Development or Displacement?

Snapshots from Small Scale Fisheries in Kerala

Dr. J.B. Rajan

Kerala Institute of Local Administration (KILA)
(February 2022)

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FOREWORD

Ever since I became the District Collector of Kollam in 1988, with the Collectorate and the Collector's Bungalow located almost on the coast, I developed keen interest in the development issues of the traditional fisher-folk. My three years tenure in the district brought me into direct day-to-day-contact with them and enabled me to get a very good understanding of their social and economic situation, struggles and tribulations, their social strengths and livelihood deficiencies.

My interest sustained through the efforts of Government to bring about decentralized planning and bring in special measures for coastal areas. Finally, as the head of a committee looking into the issues of traditional fisher-folk, I could get an excellent overview of the current situation.

A senior development professional once remarked that tribal development in India has been a serial tragedy of failures. This statement could be quite true in respect of traditional fisher-folk of Kerala. They have been rightly classified along with the Scheduled Tribes as the "outliers" of Kerala model.

Dr.J.B.Rajan who started his career as an activist more than three decades ago, has an interest which combines scholarly understanding of issues with a practical realization on some of the ways forward. In this book, "Development or Displacement" through interesting snapshots, he gives both a wide-angled and focused view of the real life situation of the fisher-folk, enriched by good data.

It is a conundrum why the fisher-folk of Kerala have remained backward, as unlike the Scheduled Tribes they are politically conscious and fairly well-organized. Their resource base though severely depleted, is still sufficient for most of their livelihood needs and their traditional skills and social strengths are still strong. But somehow, after their initial catch of fish, the value chain seems

to be totally outside their control, largely in the hands of a set of persons, institutions and forces which seem to combine the negative characteristics of feudalism and capitalism.

There is an apocryphal statement attributed to late Dr. Verghese Kurien, the father of milk cooperatives in the country that, in Kerala, what is required is "blue" cooperatives of traditional fisher-folk, owning and controlling the whole value chain starting from fishing gear and equipment up to export systems. Even at this point of time, it looks to be the only sustainable solution. To set it off, it is necessary to go to the people and make them the "subjects" of development through proper conscientisation in the true Freirian sense. An inclusive participatory development plan for traditional fisher-folk needs to be prepared bottom-up, starting from the traditional habitat, converging available resources and services, with the whole process supported by committed professionals on a voluntary basis. Of course, there are challenges posed by entrenched vested interests which can be countered only by the fisher-folk internally aware of their rights and interests. Hopefully, this is not a pipe dream.

S.M. VIJAYANAND IAS (Rtd.)
Former Chief Secretary, Govt. of Kerala &
Chairman, Sixth State Finance Commission,
Govt. of Kerala

11/12/2020

PREFACE

I am happy to present you the book entitled 'Development or Displacement: Snapshots from Small Scale Fisheries in Kerala' is an anthology of writings by Dr. J.B. Rajan, Associate Professor, KILA. This is based on his research and involvement for the last three decades in the fisheries sector of Kerala,

Dr. Rajan has nearly 70 articles on contemporary issues of small-scale fisheries sector of Kerala. From this long list of articles, he has selected the most relevant ones suited to the theme of this book. The articles so selected are updated with relevant data wherever possible and also slightly modified to suit the sequence and theme.

This book contains 17 chapters that are broadly categorised into two sets: pre-mechanisation and post-mechanisation. The chapters of post-mechanisation is further divided into technological changes, repercussions, and status. Thus, this book provides the reader a snap shot of the changes and core issues facing the small-scale fisheries sector and the fisher folk of Kerala.

We, in KILA congratulate Dr. Rajan for his efforts. I hope the the book provides ample inputs and evidence for policy makers and stakeholders while designing programmes and actions in the sector.

Joy Elamon
Director General
KILA

14th January 2021

ABOUT THIS BOOK

A study project titled 'Techno-Economic Analysis of Motorisation of Fishing Units: A Costs and Earnings Study Along the Lower South-West Coast of India' in 1988, was my entry as a researcher to the Fisheries sector of Kerala. Since then, I have continued involvement with the sector as researcher and writer on contemporary fisheries, fishing communities and coastal issues. Fisheries is a primary economic activity but also the prime livelihood activity of specific communities through generations. Like in all walks of life of our time, this sector has also undergone drastic changes. The turning point of immense consequence was the introduction of mechanization through the Indo-Norwegian Project (INP) that triggered technological changes in fisheries sector. This interfered with the hitherto traditional gears, knowledge and systems in the sector often qualified as 'traditional science' with far-reaching implications on work- organisation, community based management regimes, and socio-economic milieu of traditional fisheries. As the changes through INP made deeper inroads, traditional fishermen were compelled to shift from their artisanal character in due course of time. But looking back, from a researcher point of view and also a keen observer weighing transformations the sector underwent over the years, it is my wish to share my anxiety whether is it 'Development or Displacement' the sector witnessed? It is to share this ambiguity and also to give the reader the prospect to judge for themselves, a selection of articles from a collection of 70 including some research studies over a period of three decades become the content of this book. The selected articles shall vouch that over the years the sector has undergone noticeable changes in; fishing activity, technology, workforce, marketing, management systems including the living conditions of the community. The hope is to share a historical profile of changes in the sector through this anthology, sequenced in chronology of a primary economic activity that also, as mentioned earlier is the prime livelihood means of resource dependent communities.

The selection of articles spanning over three decades provide me the freedom to divide them into two broad phases as pre and post mechanization phases. The post mechanization phase being more intrigue is further divided to three parts to detail its multiple facets. Each part begins with a brief introduction with focus on the content part engages.

Pre mechanization phase provides a vivid account of the sector before the advent of INP, detailing its traditional characteristics and systems. The three chapters – chapter one, provides traditional systems prevailed in the small-scale fisheries sector such as traditional skills and knowledge of fishermen; and chapter two, the social relations within the community and how they related with *Kadalamma* (Mother Sea). Chapter three is about *Kadakkodi* (Sea Court), the indigenous judiciary in fisheries.

Phase two is schemed into three parts (II to IV) sequentially taking the reader through different aspects of post-mechanisation. Part two of this phase details technological dualism through the introduction of INP and subsequent changes the sector underwent. Part three is repercussions of INP on artisanal communities, their engagement and ways to cope with forced changes and to continued struggle to be in fishing as livelihood option. The final part is the plight of the section of community who are literally between the 'devil and deep sea', being further and further marginalized from the mainstream.

As mentioned at the beginning, my engagement with the sector and community remain uninterrupted and connected with more studies and interactions. The question that still haunts me is about development and how development is to be implemented? Is their process by which people become part and parcel of changes, the need to engage and prepare people when alien technology is introduced into their lives, retain or rediscover value systems those carries wealth of knowledge for generations? Each of these and many more shall continue to be probed.

Dr.J.B.Rajan

ABOUT THE AUTHOR

Dr. J.B. Rajan, with experience in research and capacity building spanning over three decades, is presently Associated Professor (Planning Management and Development) in KILA - an autonomous institution under Government of Kerala. He is Honorary Chief Coordinator-Research and Publication of Working Group 05 on Famine & Society, ISA Forum of Sociology, Spain. He is also Honorary Think-Tank Member as Senior HLP Expert in HLP Foundation, Bangladesh. His keen interest in local governance led him to become a State Resource Person in the People's Plan Campaign (PPC) in Kerala since its inception in 1996. He has initiated TQM-ISO mission for Grama Panchayats in Kerala. Dr.Rajan has several years of involvement and leadership with Non Governmental and People's Organizations in the fisheries sector. Secretary and Coordinator of Programme for Community Organisation (PCO), Member Secretary of Kerala Fisheries Society (KFS), and Member Secretary of Kerala Institute for Environment and Development (KIED) are few of his vocations among them.

Dr.Rajan earned PhD in Commerce (University of Kerala), MBA (IGNOU), M.Com (University of Kerala), and LLB (University of Kerala). He is the Editor of KILA Journal of Local Governance (KJLG), and has to his credit 30 study/evaluation reports and over 70 articles both in English and vernacular Malayalam. Dr.Rajan has participated at various international conferences and courses at countries such as the Netherlands, Germany, USA, Canada, Thailand, Philippines, Sri Lanka, Bangladesh, and Nepal.

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ACKNOWLEDGEMENT

As mentioned in 'About this book', this publication is a compilation of my writings over the last three decades based on the findings of social research in the fisheries sector of Kerala. It is the fisher people who have helped me, in each of my research in fisheries, by liberally sharing their knowledge with me. I am very much indebted to the traditional fish workers who have generously shared their wisdom and information that continues to enrich my knowledge in fisheries.

Mr.S.M.Vijayanand (IAS Rtd.), former Chief Secretary and present Chairman of Sixth State Finance Commission, who spared his valuable time to read this book despite his busy schedule. His foreword to this book has well captured its content and the nuances of fisheries sector. It is a new piece of information that he has emotional attachment to the fisher people since 1988, when he was the Collector of Kollam district. I owe him a lot for his foreword to this compilation. The motivation for this book is Dr. Joy Elamon, Director General of KILA, whose initiative for publication by KILA on the domain of faculty members. He has provided the supportive mechanism and also written preface to this book. I express a word of gratitude to him.

Mr. Siraj Meenatheri [former Additional Director, former sub editor of Kerala Language Institute, writer and winner Bala Sahitya Award] has made a thorough reading of my entire writings and helped me sequencing the articles for this book. He has also offered critical comments. I am thankful to him for his valuable service. I have made many studies on local governance in fisheries along with Mr.Haribabu.T.P, my friend and a freelancer in fisheries and coast. I thank him for critically going through this book and making constructive comments. Thanks are also due to Mrs. Asha Sudheesh, Freelance Editor, for reviewing this book.

I also extend my thanks to Mrs.Sulochana for the secretarial support to compile my writings.

23/07/2021 Dr. J.B. Rajan

TRANSLITERATION

Many terminology on fishing technology and systems are in Malayalam, the mother tongue of Kerala. Such terminologies in Malayalam are written in italics and have been transliterated within bracket and/or further explanation is given. The names of places and persons are exception to this.

ACRONYMS

AFH	:	Artificial Fish Habitat
AR	:	Artificial Reefs
ARP	:	Artificial Reef Programme
AFH	:	Artificial Fish Habitat
am	:	ante meridiem; meaning before noon
CAPART	:	Council for Advancement of People's Action and Rural Technology
CAPCC	:	Coastal Action Plan on Climate Change
CBM	:	Community Based Management
CMFRI	:	Central Marine Fisheries Research Institute
CM	:	Co-management
CPUE	:	Catch Per Unit Effort
CRZ	:	Coastal Regulation Zone
CSS	:	Centrally Sponsored Scheme
D/E ratio	:	Debt-Equity Ratio
DoF	:	Department of Fisheries
etc.	:	etcetera
FAD	:	Fish Aggregating Devise
FAL	:	Fish Attracting Lantern
FAO	:	Food and Agricultural Organisation
FAO-TAP	:	Food and Agricultural Organisation-Technical Assistance Programme
FGD	:	Focus Group Discussion
fm	:	Fathom
FT	:	Fishing Time
FRC	:	Fisheries Research Cell
FWS	:	Fishermen Welfare Societies
GEFS	:	Global Ensemble Forecast System
IAY	:	Indira Awas Yojana
IBM	:	Inboard Motors
IFP	:	Integrated Fisheries Project

ISRO	:	Indian Space Research Organisation
ITDG	:	Intermediate Technology Development Group
IMD	:	Indian Metereological Department
INP	:	Indo-Norwegian Project
KFWSA	:	Kerala Fishermen Welfare Societies Act
KFWC	:	Kerala Fishermen's Welfare Corporation
M	:	Motorised
m	:	Metre
MATSYAFED	:	Kerala State Cooperative Federation for Fisheries Development Limited
n.d.	:	no date
NGO	:	Non Government Organisation
NM	:	Non-motorised
NRs	:	Natural Reefs
NWP	:	Numerical Weather Prediction
OBM	:	Out Board Motor
PCO	:	Programme for Community Organisation
PIL	:	Public Interest Litigation
PPC	:	People's Plan Campaign
pm	:	post meridiem; meaning after noon
r	:	Correlation Co-efficient
RRA	:	Rapid Rural Appraisal.
SIFFS	:	South Indian Federation of Fishermen Societies
SOP	:	Standard Operating Procedure
Sq.km.	:	Square Kilometer
TCMP	:	Technical Cooperation Mission Programme
TT	:	Trip Time
TTP Ltd	:	Travancore Titanium Products Ltd.
TSSS	:	Trivandrum Social Service Society
TSC	:	Total Sanitation Campaign.
UE	:	Unit Effort
USA	:	United States of America
UK	:	United Kingdom [ch 8]
UN	:	United Nations
VSSC	:	Vikram Sarabhai Space Centre
VTS	:	Vessel Tracking System

PART I:
PRE-MECHANISATION

The small-scale fisheries has a long history of specialized domains carried out by specific communities, as an artisanal occupation. The artisanal fishing was based on traditional knowledge and skills – what can be termed a 'traditional science' - acquired through the trans-generational process. Gone are such days of community based fishery management regimes knitted upon the concept of '*Kadalamma*' (Mother Sea). This part, containing three chapters, is an attempt to revisit the traditional systems in artisanal fisheries. Chapter one takes the reader through the traditional science of artisanal fishing, chapter two on the social relations existed among fisher people, and chapter three on indigenous judiciary in fisheries what is termed as *Kadakkodi* (Sea Court).

1
ARTISANAL FISHING: TRADITIONAL SCIENCE

Fishing, the world over, is as old as hunting and even older than agriculture. People living close to water bodies first used their bare hands for catching fish. Over centuries, they developed simple tools, based on the learning encountered through continuous interaction with coastal eco-system. The fisher people learnt about the art of fishing, knowledge of the sea, seasons and the fish through practical orientation over long years of heritage. They shaped their own tools and implements over generations to suit the seasons and species. Their skills and knowledge are diverse in nature and vary from village to village. Traditional fish harvesting technologies are largely environmentally benign and depend on variety of factors such as profile of coastline, extent of surf action, tidal effect, width of the continental shelf, configuration of the fish resources, wind and weather conditions, availability of raw materials and fabrication skills, and socio-economic factors. (Rajan.J.B., 2013).

From time immemorial, the fisherfolk along the coasts of India used traditional harvesting technologies based on indigenous knowledge. They depended on the marine fishery resources for livelihood using indigenous and traditional technologies that required expertise and specialisation. The fishing and allied activities were followed by specific communities as an artisanal occupation. There are evidences for the art and science of artisanal fishing, evolved by the traditional fishermen through experiments and innovations. Indigenous knowledge are acquired through experience and transmitted from generation to generation. Mr. John Fernadez, an Activist from fishing community, wrote: "Through continuous interaction with the ocean and fish, the artisanal fishermen accumulated trans-generationally a treasure of scientific knowledge on diverse marine eco-systems and fish behaviour. The technical capability of artisanal fishermen

is based on this knowledge, the application of which has proven their worth by enduring for thousands of years like the Ayurveda, the indigenous form of medicine and health system. The traditional fishing technologies had evolved to suit marine terrain and the specific local fishing conditions." [Fernandez, John., 1994]. Though not acquired through formal education, indigenous knowledge is gained by the fishermen through experience and trans-generational transmission process.

The domains attributed to indigenous knowledge and skills related to fish harvesting are well recognized in the community. It is rightly remarked that "If one tries to name all the skills that a fisherman requires to go fishing we will be amazed to find that they cover a wide range of techniques." (Nalini.N and Gabriella.D, 1985). Though known only to regions of origin, the artisanal fishermen have diverse skills and knowledge in various fields, such as oceanography, navigation, craft-gear technology, astronomy, etc. Like these immense skills and knowledge, they also have indigenous regulatory systems for managing the fishery. (Rajan.J.B, 2002). The scientific theories behind indigenous knowledge are not visible. Rather not many records are available on indigenous knowledge. But there is art and science behind every sphere of indigenous knowledge, as given below.

Diving and Swimming

Fishermen learn the skills of diving and swimming from their childhood. As children, it was their hobby to skin dive into the sea bottom and learn the skill of swimming in the inshore waters. Mr. John Fernandez, an Activist from fishing community, wrote: "As a child my hobby was to skin dive into the sea bottom to catch sea crabs with my hands. Such was the beauty of the sea bed that sometimes I used to get a peculiar kind of heavenly feeling from the sights of the sea bottom. Gradually I fell in love with the sea. No one taught me swimming. The mother sea helped me learn it just like a mother helps her baby to learn how to suck her milk gently". (Fernandez, John., 1994).

Astronomy

The traditional fishermen can read time and identify directions by observing the star constellations [locally named "*velly*"[1], referring glittering star]. Some of the star constellations identified by fishermen in south-west coast are *Kurishu Velly* [Star constellation in the shape of a Cross], *Kappal Velly* [Star constellation in the shape of a Ship], *Chottu Velly* [A much glittering star that they see at the time of supper], etc. But this may vary from region to region. The identification of star constellation relates to astronomy.

