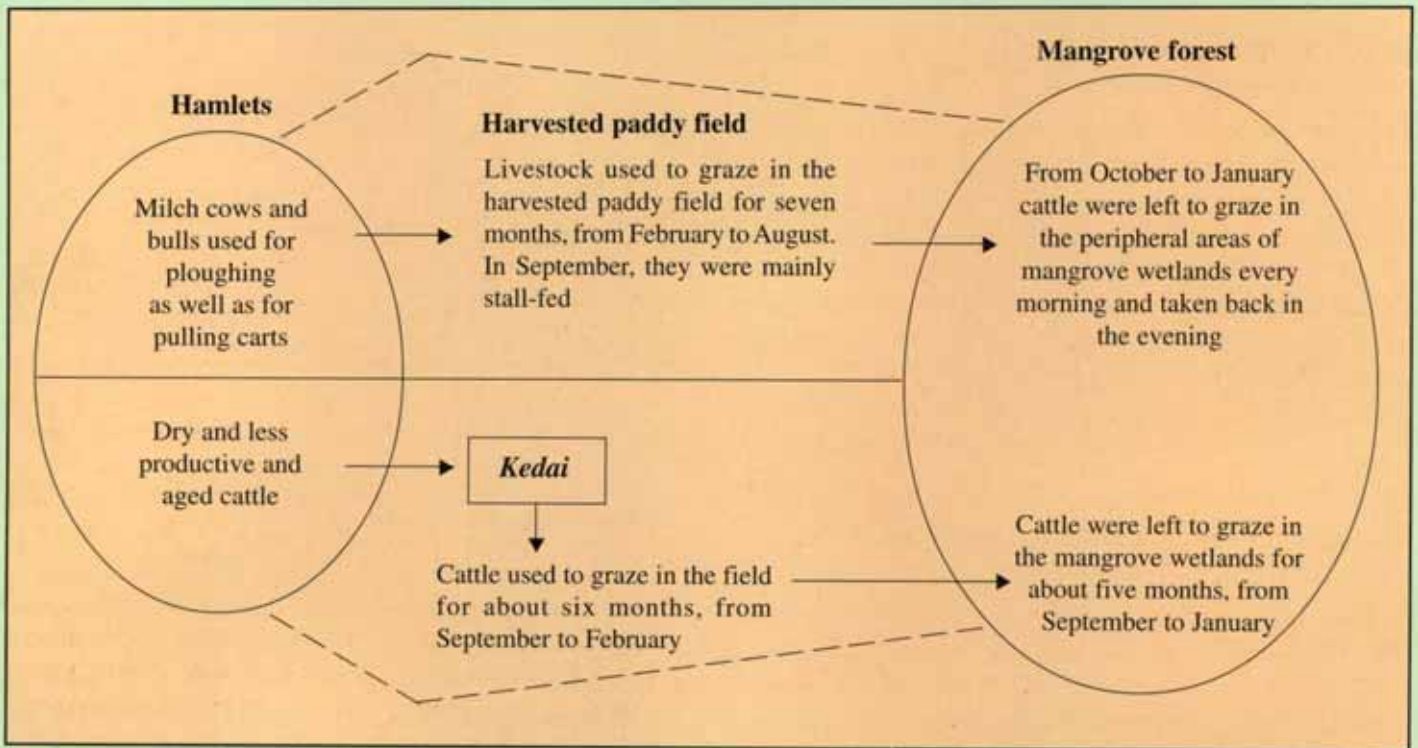
back in the evening. Daily grazing is continued till the following February.

2. Dry and less productive animals (*varattu maadu*) and aged ones are given to traditional cattle gatherers for grazing and maintenance. The animals graze in harvested fields from February to August; and in mangrove wetlands during the September-January agriculture season. While grazing in the mangroves, the cattle are left pretty much to themselves, except for occasional visits by cattle gatherers. The cattle reach the core area of the mangroves where they graze during the day, and move toward the seashore at night to rest. In February, they are picked up again by cattle gatherers and taken to the harvested paddy fields.

**Fig. 1.7 Population of Cattle, Goats and Sheep of Mangrove-Dependent Hamlets in Pichavaram**



**Fig. 1.8 Grazing System in Traditional Method of Cattle Management Followed in the Past in Mangrove User Hamlets**



This system of cattle management and grazing is explained diagrammatically in Fig. 1.8.

Interviews with these cattle gatherers led to the following points:

- Cattle gathering, locally termed *kedai kattuthal*, is an age-old practice for effective cattle management. It helps manure agriculture fields, avoids damage to agricultural crops, and provides incomes to the cattle-gathering families.
- The cattle are let into the mangroves only during the rainy season. Reason: During summer, the salt content of the water goes up, and the cattle will have no fresh water to drink.
- In the mangrove forest, what the cattle most relish are the leaves and fruits of *Avicennia marina*, which is found in large numbers in the forest.
- The dung left in the mangrove forest helps the trees grow better.
- Till 1982-83, the Forest Department followed a "token" system to permit cattle grazing in the mangroves.

*Grazing within the hamlet:* Livestock in all the hamlets are allowed to graze under the direct care of the cattle owner. To avoid any damage to agriculture plantations, the villagers had for a long time followed the *Patti* system under which every hamlet had a *Patti* (enclosed area) in the common

village land. Any cattle or goats damaging the plantations were caught and detained in the *patti*. They were released only when the cattle owner paid a fine ranging from Rs. 5 to 10.

Because of this system, the owners took care of their cattle. Damage to plantations within the hamlet was avoided. The villagers said that in the past this system was controlled by a *Maniyakkarar* (a native villager who looked after the village administration on behalf of government). He supervised this system of cattle management with great and meticulous care. But after the appointment of VAOs who belong to other villages, the *patti* system has suffered. Farmers from Killai, Vadakku and Therku Pichavaram, Ponnathittu and Keezhachavadi said that reviving this system would help them raise new plantations.

### 3.3.2 Perceptions of local people on cattle management

**1) Reduced availability of fodder:** In the past, a large quantity of fodder, particularly paddy straw, was available since paddy was cultivated twice a year. Now, because of erratic water supply through irrigation canals, paddy is cultivated only once. Result: the availability of paddy straw has gone down sharply. In addition, in recent years, large areas of paddy fields have been converted into prawn farms. This has further reduced grazing ground in the non-agricultural season.

**2) Lack of a common grazing ground:** In the past, all common lands available in a village were used as grazing grounds. But now, almost all these lands have been encroached upon. Hence, animals have to graze only along the roadside or in the mangrove forest.

**3) Increased cost of cattle rearing:** In the past, expenditure on cattle rearing was minimal and the cost of many supplementary feeds very low. But today the costs of supplementary feed as well as of paddy straw are steep.

**4) Poor quantity of milk:** The present cattle breedstock yields just a small quantity of milk, sufficient only for the consumption of the family.

**5) Mechanisation of agriculture practices:** In the past, bulls were used for ploughing and pulling carts for agricultural activities. But nowadays tractors do most of the work; hence, interest in rearing cattle is waning.

**6) Non-availability of labour:** In the past, each family had a labourer (*maattukkaaran*) who was appointed exclusively for cattle care; in recent times no one is ready to work as a *maattukkaaran*. Cattle rearing have therefore become a tough task, especially for women.

**7) Reduced forest cover:** In the past, fodder, especially grass, was freely available in drylands associated with the Killai Reserve Forest area. Now these areas are under casuarina cultivation; cattle grazing is strictly prohibited.

**8) Lack of a veterinary hospital:** The lack of a veterinary hospital is another problem in the area. Recently some

500 goats died in the village of Vadakku Pichavaram because of the "blue tongue disease."

**9) Fewer cattle:** In the past, every family had a large number of cattle. In fact, the number of cattle indicated the status of a family. But because of the problems cited above, the livestock population has over the past 15 years gone down drastically in all the villages surrounding the Pichavaram mangrove wetlands.

### 3.3.3 Ethno-ecology of the Pichavaram mangrove wetlands

Communities living close to and interacting with the Pichavaram mangrove wetlands have gained their unique cognitive understanding of the ecosystem from the resource utilisation pattern. Experiences have led to a rich knowledge system that is reflected in the native classifications of mangrove wetlands.

The cognitive understanding has also enabled an understanding of changes over a period – to the resources as well as the ecosystem as a whole. Consequently, local communities have developed their own traditional system of management to ensure sustainable harvest of mangrove resources and equitable sharing of harvested products.

However, these management systems are losing their value because of various factors. Any assistance to protect these traditional systems will win the confidence of the local people; this in turn will be the first step toward the success of community-based mangrove conservation and management.

*"When we are children, mother's milk saves us from starvation.  
When we grow up, it's mother mangrove that feeds us."*



## 4.0 Major concerns of traditional and non-traditional fishers

### 4.1 Major concerns of traditional fishers

#### 1. Declining fish catch in the mangrove water due to

- i) seasonal closure of the mouth of the Pichavaram estuary
- ii) siltation in the mangrove water bodies
- iii) siltation in the backwater region connecting the Pichavaram mangrove wetlands and the Coleroon estuary

These issues are explained in detail elsewhere.

#### 2. Erosion of traditional fishing rights in the mangrove waters:

Till 50 years ago, local fishers had free access to the fishery resources of the Pichavaram mangrove waters. After independence, the scenario has completely changed.

Local fishers say that about 50 years ago, a rich trader who was not a traditional fisher, acquired fishing rights in the fresh water area of the Coleroon River. Grabbing this opportunity, he started collecting taxes from fishers who fish in the Pichavaram mangroves and connected backwaters. When traditional fishers took the issue to court, the Revenue Department was directed to take over control of fishing rights in the mangrove areas and offer a lease to the traditional fishing community for a nominal fee.

This procedure was followed until the Forest Department took control of fishing in the mangrove waters. In 1997, the Forest Department leased fishing rights to local fishers for a fee of Rs. 5,000 for three years, and said the lease amount would be increased by 20% every three years. The local fishers are apprehensive that in future the Forest Department could impose curbs that affect their income.

### 4.2 Major concerns of non-traditional fishers

The major concerns of the *Irulars* relating to utilising the resources of the Pichavaram mangrove wetland:

#### 1. Lack of crafts and gears for fishing in the mangrove waters:

Hardly any of the *Irulars* own boats or nets for fishing in the mangrove waters because they lack capital. Catching prawns by groping gives them very low income, not enough to meet their daily food needs. Further, not having a boat or a net means a tragic inability to fish during the rich three-month rainy season when fish, prawn, and crab are available in abundance. Result: Villagers are pushed into a debt trap and aggravated misery.

**2. Indebtedness:** The perpetual indebtedness of the *Irulars*, mainly to middlewomen of the traditional fishing community, is another major concern. This state derives from the poor incomes of *Irulars*, which in turn is connected to the lack of boats and nets. Every year, most of the *Irulars* borrow Rs.7,000 to 10,000 from the middlewomen. To pay back the loan and interest, the *Irulars* are constrained to sell their fish and prawn catch to the middlewomen at half the price.

**3. Lack of firewood resources:** The residents of MGR Nagar own no land or plantations. They do not collect any firewood from the mangroves since they consider it illegal.

Result: after the hellish chore of groping for fish in the mangrove waters for five to six hours, the women can't sit or stretch their legs but have to grope around for something else – for collecting dead twigs and palm residues in land nearby. The problem gets more severe during the rainy season.

#### 4. Lack of legal entitlement for fishing in the mangrove waters:

The residents of MGR Nagar fish in the mangrove waters only at the mercy of traditional fishers. Every year a fish lease is given only to traditional fishers since they are entitled to it. For many reasons they allow the residents of MGR Nagar to fish in the mangrove waters; but they have the right to prevent them from fishing.

**5. Degradation of the mangrove wetland:** The *Irulars* feel that the catch of fish and prawn in the Pichavaram mangrove waters is fast declining. They attribute this to the degraded condition of the mangrove forest. The *Irulars* have strong emotional ties with the mangrove wetland. Says a young *Irular*: “When we are children, mother’s milk saves us from starvation. When we grow up, it’s mother mangrove that feeds us.”



*Degradation of mangrove wetlands hits the livelihoods of mangrove communities.*



*Non-traditional fishers of Pichavaram say, “We are good at using gears like nandu kachcha (above). But we need fishing crafts to use these gears well. We do not have them.”*



# Situation Analysis: Muthupet Mangrove Wetlands

## 1.0 Process and Methods of Data Collection

### 1.1 Study team

The following project team collected information on fishery and forestry resources of the Muthupet mangrove wetlands, user villages and communities and other aspects.

Dr. V. Selvam	Team Leader and Mangrove Ecologist
Mr. J. Raju	Fishery Biologist
Mr. R. Anbalagan	Social Worker
Dr. R. Somasundaram	Botanist
Mr. Y. Ansari	Agronomist
Mr. N.R. Babu	Agronomist

For the process of introducing the project to stakeholders and data collection on resources and resource utilisation, the team adopted the following methods.

- Stakeholders' meeting
- Group meetings with local NGOs, field staff of the Forest, Fisheries and Revenue Departments
- Review of literature
- Rapid Rural Appraisal.

### 1.2 Stakeholders' meetings

Immediately after the inception of the project, a well-attended stakeholders' meeting was held in the Thuraikkadu (Pettai) village of Muthupet in June 1996. Dr. M.S. Swaminathan, Chairman of MSSRF, chaired the meeting. Representatives of local communities from various socio-economic strata attended the meeting. So did the representatives of local NGOs, and managerial and field staff of the Forest, Fisheries, Agriculture and Revenue Departments. The meeting gave team members an opportunity to introduce the project, strike rapport with the communities and various stakeholders, gain an insight into the major concerns of local people, and issues related to mangrove conservation and management.

### 1.3 Group meetings with local NGOs

In the Muthupet area, two NGOs – the Environmental Conservation Society (ENCONS) and the Village Welfare Society – have been working for the last five years. ENCONS has its headquarters at Muthupet town whereas the Village

Welfare Society is based at a village called Thuraikkadu (Pettai). Both NGOs seek to sensitise the local population on various environmental issues including mangrove wetlands. They have also enabled jobs for a few poor families through alternative employment schemes. Mr.G. Ramamurthy, a native of one of the mangrove user villages and a trained environmentalist, heads ENCONS. He and other members of ENCONS enjoy good rapport with the local communities and various grassroots organisations. Mr. Ramamurthy was recently appointed Honorary Wildlife Warden for Nagapattinam district. He and Mr. R.V. Vivekanandan (Secretary, ENCONS) organised a number of informal meetings at which local communities took part in large numbers. During these meetings, the project goals, purposes and objectives, the current status of the Muthupet mangrove wetlands and of mangrove resource utilisation, and issues related to mangrove restoration and management were discussed in detail. These meetings also gave the team opportunities to get to know traditional and Panchayat leaders of mangrove user villages better.