Oceanography

The traditional fishermen predict the nature of the rain and water current, based on wind direction. The weather changes and species varieties are predicted, based on the sound of the sea tide, occurrence of typical water current, colour of the sea, water bubbles, occurrence of sea-snake/dolphin/jelly fish, etc. The *Koolu (*shoals of fish*)*, *Valivu (*water current*)*, *Polippu (*glittering*)*, *Chaakara* (mud bank), etc. are some the colloquial terminologies of traditional fishermen in southern coast of Kerala. They denote the oceanographic features such as occurrence of fish in abundance, typical water current signalling the occurrence of some specie, glittering colour of tides denoting the occurrence of specie like sardine, and mud bank. These understanding of water currents relates to oceanography. Two of the fishermen in Kerala – Mr.E.G.Peter and Mr.A.Andrews, who were also active in the fish workers movement, wrote about colloquial terminologies and traditional systems. (Peter.E.G., 1995; Andrews.A., n.d.).

Craft-Gear Engineering

The artisanal fishermen had expertise on craft-gear technology from their own community. It is the traditional carpenter from the community known as *Odaavi*, who design and make fishing crafts. The designer of traditional fishing gear locally known as *Madi-kettali*, who design and make nets like shore-seine, boat-seine, etc.

1 The 'll' in *velly* is pronounced as in Collin.

that require specialised skill. The *Odaavi* and *Madi-kettali* relate to the craft-gear engineering of modern knowledge.

Navigation

Every fishing unit has a leader to navigate the fishing craft, known as *Sranku*. This is applicable in the case of fishing units operate seine-nets; boat-seine, shore-seine, etc. where a group of crew members are involved. It is the leader, who directs the crew members of a fishing unit on navigation such as for crossing the surf, direction, etc.

Triangulation

The artisanal fishermen cast the net (especially gill nets) or hook-and-line by a method called *Kanicham*. It is a method of determining a particular site in the sea, by locating the array of mountain ranges in one row. *Kanicham* relates to triangulation[2] in engineering.

Innovations

The indigenous innovations of fishermen are also versatile in nature. The origins of artificial reefs, ring-seine nets, fish attracting lanterns, etc. are examples of their innovations. It was one Mr. Sukoorappan, a fisherman from Anchuthengu fishing village in Thiruvananthapuram, had discovered Artificial Reefs accidentally, and termed as *Kappal Paaru* (*Kappal* means ship and *Paaru* means reef); Accidental Reefs [artificial reefs formed by the part of ship wreck during Second World War] in the area and their potential for fishery resource. Taking cues from the purse-seine nets in the mechanized sector, fishermen had designed and developed Ringseine. One Mr.Dinesan Udhyavar from Kannatheertha Kadappuram in Ramadi of Kasaragod district and another Mr.V.T.Antony from Kandakkadavu of Chellanam Panchayat in Kochi have designed Ring-seine for the first time almost in the same period, but in different names respectively of *Thanguvala* and *Ranivala*. (Rajan.J.B, 1993). One Mr.S.Andrews from Marianadu fishing village in Thiruvananthapuram pioneered the idea of fish attracting lantern

2 Triangulation is a way of determining something's location using the locations of other things.

(FAL) in the district; based on his experience of fishing with Drift net during night. [Rajan.J.B, 1995].

Women in Fisheries

Traditionally, fisher women also played significant role in pre and post harvesting activities in fisheries. The pre-harvest activity of fisher women was weaving of fishing net (In colloquial language the hand-weaving of fishing net is called as *Maalu*). The post-harvest activities by fisherwomen include traditional ways of fish salting, drying, curing, and vending. Fish vending women function as the distribution channel of fish, connecting the fishermen and the ultimate consumer. They supply fishes at door to door, local markets, by-lanes, and road-side vending places. The hardworking nature of fish vending women is incomparable, as they travel to long distance on bare-foot with a head load of fish.

The traditional fishermen's knowledge of the sea and marine eco-system enabled them to adopt different technologies. A study conducted during 1981 identified 20 craft and gear combinations in small-scale fisheries. (Kurien, John and Willmann, Rolf., 1982). But the indigenous knowledge system in the traditional fish harvesting has been declining with the advent of modern technologies. The commencement of Indo-Norwegian Project (INP)[3] and subsequent changes in fisheries, the sector witnessed vanishing wisdom of fisher people; which was acquired with indigenous knowledge and skills.

(*This chapter is a modified version of my article 'Furthering the Decline of Indigenous Knowledge in Fisheries' published in the book 'Free Trade Agreements and Indian Economy: Prospects, Potentials, Problems and Experiments' by Biju.S.K et al, 2013 (Editors). P.24–32.*

3 The introduction of INP is discussed in Chapter 4.

2
ARTISANAL FISHING: SOCIAL RELATION

Traditional fisheries was founded on community cohesion, backed with values, ethics, beliefs, and practices.

Mother Sea

For the traditional fishermen, the sea is not simply a means of livelihood. They consider the sea as 'Mother Sea' (*Kadalamma* in Malayalam vernacular). It is this concept of 'Mother Sea' that make the traditional fishermen adapt to eco-friendly technologies, so as to preserve the marine resources undisturbed. (Rajan.J.B, 2019). In the words of Mr. John Fernadez: "The mother and baby relationship is so warm that the child never over drinks. The child is sure that the milk in her breast would not dry that soon if properly milked and also that the mother will never starve her child. The relationship between fisherfolk and the mother sea is almost the same." (Fernandez, John., 1994). The eco-system available in Kerala viz: wetland, mangrove forest, and riverine systems – all provide excellent nursery grounds for many species of commercial importance. Being a resource dependent community, the traditional fishermen resort to passive fishing gears - eco-friendly harvest - for conserving the Mother Sea, instead of eco-destructive active fishing gears.

Family Enterprise

The artisanal fishing is more of a social cum economic activity and less of a business, often with a considerable proportion of harvest for subsistence. It is a family enterprise, usually with little hired labor; in which men, women and children in the family play important roles in fishing and related activities. While men involve in fishing, women members take the responsibility of selling it. The women and children also engage or help in net making, repairing of fleet, etc. (Rajan.J.B., 1994). To quote from Belshaw: "….it is a home as

well as a means of earning livelihood; a source of subsistence as well as of cash income; a focus for nearly all the interests and activities of the family and not merely economic interest or activities….." (Belshaw.H., 1965). This is equally applicable to traditional fisheries.

Sharing System

Uncertainty and risk are the inherent hall marks of fisheries. To cope with these, income sharing system was in place. The sales value, after deducting common expenses, is shared for crew members and investment or repair of fishing fleet viz. craft, gear, and allied equipments like sail and oar. The sharing ratio varies between fishing villages to villages and also depending on the type of fishing fleet. However the average ratio was 80:20 before motorisation of country crafts; 80 percent share to crew members and 20 percent share to the owner of fishing fleet. With the increase in investment after motorisation, the share of fishing fleet has increased to the tune of 40 to 50 percent. Though the share of crew has declined over the period, the system still continues. The fishermen take collective responsibility of sharing the revenue and loss.

Social Responsibility

There existed a system in the community to give a share of fish catch to the socially or physically handicapped in the community, who are unable to earn their daily bread. They include barber[4], differently abled, widow, destitute, aged, etc. They will be given share of fish, what fishermen term as *Karikku-meen* (means, fish for side dish, i.e. *Curry*[5]). With the commercialisation in fisheries after motorisation of country crafts, this system was wiped out.

Karanila (Income-Spreading mechanism)

In some regions, especially central and north coast of Kerala, income spreading mechanism called '*Karanila*' was in place. *Karanila* literally means 'shore status'- a privilege granted to anyone who

4 There were community barbers in olden days, but declined with the advent of Barbour Shops and Beauty Parlours.

5 Cooked fish with rice and/or tapioca is the staple diet of fisher people.

expresses a demonstrable interest in associating with a fishing unit by being present on shore, when the fishing unit is ready to set out to sea for fishing. (Kurien, John. and Vijayan.A.J, 1995). Accordingly no fisherman is denied work, if he opts to join the crew. In case of excess number of crew, a few are rested and given half the share that the working crew are entitled on the day of fishing. However the system varies from region to region.

Kuri-kalyanam (Fund Raising Festival)

Kuri-kalyanam is a unique convention, prevailing in certain areas of Malabar region, to raise interest free finance. *Kuri* in vernacular Malayalam means *invitation*, and *Kalyanam* means Wedding. It is an invitation for feast to collect donations. By this system, anybody who wants to raise certain amounts for a particular purpose organises a feast in his house where his friends and relatives are invited. Hence this system is also called by the name *Chaaya-kuri* or *Panam-payattu*. (Rajan.J.B., 1999). *Chaaya* in vernacular Malayalam means Tea; *Panam* and *Payattu* respectively means Money and exercise[6]. The convention is that those come to attend the function would contribute small amounts within their capacity to the host. An account book is maintained to record the contributions so received. The host also, who goes to attend a similar function to another house will have to reciprocate by a contribution within his capacity. It is a mutual benefit system. The fishermen families organise *Kuri-kalyanam*, when they are in need of money for launching fishing fleet, house construction, etc. The *Kuri-kalyanam* is similar to those that prevailed in Europe and Japan. Willmann says that traditional groupings existed in the form of mutual aid associations or family loan associations in European fisheries, while fishermen's guilds were common in Japan during feudal times. (Willmann, Rolf., 1987).

Truthfulness

There was a myth among fishermen that sea is truthful and righteous. (Gotz Hoeppe, 2007). This was based on their concept of *Kadalamma* (Mother Sea). "For the fishermen, the sea's truthfulness

6 It has also another meaning fight. But here it means the exercise of raising finance.

(*satyam*) is a normative concept that subsumes the notions purity, protection and provision and emphasises reciprocity". (*ibid*.) It is this concept of protection and provision make the fishermen to provide a share of fish to those who cannot earn. Also the system of *Kuri-kalyanam* is based on reciprocity. "….. it defines a 'code of conduct' which, though in principle it can be practised by everyone, is held to be characteristic of the people residing in the beach area and distinguishes them from the people of the outside world, ….." (*ibid*.). The fishermen believe that the truthfulness has reciprocal relationship between the sea and the fishermen. The community cohesion is also built on this belief.

3
KADAKKODI: INDIGENOUS JUDICIARY

Like the immense skills and knowledge, the artisanal fisher people have indigenous judiciary for managing the fishery. The *Kadakkodi* (Sea court) that had a strong influence on the fishing community in North Kerala is an example of this. Though relevant from the management perspective, little is known about this indigenous system. The author noticed the phenomenon of *Kadakkodi* during the course of earlier studies. Also it was realised that this indigenous system have almost declined and hence attempted to document the same. (Rajan.J.B, 2002). Like the traditional technologies that had evolved to suit marine terrain and the specific local fishing conditions, the local communities also had regulated the fishery through religious and indigenous patterns. The *Kadakkodi* (sea court) had a strong hold in the fishery management regime. The nature and structure of *Kadakkodi* vary between regions and fishing villages. This chapter gives an over view of Sea Court in Kasaragod district.

Kadakkodi **(Sea Court)**

Kadakkodi is a coloquial term coined from two Malayalam words *kadal* (sea) and *kodathy* (court). The *Kadakkodi*, indigenous judiciary at the village level, was formed as per the religious beliefs and systems. This is a forum to settle all disputes in the fishing village, including fishery regulations. Interestingly, *Kadakkodi* is more than a judiciary as it performs legislative and executive functions too. It enacts rules and regulations, enforces and executes them.

Kadakkodi is comprised of two forms of committees: a committee of Hindu priests and a committee of village people. The Hindu priests, known as *Achanmaar*, are elected as per the hereditary Hindu rituals. Once ritualised, the position will be for the entire lifetime. There are 12 priests of different grades, with different functions

to perform. The grade depends on the *Tharavaad*[7] or family status. However, the system and the structure vary from village to village. For example, in the fishing village of Keezhoor, there are 14 priests as against 12 in Kasaba village. The community elects the committee of village people annually, during the time of temple festival.

Powers and Functions of the Sea Court

The indigenous court is vested with powers to settle social, family, and fishery related issues. Apart from settling disputes within and between families and also between groups, it also frames rules, regulates fishing, and executes them effectively and successfully. It regulates fishing technologies, fishing seasons, fishing timing, and fishing right. The prohibition of *avoli-vala* (a kind of Gillnet) and night fishing during monsoon seasons (months of June to August) are examples. Though these prohibitions are seen to reduce fishing pressure, they are implemented with a spirit of resource conservation and equitable distribution of resource.

In the case of family and social disputes, the affected party files a petition before the court. In the case of fishery regulations, often, the issue is taken up *su-moto* by the court or based on the petition of any one from the community like public interest litigation (PIL). The *Achanmaar* (Judges of the Sea Court) usually gather at the temple premises. On receipt of petitions, a flag will be hoisted on the seashore, where the general body is usually convened. The time of meetings and parties involved in the case are also announced. Normally the general body will be held in the evenings, where both the parties are summoned and examined. Sometimes the court will appoint a commission, comprising of independent persons from the village, for detailed enquiry. The court will then hear the version of the commission and pronounce judgment, which will be announced in the general body by the *Achanmaar* (Judges). The aggrieved parties will be given the chance of *Punar* (Appeal). As the sea court enjoys social control, the judgment is binding (socially, not legally) on the community.

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7 *Tharavaad* – These were large joint family system; known by a family name in vernacular *Tharavaad*.

The court also takes up fishery related issues and frames rules and regulations, which would be announced in the general body. But this would be after a detailed discussion, as in formal institutions like Parliament or Legislative Assembly. If the judgment or rules and regulations of the court are violated, the punishment will be in the form of ex-communication. Those who violate the rules and regulations will be denied rituals on the occasions of birth, marriage, death, etc. And also would be alienated from all social and religious ceremonies in the village. If outsiders (i.e., the other villagers) violate the rules, the same will be referred to the sea court of that village and both the courts will discuss the matter in detail and come to a consensus judgment.

Decline of Sea Court

Though the sea court is an indigenous authority, there are precise formalities like the formal judiciary. The multi-functional roles, i.e. legislative, judiciary, and executive functions of *Kadakkodi* expedite the proceedings. The acceptance of the community, the consensus in settling disputes, the participation and decentralised process are the merits of the court. However, there are no records or documents on the functioning of sea courts.

The sea court has its relevance when formal regulatory mechanisms in fisheries fail. The indigenous regulations have a positive impact. Also from a fisheries management point of view, the indigenous regulations were very productive. This indigenous court in the fisheries sector, which once had a dynamic fisheries management regime, has almost disappeared now! At this juncture, it may be worthy to address the reasons for the fading out of *Kadakkodi*. In some areas, especially in Malabar region, it has totally disappeared. However, it continues to function in the Hindu coastal belt, e.g., Kasaragod. But even here, enforcement of regulations on certain destructive fishing technologies was unsuccessful.

The emergence of two contrasting entities - mechanised sector and artisanal sector – created with the advent of INP[8] also have negative

8 The details on introduction of INP is given in Chapter 4.

impact on the communities' own built-in system of traditional and societal organisations and regulations. It led to the destruction of community cohesion, which existed hitherto. In Kasaragod, where the same group of fishermen own both mechanised and traditional fishing fleet, the divide was not so pronounced. Thus, the existence of village groups like *kadakkodi* was not affected very much. Compelled by the negative externalities like mechanisation and subsequent dwindling of resources, gradually traditional fishermen also moved to modern technologies, fading out their own systems, practices, and regulations. Although the *Kadakkodi* in Kasaragod continued to function, its influence in enforcing the regulations decreased, e.g. prohibition of night fishing was limited to only during monsoon season.

Intervention of state government, creation of formal forums and institutions have all impacted the traditional systems. The formation of fishermen co-operatives by the State Government, along political line, can be seen as yet another reason for the decline of *Kadakkodi*. Earlier, co-operatives were formed on community basis, thus promoting homogenous groups of village communities. "The first co-operative society for fishermen in the region, that is now Kerala, was registered in 1917. At that time, fishermen's co-operatives were registered on the basis of communities with separate societies for the *Arayan* and *Valan* (Hindu) and Christian fishermen" (Kurien, John., 1980). But the situation has changed since the fifties. With the formation of the present Kerala State and the beginning of the Second Five-Year Plan in 1956, a three-tier structure of fishermen co-operatives was set up. The fishermen had no control in the management of these societies, which were by and large benami[9] co-operative registered by the rich and powerful in the community to take advantage for Government loans and subsidies (Achari, Thankappan.T.R, 1980). These were functioned and managed on political lines. The enactment of Kerala Fishermen Welfare Societies Act (KFWS Act) 1980 provided for a grass-root level nodal agency. Accordingly, the coastal villages were delimited into 222 villages

9 Illegitimate ownership of something, on a third party's name.

and an equal number of Fishermen Welfare Societies (FWS) were constituted.

After the setting up of Kerala State Co-operative Federation for Fisheries Development Limited (MATSYAFED), the FWS were replaced in 1988 with 81 Fishermen Development Welfare Co-operative Societies, covering the entire coast of Kerala (*ibid.*). The delimitation of fishermen villages on administrative boundary basis and multiple forms of co-operatives, that too on political lines, have further weakened the village forums. The fifties and sixties in Kerala also witnessed the advent of revolutionary political movements and parties; thus dividing the fishworkers on political party basis. On the other hand, MATSYAFED has liberally supplied fishing implements at subsidised prices. The traditional fishermen after obtaining webbings from MATSYAFED converted those into Ringseines and over powered the fishing vessel with OBMs (Out Board Motors). The new patterns of production, marketing, and distribution patterns fuelled modernisation and ruined those traditional systems in fisheries. The old patterns of social relations have given way to more individualistic and competitive patterns, with the result that the organisations of fishing communities have become more mechanistic. To quote Derek Johnson: "In all social forms, humans have created institutions to restrict individual access to resources so that they may be preserved for collective benefit. Tragedies of the commons occur when such collective institutions are undermined and individuals lose the sense that their long-term interests in resource preservation are being assured" (Johnson, Derek., 2001).

Lessons for community based fisheries management

In the context of the failed attempts or the State Government to manage the fishery in a sustainable way, Community Based Management (CBM) and Co-management (CM) of fishery are buzzwords of the day. Whether CBM or CM, the underlying point is the role of the community in the fisheries management. As Maarten Bavinck (2001) rightly remarked, "Boats don't fish, people do". Since much of the crisis is human-induced, it is useful to recognize

the human dimensions of fisheries. In this context, *Kadakkodi*, the indigenous systems of regulations in fishery, brings lessons that may be recognised and promoted. It is a revealing fact that the *Kadakkodi* has played a significant role in fisheries management and effectively implemented fishery regulations and also maintained cohesive social relationship among and between communities. But unfortunately as traditional sector succumbed to capital intensive technologies, the systems like *Kadakkodi* also declined.

(*This chapter is the modified version of the paper presented in the XIIIth International Congress on Legal Pluralism and Unofficial Law in Social, Economic and Political Development organized by Commission on Folk Law and Legal Pluralism held at Chiang Mai, Thailand on 7-10 April 2002 and published as Congress Proceedings-Vol.II. Pradhan, Rajendra, 2003 (eds.). p. 65-72).*

PART II:
POST-MECHANISATION:
TECHNOLOGICAL CHANGES

In Part I, we have seen how the small-scale, artisanal, fisheries operated time immemorial including some of their rich community practices but unfortunately dysfunctional now. The advent of mechanization in small-scale fisheries, through Indo-Norwegian Project (INP), created technological dualism in the sector with two distinct entities – mechanised and artisanal. The artisanal fishermen had reacted against the ill-effects of mechanization, especially bottom trawling in two ways; politically and technologically. The political reaction was through long struggle against bottom trawling during monsoon season, and the technological reaction through motorization of country fishing crafts and subsequent changes such as introduction of ringseine, fish attracting lanterns, artificial reefs, etc. The selected articles throw light on introduction of finance capital, emergence of market and its influence, and demystify the myths about increased productivity through mechanization and motorization. With the backdrop of technological dualism, this part takes the reader through the reactions of artisanal fishermen.

4
TECHNOLOGICAL DUALISM

There has been a great deal of change in the Kerala fisheries since the middle of nineteen fifties. Fishing technology, socio-politic, and fisheries economic scenario have changed drastically during this period. There has been phenomenal growth in factors of production and output. The fish marketing and financing have expanded in their scope and depth. Despite these, the age old problems facing the sector still persists and new problems emerged. The scope of fishing and allied activities was limited within certain communities from time immemorial as an artisanal occupation. But things have changed especially after nineteen fifties; resulting in technological dualism in the fisheries sector.

Kerala Fisheries – Before 1950

Fishing, especially marine fishing is an age-old occupation that has been carried out by communities who have from time immemorial lived along the coastline. The small scale fishing in Kerala has been a household enterprise – men, women, and children in the family play important roles in fishing and related activities. While men involved mainly in fishing, women members take the responsibility of selling it. The women and children also engage or help in net making, repairing, etc. The traditional fishermen have been socially and economically very marginal, undertaking fishing primarily for subsistence. The artisanal fishermen venture into fishing, based on their traditional skills and knowledge accumulated through generations.

After India became independent in 1947, concerted developmental efforts took place aiming to uplift the fisheries sector. Training the traditional fishermen on modern technologies and mechanisation were the major steps in this direction. The experiments commenced even before the reorganisation of Indian States in 1956 and the formation of State of Kerala. The major projects aided by foreign

agencies were Technical Cooperation Mission Programme (TCMP) and FAO Technical Assistance Programme (FAO-TAP) in 1947. (Ghosh, Sanjeeva., 1998). The TCMP was aimed at providing marine diesel engines, variety of nets and nylon threads, insulated ice boxes, van, etc. The FAO-TAP was initiated to provide training to fishermen on new fishing methods, development of appropriate crafts and gears, construction of new fishing harbours, etc.

Kerala Fisheries – 1950 to 1980

Though development efforts in fisheries were commenced in 1947 through TCMP and FAO-TAP, major changes started with the establishment of Indo-Norwegian Project (INP) in the year 1953. The Norwegian intervention into Kerala region came in the form of an Indo-Norwegian Project (INP) for Fisheries Community Development in the erstwhile State of Travancore-Cochin. This was following a tripartite agreement signed in New Delhi between the United Nations (UN), the Government of Norway, and the Government of India on 17th October 1952. The supplementary agreement signed on 24th January 1953 gave shape to INP for fisheries and fishermen community development at Neendakara in the then Travancore-Cochin State (present Kerala State). The activities of the INP at Neendakara was subsequently extended to Cochin with the establishment of a fishing centre in 1957 under the second supplementary agreement signed on 21st April 1956. The headquarters of INP was shifted from Neendakara to Ernakulam with the third supplementary agreement signed on 27th November 1961. Under a new agreement signed between Government of India and Norway during 1967, the activities of the Project expanded to the new vistas covering offshore and deep-sea exploratory fishing, practical training and demonstration of modern technology ashore and at sea. On conclusion of agreement with Government of Norway in 1972, the administration of the Project at Cochin was completely taken over by Government of India and the INP was renamed as Integrated Fisheries Project (IFP).

During first phase of INP (1953-63), the number of mechanised boats increased from 11 in 1954-55 to 380 in 1963-64; 35 times in

10 years. (Table 4.1). Even after the winding up of INP in 1972, the investment on mechanised boats continued as the private sector found it lucrative. Over the period, number of mechanised boats increased many fold and during 2017, there were 4,248 mechanised boats. (See data on fishing crafts given in table 4.3).

Table 4.1
Mechanised Boats in Kerala

Year	No. of Boats
1954-55	11
1955-56	25
1956-57	67
1957-58	93
1958-59	109
!959-60	130
1960-61	156
1961-62	200
1962-63	297
1963-64	380

Source: Govt. of Kerala, 1966.

During its second phase (1963-72), INP extended partly to the States of Kerala and Tamil Nadu. The fishery realm outside the INP was largely unaffected by the activities that went on within the project areas. With the initiation of the Five Year Plan, the fisheries sector also moved into the arena of planned development. Fishing development was not diverted from fish workers development or the interests of the avid fish eaters of Kerala (Kurien, John., 1985).

When the INP had just started functioning in Kerala in 1953, private merchant took the bold step of exporting 13 tonnes of frozen penaeid prawns to the USA (*ibid.*). This was followed by a

swift increase in demand for frozen prawns from Kerala, leading to a quantum increase in export. The early sixties heralded in the export oriented approach to fisheries development. The project shifted its emphasis to new designs for mechanized boats to be operated from harbours when the attempt to introduce motors for country craft failed. The INP introduced trawling and purse-seining, but the latter gained momentum only in the seventies. The high market for prawns and the Government's interest in promoting exports gave a boost to trawling. The attempt to supply trawlers to the actual fishermen became a failure. The middlemen and outsiders who had no long-term stake in fishing but were after profits only moved into reap the benefits.

The effect of over-powering demand pull for prawns had its repercussions in Kerala's fish economy as a whole. The sector which was relatively outside the mainstream of the economic and social processes in Kerala society was suddenly transformed into a respectable avenue for investment and involvement. The possibilities of a "modernized" fishery sector emerged quickly, breaking down traditional barriers entry into the sector.

The advent of mechanization after the establishment of INP has created two distinct entities in the sector: mechanized sector and artisanal sector. Except a few change in webbings – i.e. from cotton nets to nylon nets – the artisanal fishermen relied on their earlier technologies till 1980. But after 1980, artisanal sector too has witnessed drastic and rapid changes, creating further distinct entities within the sector. The artisanal fishermen moved into motorization of country crafts in 1980.

Kerala Fisheries – after 1980

In September-November 1980, the Kerala Fishermen's Welfare Corporation (KFWC) introduced a pilot experiment in motorization of large country craft in Purakkad in Alleppey District. (Kurien, John., and Jayakumar, S.R.J., 1980). This was the first attempt in this direction by the State. Its importance emerged from the fact that it was introduced at a time when fish catches in the artisanal sector

declined for its lowest ebb (Achari, Thankappan.T.R., 1986a). The share of traditional sector in the marine fish production was 90.4% in 1969, which declined to 51.8% in 1980. (Table 4.2).

Table 4.2
Marine Fish Production in Kerala (1969-1980)
(Quantity in Tonnes)

Year	Total Fish Production (Quantity)	Mechanised Sector		Traditional Sector	
		Quantity	%	Quantity	%
1969	2,94,787	28,177	9.6	2,66,610	90.4
1970	3,92,880	52,571	13.4	3,40,309	86.6
1971	4,45,347	47,291	10.6	3,98,056	89.4
1972	2,95,618	38,648	13.0	2,56,970	86.9
1973	4,48,269	93,659	20.9	3,54,610	79.1
1974	4,20,257	1,01,412	24.1	3,18,845	75.9
1975	4,20,836	1,80,111	42.8	2,40,725	57.2
1976	3,31,047	58,717	17.7	2,72,330	82.3
1977	3,45,037	1,07,424	31.1	2,37,613	68.9
1978	3,73,339	1,17,571	31.5	2,55,768	68.5
1979	3,30,509	94,779	28.7	2,35,730	71.3
1980	2,79,543	1,34,783	48.2	1,44,760	51.8

Source: PCO & SIFFS, 1991.

After the advent of motorization in fisheries, the traditional sector also divided into two distinct entities viz. motorised and non-motorised. Over the period, there has been a drastic shift towards motorised crafts that increased many fold. (Table 4.3). Artisanal sector witnessed a series of technological changes in eighties viz: introduction of plywood boats in 1982; construction of artificial fish habitats (AFHs) in 1983-84; introduction of monofilament

Kangoosevala (Gillnet), *Discovala* (Trammel net), *Thanguvala* and *Ranivala* (Mini Trawl nets, and Ringseines) in the middle of eighties; and system of fishing with lighted kerosene torch of cycle tyres – fish attracting lantern (FAL) in 1987[10].

Table 4.3
Fishing Crafts in Kerala by Categories

Year	Traditional Sector		Mechanised Sector	Total
	Non-motorised	Motorised		
1957-58[1]	20,227	-	-	20,227
1966[1]	27,496	-	788	28,284
1977[1]	32,377	-	2,984	35,361
1980[1]	26,271	-	3,038	29,309
1986[2]	20,425	7,214	3,366	31,005
1990[3]	26,137	11,374	3,742	41,253
2001-02[4]	21,956	29,395	4,510	55,861
2011[5]	1,444	18,628	2,308	22,380
2017[6]	2,515	29,969	4,248	36,732

Source: 1. Achari, Thankappan.T.R, 1986; 2. Govt. of Kerala, 1987; 3. Govt. of Kerala, 1992; 4. Govt. of Kerala, 2003; 5. Govt. of Kerala, 2011; 6. Govt.of Kerala, 2017.

Nineteen nineties saw the introduction of winch for hauling Ringseine and trolly for carrying it; because the quantum of webbing has increased many fold. Late nineties also witnessed that the fishing crafts in small-scale sector fitted with Inboard Motors (IBM), one used by the mechanised boats! There is a recent trend of moving back to small canoes. (But exact data is not available). This must be due to the realisation that the huge investment is uneconomical, which

10 Studies on certain aspects mentioned like Ringseine, FAL, etc. are discussed in coming chapters.

was highlighted by the author in another study. That study revealed that as a result of technological change in artisanal fisheries, the fish production has increased. But this has achieved through structural changes in the factors of production especially at the cost of huge investment and increased fuel cost and maintenance cost. And much of the benefit of incremental income dissipated to other sectors of economy such as industrial sector, trading sector, etc. (Rajan.J.B., 1993a). These are the consequences of technological dualism triggered by the mechanisation through INP. There has been long struggle by the traditional fishermen against the bottom trawling by the mechanised boats, especially during monsoon season. The next chapter provides the steps taken by the Government of Kerala on trawling.

(*This chapter is extracted from my book published in Malayalam 'Maarunna Matsya Mekhalayum, Pranthavalkkarikkapedunna Matsyathozhilalikalum' (Changing Fisheries Sector, Marginalising Fishermen) in October 2019).*

5
STRUGGLE AGAINST BOTTOM TRAWLING

The fishermen of Kerala are blessed with resource enriched marine waters, which they conserved based on *Kadalamma* (Mother Sea) concept. The continental shelf (upto 200 in depth) along 590 km coastal length of Kerala has water area of 39,139 sq. km. (Table 5.1).

Table 5.1
Area of Continental Shelf in Kerala

Depth (m)	Area (Sq.km)	Fish Resource Potential (Lakh Tonnes)		
		Demersal	Pelagic	Total
0-50	15,993	2.29	3.42	5.71
50-200	23,146	0.56	1.24	1.80
Total	**39,139**	2.85	4.66	7.51

Source: Govt. of Kerala, 1998.
m – metre; Sq.km – square kilometer.

The maximum quantity of fish exploitable from the coastal waters is fixed at 7.51 lakh tonnes (Table 5.1). The renounced fishing grounds on the coast of Kerala (Wadge Bank, Quilon Bank and Chettuva Bank) and occurrence of *Chaakara* (mud bank) profuse the fishery wealth of Kerala. Kerala possesses a unique position in the fishing map of the country in terms of the rich fishery resource endowments. But, like other natural resources, fishery resource is also under threat. As mentioned the development programmes like the Indo-Norwegian Project (INP) started in the nineteen fifties have triggered the use of active fishing gear. It was thought that mechanization would be able to go into the deeper waters and exploit the resource hitherto untapped. But the mechanized boats

still confine their fishing operation more or less in the traditional fishing grounds and both mechanized and artisanal sectors are competing for more of the same resource. This leads to conflicts between traditional fishermen and owners of mechanized boat.

The concern for the protection of fishery wealth from over exploitation by indiscriminate fishing methods arose in seventies; and still continues. When the monsoon commences, there arises clashes and conflicts on the monsoon trawling between people who belong to two distinct sectors - traditional sector and mechanized sector. The former argues that the operation of trawl nets with its heavy iron chain and outer board cause to destroy all organic matters, including juveniles of fishes in the sea bottom and it will result in further depletion of fishery resources. The latter, on the other hand, contends that the abundance of '*Karikkadi*' (Prawn)[11] during monsoon if not caught at that time will not be available for the future, and it will incur a huge loss to the economy in terms of foreign exchange earnings.

The Government who are supposed to resolve the problems was in between the devil and the deep blue sea for a long time. On the one hand, they had to consider the struggle of the artisanal fisher people who depended fishing for their subsistence, and, on the other hand, the pressure of the boat owners who contribute in terms of export earnings. Anyhow, the Government initiated some steps by appointing expert committees at different times to study and recommend appropriate measures.

Babu Paul Committee

In August 1981, a 13 member committee was appointed under the chairmanship of Sri.S.Babu Paul IAS, the then Special Secretary to the Government. The committee submitted its report in July 1982 by recommending various suggestive measures including monsoon trawl ban. However it failed to take a unanimous decision on the issue of monsoon trawl ban. There was an opposite view among the members on this issue and reported as such.

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11 Scientific name is *Parapenauopsis Stylifera*.

Kalawar Committee

To overcome the controversial issue and to get a clear picture, another 3 member committee was appointed in March 1984 under the Chairmanship of Dr.Kalawar, a fishery consultant of the State of Maharashtra. The other two members were Prof.M.Devaraj and Dr.Arul Parulokul. This committee recommended against the ban on monsoon trawling. But it specified that trawling should be permitted only during night time beyond 20 m depth range subject to the fulfillment of certain conditions. Important among such conditions are: (i) to limit the maximum number of trawlers ventured for fishing to 1145, (ii) not to allow new trawlers, (iii) not to allow minimum mesh size of the net below 35 mm etc. But these recommendations have not been implemented effectively.

Balakrishnan Nair Committee

Under the above circumstances, a third committee was appointed in the year 1988 chaired by Prof. Balakrishnan Nair. This 10 member committee submitted its report in 1989, which included a more logical and reasonable recommendation. The recommendation was to ban monsoon trawling i.e. during the months June, July and August – for a continuous period of three years and the result of this should be studied scientifically. The ban on monsoon trawling since then is given in Table 5.2.