### 1.4 Group meetings with staff of government institutions

#### Forest Department

The team held a number of informal meetings with FD field staff – mainly the Ranger and the Forester. On a few occasions, other field staff such as the Guard and the Watcher also took part. During these meetings, the FD field staff

*The mangrove community in Muthupet gave Prof. M.S. Swaminathan and MSSRF team an idea of its problems, issues and concerns, soon after the project began.*



helped the team to identify the user villages and provided information about problems related to mangrove management and restoration. Most of the time the discussion centered on the attitude of the people towards mangrove resource utilisation and conservation.

### Fisheries Department

The Tamil Nadu Fisheries Department has two site offices around the Muthupet mangroves. The Inspector of Fisheries is based in Adirampattinam, 15 km southwest of the Muthupet town. A Research Assistant of Fisheries is based in Muthupet town itself. The team held interviews with these officials and field staff of both offices. The Inspector of Fisheries talked about fisheries societies in the mangrove user villages and listed the fish species that currently constitute the bulk of the catch. He was unable to provide any information on the quantities of fish caught (catch per unit effort) and changes in the catch over a period of time. However, he directed the team to contact Mr. M. Ramaiyan who had a temporary job as Research Assistant in the Fisheries Department on a salary of Rs.600 /month. Mr. Ramaiyan said he has collected fish landing data (about the types of fish caught, quantity of each variety harvested, number of boats used for fishing etc) over three years – but only for a few months, one or two days every month. He said his data might not be suitable for analysis of catch trends over a period or calculation of the catch per unit effort, as no such information is available with him. His office is currently preoccupied with issues and problems related to prawn farms located around the mangroves.

### Revenue Department

Revenue officials, particularly the VAOs (Village Administrative Officers) helped the team to identify the mangrove user villages and the resources found in the villages.

### 1.5 Review of literature

As in Pichavaram, only a few popular and scientific publications are available on the resources and resource utilisation pattern of the Muthupet mangroves. The team was able to collect only two papers published in 1987 and 1994. One of them deals with the fish species found in the Muthupet mangroves, the other deals with prawn seed



*Interviews were conducted with fishermen as part of an RRA on fishery resources of Muthupet mangrove wetlands.*

resources. The team also referred to the unpublished Ph.D. thesis of Mrs. Cecilia Pandian, who worked on the ichthyofauna (fish fauna) of the Muthupet mangrove waters with special reference to a fish called pearl spot.

### 1.6 Rapid Rural Appraisal

Before conducting an RRA, a preparatory workshop was held. Various RRA methods, rules for information collection, and the roles and responsibilities of team members, were discussed in detail. It was decided in the preparatory meetings that Mr.G.Ramamurthy would introduce the staff to various mangrove user villages. A checklist of information to be collected was discussed and prepared. In addition, a pamphlet was prepared in Tamil and distributed to each household. It contained information about the status of the Muthupet mangrove wetlands and its importance, the project goals, purposes and objectives, plus an outline of the project approach.

#### 1.6.1 RRA on fishery resources

An RRA on fishery resources was conducted in the following hamlets: Karaiyur, Veerankoil, Kovilanthoppu, Kamandiyadi, Pettai, Manganangkadu, Thondiyakkadu and Sengangkadu. During the RRA information on i) current status of the mangrove fisheries ii) traditional fishing methods and practices iii) changes in the species composition and quantity iv) causes for such changes and v) issues and problems related to fisheries were discussed in detail. Four to 12 persons took part in the RRA exercises. In some villages, such as Veerankoil and Thondiyakkadu, 2 to 3 women participated. The semi-structured interview

was the most common tool for data collection. Besides, interviews were held with about eight groups of fishermen who camped in the mangrove wetlands for fishing.

### 1.6.2 RRA on forestry resources

An RRA on forestry resources was conducted in the following farming and fishing hamlets: T.Vadakadu, Jambuvanvodai Vadakadu, Jambuvanvodai Therku, Kalladikollai, Veerankoil, Pettai, Maravakkadu, Karaiyur and Muthupet. During the RRA, information was collected on i) the livelihoods of the local communities, ii) forestry resources available in the mangroves, iii) cattle management iv) sources of firewood, v) collection of firewood from the mangroves and reason for sale or domestic use and vi) issues and problems related to utilising the forestry resources. Some 12 to 20 people took part in the RRA, but women were poorly represented. As in the case of RRA on fishery resources, semi-structured interviews with open-ended questions constituted the most common method.

In all the villages/hamlets, the following approach was adopted in the RRA. First, Mr. Ramamurthy introduced the team to the traditional village leaders. The project and MSSRF and the purpose of the visit were explained to them in detail. In some villages, the team, along with the traditional leaders and Mr. Ramamurthy met the Panchayat leaders as well after the meeting. A date for the RRA was then fixed with the traditional leaders. It was mostly conducted in common places. Besides, key informants (identified through traditional leaders and Mr. Ramamurthy) were also interviewed.

The following is the list of key informants interviewed during RRA

#### A. Fishing hamlets /settlements

Karaiyur

#### Key informants

Mr.P.Maniyan and  
Mr.K.V.Vijayan

Thondiakkadu

Mrs. R. Deivannai and  
Mr. M. Veeraiyan

Jambuvanodai Therku

Mr. M. Balasubramanian

Thuraikkadu

Mr. S. Subramanian

Sengangadu

Mr. P. Annamalai and  
Mr. S. Kumar

Kollaikadu

Mr. P. Tharmalingam &  
Mr. R. Balakrishnan

Veeranvayal

Mr. L. Vadivelu,  
Mr. K. Nagalingam and

Kovilanthoppu

Mr. R. Samikannu

Karpaganatharkulam

Mr. R. Nagalingam

Thuraikkadu (Pettai)

Mr. C. Vengatsamy

Mr. R. Ganesen

#### B. Farming hamlets /settlements

#### Key informants

T.Vadakadu

Mr. P. Muniandy  
-village leader and

T.Keezhakadu

Mr. S. Durairaj

Jambuvanodai colony

Mr. G. Balaiyan

Vairavan cholai

Mr.V.Sekar

Thillaiivilagam

Mr.N.Muniappan

Mr.K.Balasubramani Thevar

and Mr. R. Srinivasa Nadar

*The local communities took active part in the RRA (Rapid Rural Assessment).*



## 2.0 Mangrove Resources



Fishermen go out to sea on the traditional craft, Vathal (left). Sorting of catch from canal fishing (right).

Muthupet mangrove wetland (Fig. 2.1) occupies an area of 12,000 ha; only 1,850 ha can be described as healthy mangroves. Other categories of the wetland including degraded area are given in Table 2.1. The renewable natural resources available within the Muthupet mangrove wetlands can be divided into two types: fishery resources and forestry resources.

### 2.1 Fishery resources

The Muthupet mangrove wetland includes a large 1,700 ha lagoon, a shallow brackish water body with an average depth of 1 to 2 feet during low tide and about 3 to 4 feet during the spring high tide. The lagoon is connected to the Palk Strait by a wide mouth (about 1.5 km) located at the southern part of the mangroves. Besides the lagoon, the wetland includes many tidal creeks, channels and small bays, bordered by thick mangroves; and a number of man-made

canals dug across the mangrove wetlands, particularly in their western part, and fished intensively. The average salinity of the water, particularly in the lagoon, varies widely. During the monsoon season, salinity varies from 5 to 15 grams/litre (parts per thousand); during summer, it touches a high of 45 gram/litre – due mainly to the shallowness of the lagoon.

The fishery resources of the Muthupet mangrove wetlands and adjoining sea coast (neritic waters) are tapped by two communities:

- i) Traditional sea fishers. They belong to a caste called *Parvatharajakulathar*.
- ii) Traditional inland fishers. They belong to a caste called *Ambalakkarrar*.

**Table 2.1. Different Categories of Wetlands Found Within Each Reserve Forest (RF) of the Muthupet Mangrove Wetland (area in ha)**

Name of the RF/ wetland category	Palanjur RF	Thamaran- kottai RF	Maravakkadu RF	T.Vadakadu RF	Thuraikkadu RF	Muthupet RF	Total
Total area	189.33	529.66	1490.13	372.06	0636.54	6803.01	12020.74
Healthy mangroves	70.00 (37%)	350.00 (66%)	75.00 (5%)	60.00 (16%)	350.00 (13%)	950.00 (14%)	1855 (15%)
Degraded mangroves	74.33 (39%)	29.66 (6%)	525.00 (35%)	312.06 (84%)	1686.55 (64%)	4553.01 (67%)	7180.62 (60%)
Water bodies	0*	0*	0*	0	600 (23%)	1100 (16%)	1700 (14%)
Other vegetation (mainly Prosopis)	25 (13%)	150 (28%)	0	0	0	200 (3%)	375 (3%)
Salt pan	20 (11%)	0	890.12 (60%)	0	0	0	910.12 (8%)

\* 80 man-made canals, used for fishing, are found in the Palanjur, Thamarankottai and Maravakkadu RF. But the area they occupy is difficult to calculate since they are not clearly visible in remote sensing imagery.

**Fig. 2.1 Map of Muthupet Mangrove Wetlands Showing Six Reserve Forests and Healthy and Degraded Mangrove Areas, along with Water Bodies Associated with Each Reserve Forest.**





Muthupet fishermen catch mullet and seabass (above) ...



... prawns (above) and crab (below).



Traditional inland fishers utilise the fishery resources available within the mangrove wetlands as well as in adjoining coastal waters. Traditional sea fishers, on the other hand, restrict themselves to coastal waters. A few families from the farming community (*Thevars* and *Vellalars*) and landless groups (*Harijans* – scheduled caste), also fish in the mangrove waters, mostly as wage labourers hired by traditional fishers.

### 2.1.1 Species composition

Though Cecilia Pandian (1985) recorded about 73 species of finfish in the Muthupet mangrove wetland, local fishers

consider only 30 species as commonly occurring in the Muthupet mangrove waters and important for marketing (see box).

Common species of finfish, prawns and crabs in Muthupet mangrove wetland		
Finfish		
Local name	Common name	Scientific name
Koduva	Sea bass	<i>Lates calcarifer</i>
Madava	Mullet	<i>Mugil cephalus</i>
Serayakendai	Mullet	<i>Valamugil scheli</i>
Kada kendai	Mullet	<i>Liza dussumeri</i>
Mannan kendai	Mullet	<i>Liza parsia</i>
Pala kendai	Milk fish	<i>Chanos chanos</i>
Ven kezhuru	Cat fish	<i>Macrones sp</i>
Manava kezhuru	Cat fish	<i>Arius maculates</i>
Keduthai	Cat fish	<i>Plotusus canius</i>
Keduthai	Cat fish	<i>Plotusus arab</i>
Kezhuthi	Cat fish	<i>Mystus gulio</i> and <i>Mystus sp</i>
Thoga podi	Anchovy	<i>Coilia sp</i>
Sethal	Pearl spot	<i>Etroplus surentensis</i>
Koy mean	Clupeids	<i>Clupea spp</i>
Kathazai	Snapper	<i>Lutjanus spp</i>
Paingkalai	–	<i>Polynemus sp</i> (young ones)
Kala meen	–	<i>Polynemus sp</i> (adult fish)
Elathi	–	<i>Scatophagus argus</i>
Vallam podi	–	<i>Pellona sp</i>
Karumorral	–	<i>Scolopsis vosmeri</i>
Kilangan	Jew fish	<i>Sciaena aneus</i>
Kuliri	Marine eel	<i>Muraenesox sp</i>
Prawns		
Vella ral	White prawn	<i>Penaeus indicus</i>
Karuvandu ral	Tiger prawn	<i>Penaeus monodon</i>
Sivappu ral and Thazhai ral	Brown shrimp	<i>Metapenaeus spp</i>
Mottu ral	Scampi	<i>Macrobrachium spp</i>
Crabs		
Sethu nandu or Samba nandu	Mud crab	<i>Scylla serrata</i>
Kadukka nandu	Sea crab	<i>Portunus sangulionatus</i>
Nedunkal nandu	Sea crab	<i>Portunus pelagicus</i>

### 2.1.2 Other aquatic resources

Apart from fish, prawns and crabs, the Muthupet mangrove wetland is also rich in the following molluscan varieties.

Local name	Common name	Scientific name
Kuttu mutty	Edible oyster	<i>Crasostrea madrasensis</i>
Kuttu mutty	Edible oysters	<i>Crasostrea</i> sp
Vari mutty	Blood clam	<i>Anadara</i> sp
Sunnambu mutty	Clam	<i>Meritrix meritrix</i> and <i>Meritrix casta</i>

At one time, people exploited the *sunnambu mutty* on a large scale for making lime. Due to over-exploitation, the population of this species has fallen drastically; it is no longer exploited. Local fishers believe that oysters, which grow in large beds, prevent free exchange of water between the mangrove wetland and the sea. The local population does not consume edible oysters.

### 2.1.3 Catch per unit effort

No systematic studies have been conducted on the small-scale fishery of the Muthupet mangroves. Hence, data on catch per unit effort with reference to season and various crafts and gears used are not available. As mentioned earlier, the data collected by the Statistical Assistant of the Fisheries Department for 1990, 1991 and 1992 are limited and cannot be used to calculate the total fish landing in a year, CPUE or qualitative and quantitative trends in fish catch.

### 2.1.4 Perceptions of local fishers on fishery resources

According to local fishers, 16 species of fish, three species of prawns and three species of crabs are important for their subsistence and marketing. The local fishers possess a wealth of knowledge on seasonal variations in the occurrence and quantity of fish, on changes in catches over time and the reasons for such changes. The perceptions of local fishers on the fishery resources of the mangrove wetland are given in Table 2.2.

## 2.2 Forestry resources

### 2.2.1 Timber and Non-Timber Forest Produce (NTFP)

According to the local people, no timber or NTFP is available in the Muthupet mangrove forest.

### 2.2.2 Medicinal plants

According to the local people, none of the plants available in the Muthupet mangrove wetlands is used for any medical purpose.