Table 5.2
Monsoon Trawl Ban in the years 1989 to 2019

Year	Period of Ban	Days
1989	20th July – 31st August	43
1990	28th June – 21st July	24
1991	15th July – 16th August	33
1992	21st June – 3rd August	44
1993	15th June – 15th July	31
1994	15th June – 29th July	45

1995	15th June – 29th July	45
1996	15th June – 29th July	45
1997	15th June – 29th July	45
1998	15th June – 29th July	45
1999	15th June – 29th July	45
2000	15th June – 29th July	45
2001	15th June – 29th July	45
2002	15th June – 29th July	45
2003	15th June – 29th July	45
2004	15th June – 29th July	45
2005	15th June – 29th July	45
2006	15th June – 15th August	62
2007	15th June – 31st July	47
2008	15th June – 31st July	47
2009	15th June – 31st July	47
2010	15th June – 31st July	47
2011	15th June – 31st July	47
2012	15th June – 31st July	47
2013	15th June – 31st July	47
2014	15th June – 31st July	47
2015	15th June – 31st July	47
2016	15th June – 31st July	47
2017	15th June – 31st July	47
2018	10th June – 31st July	52
2019	10th June – 31st July	52
2020	10th June – 31st July	52

Source: Department of Fisheries, over the years.

It is clear from the table 5.2 that in the coming years of the Prof. Balakrishnan Nair Committee report, the Government imposed ban on monsoon trawling but was not complete as recommended by the said committee. As a trial, the Government ought to have imposed and studied the result to get a clear stand about the issue. But every year the traditional fishermen's agitation for ban continues. Time is ripe to take an apt decision otherwise the future of fishery will be in jeopardy.

The traditional fishermen responded against bottom trawling in two respects – politically and technologically. The agitation against bottom trawling was a political response. The motorisation of country crafts was a technological response. Does it really benefit the fisher people? Productivity, *inter alia*, is one of the measures for efficiency of technology. An assessment of productivity of fishing gears after motorisation is attempted in the next chapter.

(*This chapter is modified version of chapter 3.2 of my book published in Malayalam 'Maarunna Matsya Mekhalayum, Pranthavalkkarikkapedunna Matsyathozhilalikalum' (Changing Fisheries Sector, Marginalising Fishermen) in October 2019).*

6
MOTORISATION

The artisanal fishing of Kerala was essentially labour intensive till 1980. With the advent of motorisation in 1981, country crafts which were propelled mainly by human effort were fitted with OBM (Out Board Motor). Starting with a slow phase of few motorised fishing crafts in 1981, the number of motorised crafts increased rapidly to 7,214 in 1986, and further to 29,969 in 2017. (See Table 4.3 in Chapter 4). The country craft were motorised on the assumption that the catch would sharply increase, thus leading to higher return to fishermen. Factors contributing to increased production were presumed to be increase in fishing time by reducing trip time, access to deeper and productive fishing grounds, increase in the efficiency of active gears as a result of better maneuverability of craft, and increase in number of trips per day. There have also been perceptible changes in the factors of fish production and technology involved consequent to motorisation. These changes were reflected in the invested capital also. The fisheries sector became capital intensive one in the eighties. But the question whether the fishermen could achieve their expectation of increasing the 'fish productivity' through the capital intensive technology like motorisation was addressed by the author. (Rajan.J.B, 1994). This was assessed based on the indicator Catch Per Unit Effort (CPUE) for different fishing technology.

Catch Per Unit Effort (CPUE)

CPUE is a widely applied tool for measuring fish productivity. It is a derived quantity obtained from the independent values of catch and effort per fishing trip. CPUE is computed by dividing average catch per trip by the unit effort (UE). Unit effort is computed by multiplying the average crew size and time spent in a trip. CPUE measures catch per unit effort of manhour. This manhour can be expressed as either: manhour of trip time (T.T), or manhour of fishing time (F.T). CPUE in terms of manhour of trip time and fishing time

will give different values except in the arrival where the trip time and fishing time are same. The choice of applying CPUE of manhour of trip time or fishing time depends on objective of assessment. It may be best to take fishing time as the basic unit (i.e. the actual time on the fishing grounds) to assess the comparative efficiency of different fishing technology. But for the fishermen, it is the total time spent for fishing (ie. the trip time) and its output which is more important. It is known that consequent to motorisation, fishing power and distribution of the fleet has increased. But the relative influence of these changes on the efficiency of different gears may vary. This can be assessed using the CPUE in terms of manhour of trip time. (Better designed crafts may be able to fish in worse conditions, standardisation of effort with trip time may be appropriate).

Productivity Assessment

Four main fishing operations were identified for the purpose of analysis viz; encircling net, boat seine, gillnets and Hook and line and their CPUE analysed. (Table 6.1).

Table 6.1
CPUE of Fishing Gears in 1988-89
(Kg. Per Manhour of Trip Time)

#	Centres	Encircling Net (M)	Boat-seine (M)	Gillnets		Hook & Line	
				NM	M	NM	M
1	Kasaba	5.43	-	-	-	-	-
2	Thayyil	-	2.51	-	-	-	-
3	Mahe	-	2.60	-	2.65	-	-
4	Koyilandi	-	2.60	1.84	1.43	-	12.31
5	Chaliyam	-	-	0.76	0.78	-	3.50
6	Parappanan-gadi	5.65	-	2.03	-	-	-

7	Ottamassery	4.85	-	1.20	1.04	-	-
8	Thangassery:						
	- Plywood	-	-	-	1.57	-	1.04
	- Plank	-	-	0.47	1.34	-	-
9	Anchuthengu:						
	- Plywood	-	-	-	1.93	-	1.08
	- Kattamaram	-	-	0.63	-	0.73	-
10	Valiyathura:						
	- Plank	-	-	-	0.84	-	0.48
	- Kattamaram	-	-	0.95	-	0.40	-
11	Vizhinjam:						
	- Plywood	-	-	-	1.13	-	1.89
	- Plank	-	-	-	0.81	-	0.95
	- Kattamaram	-	-	4.40	-	0.57	-

Source: PCO & SIFFS, 1991.
M – Motorised; NM – Non_Motorised

The CPUE of different types of fishing gears used in motorised crafts vary widely. They vary from 4.85 to 5.65 kg. for Encircling net (M), 2.51 to 2.60 kg. for Boatseine (M), from 0.78 to 2.65 kg for Gillnet (M), and from 0.48 to 12.31 kg. for Hook and Line (M). For the fishing gears used in non-motorised it was from 0.47 to 4.40 kg. for Gillnets (NM), and from 0.40 to 0.73 kg. for Hook and Line (NM).

It is clear that there is no pattern emerged between the CPUE of fishing gears between motorised crafts and non-motorised crafts. However, there is some pattern shown for Encircling net and Boatseine; CPUE is around 5 kg. and 2.6 kg. respectively and ranks

top. Though both these fishing gears operate with motorised fishing craft, the CPUE is two times more for Encircling net than Boatseine. This was facilitated largely through the substantial improvement in factors of production, than motorisation.

There are odd figures noticed for Gillnets with *Kattamaram* (NM) at 4.40 kg. in Vizhinjam and for Hook and Line with motorised Dugout Canoe in Koyilandi at 12.31 kg. Whereas the CPUE for motorised small crafts with Gillnets in different centres vary from 0.81 kg to 2.65 kg. These wide variations are attributed to difference in fishing nets and fishery related factors, than motorisation of fishing crafts. The productivity of Gillnets shows a diverse picture across centres vis-à-vis motorised and non-motorised crafts. This reveals the fact that the motorisation and subsequent changes would not help to increase the productivity of passive gears like Gillnets. Changes in productivity of Gillnets depend on local fishery conditions. The CPUE of Hook & Line with motorised crafts are higher than non-motorised crafts in all the study centres. This difference is noticed when the CPUE is expressed in both the terms of manhour of trip time and manhour of fishing time. This means that the labour productivity of Hook and Line has increased with the advent of motorisation. It is a fact that CPUE is influenced by myriads of factors like craft-gear combination, skills on fishing operation, change in fish resources, season of operation of gear, length operation of gear, target specie, local conditions, etc. Hence it is clear that motorisation has not reflected on productivity of all types of fishing gears. Moreover the economy has not benefited either. The motorisation has fuelled not only the introduction of new fishing gears like Ringseine, but also huge investment on fishing fleet; with the expectation of higher return. But how the benefit of higher return dissipates to various sectors is discussed in the next chapter.

(This chapter is modified version of my paper 'Analysis of Productivity of Fishing Gears in Kerala' published in Commerce and Business Researcher, Vol.II-No 7&8 June 1994 by Department of Commerce, University of Kerala).

7
RINGSEINE: WHO BENEFITS?

As mentioned in previous chapters, many changes have taken place in the traditional marine fishery of Kerala in the decade of eighties and early nineties especially with regard to the fishing technology. One of the most significant change occurred was the introduction of Ringseine on a larger extent. (Rajan.J.B, 1993). Ringseine is a modified version of oldest *Thanguvala* (*Koruvala*). As Ringseine developed, it eroded the existing year old fishing methods such as oldest '*Thanguvala*', '*Ayalachala-vala*', '*Kollivala*' (Boatseine), etc. It became a fad to increase the quantum of gear, the size of craft, and horse power of engine. At this upward spiral of Ringseine both in terms of number and size, existing smaller units were unable to compete with the larger ones and became obsolete. The introduction of larger and larger Ringseine units necessitated heavy capital investment. The artisanal fishery which once depended on low cost technology turned out to be a high cost technology with the advent of Ringseine. Both labour effort and capital investment in a unit increased significantly. Fish production too was augmented. But the Ringseine unit owners were in a buoyant mood during the initial stages seems to be in dampened spirit over the period. This is mainly because the benefit of the increased fish production through the improved technology leaks out in various forms leaving little to the fisheries sector. Thus the pertinent question who benefits and who loses is addressed in this chapter.

Spate of Ringseines

Fishing with Ringseines started gradually in the midst of eighties and increased alarmingly from 750 in 1986 to 2,400 in 1989; then declined to 2,259 in 1991; and slightly increased to 2,277 in 1998. (Table 7.1).

Table 7.1
No. of Ringseines in Kerala

Year	No. of Ring seines
1986	750[1]
1989	2,400[1]
1991	2,259[2]
1998	2,277[3]

Source: 1. Nair, Balakrishnan.N, 1989; 2. SIFFS, 1991; 3. SIFFS, 1998.

Input Factors

The initial capital investment for a Ringseine unit in 1988-89 was Rs. 2,36,670, compared to Rs. 19,596 for *Thanguvala* unit in 1980-81. (Table 7.2). The labour effort exerted per Ringseine unit was around 6,000 manhours, compared to 1,620 manhours for *Kollivala* and *Thanguvala* units. The annual fuel expenses, which was an added item after the coming of OBMs is about Rs. 82,661 in 1988-89 for Ringseine unit.

Table 7.2
Input Factors for fishing units

Particulars	1980-81	1988-89
	Thanguvala[1]	Ringseine[2]
Initial Capital Investment (Rs)	19,596	2,36,670
Labour Effort (man hour per annum)	1,620	6,000
Fuel consumption (Rs. Per annum)	-	82,661

Source: 1. Kurien, John & Wilman, Rolf., 1982. 2. PCO & SIFFS, 1988-89.

Structural Impact

The order in which sales revenue is apportioned and the corresponding sector to which each of these items belongs is presented in Exhibit-7.1.

Exhibit 7.1
Distribution of Turnover of a Fishing Unit

Sales Turnover		
(-) Sales Commission	→	Trading Sector
(-) Operating expenses		
fuel & lubricant	→	Industrial Sector
food expenses	→	Fisheries Sector
other expenses	→	Other Sector
(-) Remuneration to labour	→	Fisheries Sector
(-) Repair Cost	→	Other Sector
(-) Depreciation on equipment	→	Industrial Sector
(-) Interest on Govt. Loan	→	Trading Sector
(=) Net income to investors	→	Fishing Sector

Source: Rajan J.B., 1993.

The items of food expenses, crew remuneration, and investors' net income go to the fisheries sector; fuel & lubricants and depreciation on equipments go to the industrial sector; sales commission and interest on loan go to the trading sector; and repair and other expenses go to respective sectors. How the average annual sales turnover of a fishing unit flows into different sectors is given in table 7.3.

Table 7.3 shows that the average annual sales turnover of Ringseine unit is Rs. 4,74,760 in 1988-89, compared to Rs. 49,312 for *Thanguvala* in 1980-81. The share of fisheries sector from Ringseine unit is Rs. 2,95,581 compared to Rs. 42,966 for *Thanguvala*. The industrial sector shares Rs. 1,27,482 from Ringseine, compared to Rs. 2,998 for *Thanguvala*. The share of trading sector is Rs. 31,240 from Ringseine, compared to Rs. 500 *Thanguvala*.

In terms of percentages, little more than 60% of the turnover of a Ringseine unit goes to the fisheries sector, 6% to the trading sector, 27% to the industrial sector, and 7% to the other sector. While for *Thanguvala* in 1980-81, 87% of the turnover was shared by the fisheries sector itself. The shares of trading, industrial, and other sector were 1%, 6%, and 6% respectively.

Table 7.3:
Sector-wise Distribution of Sales revenue

#	Sectors	1980-81[1]		1988-89[2]	
		Thanguvala		Ringseine	
		Amount Rs	%	Amount Rs	%
1	Fisheries Sector				
	- Net income to investors	11,990	24.3	65,649	13.8
	- Crew remuneration	26,980	54.7	2,03,450	42.8
	- Food expense	3,996	8.1	26,582	5.7
	Total (1)	42,966	87.1	2,95,581	62.3
2	Trading Sector				
	- Sales Commission	500	1.0	26,410	5.6
	- Interest on loan	-	-	4,830	1.0
	Total (2)	500	1.0	31,240	6.6
3	Industrial Sector				
	- Depreciation on equipment	2,998	6.1	44,821	9.4
	- Fuel & lubricants	-	-	82,661	17.4
	Total (3)	2,998	6.1	1,27,482	26.8
4	Other Sector				
	- Repair charges	450	0.9	13,022	2.7
	- Other expenses	2,398	4.9	7,435	1.6
	Total (4)	2,848	5.8	20,457	4.3
5	Sales Turnover	49,312	100.0	4,74,760	100.0

Source: 1. Compiled from Kurien, John & Wilman, Rolf, 1982.
2. Data of 20 Ringseine units compiled from PCO & SIFFS, 1991.

Fisheries, the Loser

It is clear that the sales turnover of a Ringseine unit is higher than its predecessors. But this high output has been achieved at the cost of high capital investment, exertion of much labour effort, and consumption of fossil fuel. With the transformation of the technology over the period from *Thanguvala* to the Ringseine, the share of

the fisheries sector declined in percentage terms though increased in absolute terms. The decline in the share of the fisheries sector in percentage terms was facilitated by contributing more towards the industrial and trading sector. This is because the existence of Ringseine depends upon motorisation, marketing etc. and hence the corresponding sectors of industry and trade also claim a substantial portion of the additional income generated. This reveals the fact that with the improvised technology, the intervention of merchants and traders towards the sector is increased and much of the incremental benefit is reaped by them; the fisheries sector remains to be the loser. How long can they sustain such loss? A recent rapid enquiry reveals that the Ringseine unit owners in central and north Kerala are moving back to small types, as they incurred recurring loss from the large Ringseine units. Whereas the fishermen off the coast of south have relied on small scale fishing but with alternative technology options. Even then there were conflicts. One such case is given in next chapter.

(*This chapter is modified version of my paper presented in the Sixth Kerala Science Congress organized by State Council for Science Technology and Environment, Government of Kerala held on 27-29 January 1994; based on my study 'Techno-Socio-Economic Stud on Ringseine Fishing in Kerala', 1993).*

8
FISH ATTRACTING LANTERNS: SURVIVAL STRATEGY

The use of Fish Attracting Lanterns (FAL) is one of the fishing methods resorted to by the traditional fishermen off the coast of Thiruvananthapuram district during late eighties, which had resulted in social tension within the traditional fishing committees. The confrontation was between the fishermen using Hook and line who resort to FAL and those using nets. The latter allege that "light fishing" is detrimental to their interest. They content that the Hook and line operating by night is heavily depleting the fish wealth, thus depriving them of their catch. The author had conducted a study when the disputes and conflicts regarding the method of fishing with FAL in fishing villages have become severe. (Rajan.J.B, 1995; Rajan.J.B *et al.*, 1998).

Fish Attracting Lanterns: Brief History

Records reveal that the method by which fish are attracted to and caught by light of lamps had been in existence in all the countries where fishing is carried out and the same had been an age old practice. (Rajan.J.B, 1995). FAL is in vogue in Mediterranean countries, Egypt's Gulf of Suez, France's Bay of Lyon, Russia, Sweedan, Germany, Norway, America, Philippines, Korea, Thailand, etc. Eventhough no records are available to show when the lanterns started to emerge in Kerala, fishing is being done in the inland sector by fixing the lanterns in "*Cheenavala*" (Chineese net) and "*Kuttivala*" (Stake net). In ancient times, the people who were going for fishing in the sea during night used to take with them kerosene lanterns as a measure of safety and also for warning ships which pass by. But it was in 1985 that lantern began to be used as a method of fishing. This is made clear by the experience which one Mr.S.Andrews of Marianadu, who introduced the idea of FAL in Thiruvananthapuram. In the year 1982, he was fishing with drift net during night. A ship

which passed by and in order to warn the ship not to plough through his boat/net, Andrews lighted his kerosene lantern. He was delighted to see a shoal of fish in the light of the lantern. He understood that it is the light that attracted the fish; but the same was made into a method of fishing only in 1985.

Fish Attracting Lanterns: Features and Changes

Those who go for fishing during night use lantern mainly on moonless days so as to attract fish. Eventhough FAL is used by the fishermen who fish with Hook and line, fishermen who fish with boatseine also use the lantern. It is mostly "*Kannankozhiyala*" (Big eye scad) and "Ayala" (Mackeral) that are being caught with FAL. This kind of fishing is being adopted during the months extending from November to April.

At the beginning it was kerosene lantern that was being used as FAL. Gradually the same was replaced by other kinds of lights such as pertromax light and gas light. The use of Petromax light began in 1987 and the gas light in 1991. The people of Marianadu started to use tube light to which battery was fitted. But that attempt was given up due to technical reasons.

The prominence which the FAL achieved, also contributed to increase in the number of plywood boats. The number of plywood boats in Thiruvananthapuram has increased from 1128 in 1991 to 2055 in 1995; owing to the usage of FAL. Of this total number of plywood boats, 1,686 (82 %) had used FAL. Also 22 plank canoe and 1,380 Catamarams used FAL in 1995. Including all these, the total number of fishing units using FAL was 3,088 in 1995. It was particularly in the village of Poovar, Marianadu, Puthiyathura etc. that the use of plywood boats increased inconceivably.

The Fish Attracting Lanterns – Fishermen's View

Two different view points exist in the district of Thiruvananthapuram with regard to FAL – those who favour FAL and those who oppose it. The conflict between these two groups has become severe during middle of nineties. Why is there a difference of

opinion even in the traditional sector? Why has the conflict between these two groups became severe?

The main reason for the two view points can be traced to the differences between the technology used and the skill of the fishworkers involved. Those people who use "*Ozhukkuvala*" (Drift net), "*Karamadi*" (Shore seine), and small size gillnet are against the use of FAL, while those who use Hook and line favour it. FAL is used in "*Thattumadi*" (Boat seine) to a small extent. Before the FAL came into use, the Hook and line fishermen used to go for fishing during day time and/or on moonlight nights. After the FAL came into being, they go for fishing during moonless nights too. The complaint of those who use "*Ozhukkuvala*" (Drift net) is that they do not get fish as they are attracted towards the flame suspended from the Hook and line craft using FAL. Since available fish is caught with the aid of FAL, there will not be any fish left for those using "*Karamadi*" (Shoreseine) and those who go for fish during day time, which is what they complain about. There is insufficiency of fish during day time because fish has already been attracted to the surface of the sea by the light of FAL from the under water. This practice upsets the existing marine eco-system.

The increments of income during the months of January to March, the months of starvation in coastal area is mentioned as a benefit by those who favour FAL. They justify the use of FAL by pointing out that it is also widely used in inland sector. Since the operation of harmful nets like Trawl nets, Ring seine, etc. are prevalent, they question why FAL users are singled out. They also point out that if the usage of lantern is stopped, their income during the lean months will dwindle and their families will starve.

Contributory Factors of Conflict

The problems arising from and perhaps leading up to the use of lantern cannot be understood only on the basis of conflicts within fishing villages. The conflict arising from the use of lantern points to larger problems which the marine sector in its entirety is facing. It is one of the series of modifications in the traditional methods adopted under pressure from externalities. In the eighties the traditional

fisheries sector have been changed much in terms of technological modifications. It started with motorisation in 1980, the other major changes are introduction of plywood boats in 1982; artificial reefs in 1982-83; 'disconet' (Trammel net) in 1984; and ring seine, minitrawl, monofilament, and FAL in 1985. Why have these changes happened so fast and so radically?

The changes in fishing technologies is an attempt to catch more fish and thereby to make good fish deficiency. The injection of capital from the new business class and the trend of technological advancement have raised concerns about the alienation of traditional workers from the customary rights. To protect the ill effects of modernisation, fishermen movements have emerged. At the same time, the artisanal fishermen moved into motorisation of country crafts. From 1970s fish production in Kerala has started diminishing and in 1980 it reached its lowest. The situation in Thiruvananthapuram too was the same. The fish resources are renewable but limited. But now, the energy spent for exploiting this limited wealth is more than the energy invested for keeping the wealth as such. Taking just one important fishing techniques of Kerala – the encircling net with plank canoe combination – we can illustrate vividly the all-around character of the change that has swept the traditional fisheries of this state. The fishermen whose only means of living is fish are running after new methods in their anxiety to catch more of the declining fish. In order to exploit the limited fish available more input pressure is applied than required, (and then) that would have been invested under "normal" circumstances.

Pointers

The above discussion reveals that it is difficult to reach a conclusion on the issues of fish attracting lanterns alone. By itself the fisher population is increasing. In addition to this, new pressures from external interventions by market forces. All these circulate to a situation where the resources base is crumbling. People whose only source of livelihood is fish, face all kinds of contradictions, dilemmas, and make several types of choices. Perhaps all of them may not be based on their traditional understanding.

The fishing pressure is high in Kerala especially, in Thiruvananthapuram district. The consumption pattern and the method of resource exploitation have changed much. Still the traditional fishermen have some concern for resources. In fact, the internal conflicts reflect their concern for resource. Gradually fishers have moved from subsistence fishing to the market economy. How long can they retain their concern for environment? Fishing methods that have been questioned and criticised before are now being introduced. It is stated that chaos and not stability is the indicator of healthy sector. There was once a homeostasis which maintained equilibrium in the fisheries sector. But now the sector is moving away. Is it to a dynamic equilibrium? At the moment there are more contradictions than revolutions! The use of fish attracting lantern was not major conflict issues at the initial stages. Conflicts have arisen when the pace and level of its adoption changed tremendously. Often it is a survival choice. The Artificial Reef (AR) discussed in the next chapter is another initiative of traditional fishermen that function as Fish Aggregating Device (FAD) and mature into Artificial Fish Habitats (AFHs) in the long run.

(*This chapter is modified version of my paper presented in the National Workshop on 'Livelihood Strategies of the Rural Poor and Environment Challenges Ahead' organized by HIVOS at IIM Bangalore in 1995; based on my study 'Fish Attracting Lanterns (FAL) off Trivandrum Coast and Allied Problems', 1995).*

9
ARTIFICIAL REEFS: INNOVATION OF FISHERMEN

The Artificial Reefs (ARs) along the south west coast of India (Kerala) proved to be one of the important means of resource regeneration and sustenance of marine habitat. In the past AR placement was known only to regions of origin and kept on low profile. But later AR placement did not limit as a trial programme but a full fledged one, thanks to the nurturing by NGOs. ARs are considered to play significant role in sustenance and generation of aquatic environments. The roles of ARs are particularly well appreciated by the artisanal fishermen who are traditionally using Hook and line fishing techniques. The ARs are innovated by artisanal fishermen and nurtured by NGOs.

Innovation of Fishermen

Fishermen over long years of their knowledge of the sea and the aquatic living beings know that external objects deployed in the sea bottom is an effective way to attract fish and other marine fauna and flora. The fishermen of South Coast of India have extensive and detailed knowledge of reef ecology and fish behavior. This is based on their fishing experience in a limited number of natural reefs (NRs). There are many natural reefs in the inshore waters of Kerala identified by the traditional fishermen and named locally. For example, the fishermen of Pozhiyoor fishing village (Thiruvananthapuram district) from time immemorial identified 8 NRs in the depth range of 8 to 10 fathom[12]. They are named locally as *Kuttiparu*, *Ottakkallu*, *Paruthikkallu*, *Puthenpaaru*, *Manankhanpaaru*, *Maanalu*, *Keelakkallu*, and *Karakkallu*. (Rajan.J.B, 2001).

Knowledge of the marine environment and fish behavior has accumulated through generation. This knowledge leads to innovations that are spread horizontally. In the case of ARs, what one fishing

12 1 fathom = 1.8 meter

village has on reef construction is observed by neighbouring villages. Fishermen talk openly about reef construction. Social occasions such as festivals can help spread the AR innovations. As an age-old practice, traditional fishermen of Thiruvananthapuram operating Shore-seine had used to dump rocks fastened with coconut fronds into sea bottom. This was to attract fish closer to the shore. This practice was based on their knowledge that fish tends to congregate over bottom structures. Apart from this, "accidental reefs" have matured into rich fish habitats. Actually these have enlightened the fishermen the idea of ARs.

Accidental Reefs

The ship wrecks and other alien objects like fishing boats and rocket noses that sank in the inshore sea were matured into fish habitats; which is termed as accidental reefs. During the Second World War a ship was sunk off Anchuthengu fishing village 45 km north of Thiruvananthapuram at 25 fm (45 m) depth. After nine years in 1949, a Hook and line fisherman alias Sukkurappan discovered the wreck while engaged in Hook and line fishing. The wreck matured into a rich Artificial Fish Habitat (AFH), which attracted fishermen who began fishing from the AFH. Other objects like anchors which were lost and sunk became rich fish habitat. After the establishment of Thumba Equatorial Rocket Launching Station (TERLS)[13], rocket noses which fell into the inshore water from the weather testing space rockets became rich fishing spot.

The attempt to create ARs started in the nineteen fiftees. According to well informed fishermen of Puthiathura and Eraiputhenthura, AFHs were set up in Puthiathura of Thiruvananthapuram in 1953 and in Eraiputhenthura village of Kanyakumari in 1957. After a time lag of two decades, efforts were taken to construct ARs in 80s. This partly mitigated the decline in fish production especially in Thiruvananthapuram. The continuous drop in fish production, especially in Thiruvananthapuram, impelled the fishermen to resort to alternate technologies like artificial reefs, jigs, etc.

13 TERLS is an Indian spaceport established on 21st November 1963, operated by the Indian Space Research Organisation (ISRO). It is located in Thumba, Thiruvananthapuram which is near the southern tip of mainland India, very close to earth's magnetic equator.

NGO's Intervention

The nineties have witnessed a spate of AR placements in the coastal waters of Thiruvananthapuram, the bamboo reefs, concrete rings, and concrete triangular modules, under the initiative of PCO[14]. The impact of these designs and materials was monitored by Fisheries Research Cell (FRC) of PCO. In 1987, PCO participated in a workshop organized by Department of Aquatic Biology & Fisheries, University of Kerala on aquaculture. In it, PCO made presentation on AR placement. The representative of CMFRI present in the workshop took keen interest in the developments and directed his officers to visit the villages and report to him the details. PCO also collaborated with CMFRI Scientists to monitor the information.

As an NGO working with the traditional fishing community, PCO involved in planning, organizing, and constructing of AFHs together with studies and dissemination. This has helped to bring to light the fishermen's innovations. PCO's association with AR started in 1986 while involving in CAPART's programme on people's technology development. In 1988 PCO initiated Village Gathering ('*Gramakootoms*') in the fishing villages of Thumba, Adimalathura, and Puthiathura. The placement of ARs in these villages became part of *Gramakootoms*. In the year 1988, fishermen of Valiathura created ARs with the financial assistance of Intermediate Technology Development Group (ITDG), London through South Indian Federation of Fishermen Societies (SIFFs), Thiruvananthapuram. The PCO was also actively involved in this venture.

In 1989, PCO conducted a study of the origin, development, and diffusion of AR technology in the fishing villages of Thiruvananthapuram and Kanyakumari districts. At the time, more and more village communities began to express their need to have ARs, as fishing on ARs has produced encouraging results. PCO extended its support to the fish workers to enrich and facilitate further innovations and appropriate development in AR technology. ARs were constructed in the villages of Thumba, Adimalathura, and

14 PCO – Programme for Community Organisation; an NGO worked with fisher people, focusing on community organisation, training, and research.

Puthiathura with the initiative and support of PCO in 1990. PCO monitored fishing on these ARs for 3 years from 1991. In 1994, PCO started AR Programme (ARP) in Kannanthura, a fishing village in Thiruvananthapuram.

Government-NGO-Community Partneship

ARP in Pozhiyoor fishing village in Thiruvananthapuram was initiated in 1994 by PCO in collaboration with the Department of Fisheries (DoF) and implemented through community partnership. In Pozhiyoor, ARP made of ferro cement modules were used for the first time, instead of concrete or bamboo modules. The light-weight ferro cement modules ensured easy transportation and lifting.

A new method of AR lifting and placement was applied in ARP, Pozhiyoor. This is for the first time that a maximum number of modules were placed in a spot i.e. 50 each in Paruthiyoor and Kollemcode, thus a total of 100 modules in Pozhiyoor village. While the number of modules placed in other fishing villages were 10-30.

The process was more systematic. Instead of "random dumping" of modules, they were placed in a systematic manner making the reef more concentrated. The "random dumping" hitherto adopted not only disperse the modules in different directions, but also may cause damage or collapse of the triangular shape when placed. A new method of AR placement was devised by Mr. Paul Calvert, an Engineering Consultant from ITDG. The management of the ARP was entrusted to the village committee comprising fishermen, Ward members of Panchayat, and TSSS workers with PCO Co-ordinator as the General Convenor.

The PCO made an interim study of the Pozhiyoor ARP in 1994. (Rajan.J.B, 1994a). As a follow up of this, a broad 3 year based study was envisaged. In this study, apart from techno-socio-economic aspects, assessment of biological aspects has also been included. (Rajan.J.B, 2001). As requested by PCO, CMFRI deputed one of their Biologists as Consultant. In January 1995, SCUBA diving was carried out for the first time to determine the distribution placement of AR units, extent of colonization of the reef surface, and structure

of the fish community. Open seabed of Pozhiyoor, location of NRs, and ARs etc. were filmed in video. For this, a team of Oceanography Professors from Southampton University, UK has been arranged by PCO. The cost of the study including the visit of the UK Scientists was met by the Department of Fisheries, PCO, SIFFS, and ITDG. The video and photographs were quite revealing of the high potential of the AR fishery, particularly the rich biodiversity growth in it.

Practice to Policy

During 1995, a provision of Rs. 2.50 lakhs was earmarked in the Kerala budget as a Centrally Sponsored Scheme (CSS) for ARP. This is being utilized for constructing ARs in the fishing villages of Thumba and Valiathura. PCO was entrusted with the responsibility of ARP in these two villages to be implemented through people's organisations. During 9th five year plan, Kadinamkulam Grama Panchayat implemented ARP through People's Plan Campaign (PPC). Subsequently other local governments like Thiruvananthapuram Corporation, Kulathur Grama Panchayat, etc. also came forward for ARP. ARP became one of the model projects proposed PPC. Now the Department of Fisheries has undertaken ARP in their schemes. The institutional convergence model ignited in the ARP of Pozhiyoor has now not only upscaled but is also part of the government policy. The innovation of fishermen has found a due recognition.

(*This chapter is modified version of my paper presented in the National Workshop on* 'Artificial Reefs and Sea Farming Technologies' organised by CMFRI at Cochin on 16-26 January 1996).

PART III:
POST-MECHANISATION:
REPERCUSSIONS

Part II has portrayed how the drastic changes taken place even within the artisanal sector is transforming its basic characteristics. Such changes have repercussions on capital and labour; the factors of production. Investment in fishing fleet has moved up considerably, leading to over capitalization and increased dependence on credit. There are tendencies of spatial mobility of labour for fishing and also women workers find new avenues of employment in fish processing plants but in a distressed condition. However diversification of employment among the fishworkers is not pronouncing and also the future for diversification is bleak. This part, through five chapters, gives an account of over capacity in fisheries, credit dependency, spatial mobility of labour, distressed situation of women in fish processing plants, and the extent of employment diversification among fisher people. All five chapters are technical and analytical studies undertaken from time to time for deeper understanding of issues in the sector.

10
OVER CAPACITY

The changes in technology of traditional fisheries sector in Kerala over the period have resulted over capitalization and over capacity in the sector. It is to be inferred that the shift of attention from the issues of "over exploitation" to "over capacity" is a self-realization of the gravity of the problems in small-scale fisheries. Both over exploitation and over capacity reflects imbalance – the former is an imbalance of exploitable and exploited resource, while the latter is an imbalance of energy use and output. In other words, over capacity is a situation, where the energy and investment do not justify the output.

Fishing Fleet in Kerala – Allowable and Actual

Considering the marine resources potential in Kerala, the Kalawar Committee in 1984 recommended to limit the number of mechanised boats at 1,145, motorised country crafts at 2,960, and non-motorised country crafts at 20,000. But the statistics in 2001-02, 2004-05, and 2017-18 show the over capacity in fisheries computed at percentage terms as 232, 121, and 152 respectively. (Table 10.1). However in respect of non-motorised crafts there is under capacity during 2004-05 (48%) and 2017-18 (13%), whereas over capacity of motorised crafts were increased alarmingly at 1,012 percentage.

According to the Department of Fisheries, 1,29,000 stake nets, 5,000 Chinese dip nets and more than 2,000 free-nets are operating in the inland waters. Of this, 30% stake nets and 35% Chinese dip nets were unauthorized (Govt. of Kerala, 1998). Though current data is not available, the situation would be much worse at present.