### 2.2.3 Fodder and firewood

Cattle are not let loose in the Muthupet mangrove wetlands for grazing every day. But the villagers said that aged and dry cattle, particularly from Adirampattinam, Earipurakarai and Jambuvanoodai, are permanent residents in the mangroves. Normal practice is that the owners leave these cattle to their own fate. (Skulls and bones of cattle carcasses litter the mangroves). However, if the owner comes to know that his cattle are healthy or that his cow has given birth to a calf, he will trace them and drive them back to his house. The villagers said that at present about 150 to 200 such cattle wander about in the Muthupet mangrove forest.

Firewood collection from the Muthupet mangrove forest has been declared illegal, but some of the locals continue to collect firewood from the mangroves, both for their own use and for sale. Some of the fishers collect small bundles of dead wood for their homes when they go fishing. Some others collect firewood from the mangroves during summer or in the pre-monsoon season and store them for use during the monsoon. Some 80 poor families living in villages around the Muthupet mangroves earn their daily bread by collecting firewood from the mangroves, and selling it – usually to local tea shops and small hotels. Villagers said that it's mostly destitute women who collect firewood from the mangroves. A few men also do so; they normally sell it to illegal arrack distillers who have their "distillation units" near the mangroves.



Old woman (left) busy removing silt from canal, to facilitate fishing. Old man (right) fishes in lagoon waters.

**Table 2.2 Perceptions of Local Fishers on Fishery Resources of Muthupet Mangrove Wetland**

No.	Name of the fish	Season	Quantity	Location	Changes in the quantity caught	Reasons for Change
1	Koduva	Mid-Dec to mid-Jan	250 to 300 kg per group of fishers during the peak season; 1 or 2 kg at other times	In all of the mangrove waters during the peak season; only in the lagoon mouth region during the off season	Quantity reduced by 50% over a period of 25 years	<p>1. Siltation in the mouth region and reduced ingress of sea water</p> <p>2. Siltation in the lagoon and reduction in the average depth of the lagoon</p> <p>3. Trawler fishing in coastal waters nearby which disturb the migration of fish into the lagoon</p> <p>4. Discharge of effluents from the prawn farm</p> <p>5. Extensive growth of oyster, resulting in poor exchange of water between the lagoon and the mangrove creeks and canals.</p> <p>6. Degradation of the mangrove forest; most of the fishermen believe that prawns are abundant in the lagoon and sea only because of the presence of mangroves. They believe that prawns breed in decaying leaves of mangrove plants.</p>
2	Kooral (young ones of koduva)	Throughout the year	One or two individuals	In all of the mangrove waters during the peak season; only in the lagoon mouth region during the off season	-	
3	Madava	Mid-Dec. to mid-Jan.	20 to 30 kg during the peak season; 2 to 5 kg during the off season	Lagoon, creeks, canals and bays bordered by thick mangroves	Average size of fish falls drastically – by 25 to 30% over a period of 25 years.	
4	Seraya kendai	Throughout the year	20 to 30 kg per group of fishers	Lagoon, creeks, canals and bays bordered by thick mangroves	Quantity reduced considerably over a period of 15 years	
5	Pala kendai	Mid-Dec. to mid-Jan.	Young ones are abundant during the peak season	Lagoon and lagoon mouth	Quantity reduced drastically	
6	Kada kendai	Mid-Dec. to mid-Feb.	-	Lagoon and lagoon mouth; available in large quantities when the salinity becomes moderate; migrate from the sea during the late monsoon for feeding	Quantity reduced considerably	
7	Keduthai (cat fish varieties)	Mid-Apr. to mid-Aug.	20 to 40 kg for a group of fishers during the peak season; five kg during the off-season	Lagoon, lagoon mouth, bays and canals; abundant during June and July; breeds in the burrows of the lagoon	Quantity reduced by 10 to 20 %	
8	Khezuru (cat fish) varieties	Throughout the year but only during the spring high tide	-	Lagoon and lagoon mouth	Quantity reduced	
9	Thoga podi	Throughout the year	5 to 10 kg	Marine fish; only around the lagoon mouth; small sized fish but very tasty	No change in quantity	
10	Sethal	Throughout the year	4 to 5 kg	Around the roots of mangroves	Quantity reduced by 25%	
11	Elathi	March to July	20 to 30 kg during the peak season; 1 or 2 kg during the off season	Lagoon and near the lagoon mouth	Quantity reduced considerably	



No	Name of the fish	Season	Quantity	Location	Changes in the quantity caught	Reasons for Change
12	Koy meen	November to April	Four to five kg during the peak season	Marine fish; lagoon and lagoon mouth	-	
13	Vallam podi	October to March	5 kg	Lagoon and lagoon mouth	Quantity reduced considerably	
14	Tholi	October to March	5 to 8 kg	Lagoon and lagoon mouth	Quantity reduced considerably	
15	Paingkalai (young ones of kaala)	Throughout the year	-	Lagoon	Quantity reduced considerably	
16	Kaala meen	Mid-Nov. to mid-Dec.	One or two fish occasionally but each fish costs Rs.200 to Rs.300	Lagoon and lagoon mouth	Quantity reduced considerably	
No	Name of the prawns)	Season	Quantity	Locality	Changes in the quantity caught	Reasons for Change
1	Vella ral (white prawn)	Throughout the year	Five to six kg one to two kg during the summer	The uppermost part of the lagoon, tidal creeks, canals and bays bordered by mangroves	Quantity varies from year to year but a sharp fall over a 10-year period	As given in the previous pages
2	Karuppu ral (tiger prawn)	Mid-Dec. to mid-April	2 to 3 kg during the peak season	The uppermost part of the lagoon, tidal creeks, canals and bays bordered by mangroves	Quantity varies from year to year but a sharp fall over a 10-year period	
3	Sivappural (Brown shrimp)	Mid-Dec. to mid-April	1 to 2 kg during the peak season	Lagoon and lagoon mouth	Quantity varies from year to year but a sharp fall over a 10-year period	
No	Name of the crabs)	Season	Quantity	Locality	Changes in the quantity caught	Reasons for Change
1	Sethu nandu or samba nandu (mud crab)	Mid-April to mid-Aug.	5 to 10 kg crabs; each costs about Rs.300	Bays, creeks, canals and in places where the substratum is muddy	Sharp fall in average size and number of crabs	
2	Kadukka nandu (sea crab)	June to August	4 to 5 big crabs	Lagoon and lagoon mouth	-	
3	Nedungal nandu (sea crab)	June to August	4 to 5 big crabs	Lagoon and lagoon mouth	-	

## 3.0 Mangrove Resource Utilisation Pattern



Traditional fisherman (left) holds aloft catch of seabass. Fishermen (right) go lagoon fishing on motorised fabricated kattumaram.

### 3.1 Mangrove user hamlets, communities and population

Both traditional fishers and farmers utilise the mangrove resources of Muthupet.

The fishery and forestry resources of the Muthupet mangroves are utilised by the residents of 26 hamlets belonging to 16 revenue villages. (Fig. 2.2). Of these, 20 are fishing hamlets, six are farming hamlets. These hamlets have 8,216 families – of whom 4,334 are fisher families, 3,882 are farming families and agricultural labourers (Table 2.3) – and a total population of about 35,855.

#### 3.1.1 Traditional fishing communities

Traditional fishers are the dominant direct users of the resources of the mangrove wetland. They can be broadly divided into three categories.

- i) *Seagoing fishers or meenavars*: They reside in the revenue village of Karaiyur with a total population of 1,907. They fish only in the Palk Strait, they do not venture into the mangrove wetland for fishing. However, some of the *meenavar* families utilise the forest resources of the mangroves for firewood.
- ii) *Inland fishers*: This category includes Hindu fishers known locally as *Ambalakkarars* and a group of traditional Muslim fishers. Two groups of *Ambalakkarars* are dominant. These inland fishers can be further divided into two groups according to the main area of fishing.
  - a) *Lagoon fishers*: This category includes the *Ambalakkarars* and the Muslim fishing community, who depend mainly on the fishery resources of the lagoons, creeks, channels and small bays found within mangrove wetlands, particularly in the Muthupet and Thuraikadu Reserve Forests.
  - b) *Canal fishers*: These are *Ambalakkarars*, who fish mainly in the man-made canals of the Thamarankottai, Maravakkadu and Palanjur Reserve Forests.

The box on page 52 provides details of the hamlets which depend mainly on fishing in the lagoon and man-made canals.

*Ambalakkarars* can also be classified into two groups on the basis of duration of fishing in the mangrove wetlands.

- i) *Annual fishers*: These are *Ambalakkarars* who fish in the mangrove wetlands throughout the year.
- ii) *Seasonal fishers*: These are *Ambalakkarars* who fish in the mangrove wetlands only during the peak fishing season.

The seasonal fishers far exceed the annual fishers. Many fishers operate in the mangrove waters only from mid-December to mid-January, when prawns are available in abundance.

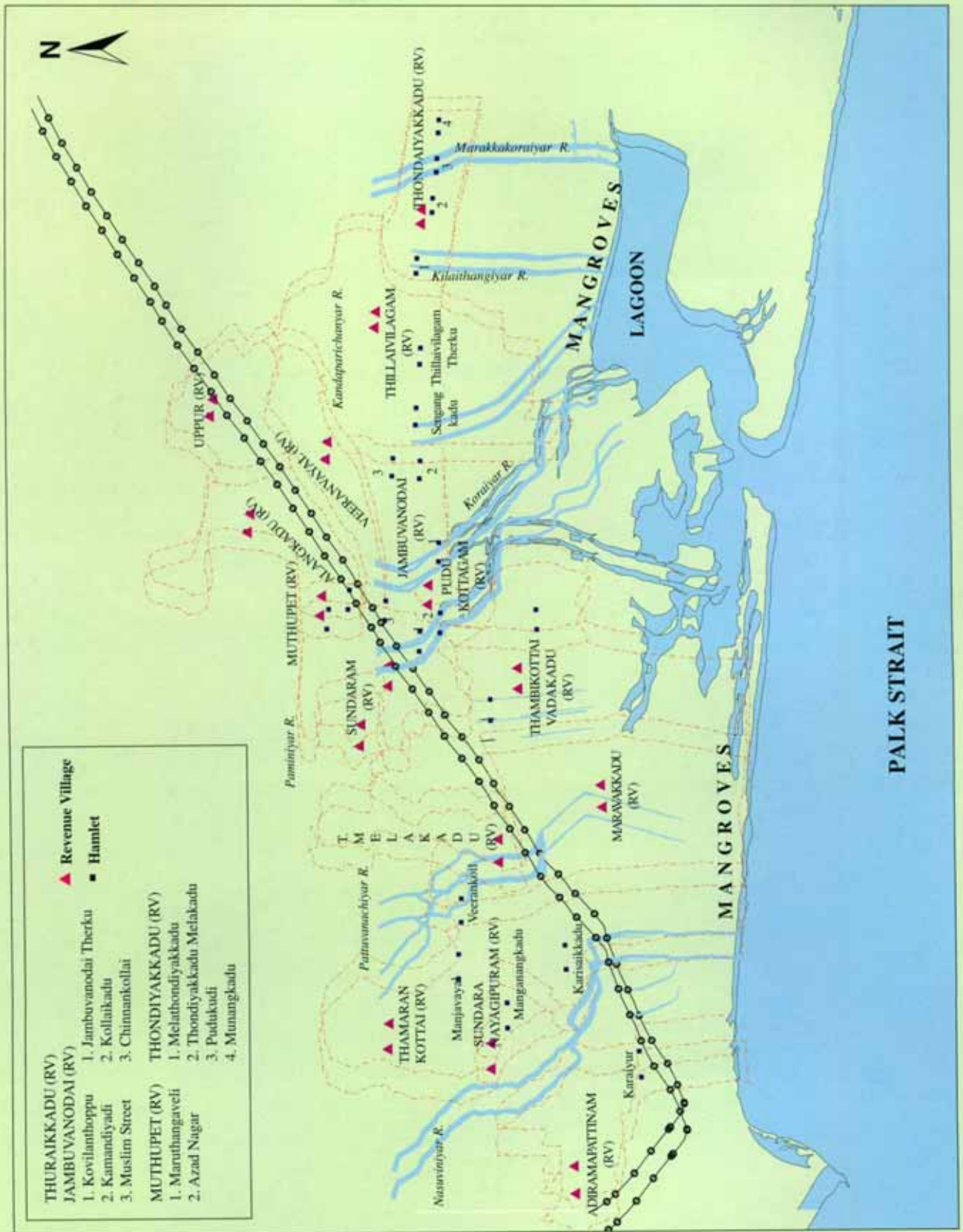
#### 3.1.2 Farming communities

The farming communities of the Muthupet region are dominated by two backward class communities, *Thevars* and *Vellalars*. They own most of the agricultural lands and possess coconut groves varying in size from 2 to 15 acres. The other dominant community living in the farming hamlets/villages is from a scheduled caste, locally known as Harijans. They are landless poor, earning their livelihood mostly by working as agricultural labourers. In most of the farming hamlets, one or two Harijan families live permanently in the coconut groves of the *Thevars* and *Vellalars* as residential labourers.

Some of the poor *Thevars*, *Vellalars* and *Harijans* depend directly on the mangrove resources for their livelihood by

- going for fishing in the lagoon along with *Ambalakkarars*, mostly as wage labourers and
- by collecting and selling firewood from the mangrove forest to local tea shops and small hotels; poor and destitute women dominate the second category.