Table 10.1
Over Capacity of Marine Fishing Crafts

Fishing Craft	Allowable Crafts[1]	Fishing Crafts in Operation			Under Capacity/ Over Capacity (%)*		
		2001-02[2]	2004-05[3]	2017-18[4]	2001-02	2004-05	2017-18
Mechanised Boats	1,145	4,510	5,504	4,248	394	480	371
Motorised Crafts	2,960	29,395	14,151	29,969	993	478	1,012
Non-motorised Crafts	20,000	21,956	9,522	2,515	110	48	13
Total	24,105	55,861	29,177	36,732	232	121	152

Source: 1. Kalawar, 1984; 2. Govt. of Kerala, 2003a; 3. Govt. of Kerala, 2007; 4. Govt. of Kerala, 2017.
* More than 100 is over capacity and less than 100 is under capacity.

Overcapacity - Some Indicators

Various studies reveal that the energy and investment for marine fishing in Kerala has increased substantially, especially after nineteen eighties.

i. The fishing pressure in the inshore coastal waters has increased much. The rate of fishing pressure in the inshore waters (as measured by the number of active fishermen per sq.km area of inshore waters) has increased from 9 persons in 1985 to 10 persons in 1990-91, and 12 persons in 2017. (Table 10.2).

Table 10.2
Fishing Pressure

Year	Active Fishermen[1]	Fishing Pressure[2]
1985-86	1,43,088	9
1990-91	1,53,570	10
2003	1,77,068	11
2007-08	1,84,430	12
2017	1,86,287	12

Source: 1. Data from Department of Fisheries, Government of Kerala.

2. Computed by deviding the number of active fishermen with the inshore water area of 15,993 sq.km.

ii. According to SIFFS, the total number of Outboard Motors (OBMs) has increased by 42 percentage during nineties and the total horsepower by 96 percentage during the same period. (Table 10.3). The current data on OBMs by horse power is not available but oral enquiries reveal that the number of OBMs and their horse power have increased substantially. These result in the consumption of more fossil fuel and consequently emission of more carbon.

Table 10.3
Fossil Fuel Dependency in Marine Fisheries
– Outboard Motors & Horse Power (1991 & 1998)

HP of OBMs (1)	No. of OBMs		Total HP	
	1991[1] (2)	1998[2] (3)	1991 (4) = (1)x(2)	1998 5 = (1)x(3)
2	28	79	56	158
5	27	-	135	-
8	7,961	4,260	63,688	34,080
9.9	930	6,041	9,207	59,806
11	135	4	1,485	44
15	918	1,319	13,770	19,785
20	199	155	3,980	3,100
25	1,335	3,208	33,375	80,200
40	88	1,400	3,520	56,000
Total	**11,621**	**16,466**	**1,29,216**	**2,53,173**

Source: 1. SIFFS, 1991; 2. SIFFS, 1998.

These data reveal that the traditional sector, which depended on renewable energy is now depending more on non-renewable energy. Studies show that the motorisation of country craft has helped to increase the fishing capacity. While the productivity of active fishing

gear have increased slightly, the productivity of passive fishing gears have not increased. (Rajan.J.B.,1994).

iii. The number of traditional marine fishing gears increased by 12% between 1991 and 1998. (SIFFS, 1991; SIFFS, 1998). During the same period, there was tremendous increase in the number of Mini-trawl nets – i.e. by 164%, while the number of Ringseines increased by 1% only. The main reason for increase in Mini-trawl is that with small investment exportable variety of fish could be caught. Even though the number of Ringseines has not increased, the mechanized effort to operate the same has increased much. It is to be noticed that the number of Hook and line, the gear that requires much skill and effort, has declined by about 30%. At the same time, the number of Trammel net (*Discovala*) and Gillnets have increased during the above period respectively by 32% and 13%. But a study in Pulluvila fishing village of Thiruvananthapuram district in 2013 revealed that the Trammel net is not in use. (Rajan.J.B & Biju.S.K, 2014). The reason was that the decline of prawns, main target specie for Trammel net, forced the fishermen to abandon the net.

iv. According to the Department of Fisheries, the annual average government investment in fisheries was Rs 0.60 Lakhs during first five year plan, which has increased to Rs 17,129.74 Lakhs during 12th five year plan. (Table 10.4). Whereas annual average marine fish production during these periods increased from 1.31 Lakh tonnes to 7.05 Lakh tonnes. The annual average investment over the period has increased many fold of thousands, while the annual average marine fish production is increased by five times.

v. As mentioned in chapter 7, a major chunk of the earnings dissipate to sectors of industry and trade even though the fish production and total turnover have increased after the introduction of new technologies. Of the turnover of encircling net (*Koruvala*), which was in use before the advent of motorisation, more than 87% was towards the fisheries sector. With the advent of Ringseine after motorisation, the share of fisheries sector decreased to 62% of the total turnover. This is by giving more shares to industrial and trading sectors. The increase in fuel cost and depreciation of equipment are the major reasons.

Table 10.4
Marine Fish Production and Investment in Fisheries of Kerala

Plans Period	Year	Annual Average Marine Fish Production (Quantity in Lakh Tonnes)	Annual Average Investment by Government (Amount in Rs Lakhs)
First Plan	1951-56	1.31	0.60
Second Plan	1956-61	2.59	13.00
Third Plan	1961-66	2.64	67.00
Annual Plan	1966-67 to 68-69	3.52	234.33
Fourth Plan	1969-74	3.87	108.00
Fifth Plan	1974-78	4.03	156.60
Annual Plan	1978-79 to 79-80	3.77	312.00
Sixth Plan	1980-85	3.64	414.01
Seventh Plan	1985-90	4.43	585.42
Annual Plan	1990-91 to 91-92	6.52	970.84
Eighth Plan	1992-97	6.18	2254.90
Ninth Plan	1997-2002	6.42	2919.05
Tenth Plan	2002-07	6.71	3811.15
Eleventh Plan	2007-2012	6.85	9126.75
Twelfth Plan	2012-17	7.05	17129.74

Source: Computed from the Plan Documents of Department of Fisheries for the periods concerned.

vi. Studies show that the over capacity in fisheries leading the sector to huge loss and the owner of fishing fleet will become insolvent in the near future (Rajan.J.B., 1999; Kurien, John., 2000).

Is it Controllable?

The over-capacity in Kerala fisheries began with the introduction of foreign assisted programmes viz. TCM Programme and FAOs Technical Assistance Programme in nineteen forties and the Indo-Norwegian project in nineteen fifties (Ghosh, Sanjeeva., 1998). The traditional fisheries sector became commercialized with the advent of motorisation of country canoe and the consequent changes (Rajan.J.B, 1999). The traditional fisheries sector witnessed over-capacity in fisheries in the nineties. The evidence shows that over-capacity in fisheries would be a threat for the sustainability of the sector. The relevant question posing us in this context is: whether over-capacity is controllable? If yes, how?

The free-access nature of fishery and limited availability of fish resource persuade each individual fisherman to catch the maximum available quantity even by exerting more energy. This leads to unhealthy competition between fishermen, adoption of modern technologies and finally, over capacity. The short-term profit resulting from the over-capacity would not make the fishermen to think of the long-term implications and depletion of fish. Through a concerted effort, the over capacity in fisheries can be reduced and the sustainability of fishery can be ensured. Ensuring traditional property right, envisaging traditional community controlled fisheries management, formulating fishworker controlled marketing network, and ensuring diversification of employment are the major suggestive steps for resolving the problems. *Matsya Sabha* envisaged in the guidelines[15] could be a platform for planning these.

(*This chapter is modified version of my paper presented in the State Seminar on World Fishworkers Day organized by Kerala Swathanthra Matsyathozhilali Federation (KSMTF) at YMCA Hall, Trivandrum on* 21 November 2000).

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15 Assembly of fisher people. For details see Rajan.J.B and Haribabu.T.P, 2012. The Guidelines for 12th five year plan (G.O. (MS) No. 168/12/LSGD. Thiruvananthapuram dated 15/6/2012) and 13th five year plan (G.O. (MS) No. 72/2017/LSGD. Thiruvananthapuram dated 29.03.2017) envisage the coastal local governments to convene the meeting of *Matsya Sabha*. (Govt.of Kerala, 2017a; Govt. of Kerala, 2012).

11
CREDIT AND CAPITAL STRUCTURE

Competition from the mechanised sector has forced small scale fishing units to improve their crafts and gears. Consequently, a large number of traditional fishing crafts have converted into motorised units. Investment in equipment has moved up considerably. Thus, the small scale fisheries sector switched over from a labour intensive to a capital intensive one. Despite its impressive investment growth, the sector has failed to maintain its earlier sound health. The factors responsible for this sad state of affairs include the increased dependence on credit and unfavourable capital structure. This was revealed by a study on credit and capital structure of small scale fishing units, using the ratio analysis method.

The study of capital structure of small scale fishing units was based on the data collected from a sample of fishing units selected from one of the main fishing villages of Thiruvananthapuram District, Pulluvila. The sampling unit consisted of craft, gear and other allied equipment, necessary for fishing operations. A sample of 40 units was selected from the village, after classifying the fishing units into two categories - large investment units and small investment units. Twenty units were selected from each group. The investment of these units and the amount borrowed were collected through direct personal enquiry.

Debt-Equity and Solvency Ratios

For analysing the capital structure, the debt equity (D/E) ratio and solvency ratio were applied. The relation between investment and debt was examined by calculating correlation between borrowed capital and owned capital. This measure is helpful in assessing the debt position in terms of the owner's capital. Whenever D/E ratio is greater than unity, it indicates an unfavourable capital structure. Solvency ratio, a variant of D/E ratio, indicates the relationship

between the borrowed capital and total assets. It measures the percentage of assets financed through borrowing. Generally, lower the ratio, more satisfactory or stable is the long term solvency position and vice-versa.

Credit and Capital Structure

The ratio analysis of fishing units is given in Table 11.1, which reveals that out of the 20 units selected from each group, 4 units show the ratio zero. This implies that these units do not depend on loans. All others depend on loan for financing their investment in fishing equipment, i.e. out of the total units selected, 80 per cent units are indebted.

The table 11.1 also reveals that 6 units of the large investment group and 13 units of the small investment group show a solvency ratio greater than 0.5. This indicates that more than 50 per cent of their investment in fishing equipment is financed through borrowed capital. In these cases; D/E ratio is greater than unity which indicates that they are greatly burdened with debt capital and their long term solvency position is bad i.e. 30 per cent units of the large investment group and 65 percent units of the small investment group are affected by financial stringency. It is also evident that when the ratio of all the units is taken together, the D/E and solvency ratios are 0.75 and 0.43 respectively in the case of large units. These ratios are 1.63 and 0.62 respectively in the case of small units. Thus, it is evident that the effect of debt burden is more in the case of small units.

The correlation co-efficient of magnitude of investment and borrowal is given in table 11.2. Eventhough both the capital size groups show a positive coefficient correlation, it is not significant in the case of large investment group. The coefficient of determination of the small investment group is 0.70 as against 0.01 in the case of large investment group. Therefore, it can be concluded that an association between magnitude of investment units exists. From the data collected, a regression equation has been developed (Dixon.W.J and Massey.E.J, 1969) to make estimates of credit demand (Y) from given values of investment (X). This has been worked out to be Y=

0.91 X – 2.70 with a standard error of estimate of Y on X equal to 3.4 for small investment group. Using this equation, we can estimate the credit demand of these units, if investment requirements are known.

Table 11.1
Debt Equity and Solvency Ratios of Fishing Units

Sample unit	Large Investment Units		Small Investment Units	
	Debt equity ratio	Solvency ratio	Debt equity ratio	Solvency ratio
1	2.34	0.70	4.00	0.80
2	*	1.00	0	0
3	0.19	0.16	1.78	0.64
4	0	0	5.67	0.85
5	1.45	0.31	1.27	0.56
6	0	0	3.76	0.79
7	0.54	0.35	8.09	0.89
8	*	1.00	*	1.00
9	*	1.00	1.56	0.61
10	0.23	0.19	0.34	0.25
11	*	1.00	0	0
12	0.85	0.46	0.79	0.44
13	*	1.00	2.03	0.67
14	0	0	0.32	0.20
15	0.41	0.29	0	0
16	0.45	0.31	11.50	0.92
17	0.35	0.26	5.25	0.84
18	0	0	1.04	0.51
19	0.89	0.47	*	1.00
20	0.30	0.23	0	0
Average of all the units	0.75	0.43	1.63	0.62

Source: Rajan.J.B, 1990.
* In these cases, the units are financed only through borrowed capital. Therefore,

it is not necessary to calculate debt-equity ratio. However, solvency ratio of one indicates that it is fully financed by borrowed capital.

Table 11.2
Estimated Values of Correlation Ratios
(Between magnitude of investment and borrowal)

Capital size group	No. of sample units	r	r^2	Confidence limit of r*	
				Lower	Upper
Large investment group	20	0.12	0.01	0.40	0.50
Small investment group	20	0.84	0.70	0.75	0.95

* Confidence coefficient 0.95.

Policy Implications

(i) This study reveals that investment in the small scale fisheries sector is heterogeneous. This must be taken into consideration while formulating proposals for fishery development.

(ii) We cannot completely eradicate the debt burden of fishing units. But, through a planned scheme this can be reduced to some extent. This study clearly shows that small units are very much burdened with debt. In this regard, soft loans with differential rates of interest should be made available to fishermen in the small scale sector.

(iii) In most of the cases, loans provided by the organised sector are insufficient. This has compelled the fishermen to go to the unorganised sector to procure additional capital. As a result, the benefits of soft loans from the organised sector are offset by the high interest rate loans from the unorganised sector. To overcome this unhealthy practice, loans should be granted according to credit demand.

(iv) The proportion of units showing unfavourable capital structure was more in the case of units with smaller investment. The

correlation between borrowed capital and investment was also high in these cases. Suitable measures for altering the unfavourable capital structure of fishing units have been suggested. The regression equation presented is useful for estimating the credit demand of small scale fishing units.

A further study on the credit of fishing units revealed that the informal sources of credit have been predominant and the source of credit from informal sources is exceptionally high. (Rajan.J.B., 1999). The credit from formal sources is not able to meet the requirements of the small-scale fishing units both in terms of quantity and timeliness. The preference for the informal sources of credit are influenced by face to face relationship, rapid response, flexible terms and conditions, absence of procedures and formalities, and meeting the needs of both production and social overheads. Thus the informal source of credit in small-scale fisheries is necessary evil.

(*This chapter is modified version of my paper presented in the Second Indian Fisheries Forum, held at Mangalore, Karnataka in 1990. P. 349-351).*

12
LABOUR MOBILITY

In the course of carrying out various studies in fisheries sector, the growing tendency of fishermen to move from one place to another for fishing was noticed. These tendencies, unevenly distributed within and among places, create inequalities within the community and result in a series of interlinked economic and social consequences. The adverse consequences of this phenomenon, inter alia, include: continuous absence of fishermen from families and that increases the burden of housewives, disturbing the socio-economic milieu of families due to irregular remittances, polarisation of fishermen into owners and workers due to capital-deepening of fishing crafts, movement of labour in the traditional sector towards modern fishing technologies, loss of income source to women, and fading of traditional community pattern of fishing and allied activities. In this context a study was undertaken to understand the various forms of labour mobility and their magnitude. (Rajan.J.B, 2002b). This chapter discusses the different forms of labour mobility in fisheries and the extent of spatial mobility.

Forms of Labour Mobility

Mobility has two dimensions: time and direction. Time mobility may be inter-generational or intra-generational. Directional mobility may be vertical, horizontal, or spatial.

Inter-generational Mobility

It is measured in terms of father's and/or mother's occupation. For this, the present/major occupation of the respondent (household head) is compared with the major/last occupation of father.

Intra-generational Mobility

This form of occupational mobility refers to the transition of an individual from one occupation to another. In the context of fisheries sector, the forms of intra-generational mobility noted are basically

two: inter-sectoral mobility denoting movement from fishing to non-fishing and vice-versa; and intra-sectoral (technological) mobility referring to moving from traditional technology to modern technology or from small scale to large scale. These two forms may be either vertical or horizontal, depending on occupational status.

Spatial Mobility

There are various terms in vogue in relation to spatial mobility: migration, circulation, and commutation.

Commutation

Commuters are persons who leave home to return in the evening or the next day and do so regularly. Commutation is the expansion of work space. Fishermen used to move out of their village as part of their fishing activity and even land their craft in other villages. Eg. fishermen of other villages moving to Vizhinjam fishing village for fishing.

Circulation

Circulation is a persistent, continuous return to the starting place, accidental or not, for a short while or for a longer period. Seasonal migration is the clearest example of circulation. Circulation is the expansion of workspace for a longer period. This moving out constitutes not only the expansion of workspace for longer periods, but the residence of mover, may also be shifted for a longer period in connection with the occupation. Eg. fishermen from south moving to central and northern regions of Kerala or elsewhere for fishing.

Migration

Migrants are those who go away and stay away, even if this was not their intention at the time of departure. The term 'migration' remains appropriate when this movement acquires a permanent character in time, and merges into a wandering existence. Migration is more than a movement of factors of production. It is the permanent settlement. Migration is a broader term than circulation in which the movers settle in the destination village with family, i.e. both place of work and place of residence are shifted.

Labour mobility in the fisheries sector is varied in nature such as labour moving to distant places for fishing, fish vending and fish processing; fishermen moving to distant places in search of other employment; moving of labour within the sector but from one technology to another, and moving to other sectors of the economy. Present chapter looks into the spatial mobility of labour. The magnitude of spatial mobility in study centres viz. Pozhiyoor (Kollemkode and Paruthiyoor), Vizhinjam South, Anchuthengu is given in table 12.1.

Table 12.1
Spatial Mobility of Labour for Fishing

Forms of Spatial Mobility	Pozhiyoor			Vizhinjam South	Anchuthengu	Total
	Paruthiyoor	Kollemkode	Total			
1.Commuters	479	378	857 (44)	2151 (87)	1247 (75)	4255 (70)
2.Circulators	520	555	1075 (56)	311 (13)	418 (25)	1804 (30)
3.Migrants	-	-	-	-	-	-
4.Total Fishermen (1 to 3)	999	933	1932 (100)	2462 (100)	1665 (100)	6059 (100)
5.Male Workforce	1064	1068	2132	2817	1941	6890

Source: Rajan.J.B, 2002b.
Figures in () are percentages.

The spatial mobility in the study centres predominantly takes into account the forms of commutation and circulation. Every fishermen move during fishing as the prey moves. This move may be considered commutation. Commutation constitutes more than 70 percent of all fishermen. Circulating fishermen form 30 percent of fishermen in all the study centres taken together. However between centres it varies between 13 percent in Vizhinjam South and 56 percent in

Pozhiyoor. The circulation for fishing is prominent in Pozhiyoor and it form fifty percent of male workforce.

Reasons for Circulation

The reasons for circulation differ from centre to centre. In Pozhiyoor, the reasons relate to technological and oceanographic factors. The circulation in Vizhinjam is on the lower side because it is the only centre in Thiruvananthapuram where fishing takes place for almost 12 months of a year. Hence inward circulation of labour is high in Vizhinjam, especially during the monsoon season (June to August). It may be interesting to see why there is circulation from Vizhinjam South (though in small proportion) when fishermen from other centres come to Vizhinjam. Some of the reasons noted are Hook and line base, exposure to outside world, and marital status. In Anchuthengu, on the other hand, the lack of landing/berthing compels the fishermen to circulate during specific seasons. In Pozhiyoor, those who mainly base on Driftnet units do circulate and those who base on variety of gears (especially varieties of small gillnets) do not usually circulate. The benefits envisaged from circulation are higher and more regular income and that too received in lumpsum, which could provide a sound financial base. The circulation was the result of technology upgradation with respect to gear. The introduction of Driftnet all along the coast of Kerala and elsewhere, fuelled the demand for labour to operate the same and ultimately the exposure through marketing network bridged the gap between demand for and supply of labour. The lack of appropriate skills of fishermen in the receiving villages to tap the available resources pulled the skilled labour from other areas.

Circulation by Type of Craft

The distribution of circulating fishermen by craft type is given in table 12.2. The majority of circulating fishermen use Plywood canoe – 86 percent if all the centres taken together and in the range of 76 to 91 percent between centres.

Table 12.2
Male Population and Fishermen Circulators

Craft Type	Pozhiyoor			Vizhinjam South	Anchuthengu	Total
	Paruthiyoor	Kollemkode	Total			
Plywood Canoe	455 (87)	528 (95)	983 (91)	255 (82)	316 (76)	1554 (86)
Mechanised Craft	65 (13)	22 (4)	87(8)	20 (7)	74 (18)	181 (10)
Catamaran	-	-		4 (1)	17 (4)	21 (1)
Other Crafts	-	5 (1)	5(1)	32 (10)	11 (2)	48 (3)
Total	520 (100)	555 (100)	1075 (100)	311 (100)	418 (100)	1804 (100)

Source: Rajan.J.B, 2002b.
Figures in () are percentages.

It was reported that one Mr.Ambrose and a few other fishermen are the pioneers of circulation for fishing, which began in December 1964. (Rajan.J.B, 2002b). However, it was observed that the commencement of circulation for fishing had started much earlier than 1980, i.e. in 1964. But, more than four-fifths of the circulation began after 1980. (Table 12.3). This reveals the fact that the circulation has commenced after INP and has increased after the motorisation of country fishing crafts.

Table 12.3: Distribution of Fishermen by Period of Commencement of Circulation (%)

Period	Pozhiyoor			Vizhinjam South	Anchuthengu	Total
	Paruthiyoor	Kollemkode	Total			
Before 1980	20	30	25	9	11	19
After 1980	80	70	75	91	89	81
Total	100	100	100	100	100	100

Source: extracted from Rajan.J.B, 2002b.

Destination

The destination of circulating fishermen from study centres is given in table 12.4. Among the circulating fishermen, 71 percent go mainly to destinations within Kerala, whereas places of other States in India attract 24 percent and places outside India were the destinations of 5 percent.

Table 12.4
Destination of Circulating Fishermen

Craft Type	Pozhiyoor			Vizhinjam South	Anchuthengu	Total
	Paruthiyoor	Kollemkode	Total			
Kerala	275 (53)	383 (69)	658 (61)	280 (90)	342 (82)	1280 (71)
Other States in India	230 (44)	157 (28)	387 (36)	25 (8)	15 (4)	427 (24)
Outside India	15 (3)	15 (3)	30 (3)	6 (2)	61 (14)	97 (5)
Total	520 (100)	555 (100)	1075 (100)	311 (100)	418 (100)	1804 (100)

Source: extracted from Rajan.J.B, 2002b.
Figures in () are percentages.

Fishermen from Pozhiyoor circulate to northern districts of Kerala and also to the neighbouring States for fishing. Fishermen from Vizhinjam circulate mainly to the fishing villages in the northern districts of Kerala, as in the case of their counterparts of Pozhiyoor; some also move to Rameswaram in Tamilnadu. Fishermen from Anchuthengu usually move to the adjoining Thangassery, a fishing village in Kollam district, with which they had marital relations.

Problems of Circulators

Over the period, the fishermen who circulate most often face opposition from the destination villages. In Kannur and Parappanangady in north Kerala, fishing crafts from other places are not allowed to land. In Beypore, landing is allowed but the catch can

be sold only through local auctioneers. The kerosene dealers in these villages insist on the right to auction the fish catch. They charge exorbitant rates on the in-migrant fishermen in various forms viz. basket charge, auction floor charge, auction commission, and value of offerings to temple/church. It was estimated that these impositions come to about 25 percent of the catch value. Also, fish is taken away by the "market leaders" for their home consumption. In some centres, exploitative practices such as lowering of price, stealing of fish, beating and man handling were reported. The absence of facilities for basic amenities and keeping implements were also the problems. When the circulating fishermen met with accidents/mishaps at sea or fell ill, they feel uncomfortable. The alcohol drinking habits, "callous" nature, and daring attitude of fishermen from south Kerala are resented and feared by the villagers in the destinations. Often squabbles arise between the locals and the circulators.

Spouses of circulating fishermen are burdened with additional responsibilities of managing the household. Education of children goes haywire. Instances of infidelity on the part of circulating fishermen while in the destination villages are not rare.

Over time, some of the local fishermen in the northern fishing villages have mastered Driftnet operation from the circulators. The lucrative activity of circulating fishermen shows signs of decline in spatial and temporal terms. The owner-crew is mostly affected, as the there are restrictions on landing of fishing fleet. At the same time, demand for skilled labour in Driftnet operation persists. Due to the technology adaptation by the locals at destinations, the landing of alien fishing fleet is restricted; while the requirement of labour continues. This creates new modes of work organisation.

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13
WOMEN WORKERS IN FISH PROCESSING PLANTS

The advent of modernization has impacted the small-scale fisheries sector in multiple ways. The changes in terms of motorization of fishing crafts, modern fabrication and production materials for crafts and gears, new varieties of crafts and gears, new allied fishing equipments, new types of fish processing and handling, etc. came in quick succession. All these have negatively impacted the fisher women who played significant roles in pre and post harvesting activities earlier. The decentralized fish distribution and marketing, fish curing and drying had been primarily fisher women's domain. The new systems of centralized fish landing and large scale fish distribution and marketing channels gradually alienated the fisherwomen. Fishing net weaving had been another area from which the fisher women contributed to the household income. The handmade nets replaced by the machine made nets also displaced fisher women from their traditional occupation. Curing and drying of sail had been another traditional activity of fisher women, wiped out due to motorization.

The fisher women who had fast lost their traditional foothold in the sector found modern avenues for subsistence. Export market created new ventures like fish processing plants, where women found multiple employment opportunities. Women from coastal area were offered work in fish processing plants in States like Gujarat, Maharashtra, Karnataka, Goa, and West Bengal. But it was noticed that the women workers in those plants are being subject to exploitative practices and harassment. In that context, a study was conducted in 2002 by selecting 30 fish processing companies in Gujarat. However five companies refused to provide information and were able to collect data only from 25 fish processing plants. (Rajan.J.B, 2002c). The study revealed pathetic working conditions of women workers in such plants.

Workers Composition

The total workers recruited in the companies studied numbered 2,254, of this 88 percent were from Kerala – male and female included. And the women account for 89 percent of workers from Kerala. (Table 13.1). Considering the target output, the number of workers required for the fish processing plants studied was estimated at 3,485. The actual number of workers recruited accounts for only 65 percent of total labour requirement. This shortage of labourers had extra burden on the workers, as they had to over work so as to attain the target output of the company.

Table 13.1
Workers Composition

Particulars	Male	Female	Total
Number of workers required			3,485
Actual number of workers	231	2,023	2,254
Number of workers from Kerala	217	1,758	1,975
Number of workers from other States	14	265	279

Source: Rajan.J.B. (2002c).

Activities

The fish processing companies have broadly two cadres of employees - managerial cadres and plant-level worker cadres. The managerial cadres include General Manager, Production Manager, Work Supervisors, and Contractors. The plant-level worker cadres were of different sections viz. workers at peeling, measuring, washing, cleaning, sizing, grading, packing, storing, freezing, loading, and unloading. The local male/female workers were engaged in the sections of peeling, washing, measuring, cleaning, and sizing. Whereas, women from Kerala were involved mainly in grading and packing sections.

Job Equipments

Since the workers were handling a product of wet in nature and also working in wet conditions, the company has to provide protective

equipments like gloves, woolen cloths, caps, and boots. But none of the companies, except three, provide these. This made hardship to workers to work without such accessories, especially during nights and winter season. This also causes occupational diseases.

Working Time

The companies studied had two shifts; first shift from 9.00 am to 9.00 pm, and second shift from 9.00 pm to 9.00 am. This was against the rule of eight hours of work a day. In order to attain the target production, most often the companies compel the workers to work over time too. But that was with a meager wage of Rs 12 per hour. Some companies did not even bother to pay overtime wages. These were violations of labour law, which insists that over time wage should be double that of normal rate and also that female workers should not be engaged between 7 pm and before 6 am.

Salary

All companies studied had agreement with Contractors and the workers were paid salary through the Contractors. The average monthly salary was around Rs 1,900/-. There was no uniform pattern regarding other perquisites. Six out of 25 companies studied maintained provident fund contribution satisfactorily, whereas another six companies refused to reveal the records to the study team. As a matter of policy, the companies reimburse the travel expenses of workers from home to work place; but remittance was through the Contractors. Unfortunately, the Contractors did not pay the travelling expenses to the workers. Even there was complaint from the workers about the Contractors not paying the salary as was promised at the time of recruitment. Also at the time of recruitment, the Contractors had agreed to pay 11 months salary for 10 months of work, but were not walking with the talk. It was found that the workers eligible leaves and bonus were also denied.

Medical Support

The workers in the fish processing plants are entitled for medical support. Only five out of 25 companies studied paid medical reimbursement to the workers. Two companies ensured the service

of a Doctor in the company. In one company, monthly medical allowance of Rs. 75 was paid. Another problem was about accidents during working hours. No serious medical care was provided by the companies, when accidents occurred during working hours. In such cases the workers were in a double jeopardy; one, to meet medical expenses, and two, loose working days. Many were affected by occupational diseases too, especially sore and skin infections.

Accommodation

As per the contract, the workers were entitled to get accommodation; but the situation showed pathetic. Seven out of 25 companied studied, did not allow the study team to visit the accommodation of workers; perhaps they were afraid of the poor facilities to be exposed. Another eleven companies visited had poor accommodation facilities; narrow rooms, insufficient number of cots, light, and fan. The condition of bath room was found to be satisfactory only in case of six companies. But the average workers per bath room were worked out at 50. Same was the situation of latrines. The lack of proper locking facility for latrines badly affected the privacy too. Water scarcity in latrines was another problem reported. The unhygienic situation also caused health problems.

Food

All fish processing companies studied run canteen and the workers had to bear the food expense. The food was satisfactory only in seven out of 25 companies, whereas totally unsatisfactory in case of 10 companies. Workers complained that the company serves poor quality food but charged exorbitantly. Eight companies refused to provide information on food. The kitchen was found unhygienic in 12 companies. Another problem reported was scarcity of drinking water.

Surroundings

The surroundings of the plants studied were not maintained well. The surroundings were found unhygienic and emit foul smell. Lack of facilities for managing fish wastes from the plants was the main reason for the foul smell.

Other Aspects

The companies process an average 15 tonnes of fish a day. But the Contractors and companies did not have a permit to process that much quantity of fish. Twenty companies refused to show their license.

Only seven companies had issued identity card and passbook to the workers. Four companies denied showing the records relating to identity cards and passbooks.

Only in seven companies harmonious relation exists between the management and workers. As reported from other companies, incidents of harassment and torturing were the routine. There are incidences of ragging too. The workers hesitate to reveal these, as they are afraid of termination from the job. Also the companies would not allow outsiders to talk to the workers.

There is lack of mechanism for delivering correspondence from family and vice-versa. The communications were delayed even in the situations of death, accidents, or sickness of kith and kin.

As perceived by the society, the dignity of women workers in fish processing plants was low. There existed social taboo against those who work in fish processing plants; badly affecting matrimonial prospects too.

After the advent of INP, avenues for export market opened in the fisheries sector. The traditional, small-scale, and decentralized fish processing that too by fisher women were replaced by plant-based, large-scale, centralised fish processing companies. While the fish exporters find lucrative business, the women workers were pushed down to most vulnerable situation. Labour rights and human rights were totally denied.

(This chapter is extracted from my study 'Problems of Women Workers in Fish Processing Plants: Study with Reference to Gujarat' published in Malayalam by Fisheries Research Cell, Programme for Community Organisation (PCO), Thiruvananthapuram in January 2002).

14
EMPLOYMENT DIVERSIFICATION

The globalisation[16] and subsequent changes have caused structural shift, creating new employment and opportunities. Fishing, which once was a subsistence activity for livelihood, has become a commercialised venture with the advent of globalisation. The production and disposal of fish for subsistence and home consumption are no more relevant after commercialisation. The sector has changed drastically in tune with the market driven economy. Do these create new opportunities for fisherworkers in the changed scenario? Studies show that the diversification of employment among the fishing community is dismally low. Even after the structural changes in the economy due to globalisation, why has diversification of employment not taken place among the fishing community? What are the hindrances for fishing community to diversify their employment? What are the potentials and possibilities for the fishing community in the context of globalisation? This chapter attempt to address these issues.

Specialisation

Traditional marine fishing is a household enterprise with craftsmanship on pre-harvest, harvest, and post-harvest activities; in which men, women, and children play significant role. The advent of commercialisation has promoted trade and industry, thus structural changes within the fish economy too. (Table 14.1). Before the advent of commercialisation, the community themselves had undertaken all the activities of the fishing based on their trans-generationally acquired skills and knowledge.

16 Though the usage of term globalisation was prominent from the late eighties, the process of globalisation dates back to the post independent era; perhaps more referred as commercialisation and with a lower phase.

Table 14.1
Fish Economy Before and After Commercialisation

Activity	Before commercialisation	Specialisation	After commercialisation
Pre-Harvest:			
Craft making	*Odavi* (Traditional Carpenters)	Craft Engineering	Entry of Boat Yard
Gear setting	*Madikettali* (Handmade nets)	Textile Engineering	Entry of Machine made nets
Maneuverability	Sail & Oar	Navigation	Import of OBMs
Harvest:			
Skills, knowledge and expertise	Crossing the surf	Navigation	More of mechanical devices viz. Wiench, Trolley, Compus, GPS, etc.
	Water currents	Oceanography	
	Star location	Astronomy	
	Kanicham (Triangulation)	Triangulation - Engineering	
Post-Harvest:			
Disposal	Head load	Transportation	Entry of Motor vehicles
Storage	Drying and salting	Processing	Entry of Cold storage/ freezer
Vending	Head load/Cycle load	Marketing	Entry of large-scale traders/merchants

Source: Rajan.J.B, 2002a.