Fig. 2.2 Villages and Hamlets which Utilise the Resources of Muthupet Mangrove Wetland



**Table 2.3 Revenue Villages and Hamlets in Muthupet, with Statistics of Households, Population, Fishing and Farming Families, and Major and Minor Use of Mangrove Wetlands**

No.	Revenue village and hamlet	Fishing or farming hamlet	Number of households	Population	Number of fishing families	Number of farming families	Major use of mangrove wetland	Minor use of mangrove wetlands*
1	Revenue Village (RV) Adiramapattinam Hamlet Karaiyur	Fishing	325	1,907	325	0	Nil	Firewood
2	RV. Sundaranayagipuram Hamlet: Manganangkadu	Fishing	110	571	105	5	Fishing	Firewood
3	RV. Thamarankottai Hamlet: Karisaikkadu	Fishing	180	464	124	56	Fishing	Nil
4	Hamlet: Manjavayal	Farming	501	1,882	196	305	Fishing	Firewood
5	RV. Maravakkadu Hamlet: Veerankoil	Farming	159	1,342	139	20	Fishing	Firewood
6	RV. Thambikottai Vadakadu	Farming	969	3,903	0	969	Nil	Firewood
7	RV. Thambikottai Melakadu	Farming	835	3,071	90	745	Fishing	Firewood
8	RV. Sundaram	Farming	576	2,337	153	423	Fishing	Nil
9	RV. Pudukottagam	Farming	87	358	20	67	Fishing	Firewood
10	RV. Thuraikkadu (Pettai) Hamlet: Kovilanthoppu	Fishing	173	743	156	17	Fishing	Nil
11	Hamlet: Kamandiyadi	Fishing	220	1,100	220	0	Fishing	Firewood
12	Hamlet: Muslim street	Fishing	406	1,625	170	236	Fishing	Firewood
13	RV. Muthupet Hamlet: Azad Nagar	Farming	225	674	75	150	Fishing	Nil
14	Hamlet: Maruthangavaeli	Farming	500	2,056	0	500	Nil	Firewood
15	RV. Jambuvanodai Hamlet: Jambuvanodai Therku	Fishing	256	1,270	256	0	Fishing	Firewood
16	Hamlet: Kollaikadu	Fishing	47	141	47	0	Fishing	Nil
17	Hamlet: Chinnankollai	Fishing	46	230	46	0	Fishing	Nil
18	RV. Veeranvayal	Fishing	257	1,068	257	0	Fishing	Nil
19	RV. Thillaiivilagam Hamlet: Thillaiivilagam Therku	Fishing	391	1,702	295	96	Fishing	Nil
20	Hamlet: Sengangkadu	Fishing	337	158	260	77	Fishing	Nil
21	RV. Thondiyakkadu Hamlet: Thondiyakkadu Melakadu	Fishing	233	908	233	0	Fishing	Nil
22	Hamlet: Melathondiyakkadu	Fishing	139	504	139	0	Fishing	Nil
23	Hamlet: Pudhukudi	Fishing	80	374	80	0	Fishing	Nil
24	Hamlet: Munangkadu	Fishing	192	908	192	0	Fishing	Nil
25	RV. Alangkadu	Fishing	615	4,061	506	109	Fishing	Nil
26	RV. Uppur	Fishing	357	2,498	250	107	Fishing	Nil
	Total		8,216	35,855	4,334	3,882		

\* Details of families utilising the mangrove firewood for domestic use and commercial purposes are given in detail under the section on utilisation of forest resources.

## Hamlets that Depend on the Fishery Resources of the Sea, Lagoon and Man-Made Canals

### Fishing hamlets

Those that depend exclusively on the resources of the sea

1. Karaiyur

Those that depend on the fishery\* resources of the mangrove lagoon

1. Kovilanthoppu
2. Kamandiyadi
3. Muslim street
4. Azad Nagar
5. Jambuvanodai Therku
6. Kollaikadu
7. Chinnankollai
8. Veeranvayal
9. Thillaivilagam Therku
10. Sengankadu
11. Melathondiyakkadu
12. Thondiyakkadu Melakadu\*
13. Pudhukudi
14. Munangkadu\*\*
15. Alangkadu
16. Uppur

Those that depend on the fishery\* resources of man-made canals

1. Manganangkadu
2. Karisaikkadu
3. Manjavayal
4. Veerankoil

\* indicates that some of the fishers go sea fishing during the off-season in the mangrove lagoon

\*\* indicates that fishermen fish in the mangrove waters mainly during the peak season

In the socio-economic hierarchy, *Thevars* and *Vellalars* (backward class) rank higher since they own most of the cultivable lands and are socially and economically influential. The last stratum of the socio-economic hierarchy is occupied by the *Harijans* (Scheduled caste) who are landless. Traditional fishers occupy the middle rank of the social stratum.

### 3.2. Utilisation patterns and practices: Fishery resources

#### 3.2.1 Fishing in the lagoon, bays and creeks

##### *Methods of fishing*

Traditional inland fishers harvest the fishery resources in the Muthupet mangrove wetlands using various gears and crafts. None of these fishing methods affects the health of the mangroves.

##### *Fishing crafts*

In lagoon fishing, three types of boats are used: *Vathal*, *Thoni* and *Vallam* (Fig. 2.3).

i) *Vathal* (Fig. 2.3a) is a large-size country boat used in the mangrove waters. It is 10 to 13 m long, 1.3 to 1.7 m wide and 0.7 m deep. It is capable of carrying 20 to 30 fishers at a time. The *vathal* is made up of the planks of neem (*Azadirachta indica*), vaagai (*Albezzia lebbak*), raintree (*Enterlobium saman*), poovarasu (*Thespesia populnea*) and teak (*Tectone grandis*). Each *vathal* costs about Rs.30,000 to Rs. 45,000. The boat was at one time built in Muthupet itself, now it is bought from Adirampattinam and Rameswaram. During the off-season in the lagoon, fishers use this boat for fishing in the neritic waters adjacent to the mangroves.

ii) *Thoni* (Fig.2.3b): is a medium-size fishing craft used in the mangrove waters. It is 5 to 8 m long, 1.0 to 1.5 m broad and 0.7 m deep, and can accommodate about 10 people. Like the *Vathal*, the *Thoni* is also made up of neem,

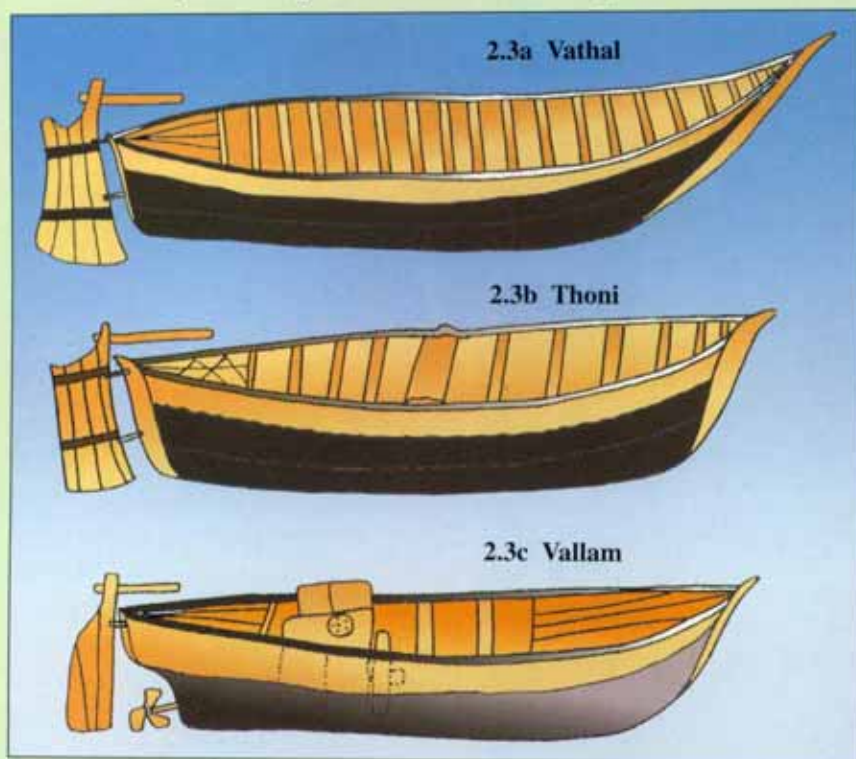
teak and *poovarasu* planks. Another similarity is that the *Thoni* too was at one time built in Muthupet but is now bought from Adirampattinam and Rameswaram. Each *Thoni* costs Rs.15,000 to Rs. 30,000, and is used mainly for catching a variety of fish known as 'Vallam podi'.

iii) *Vallam* (Fig.2.3c) is the smallest boat used in the mangroves and is designed specially for fitting with a 6HP Lambodi diesel engine. The craft is about 7.7 m long, 1.3 m broad and 0.7 m deep. Together with engine, the boat costs about Rs.70,000. It can accommodate about 10 persons. The *Vallam* is capable of moving freely even in very shallow waters.

Nowadays, these traditional fishing crafts are being replaced gradually by moulded catamarans with lambadi engines fabricated and marketed by Tamil Nadu State Apex Fishermen's Co-operative Federation (TAPCOFED).

Table 2.4 shows the number of *Vathal*, *Thoni* and *Vallam* crafts available with fishers in Muthupet.

**Fig. 2.3 Traditional Fishing Crafts Used in the Muthupet Mangrove Wetland and Adjacent Waters**



**Table 2.4 Non-mechanised and Mechanised Crafts Owned by Fishers in Muthupet**

No	Village/hamlets	Available boat	
		Vathal and Thoni	Vallam
1	Pettai-Thuraikkadu		
	Kovilanthoppu Muslim street	7 10	1
2	Thillivilagam		
	Sengangkadu	22	
3	Jambuvanodai		
	Veeranvayal Jambuvanodai Therku	3 5	
4	Thondiyakkadu	7	
<b>Total</b>		<b>54</b>	<b>1</b>

**Fishing gears**

The following are the common gears used by fishers for fishing in the mangrove waters

- i. Adappu valai
- ii. Koduva valai
- iii. Izhuppu valai
- iv. Chippi valai (Midhappu valai)
- vi. Nandukachcha valai
- vii. Yendhu valai

**i) Adappu valai**

This is a type of gill net used in the mangrove water, mainly to fish mullets (but catfish, particularly *keduthai*, are caught in the net many times in large numbers). It is about 18 m long and 2 to 2.5 m broad. The mesh size is about 2 cm. The fishers said that the mullets, especially *seraiyakendai*, have a habit of moving to regions very close to the shore for feeding. Once fisherfolk see a shoal of mullets, they will immediately put up this gill net about 10 to 15 m away from the shore. During low tide, fish that start moving away from the shore will be trapped in the net. The net is put up in the water around 8 pm and left undisturbed, and catches are collected the next morning. The net is operated in open lagoon waters as well as in tidal creeks and canals adjacent to the mangroves.

**ii) Koduva valai**

It is another kind of gill net used exclusively for fishing seabass, and is about 30 m long and 4.5 m broad, with a mesh size of 8 to 10 cm. It is mostly used in the lagoon and near

the lagoon mouth area. The net is erected in the muddy bottom with the help of wooden poles, normally put up around 6 pm and left undisturbed. The seabass moving along with the incoming tides are caught in the net, and are collected the next morning. The *koduva valai* operation requires 4 to 10 persons.

**iii) Izhuppu valai**

This is a small-sized drag net used mainly for prawns; sometimes fish like mullets and catfish also get caught with this net, which is 30 to 40 m long. The mesh size of *izhuppu valai* is small, about 2 to 3 cm. During fishing operations, two persons who hold opposite ends of the net move slowly towards each other, marking a rough circle as the net moves



Motorised fibreglass kattumarams are replacing traditional fishing crafts in and around Muthupet.



*Koduva valai* - displayed (left) by project staff, and deployed (right) by fisherman to trap seabass.



*Izhuppu valai* for fishing mullets (left), and *Chippi valai* (right) for small fish and prawn

towards the shore. The fish and prawn entangled in the net are collected.

#### iv) *Chippi valai*

This is the most common gill net, used to catch varieties of small fish like *Tholli*, *Vallampodi*, *Thogaipodi* and prawns. It is about 20 m long, with a mesh size varying from 2 to 4 cm. Two types of *chippi valai* – *oonuchippi valai* and *vazhichippi valai* – are used in the mangrove water. The *oonuchippi valai* is a stake net used across the lagoon with the help of wooden poles. The *vazhichippi valai* is allowed to float along the water current. *Chippi valai* operations start around 4 or 5 a.m. and end around 10 or 11 a.m.

#### v) *Nandu kachcha valai*

This is specially designed to catch crabs, particularly samba crab (*Scylla serrata*). It is about 8 to 10 m in length; mesh size varies from 7 to 9 cm. It is used across the water current. Its operation starts by 5 p.m., it is left undisturbed in the water overnight and catches are collected the next morning. It is used mostly in the mouth of the lagoon.

#### vi) *Yendhu valai*

*Yendhu valai* is a scoop net used in the mangrove water by poor fishers. The scoop net contains a round wooden frame with handle and a net with mesh size varying from

1 to 2 cm. The net is used mainly in the estuarine regions of rivers, tidal creeks and canals where the speed of the water current is low. In these areas, a small branch of *Avicennia marina* is dropped into the water; fish and prawns that assemble around the branch are scooped by the net. Table 2.5 shows the fishing sequence for different types of nets and the time they take for fishing.

**Table 2.5 Fishing Sequence for Various Types of Nets (During the Peak Season)**

Types of nets	When fishing starts	When nets are fixed	When nets are removed	When catch is marketed
<i>Adappu valai</i>	5 p.m.	8 p.m.	8 a.m. next day	10 a.m.
<i>Koduva valai</i>	4 p.m.	6 p.m.	6 a.m. next day	8 a.m.
<i>Izhuppu valai</i>	2-3 a.m.	4 a.m.	10 a.m. on the same day	11 a.m.
<i>Chippi valai</i>	2-3 a.m.	4 a.m.	10 a.m. on the same day	11 a.m.
<i>Nanducachcha valai</i>	3 p.m.	5 p.m.	9 a.m. next day	10 a.m.



*Fishing canal during peak season (left), during off-season (right)*



*The Saar (left) diverts fish towards the fish trapping device, the Pari (right)*



*Two fishers pick fish from a mangrove canal. They also use *Avicennia* and *Suaeda* bushes to drive fish towards the saar.*



### 3.2.2 Canal fishing

Some 80 fishing canals linking sea and land are found in Thamarankottai (58), Maravakkadu (7) and Palanjur (16) Reserve Forests. Fishers from Manganangkadu, Karisaikkadu, Manjavayal and Maravakkadu (Veerankoil) villages are active in these canals, fishing intensively from November to March (late monsoon to post-monsoon season). The canals are about 1 to 3.5 km long, 1.8 to 3.5 m broad and 1 to 1.5 m deep. Sea water along with fish and prawns and their juveniles enter these canals during the high tide. During low tide, the mouth of the canal is fitted with a locally developed fish pen called *saar*. Fish and prawn that try to move out into the sea during the low tide are caught in a trap called *pari* or harvested by a scoop net locally known as *kachcha valai*.

Since this method of fishing ensures free flow of tidal water in and out of the canals, it helps maintain the moisture and salinity level of mangrove soil suitable for the growth of mangroves. Result: healthy mangroves are found on both the sides of the canal. *This method can be effectively utilised to restore degraded mangrove areas, since it encourages local people to take part in mangrove restoration and conservation* (Annexure 1).

### 3.2.3 Traditional fishing practices

Fishing in the Muthupet mangrove wetlands is done by a group of fishers, also by individual fishers.

#### Group fishing

Group fishing is normally done to catch seabass, mullets and crabs. Under this method, a group of fishers camps in the mangrove wetlands for seven to 10 days. Each group takes different types of fishing gears with them besides food essentials such as rice, cooking materials and drinking water. While camping, some group members operate the net, some others carry catch daily to the market, a few others engage in cooking and net mending. After earning sufficient money, the group returns home.

During the peak season, each group fishes for only one day. Villagers say that the number of fishers in a group varies according to the type of net to be used. For example, 10 to 20 fishers comprise a group if *adappu* is used. The group is smaller, about 4 to 6, if *koduva valai* is used. The group gets further small, to 3 or 4 if *nandu kachcha valai* is used in fishing.

It is common practice for a group of fishers without boats to go along with a boat owner for fishing. The net income is divided in such a way that one-third goes to the boat owner and the balance is divided equally among individuals of the group. Sometimes a group of fishers hires a boat from the owners and uses it to fish.

#### Individual fishing

Fishers who neither own boats nor engage in group fishing walk to the mangroves early in the morning (around 2 or 3 a.m.),



*Fishers who engage in group fishing in the lagoon (above) using the Adappu valai, spread a tent for overnight stay. After operations they spread their nets out to dry (below).*



*Individual fisherman (below) catches small fish and prawns with a chippi valai, presently in his container.*



taking with them a 20 to 30 litre aluminum pot, a *chippi valai* and scoop net and an inflated car tube. They catch fish, prawns and crabs using these nets from 4 a.m. to 9 a.m. and return to the market around 11 a.m. to sell their catch.

### 3.2.4 Fisheries management

Three traditional systems focus on tapping the fishery resources of the Muthupet mangrove wetland:

- i. free fishing in the lagoon and tidal creeks

- ii. traditional pen culture of wild prawns and fish
- iii. family fishing in man-made canals

**i) Free fishing in the lagoon and tidal creeks**

Fishing in the mangrove lagoon and tidal creeks is open to all fishers: no curbs on fishing areas or fishing days. Fishers said that anyone can go to any area of the lagoon where a high fish harvest is expected. If one high-harvest area is already occupied, a group moves to other areas of expected high harvest. Sometimes the second fishing group drops its nets just behind the net set up by the first group. Only 50 to 60 fishers can be seen fishing at any one time in the mangrove waters; the only exception is during the peak prawn season. Fishers say competition among fishers isn't fierce because while the lagoon area is vast, the number of fishers active on a particular day is low.

Some fishers said that during the peak season for prawn (mid-November to end-December), some norms and procedures are followed. During this season, some 150 to 200 fishers go for prawn during the day – from 6 a.m. to 6 p.m. At night, fishing is reserved for another group of fishermen – who in turn vacate the place the next morning in favour of a third batch of fishermen. This practice of rotation goes on till the end of the prawn fishing season; after that, no restrictions in fishing time, day or area are imposed. The fishermen interviewed said the rotation system ensures that all fishers share available prawn resources equally during the peak season.

**ii) Traditional pen culture of wild prawns and fish**

The fishers said that an entirely different method is employed for fishing in certain pockets of the mangrove wetlands such as Sethuguda and Thottam. These areas are very rich in prawn resources. Sethuguda is a small bay of about 30 to 40 ha, bordered by thick mangroves. It is located at a place where the River Koraiyar mixes with the lagoon. Thottam is a vast area of the mangrove wetland covering a portion of the lagoon; most of the trough-shaped area is located on the western part of the mangrove wetlands. In these areas, brackish water enters during the monsoon season (mid-October) along with young ones of prawn and fish. Immediately after, the mouth and other openings through which water can drain out are closed with a pen (locally known as *saar*) which allows only water to flow in and out during high tide and low tide respectively. Prawn and fish juveniles trapped in are allowed to grow and periodically harvested till May or June. After that, the pen is removed.

Villagers say that this type of prawn and fish culture was developed by traditional fishers. But till the 1950s, only a few rich and influential farming families, and later a few Muslim families, utilised this method to harvest fish and prawns. These families used to employ traditional fishers

to protect the pen and harvest fishery resources; they were strict in preventing the entry of any fishermen into these areas. Later, during the 1950s, a fishermen co-operative society was formed to break this tradition. The society succeeded in its aim; it took these areas on lease from the government and opened it to all fishermen.

**iii) Family fishing in the man-made canals**

Fishers from Manganangkadu, Karisaikkadu, Manjavayal and Veerankoil villages claim that the canals found in the Thamarankottai, Maravakkadu and Palanjur Reserve Forests were constructed by their ancestors. They have been fishing in these canals for the last 150 years. A single family or group of families owns a canal, harvests fishery resources and maintains it by regularly desilting the canals. After these canals were taken over by the Forest Department, they were given on lease to a Fishermen Co-operative Society which in turn allotted to them to the respective families. No other fishers, either from the same village or another village, will fish in a canal owned by a fisher family. However, the families have the right to sell or mortgage these canals to other families within the village. The *saar* method or traditional pen culture of wild prawn and fish juveniles is followed to harvest fishery resources in these man-made fishing canals.

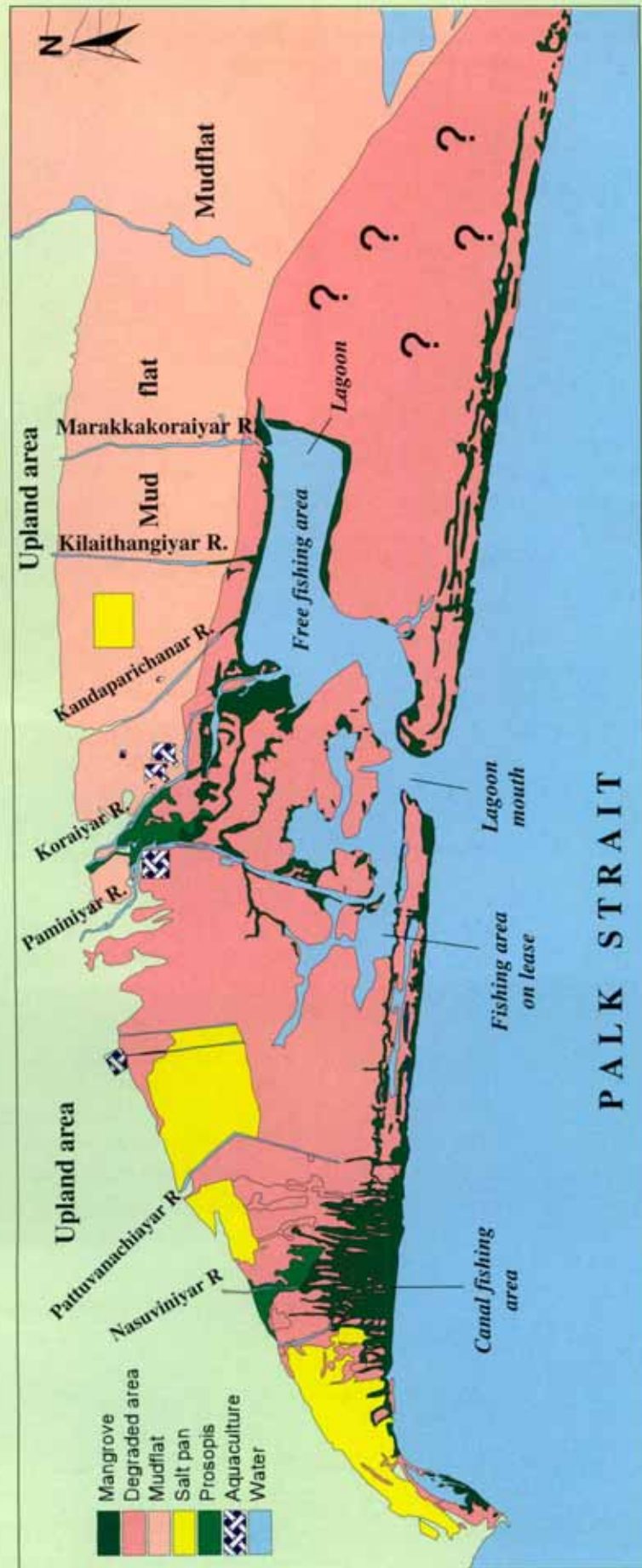
Figure 2.4 shows the area of the Muthupet mangrove wetland where free fishing, lease fishing and canal fishing are normally practiced.

**3.2.5. Marketing**

Fish markets are located in the following villages where fish are sold through commission agents: i) Maravakkadu ii) Thambikottai Vadakadu iii) Thambikottai Melakadu iv) Pettai and v) Azad Nagar. In Pettai and Azad Nagar, the following method is adopted to market the catch. If the catches are low-priced (such as mullets, pearl spot, clupeids), they are sold to small commission agents who in turn sell them to market vendors. The agents charge a 10% commission for selling the fish to vendors. The fishers are expected to bring their catch to commission agents before 11 a.m. to get a good price, villagers say.

During the peak prawn and crab season, fishers sell their catches to big commission agents at the landing centre itself. Traders send their men to the landing centre to collect prawns and crab from fishers and pay for them on the spot. The trader takes a 10% commission on the money paid. The collected prawns and crabs are then sorted out by the traders into Grade I and Grade II varieties. Larger prawn and crabs which are unspoiled are classified as grade I. The grade I fish, prawn and crab are exported to foreign countries, whereas the grade II creatures are sold to market vendors who in turn sell them to local consumers.

Fig. 2.4 Muthupet Mangrove Wetlands, Showing Free Fishing Area, Area on Lease and Canal Fishing Area



? - Whether permanently barren area or degraded mangrove forest - not known

In Thambikottai Vadakadu and Maravakkadu fish markets, it is mandatory for fishermen to bring in their catch before 11 a.m. Exactly at 11 a.m. the catch will be auctioned directly by the fishers to vendors – who will sell it directly to consumers of other villages. The fisher may opt to sell the prawn and crabs directly to big traders. But if a fisher bring his catch after 11 a.m. he has to sit and sell the catch directly to consumers.

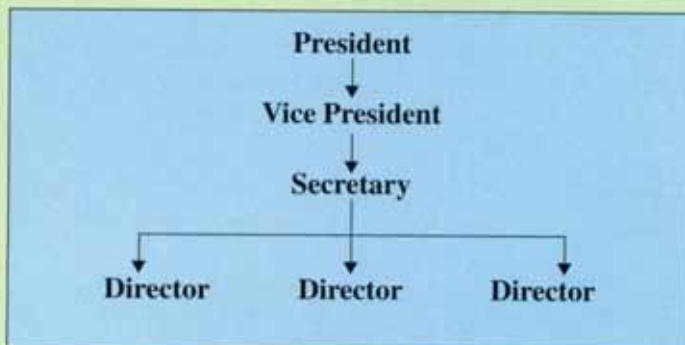
### 3.2.6. Fishermen Co-operative Societies

Ten fishermen co-operative societies operate in villages around the Muthupet mangrove wetlands. Members of the societies include all categories of fishers – those who fish in the mangrove waters, canals, the sea, and inland waters. But only people from fisher castes (*Parvatharajakulathars* and *Ambalakkarars*) are admitted as members. Table 2.6 lists the names of the society, the year of establishment, the hamlets covered by each society, the total number of members and the name of the current president. As the fishermen said, all these societies are under the “control” of the Inspector of Fisheries, Adirampattinam.

#### Organisational structure of the societies (Fig. 2.5)

As shown in the figure, each Fishermen Co-operative Society is headed by a President who is assisted by a Vice-President, Secretary and Directors. Each hamlet covered by a society is represented by a Director. She/he is elected by members of the society of that hamlet. The President is elected once in three years, under the supervision of the Assistant Director of Fisheries, Pattukkottai. If there is no competition for the post of President, one of the members who is socially committed and influential among the members is nominated to the post by the members.

**Fig. 2.5 Organisational Structure of Fishermen Co-operative Societies**



#### Functions

The following are the main functions of the Fishermen Co-operative Societies.

1. Organise the fishers for collective decision-making
2. Demarcate the areas of fishing for different groups of fishermen



*Fishers are sorting and grading harvested prawns meant for export as well as the local market.*

3. Solve inter and intra-society problems
4. Solve the problems of the societies' members.
5. Ensure that the welfare and other developmental schemes of the government reach deserved members of the society.

During the course of discussion with the Presidents and ex-Presidents, other office bearers and some members of different societies, the team came to know that these societies have done the following important assignments:

- a) Members of the Karaiyur Fishermen Co-operative Society constructed a deep canal from the sea up to the hamlet to facilitate boat movement. Result: fishers are able to sell their catches fresh and in time at the market and get better prices.
- b) The Maravakkadu Fishermen Society was established in 1956. Members passed the following resolutions, paving the way for different groups of fishers to fish in different areas without any conflict. The resolution said:
  - i) Fishermen belonging to particular hamlets (Karungkulam, Sengapaduthankadu, Sundaranayagipuram and Narasingapuram) can fish only in water bodies located in between the Pattuvanachi River bridge and the sea
  - ii) Fishermen belonging to Maravakkadu, Manjavayal, Karisaikkadu and Manganangkadu can fish only in man-made canals, the lagoon and the sea.
  - iii) Fishers who do not fish in these areas can fish in the Amerikulam lake (the biggest lake found in this area) and in fresh water bodies located north of the Pattuvanachi River bridge and the Amerikulam lake.

Oral agreement to these resolutions – which have been adhered to strictly ever since – was obtained from different groups of fishers.

- c) Another interesting task relating to mangrove management is being carried out by the Thuraikkadu

**Table 2.6 Fishermen Co-operative Societies Operating Around Muthupet Mangrove Wetlands**

No.	Society	Year of establishment	Member hamlets	No. of Members	Name of the president
1	Thuraikkadu Sea Fishermen Co-operative Society	1952	Mangrove fishing hamlets: Thuraikkadu, Pettai, Muthupet, Azad Nagar others Kovilur (only)	1,200 Muslims – 30% Others – 70%	Mr.E.Shiek Mohammed
2	Karaiyur Sea Fishermen Co-operative Society	1955	Sea fishing hamlet: Karaiyur	1,100 Muslims – 140 Parvatharaja-kulathar – 960	Mr.Murugesan
3	Sengangkadu Sea Fishermen Co-operative Society	1968	Mangrove fishing hamlets: Sengangkadu, Thillaiivilagam South others Athivettikadu, Keezha Athivettikadu, Vembalankadu, Pachiyankadu	400 Ambalakkarar	Mr.P.Annamalai
4	Jambuvanodai Sea Fishermen Co-operative Society	1977	Mangrove fishing hamlets: J.Therukku, Chinnankollai, Melakadu and Kollaikadu	495 Ambalakkarar	Mr.M.Subbaiyan
5	Thondiyakkadu Sea Fishermen Co-operative Society	1982	Mangrove fishing hamlets: Thondiyakadumelakadu, Melathondiyakadu, Pudhukudi and Munangkadu	820 Ambalakkarar	Mr.P.Thangaraj
6	Thambikottai Sea Fishermen Co-operative Society	1982	Mangrove fishing hamlets: T.Vadakadu, T.Melakadu, Sundaram	470 Ambalakkarar	Mr.P.Muniyandi
7	Alangkadu Sea Fishermen Co-operative Society	1988	Mangrove fishing hamlets: Alangkadu, Uppur, Veeranvayal Other hamlets: Karaithidal	315 Ambalakkarar	Mr.K.M.Vadivelu
8	Keezha Vadiakkadu Sea Fishermen Co-operative Society	1987	Keezha Vadiakkadu (not a mangrove fishing hamlet)	500 Ambalakkarar	Mr.k.k.Rajendran
9	Karpaganatharkulam Sea Fisher Society	1994	Mangrove fishing hamlets: Karpaganatharkulam Other hamlets: Karayankadu	278 Ambalakkarar	Mr.R.Nagalingam
10	Maravakkadu Sea Fishermen Co-operative Society (it was registered as Inland Fishermen Society in 1956)	1995	Mangrove fishing hamlets: Manjavayal, Maravakkadu, Karisaikkadu and Manganangkadu Other hamlets: Sundaranayagipuram, Narasingapuram	510 Ambalakkarar	Mr.Uthirapathi

Sea Fishermen Co-operative Society. About 80% of the fishers of this society walk to the lagoon and the sea across the mangrove forest. The Forest Department objected to this; the FD felt that it would destroy the mangroves and disturb wild life. This view upset the fishers for it endangered their sole source of livelihood. To solve the problem, society members sat together with officials of the FD and the Fisheries Department, and resolved the conflict. The FD has since permitted fishers to walk across the forest while going for fishing; but

only through particular routes. Secondly, they should not indulge any activities that will be detrimental to the mangrove forest and wild life. The fishers agreed to these conditions; they have been sticking to the terms of the agreement.

All these indicate that better management of the mangrove wetland is possible if fishermen co-operative societies are given suitable roles in decision-making and conflict resolution.

### 3.3. Utilisation Patterns and Practices: Forestry Resources

#### 3.3.1. Cattle grazing

No grazing is practised in the mangroves, daily or on a regular basis. However, as mentioned earlier, aged and dry cattle, particularly from Adiramapattinam, Earipurakkarai and Jambuvanoodai, live in the mangroves permanently with markings. The owners let these cattle to their fate and do not bother about them. (Skulls and bones of dead cattle are a common sight in the mangroves). However, if the owner comes to know that his cattle have become healthy or that his cow has given birth to a calf, he'll trace them and drive them back home. The villagers said that at present, some 150 to 200 such cattle are found within the Muthupet mangrove forest – a situation in contrast to that prevailing in the Pichavaram mangrove wetlands.

#### 3.3.2. Firewood collection

Almost all mangrove user villages and hamlets have large coconut groves, which help the villagers meet their firewood demands. The supplementary products of coconut trees such as spathe (*paalai*), fibrous bract (*pannadai*), coconut husk (*urimattai*), and footstalk (*kurungumattai*) are used as fuel. Of these, coconut husk and footstalk are widely used. These products are available cheaper than in the local market. Apart from these, dense prosopis bushes are present in large areas adjacent to all the villages; they meet the firewood demand of local people. Despite the coconut groves, people collect firewood from the mangroves for their own use and for sale.

##### *Collection of mangrove firewood for own use*

Only a limited number of fisher families, particularly those who live in Karaiyur, Manganangkadu and Thondiyakkadu,

**Table 2.7 Families that Depend on Mangrove Forests for Their Livelihood**

Hamlet	No. of families
<i>Fishing hamlets</i>	
Manganangkadu	about 19
Veerankoil	about 9
Kovilanthoppu	about 15
Pettai-Muslim street	about 12
<i>Farming hamlets</i>	
Ramankottagam	about 6
Thambikottai Vadakadu	about 10
Thambikottai Melakadu	about 15
Manjavayal	about 5
Jambuvanodai	about 12



*Destitute women earn their livelihood by collecting and selling firewood from the mangrove forest.*

collect firewood from the mangroves for their own use. Interviews in these villages revealed that these fishers collect mangrove firewood only during the late summer or early pre-monsoon period and store them for use during the monsoon season.

##### *Collection of firewood for marketing*

Interviews with villagers, as well as with field staff of the Forest Department and NGO representatives, revealed that a few families of fishing and farming hamlets regularly collect firewood from mangroves and sell it to local tea shops and hotels for their livelihood. After collecting this information, the team visited each village, and with the help of traditional leaders and key informants, identified families that depended on mangrove firewood for their daily bread. Table 2.7 lists the number of families in various hamlets that depend on mangrove firewood for their livelihood.

Field visits showed that in most cases, only poor and destitute women collect and sell firewood in local markets. The team interviewed some of these women. They said that their occupation is tough and arduous, but they pursue it because of good demand for firewood, particularly from tea shop owners. It gives them a decent sum of money. For example, one bundle of mangrove firewood is sold approximately for Rs. 40 to 50 whereas the same quantity of Prosopis fetches only Rs. 20 to 25. Some men too collect mangrove firewood and sell it to local arrack distillers.

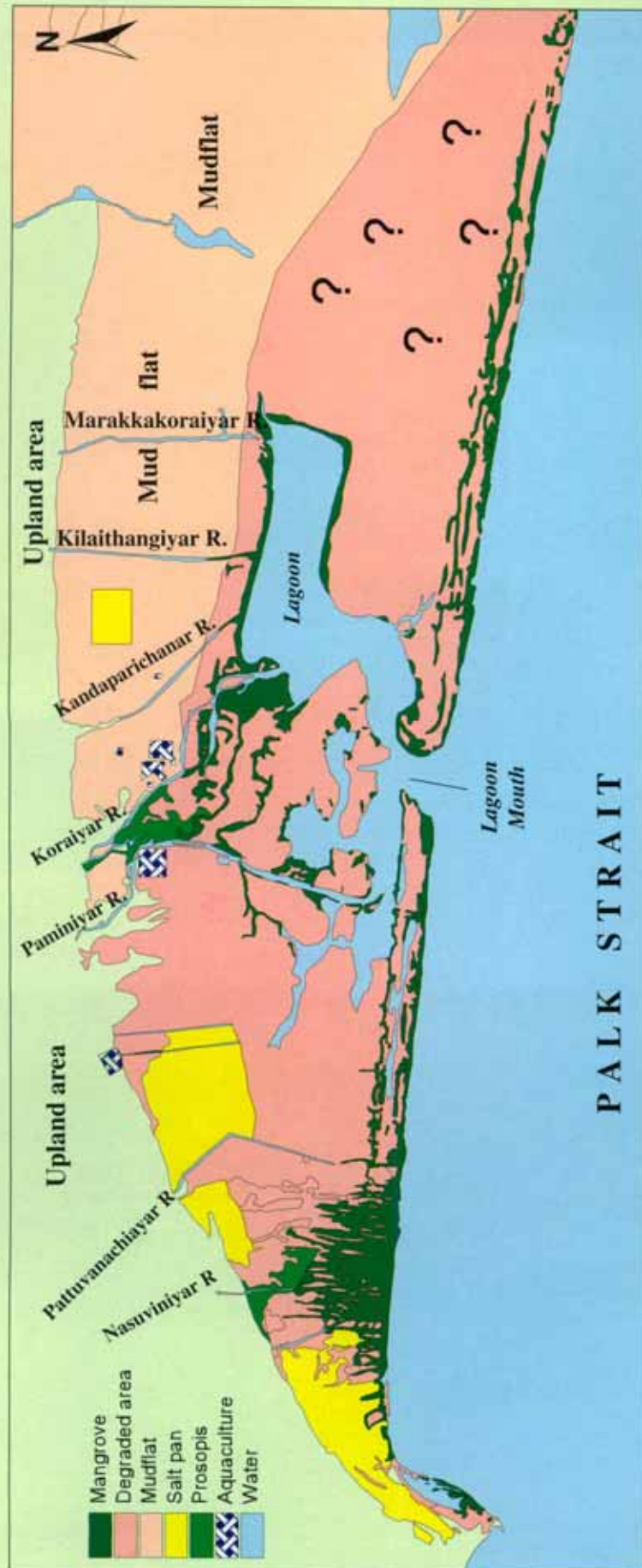
#### 3.3.5. Land use pattern around the Muthupet mangrove wetlands

Figure 2.6 shows the land use pattern around the Muthupet mangrove wetlands.

##### **Mudflats**

A large tract of mud flat lies between mangrove wetlands and mangrove user villages. These mud flats are devoid of

Fig. 2.6 Land Use Pattern in Areas Close to the Muthupet Mangrove Wetlands



? - Whether permanently barren area or degraded mangrove forest - not known

any major vegetation (except the patches of *Suaeda* found in many places in the mud flat). The mud flats are prone to flooding during the monsoon season and in the month of May, when tidal water inundation occurs during high tide. Some areas of these mud flats are utilised for the development of salt pan and prawn farms.

### **Salt pans**

Fourteen salt pans occupy an area of 4,082 acres around the Muthupet mangrove wetland. These are located very close to the Palanjur, Thamarankottai, Maravakkadu Reserve Forests (the western part of the Muthupet mangrove wetland) and the Muthupet Reserve Forest (eastern part). Most of the salt pans located on the western part of the Muthupet mangrove wetland started as early as 1855; those located on the western part (near Thillaivilagam village) are newly constructed. Of the 14 salt pans, the Salt Corporation of the Government of India owns 13, while the Tamil Nadu Salt Corporation Ltd owns one. (Salt pans owned by Government of Tamil Nadu have been developed in the degraded mangrove wetland of the Maravakkadu Reserve Forest. Salt production here was stopped in 1997 following a Supreme Court directive.)

Most of these salt pans produce salts for industrial chemicals. The salt pans located on the western part of the Muthupet mangrove wetland draw sea water from the Palk Strait through canals for salt production. The canals are about two metres wide, one metre deep, and about 4 km long. The salt

pans located on the eastern side of the Muthupet Reserve Forest use high-saline groundwater which is pumped into the pans.

### **Impact of the salt pans on mangrove wetlands**

The impact of the salt pans on the mangrove wetland has not been studied.

### **Prawn farms**

Apart from the salt pans, 27 prawn farms are located close to the mangrove forest. The total area of these farms is about 1,000 acres. Of these, 796 acres are located on the western side of the Muthupet mangrove wetlands and 204 acres on the eastern side. These farms follow a modified extension system. All these farms draw water either from the sea through canals or from the mangrove wetland. Water exchange is done once in three days in the modified extensive farms, once in four days under extensive methods. The water level maintained in the farms is about 110 to 115 cm. Normally, 25 kg of prawn feed is used per 0.5 ha of pond. About 250 to 350 kg of lime is used per 0.5 ha pond to increase the soil pH. A variety of antibiotics such as oxytetracycline, wolmid, muzophore and germicides are used to control diseases.

### **Impact of the prawn farms on mangrove wetlands**

The impact of these aquaculture farms on mangrove wetlands has not been studied.

*Fourteen salt pans function around the Muthupet mangrove wetland. Most of them produce salts for industrial chemicals.*





## 4.0 Major Concerns of the Local People

The following are the major concerns of the fishing and farming communities living around the Muthupet mangrove wetlands:

### 4.1. Major concerns of fishing community

#### 1) Decline in fish catch

Almost all fishers interviewed said there has been a sharp fall in quantity and a noticeable reduction in size of fish caught during the last 15 to 20 years. The following factors are said to be the major causes for the reduction in fishery resources.

##### i) Deposit of silt in the mouth region of the lagoon

Most fishers said that the migration of fish, prawns and crabs and their juveniles into the mangrove wetlands has gone down in the last 20 years since the width and depth of the lagoon mouth are shrinking every year. Some 20 years ago, the mouth was about 2.5 km wide and 2 to 2.5 m deep; today the mouth is just 1 km wide and not even 1 m deep. Some of the fishers said that though the mouth now is about 1 km wide, sea water enters the lagoon only through a narrow passage (only about 10 to 15 m wide) which is, however, deeper than the rest of the mouth.

A group of fishers camping in the mangrove wetlands showed the team the present condition of the lagoon mouth. During the visit, the team explained to fishers the situation prevailing in the Pichavaram mangrove region. Fishermen accompanying the team said that the mouth of the Muthupet lagoon never closed completely; but they fear that this may happen soon, considering the rate at which the width of the mouth is shrinking. They also said that no sand is deposited in the mouth region; it's only the fine silt brought from the sea that is being deposited. Fishers said that this problem has stopped not only the migration of larger fish to the mangrove waters but also the recruitment of fish juveniles.

##### ii) Deposit of silt in the lagoon

The fishermen said that it isn't just the lagoon mouth, but the lagoon as a whole, that is getting narrower every year. In some regions of the lagoon, particularly in the eastern part, the depth of the water is not even 30 cm during high tide. Some of the fishermen said that the areas which were once considered rich fishing grounds are now completely silted up. Elder fishers said that

in the past, dolphins were seen in large numbers in the lagoon; but not even a single dolphin has been spotted in the lagoon during the last 15 years. This is mainly due to the shallowness of the lagoon. Many of the marine fish which seasonally migrate into the lagoon in large schools for breeding and feeding are no longer seen even near the mouth region of the lagoon.

##### iii) Over-exploitation of fishery resources in the neritic waters by trawlers

Almost all fishers interviewed said that fishing by trawlers in the Palk Strait, particularly in areas close to the mangrove forest, is one of the main reasons for the decline in fish catch in the mangrove waters. They said that currently, 100 to 150 purse seine trawlers fish in the Palk Strait.



*Dwindling fish catch – a perennial concern.*



*Shrinking of the mouth region of the lagoon due to siltation.*

The purse seines scoop up all the fish, prawns and crabs, including the young ones. Result: a steep reduction in the quantity of fish migrating into the lagoon.

## 2) Extensive growth of oysters in the mangrove waters

Another major concern expressed by the fishers relates to the unrestrained growth of oysters in the lagoon. In recent years, a number of new oyster beds have formed in the lagoon, particularly in the region where the River Koraiyar meets the lagoon. This prevents the free movement of fishing boats. Second, it damages nets during fishing and causes injuries to fishermen. Some fishers said that the growth of the oyster beds in vast areas is also responsible for the shallowness of the lagoon.

## 3) Pollution by prawn farms

Some fishers said that the prawn farms located along the border of the mangrove forest discharge their effluents into the mangrove water; these impact on fishery resources.

## 4) Reduction in the area of the mangrove forest

Most fishers interviewed expressed serious concern over the degraded state of the mangrove forest. They said that reduction in forest cover is one reason for the decline in fishery resources, particularly of prawn. The fishers believe that prawns breed only in areas where large quantities of degrading mangrove leaves accumulate. Restoration of the mangrove forest will help them a lot, by increasing the prawn population in the lagoon as well as in the sea water nearby.

## 5) Fear of losing traditional fishing rights in the man-made canals

There are some 80 man-made canals within the limits of the Palanjur, Thamarankottai and Maravakkadu Reserve Forests, as mentioned earlier. Fishers from Veerankoil (Maravakkadu), Manjavayal (Thamarankottai) and Manganangkadu (Sundaranayagipuram) said that these canals had been constructed by their ancestors when the mangrove wetland was owned by the community. They said that they have been fishing in these canals for many generations following their own social norms and procedures. But after the mangrove wetland was declared a reserve forest, the Forest Department (FD) took over these canals and declared them as government property.

The canal fishers said that till today the FD has not prevented their fishing in the canals, but they apprehend that they may lose their livelihood if the FD leases out these canals to



*Oyster bed formation reduces fishing areas.*

other fishers. The canal fishers said that they would be very grateful to the FD if it recognised their rights and gave them these canals permanently. If this was not possible, the FD could give these canals on a long-term lease to the Maravakkadu Sea Fishermen Society, which in turn would allot them to the respective families. In return, said the fishers, they would help the Forest Department in conserving the mangrove forest located in between these canals.

## 4.2. Major concerns of farming community

### 1) Silted up irrigation canals

The villages around the Muthupet mangrove wetlands are located at the southernmost end of the Cauvery delta. They get water for agriculture during the non-monsoon season (July – September) from the Mettur dam. This water is supplied through a network of larger canals – Koraiyar, Paminiyar, Kanthaparichanar, Kilaithangiyar, Marakkakoraiyar and Valavanar. The farmers said that all these canals are silted up; as a result, water does not reach their villages in time. The quantity of water has become insufficient for cultivation.

### 2) Excessive growth of *Ipomea* in the canals

The farmers said that the canals mentioned above also act as drainage canals during the monsoon season. But free flow of water in these canals is obstructed by the excessive growth of *Ipomea* sp, which was first planted on banks to reinforce them. The farmers said that as a result of this, flooding of the village and submergence of the crops during the monsoon season have become regular features.

To solve these two problems, the Government of Tamil Nadu has recently started a massive programme to desilt the canals and remove the *Ipomea* sp.

### 3) Problems posed by salt pans and prawn farms

As already mentioned, a large number of salt pans are located both on the western and eastern sides of the Muthupet mangrove wetlands. Villagers said that salt pans operating on the western side of Muthupet mangrove wetland do not pose any problem since most of these pans are quite far from the village; the villages are at a higher elevation (in reclaimed sand dunes); and surface drainage during the monsoon season is not blocked (because water drains out through the canals that are used to draw sea water from the Palk Strait and also through the canals constructed for canal fishing).

On the other hand, the salt pans located in the eastern side of the Muthupet mangrove wetlands pose several problems to residents of the Thillaivilagam Therku village. The villagers complained that the cultivable lands located close to the salt pans as well as the ground water, have become saline on account of the salt pan operations. Since these salt pans use only ground water, they do not have any canals that could drain flood water to the sea during the monsoon season. Result: free drainage of surface water during the monsoon season is blocked by the bunds of salt pans, resulting in heavy flooding.

Some of the villagers said that prawn farms too increase the salinity of the ground water.

### 4) Degradation of mangrove forest

Many of the farmers interviewed had only limited knowledge about the mangrove forest, which is located just a few kilometers away from their home. But some of the elder members of the farming community, particularly the traditional leaders, expressed serious concern over the degraded state of the mangrove forest.

These leaders said that at one time the Muthupet mangrove forest was luxuriant with tall and huge trees. At that time, the traditional Panchayat took care of the mangrove forest and the traditional leaders considered conservation of the mangrove forest their prime duty. But after the forest was



*Degraded mangrove forest during summer (above).  
Stagnation of tidal water (below) leads to hypersaline condition in the mangroves.*



taken over by the British government, management of the mangroves became the responsibility of government agencies. Some of the management practices followed by these agencies, plus other factors such as reduction in fresh water flow in recent times and the reckless cutting of trees by some vested interests in the past, had heavily degraded the mangrove forest.

One of the traditional leaders expressed the fear that their village and their agricultural plantations such as coconut groves would be destroyed in the future by cyclonic storms if the mangrove forest was allowed to degrade completely.

## Annexure - 1

# Canal Fishing in the Muthupet Mangrove Wetlands – An Example of the Traditional Wisdom of Local Fishers in Integrating Fisheries Development with Mangrove Conservation

### 1. Introduction

During the biophysical survey in the Muthupet mangrove wetlands, the MSSRF project team noticed a unique method of fishing practised by local fishers in the Palanjur, Thamarankottai and Maravakkadu Reserve Forests of the Muthupet mangrove wetland (Fig. A-1). This method of fishing ensures free flow of tidal water in and out of the mangrove wetlands through man-made canals and thereby provides suitable biophysical conditions (particularly of moisture and salinity levels) for the regeneration and growth of the mangrove plants. Apart from this, the local fishers harvest fish and prawn worth Rs. 10,000 to 20,000 every year from these man-made canals.

The project team noticed that the mangrove forest is healthy in those areas of the mangrove wetland where canal fishing is practised, but highly degraded in areas nearby where no canal fishing is practised (see photographs) due to stagnation of tidal water. Since this traditional method of canal fishing integrates mangrove development with fishery development,

it is considered very helpful for the restoration of degraded mangrove areas with people's participation. A detailed study of canal fishing was therefore undertaken. A report follows.

### Canal fishing

#### 2. Definition

In the western part of the Muthupet mangrove wetland, a traditional but unique method of fishing is practised. In this method adult and juvenile fish and prawns are trapped in the man-made canals during the late monsoon season, and harvested periodically by fishers till the end of the post monsoon months. This traditional practice of trapping and harvesting fish and prawns in man-made canals is called canal fishing; it began some 200 years ago.

#### 3. Physical description of canals

Seventy nine man-made canals are found in different Reserve Forests of the Muthupet mangrove wetland.

**Fig. A-1. Remote Sensing Imagery of the Western Part of the Muthupet Mangrove Wetland, Showing the Canal Fishing Area and the Vast Adjacent Area of Degraded Mangroves.**



Name of the Reserve Forest	Number of man-made canals
Palanjur Reserve Forest	14
Thamarankottai Reserve Forest	58
Maravakadu Reserve Forest	7
	<hr/> 79

The canals have been constructed across the mangrove wetland in the north-south direction. In the south, the canals are open to the Palk Strait; in the north, the canal is closed. The length of these canals varies from 1.50 to 2 km. Their upper width varies from 1.8m to 2.5m whereas the lower width varies from 1 to 1.2m. The average depth of the canals is about 1.2 m. All the canals are connected to the Palk Strait by a wide mouth. The distance between the canals varies from 20 to 30m (Fig. A-3).

#### 4. Fishing in the canals

##### *Fishing season*

The movement of fish and prawn into the canals is determined by the quantity of rainfall occurring during the southwest (SW) and northeast (NE) monsoon seasons. Hence, fishing in the canals is seasonal and closely linked to the monsoon seasons.

During the NE monsoon season (from October to December), and the early post-monsoon season (from January to February), fishing in the canals is intensive. During October and the first half of November, rainfall in the coastal belt of Tamil Nadu, including Muthupet, is heavy. The entire mangrove wetland is immersed in water to a depth of 3 to 4 feet. Since the salinity level of the water is low and ample quantities of detritus (decayed leaves and other parts of mangroves used as food by fish and prawns) are available, fish and prawns and their juveniles migrate in large numbers into the mangrove wetland.

Around November 15, water from the mangrove wetland starts draining into the sea as the monsoon rain recedes gradually. Since there is no major river in the western part of the

Muthupet mangrove wetland, water from the shallow portion of the mangrove starts receding through the man-made canals. Along with the water, a large number fish and prawn and their juveniles enter the canals. They are trapped in the canals by local fishers using an indigenous fishing method and harvested periodically till the end of February or the middle of March.

The fishers say that if there is good rainfall during the months of July and September due to the SW monsoon, large quantities of fish and prawn migrate into the canals from the sea. These animals are trapped and harvested with



*Healthy mangrove trees (above) are found in large numbers around the fishing canals dug by fishermen. Below: Mangrove forest is in a highly degraded state wherever tidal water stagnates because of poor drainage facilities. In these areas, canal fishing not merely provides incomes through fish catch; it effectively regenerates mangroves.*



scoop nets. According to the fishers, fishing in the canal during this season is limited, since rainfall during the SW monsoon is very low in this area.

### Method of fish harvest

The canal fishers use two types of gear for harvesting fish and prawns from the canals. These gears are known locally as *saar* and *pari*. The *saar* is nothing but a pen made of cane or the midribs of date palm leaves. It is about 1.5 m high and 2.5 to 3.0 m long. The size of the pen depends on the size of the canal. The *saar* is fixed across the canal, from a point 20 to 30m from the shore (see photographs), as soon as water from the mangrove wetland starts draining into the sea. As a result, all the fish and prawns including the young ones are trapped in the canal. The *pari* is a basket-type gear made of cane, also used in canal fishing. Both ends of the *pari* are closed, but it can open one end when required. The other end of the *pari* has two openings that are specially designed so that fish and prawn can enter but cannot come out.

According to the fishers, after the *saar* (pen) is fixed across the canal, two small curved canals are dug near the place where the *saar* is fixed (Fig. A-3). These small side canals are locally known as "*kaan*". The *pari* is fixed at the lower end (from the landward side) of this side canal. During low tide, water from the canal starts flowing towards the sea, so does the fish and prawns. These fish and prawns are trapped in the *pari*. The *pari* is removed during high tide or early morning; all the fish and prawn trapped in the *pari* is removed to be marketed. The *pari* is immediately placed back in the side canal. This practice continues till February-

end or mid-March. Within the period, the juveniles of fish and prawn trapped in the canal also grow and get harvested. At the end of the season, the fish and prawns remaining in the canals are driven into the fish trap by pushing the water using *Suaeda* bushes.

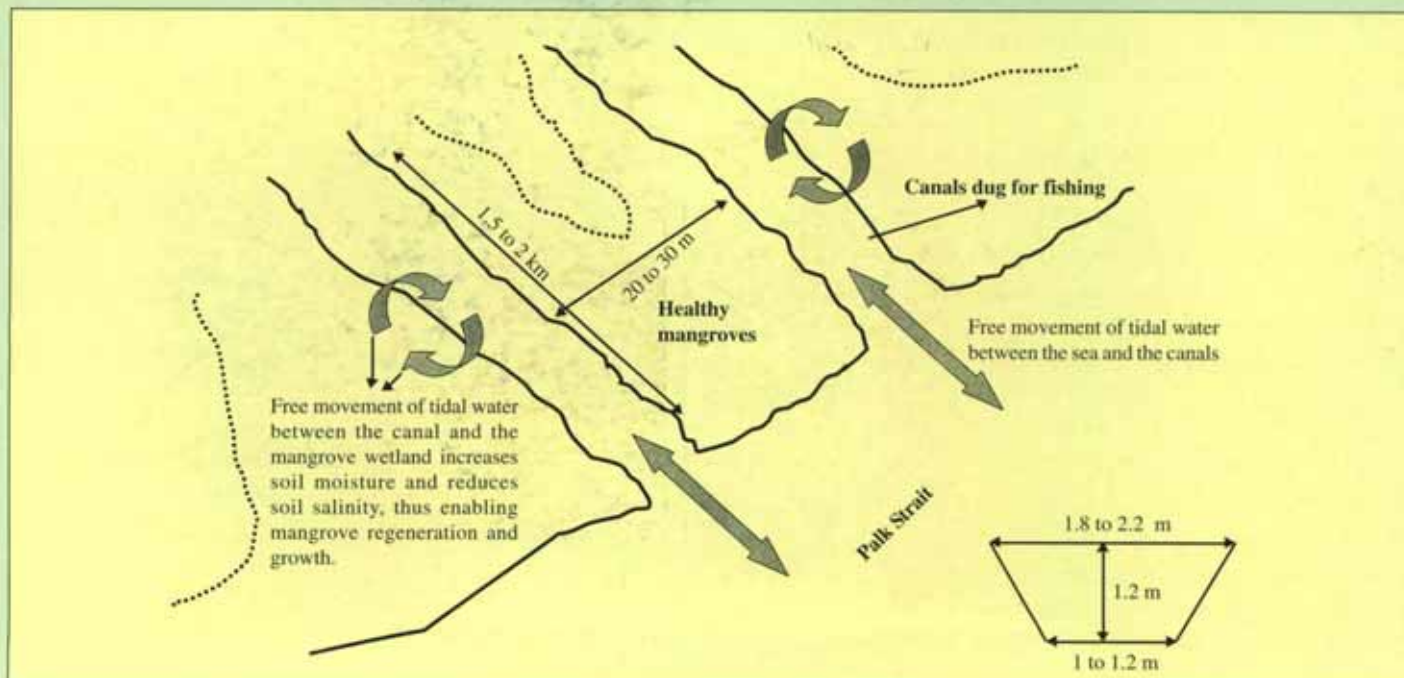
During the southwest monsoon season, a different fishing method is followed. During this season, fish and prawn that migrate from the sea into the canals during high tide are trapped and harvested. Two pens are fixed in the main canals, about 100 and 250m from the sea respectively. In addition, a modified pen, locally known as *mookku saar*, is fixed at the mouth of the canal. This pen allows fish and prawns to migrate into the canals from the sea along with the high tide, and do not allow them to escape into the sea during low tide. The trapped fish and prawn move into the semi-circle canal from where they are collected using a small scoop net.

### 5. Origin and development of canal fishing

Local fishers say that canal fishing began some 200 years ago. Its origins are linked closely to the history of salt-making in this area.

Salt-making started in the lands situated north of the present mangrove reserve forest during the reign of King Sarabhoji I of Tanjore (some 270 years ago, as per the documents available in the Saraswathi Mahal Library, Thanjavur). A simple method was followed to make salt. Seawater entering the wetland behind the mangrove forest during summer was trapped and allowed to evaporate; the resulting salt was collected for domestic use. Normally during the

Fig. A-2 How Man-Made Canals Integrate Development of Mangroves and Fisheries





*Typical mangrove fishing canal area (along with side canal). The saar and pari will be deployed here for trapping fish, prawns and crabs.*



*Close-up of Mookku saar. This device is used to divert fish towards the pari.*



*Close-up of a pari, a common fish trapping device used in mangrove canals.*

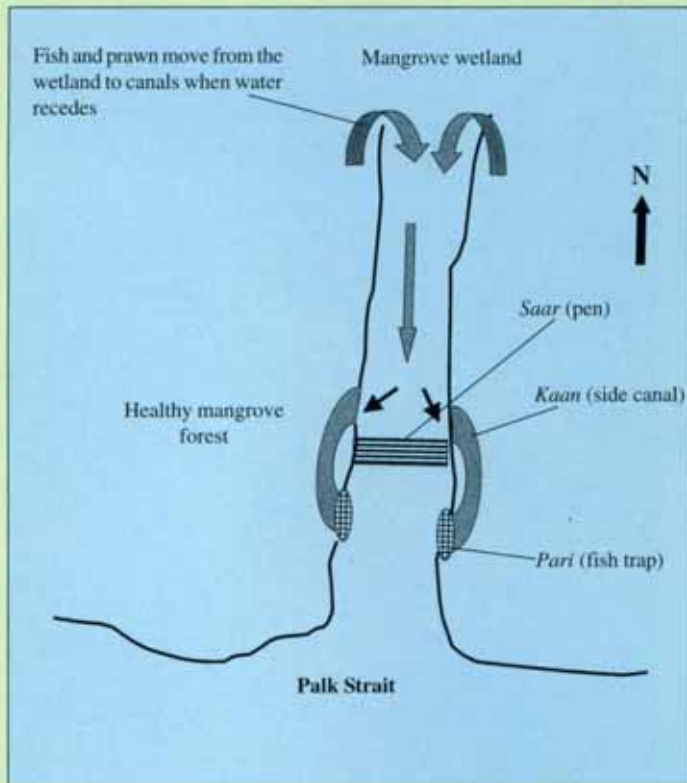


*Canal fishers have harvested fish and prawns from the pari and are setting it up for a second harvest.*



*Scoop net used for harvesting fish and prawns in the canals, usually at the end of the season.*

**Fig. A-3 Fish Harvesting in Man-Made Canals**



month of May, the tidal amplitude of spring tide is very high since the earth is very close to the sun. Hence the gravitational pull is more powerful. According to records available in the Salt Corporation of India, Madras, the British rulers modified the traditional method of salt-making during the early 1800s and introduced the present systematic procedure to produce good quality salt.

The new method introduced by the British required the supply of a large quantity of sea water. For this purpose, five

**Table A-1 Families that Traditionally Utilise Canals for Fishing**

No.	Name of the hamlet	Number of families	No. of canals	Location of canals – Reserve Forest
1.	Veerankoil – Maravakkadu village	25	31	Maravakkadu and Thamarankottai RFs
2.	Manganangkadu – Sundaranayagipuram village	18	19	Maravakkadu and Palanjur RFs
3.	Manjavayal – Thamarankottai village	9	9	Maravakkadu and Thamarankottai RFs
4.	Karisaikkadu – Thamarankottai village	19	21	Thamarankottai and Palanjur RFs
		<b>71</b>	<b>79</b>	

large canals were constructed across the mangrove wetland. Some of the Veerankoil families who worked as labourers in the salt pan noticed that these canals were full of fish and prawn, and catching them in the canals was quite easy. That's what led to the practice of canal fishing in the area.

Between 1743 and 1837, the Maratha rulers of Tanjore founded a number of *chatrams* (rest houses for pilgrims to Rameswaram). To maintain these *chatrams*, the Maratha rulers established a separate Chatram Department. The Chatram Department earned revenue through the felling and sale of mangrove trees of the present Thuraikkadu, Maravakkadu, Vadakadu and Thamarankottai Reserve Forests. (The Forest Beat covering these reserve forests is still known as Chatram Beat). Fishers of Veerankoil utilized this clear-felled area to construct canals and developed their own fish traps for effective fishing in the canals.

#### 6. Social dimension of canal fishing

According to local fishers, a family that provided labour for salt pans about 200 years ago constructed every man-made canal found in the mangrove wetland. Since then, these canals have been utilized by the descendants of the families that constructed the canals.

#### Families traditionally using man-made canals for fishing

Table A-1 shows the number of families from different hamlets that traditionally use the canals for fishing. Table A-2 mentions the castes these families belong to.

**Veerankoil:** In the Veerankoil hamlet of Maravakkadu village, 163 families of the *Ambalakkurar* caste reside. Among them, 25 families traditionally use the canals for fishing. Other families fish in the sea and the pits and puddles of the mangrove wetland.

**Manganangkadu:** In Manga-nangkadu, 18 of the 105 *Ambalakkurar* families depend on the canals for their livelihood. Other families fish in the sea.

**Manjavayal:** Among the 511 households of the Manjavayal, 263 belong to Thevars, 196 to *Ambalakkurars*, 35 to Scheduled Castes and seven to other communities. One Thevar family, seven *Ambalakkurar* families and one scheduled caste family use the canal. All other *Ambalakkurar* families and a few families belonging to scheduled castes fish in the sea and lagoon.

**Karisaikkadu:** There are some 180 households in this hamlet. Of these, 105 belong to *Ambalakkurars*, 25



**Table A-2 Families that Utilise Fishing Canals – by Caste**

No.	Name of the hamlet	Families that fish in canals	Community		
			Thevar	Ambalakkarakar	Scheduled caste
1.	Veerankoil	25	-	25	-
2.	Manganangkadu	18	-	18	-
3.	Manjavayal	9	1	7	1
4.	Karisaikkadu	19	12	1	6
		<b>13</b>	<b>51</b>	<b>7</b>	

and 40 belong to Thevars and Scheduled Castes respectively. Among them, 12 Thevar families, six families from scheduled castes and one Ambalakkarakar family utilise the canals.

#### *Norms followed for fishing in the canals*

The fishers who utilize the fishery resources of the canals strictly follow the following norms:

- Only the families that traditionally use the canals have the right to fish in them. No other fisher should fish in the canal even if it is not being utilized.
- A family that traditionally uses a canal can temporarily transfer the rights to relatives, but they cannot claim any rights over the canal.
- The families that traditionally use the canals should maintain them by desilting them every year.

#### **7. How canal fishing helps in mangrove regeneration**

The canals constructed for fishing prevent stagnation of tidal water in the mangrove wetland during summer, and thereby help in maintaining the soil salinity suitable for mangrove regeneration and growth. The biophysical research carried out by MSSRF indicates that the Muthupet mangrove wetland is degraded mainly because of changes in the microtopography, the cumulative effect of past management practices such as clear felling and reduced inflow of

freshwater. The changed microtopography leads to stagnation of tidal water during summer, which in turn increases salinity to a level that's lethal to mangrove plants.

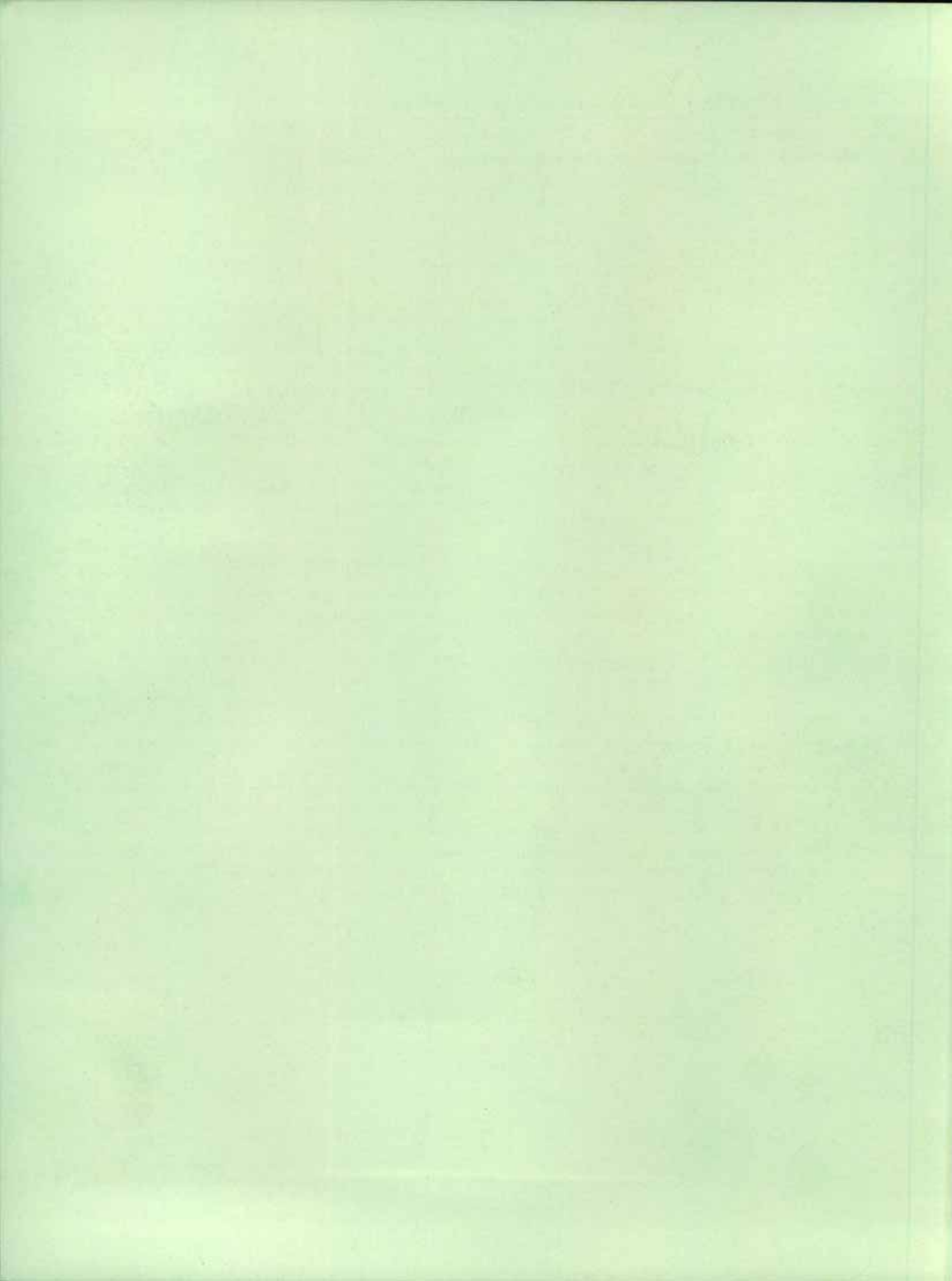
Second, the free movement of tidal water keeps the moisture level of the mangrove wetland high; thereby the bulk density of soil is maintained. This avoids

subsidence of the sediment in the mangrove wetland. Therefore the canal fishing method can be effectively utilized to restore the degraded mangrove wetland.

It must be mentioned that the trench technique developed for mangrove restoration by MSSRF and demonstrated successfully at Pichavaram can be effective only in relatively small areas of about 10 to 20 ha. The traditional canal fishing method, on the other hand, can help restore large areas of degraded mangrove wetland.

#### **8. Forest Department vs Canal Fishing**

All the man-made canals found in the Muthupet mangrove wetland became the property of the Tamil Nadu Forest Department after the mangrove wetland was declared as Reserve Forest. However, the Forest Department allows fishing in the man-made canals by leasing them to the Maravakkadu Sea-fishers Cooperative Society. Families that traditionally use the canals are members of this society. The Tamil Nadu Forest Department has recently recognized the utility of canal fishing in the restoration of degraded mangrove areas. The department can effectively utilize the canal fishing method to introduce eco-development programs in the Muthupet mangrove wetland. Canal fishing can also encourage fishers to participate in mangrove conservation and management, and thus promote Joint Mangrove Management.





1



2



3



4

1. Vathal craft from Adiramapattinam entering the fish landing centre after fishing in neritic waters near the Muthupet mangrove wetlands.
2. Fisherman displays catch of seabass from neritic waters near mangrove forest in Muthupet.
3. Prawn catch from Muthupet lagoon.

4. Canal fisherman sets up a pari to trap fish and prawns.
5. Catch harvested from Muthupet mangrove fishing canals being auctioned.



5



*Conserving and strengthening mangrove ecosystems, empowering local communities, enabling participatory mangrove forest management, spreading mangrove literacy... these are the major objectives of Joint Mangrove Management.*



**M.S. SWAMINATHAN RESEARCH FOUNDATION**  
3rd Cross Street, Institutional Area, Taramani, Chennai 600 113, India.  
Tel: +91(44)2254 1229, +91(44)2254 1698. Fax: +91(44)2254 1319.  
E-mail: [msswami@mssrf.res.in](mailto:msswami@mssrf.res.in) [executivedirector@mssrf.res.in](mailto:executivedirector@mssrf.res.in)