It is clear from table 14.1 that the fisher people had the specialized domains before commercialization in fisheries that has been captured by entry of business and industry. The question is who benefits the

fruits of commercialization. A study of Ringseine[17] fishery in Kerala provides a piece of information on this question. It reveals that the fish production has increased with the technological changes in fisheries. But this has achieved through structural changes in the factors of production, especially at the cost of huge investment and increased fuel cost. (Rajan.J.B, 1993a). The sales turnover of a Ringseine unit is higher than its predecessors. But this high output has been achieved at the cost of high capital investment, exertion of much labour effort, and consumption of fossil fuel. The contribution to different sectors[18] is also increased in absolute terms, but this increase is not uniform across the sectors. Industrial, trading, and other sectors shared the rest. (See chapter 7 for details). With the transformation of the technology over the period, from *Kollivala* and/or *Thanguvala* to the Ringseine, the share of the fisheries sector declined in percentage terms though increased in absolute terms. This was by contributing more towards the industrial and trading sector. The relevant question here is: could the fishworkers enter in to the arena of marketing and trade to tap incremental benefit? In other words, to what extent inter-sectoral[19] diversification of employment took place?

Status of Employment Diversification

Whether the fishworkers, who acquainted with diverse skills, knowledge, and expertise, could move along the structural changes in the fisheries and the economy is reviewed by looking at the employment status of fishing community. A study in the four coastal villages viz. Kollemcode, Paruthiyoor, Vizhinjam South, and Anchuthengu (Anjengo, in Anglicised) of Thiruvananthapuram district of Kerala is quite interesting. See table 14.2.

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17 See chapter 7.

18 As mentioned in Chapter 7, the components of sales turnover of fishing units go to different sectors of the economy. The items of food expense, crew remuneration and investors net income go to the fisheries sector; fuel & lubricants and deprecation on fishing equipments go to the industrial sector; sales commission and interest on loan go to the trading sector; and repair and other expenses go to the miscellaneous groups.

19 Inter-sectoral diversification of employment refers to the engagement in non-fishing activities, whereas intra-sectoral diversification of employment refers to the engagement of new opportunities within the fisheries sector.l

Table 14.2
Fisher Population by Labour Component

Labour Component	Kollem-code		Paruthiy-oor		Vizhinjam-S		Anchuthen-gu		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
1. Working Population										
1.1 Fishery										
Fishing	922	21	979	22.9	2301	27.4	1617	25.8	5819	23.0
Fish vending	109	2.5	226	5.3	366	3.6	607	9.7	1308	5.2
Fish related	10	0.2	11	0.3	193	1.9	31	0.5	245	1.0
Total (1.1)	1041	23.5	1216	28.5	2860	27.9	2255	36.0	7372	29.2
1.2 Non fishing	184	4.2	97	2.3	466	4.5	369	5.9	1116	4.4
Total (1)	1225	27.7	1313	30.8	3326	32.4	2624	41.9	8488	33.6
2.Seeking work	281	6.3	465	10.9	1198	11.6	327	5.2	2271	9.0
3.Outside labour force	2920	66.0	2489	58.3	5756	56.0	3305	52.9	14471	57.4
Total (1 to 3)	4426	100	4267	100	10280	100	6256	100	25229	100

Source: Rajan.J.B, 2000.

The total population of the villages are in the range of 4,267 to 10,280; thus a total population of 25,229 in the four villages together. The population is categorised by three broad categories viz. working population, population seeking work, and population outside labour force. Working population in the study villages together is 8,488 that form 34 percentage of the total population. The population engaged in the fisheries sector is 30 percentage of the total population and 90 percentage of the working population. This comprised of fishing, fish vending, and fish related activities. It is important to note that fishing continues to be the major occupation of the fishing community.

The evidence from other sectors of the economy (eg. rural area) depicts a different situation from coastal area. The study by Mahesh.R shows a comparative better position in employment diversification (Mahesh.R, 2000). See table 14.3.

Table 14.3
Percentage of Population according to Activity Status

Usual Activity	Percentage of population		
	Male	Female	Total
A. Working population			
i. Farming	4.24	1.37	2.74
ii. Agricultural labour	8.10	5.22	6.60
iii. Other rural labour	15.75	6.60	10.95
iv. Self-employed in unorganised trade, transport & commence	10.00	-	4.80
v. Organised sector	8.38	4.02	6.06
vi. Others	10.00	3.60	6.65
Sub total	56.47	20.81	37.80
B. Employment seekers	5.65	7.54	6.64
C. Outside labour force	37.88	71.65	55.56
D. All	100.00	100.00	100.00

Source: Mahesh.R, 2000.

The study of inter-generational mobility of labour[20] between two generations in the coastal villages further reveals that the fishing continues be the major occupation of the community. (Table 14.4).

Table 14.4
Inter-generational Mobility (%)

Activity Status	Kollemcode		Paruthiyoor		Vizhinjam-S		Anchuthengu	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Fishing	98.3	82.4	98.8	89.5	97.7	85.1	95.6	85.5
Fish related	0.1	0.6	0.2	4.2	1.1	3.2	0.3	4.2

20 Comparing the main occupation of households head via-a-vis the main occupation of the parents. For details of concept and methodology, see Rajan.J.B, 2000.

Non-fishing	1.6	16.9	0.9	6.3	1.2	11.7	4.2	10.4
Total (1)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Rajan.J.B, 2000.
1st – first generation; 2nd – second generation.

Fishing as a major occupation has come down from the range of 96-99 percentage for first generation to 82-90 percentage for second generation. Though the fish related activities seem to be increased, this is more on fish vending by women and auctioning, sale of webbings, kerosene supply, etc. by men. Similarly, inter-sectoral (non–fishing activity) occupational mobility between two generations increased from the range of 1.2-4.2 percentage to 6.3-16.9 percentage. This may seem to be encouraging at first sight, but on a close look the picture is different with regard to the status of non-fishing activities. Table 14.5 presents the distribution of male workforce engaged on non-fishing activities.

Table 14.5
Distribution of Male workforce engaged on Non-fishing Activities

Employment Status	Kollem-code		Paruthiyoor		Vizhin-jam-S		Anchuthen-gu	
	No	%	No	%	No	%	No	%
1. Gulf*	62	5.8	37	3.5	226	8.0	110	5.7
2. Government Employment	48	4.5	13	1.2	46	1.6	23	1.2
3. Private Employment	12	1.1	3	Neg.	11	Neg.	9	Neg.
4. Self Employment	9	Neg.	1	Neg.	2	Neg.	-	-
5. Professional	4	Neg.	1	Neg.	2	Neg.	-	-
Total (1 to 5)	135	12.6	65	6.0	355	12.6	276	14.2
Total male workforce	1068	100	1064	100	2817	100	1941	100

Source: Rajan.J.B, 2000.
Neg. – Negligible.
* Employed in Arabian countries.

The inter-sector occupational mobility plays a fundamental catalytic role in the structural changes in the coastal sector that is associated with development. The inter-sectoral occupational mobility is thus intimately influenced by profound changes within and outside the villages. As far as the studied villages are concerned, the inter-sectoral mobility is not substantial. The employment in Arabian Countries is the major component in non-fishing activities. The employment in the government services is marginal and a look at the data show that the same is mainly in military and police services at lower cadres.

The study also reveals that the chance of employment diversification of the future generation is bleak. Transition probability of the occupation of future generation based on the information of household heads' and occupation of their father reveals this (table 14.6).

Table 14.6
Transition Probability of Occupation (Males)

Occupation of son	Occupation of father		
	Fishing	**Fish-related**	**Others**
Fishing	87.2	31.4	28.3
Fish-related	2.9	31.4	4.5
Others	9.9	37.2	67.2
Total	100.0	100.0	100.0

Source: Rajan J.B, 2000.

The transition probability in table 14.6 shows if father's occupation is fishing, the probability of son becoming a fisherman is 87%, the probability that he will engage in fish related activity is 3%, and in non-fishing activity is 10%. It is very clear that diversification of employment among the fishworkers is not pronouncing and also the future for diversification is bleak. The constraints to achieve employment diversification could be problems of approach and social

fabric. Review of the projects implemented through People's Plan Campaign (PPC) in the fisheries sector reveals that the projects to diversify employment are meager. (Rajan.J.B, 2001a; Rajan.J.B and Haribabu, 2005). Evidences show that the increasing fishing pressure and over-capacity would be a threat for the sustainability of the sector and lead to chronic unemployment and under-employment (Rajan, J.B., 2000a). This would lead to declining living standards, growing social discontent, economic insecurity, and increasing violent outbursts. There is a need for a new development paradigm that recognises 'employment diversification' of the fishworkers – within and outside sector – as one of the top priorities for the upliftment of the fishing community.

(This chapter is a modified version of my paper presented in the International Seminar on Income Generating Activities organised by Department of Applied Economics, CUSAT & Tilburg University, The Netherland on 9th August 2002, at CUSAT, Kochi).

PART IV:
POST-MECHANISATION: STATUS

Having examined the changes in artisanal fisheries and its repercussions on traditional fisher people, this concluding part discusses the alarming living conditions of fisher people. The coastal health, one of the pressing problems of fisher people is highlighted in chapter 15. The vast contrast between the macro scenario and the micro realities of socio-economic conditions of fisher people is analysed in chapter 16. The concluding chapter throws light on the vulnerable situation of fisher people due to incessant natural disaster and calamities; particularly in the context of two unprecedented cyclones – *Tsunami* and *Okhi*. Chapter 17, Fury of the Sea, points to the under-preparedness and paucity of communication to avert human loss among fishing and coastal communities. It raises issues of climate change, sea level rise, cyclones, etc. and emphasizes need for serious attention on formulating coastal action plan on climate change.

15
COASTAL HEALTH

The Kerala's famed model - Kerala Model of Development - is predominantly influenced by health and educational indicators. However a counter argument also prevails that the two traditional communities in the State are an exception to the Kerala Model of Development. They are tribal and fisher people, who have been deprived socially, politically, and economically. A study on health status of fisher people in Thiruvananthapuram Corporation in two time-intervals further proves this.

Despite the long history of interventions by Government and Non-Government Organisations in the fisheries sector, the coastal communities - particularly the fisher people - remain most backward in all respects. It is needless to say that the situation would be worst, if those interventions were not carried out. But the treatment without proper diagnosis might be the problem for not being able to bring the fisher people into the mainstream. The fact that intervention without adequate data would mislead the entire process was realised by the Taskforce on Fisheries Sector of Thiruvananthapuram Corporation during 9th Five Year Plan (1997-2002). Hence a 'Study of Education, Employment and Health in the Coastal Area of Thiruvananthapuram Corporation' was undertaken. (Rajan.J.B, 2000b). In the course of time, delimitation of ward boundaries and merger of nearby Panchayats to the Corporation had altered and expanded the boundaries and size of coastal wards. In that context, the Working Group on Fisheries during 12th Five Year Plan (2012-2017) experienced the need for yet another survey that lead to the project 'Household Survey of Coastal Wards, Thiruvananthapuram Corporation'. (Rajan.J.B, 2010). These projects attempted to generate data on socio-economic aspects including health status[21] of fisher people.

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21 One of the limitations of these studies were the health aspects could not be covered holistically, but status indicators like population of prolonged illness and the challenged only could be collected.

Health Status

The number of coastal wards, population in the coastal wards, and population of fisher people are given in table 12.1. The sex ratio, one of the prime indicators of demography that has implication on health too, is extremely unfavourable among fisher people. The unfavourable sex ratio among the fisher people of Kerala, is in contrast to the State level status as the state has a unique position with regard to sex ratio. In all the censuses, females outnumbered males in Kerala, which is in contrast to all India pattern. The sex ratio of Kerala has gradually increased from 1004 in 1901 to 1028 in 1951 and then to 1058 in 2001. (Govt. of Kerala, 2005). The same in 2011 was 1084. (Govt. of Kerala, 2016). Contrary to this, males among fisher people outnumber females in sex ratio among fisherfolk as 936 females to 1000 males. (Govt. of Kerala, 2005). This contradictory phenomenon is interpreted as the gender bias and healthcare related issues. (Govt. of Kerala, 1997). The sex ratio among fisher people of Thiruvananthapuram Corporation was 939 in 1999-2000 and 931 in 2008-09. (Table 15.1).

Table 15.1
Thiruvananthapuram Corporation-Population of Fisher People

#	Particulars	1999-2000[1]	2008-2009[2]
1	No. of Coastal Wards	8	12
2	Total Population of Coastal Wards	71,022 [100]	91,260 [100]
3	Total Population of Fisher People	27,100 [38]	45,009 [49]
4	Sex Ratio among Fisher People	939	931

Source: 1. Rajan.J.B, 2000b; 2. Rajan.J.B, 2010.
Figures in [ ] are percentages.

Of the total population of fisher people in Thiruvananthapuram Corporation in 1999-2000, 9.28 percentage were affected with prolonged illness. This was increased to 12.82 percentage of fisher people in 2008-09. The proportion of fisher peoples population with

prolonged illness reached double digit over the period of 10 years. The physically challenged population among the fisher people in the survey area was 0.98 in 1999-2000 that increased to 1.59 percentage in 2008-09. Similarly, the mentally challenged population among the fisher people increased from 0.23 percentage in 1999-2000 to 0.58 percentage in 2008-09. (Table 15.2).

Table 15.2
Thiruvananthapuram Corporation - Prolonged Illness & Challenged among Fisher People

#	Particulars	1999-2000[1]		2008-09[2]	
		No.	%	No.	%
1	Fisher People	27,100	100.00	45,009	100.00
2	Population with prolonged illness among Fisher People	2,514	9.28	5,772	12.82
3	Population by physically challenged among Fisher People	265	0.98	714	1.59
4	Population by mentally challenged among Fisher People	62	0.23	259	0.58

Source: 1. Rajan.J.B, 2000b; 2. Rajan.J.B, 2010.

Overall, the proportion of fisher people with prolonged illness and challenged [physical/mental] has increased from 10.49 percentage in 1999-2000 to 14.99 percentage in 2008-09; 43 percentage increase over 10 years period. This micro reality is further revealed by macro level data of Department of Fisheries. According to them, the fisher people affected by prolonged disease have increased from 8 percent in 2004 to 13 percent in 2013. (Govt. of Kerala, 2005; Govt. of Kerala, 2016).

The surveys could not gather the reasons on health problems, but the Focus Group Discussion (FGD) revealed that the fishworkers suffer from hypertension due to acute poverty, lack of safe housing,

lack of rest, lack of regular food, etc. Hence they are more vulnerable to physical and mental ailments. The proxy variables of poverty on basic amenities viz. households with toilet facility, potable water, etc. reveals pathetic conditions of fisher people that have implications on health in the long run. (These are discussed in chapter 16). An RRA in the above survey revealed that most of the living places are congested and houses very close to sea front. Hence the coastal area is prone to epidemics and water-borne diseases.

It is noted that the population of fisher people with prolonged illness and challenged has increased in relative terms. This is further revealed by the proxy variables on poverty such as poor status on entitlements and amenities. On the one hand, this is due to the geographic and occupational factors. On the other hand, the negative externalities also impact the peaceful livelihood and health status of the fisher people. It is shocking that the survey area itself is bounded with disease causing "development" interventions, which creates explicit health problems. The *Parvatheeputhenaar,* a river bordering Poonthura fishing village and crossing Vallakkadavu ward is locally termed as 'garbage bin' of city dwellers; since the medical and domestic wastes from the city finally reach in this river. Similarly, the sewage farm in Valiathura fishing village, which receives garbage from the city, gives rise to severe health problems. The Travancore Titanium Products (TTP) Ltd. at Vettucaud ward emits poisonous chemical smoke and also releases acidic waste into the inshore waters. The English-Indian Clay Factory at the boundary of Vettucaud fishing village emits poisonous chemical dust into the air. These are not the exceptions. The coastal areas in other districts too are facing similar situation. The 'coastal health' is one important indicator that the State Government in general and the Local Governments in particular have to look into, so as to ensure peaceful and healthy living of the fisher people.

(This chapter is mainly extracted from two studies that I have undertaken for Thiruvananthaputam Corporation, Kerala in different periods viz. 'Status of Education, Employment and Health in the Coastal Area of Thiruvananthapuram Corporation' (2000), and 'Household Survey of Coastal Wards, Thiruvananthapuram Corporation' (2010)).

16
MARGINALISED FISHER PEOPLE

The use of indiscriminate fishing methods, over capacity, resource depletion, etc. have adversely affected the fisheries sector and have left the traditional fishers in despair. The top down planning hardly addressed these issues and the community had no access to these conventional planning modes. The bottom-up planning through People's Plan Campaign (PPC) in Kerala could be seen as opportunities and provide access to the marginalized in the planning process and that certainly include the fisher people. After over two decades of PPC, have the lives of traditional fisher people improved? This is attempted at the macro scenario of fisheries sector followed by a micro situation.

Pathetic Standard of Living – Macro Scenario

The pathetic standard of living of fisher people is revealed by the socio-economic survey reports published by the Department of Fisheries. (Table 16.1). The indicators show worsening trend in health and sanitation between 2004 and 2013. Households without toilet have increased from 11 percent to 15 percent and the disease affected has increased from 8 percent to 13 percent. However other indicators show signs of positive trend. Two factors are to be considered for this. They are.

i. In the context of Kerala Model of Development, there exists a distance between the mainstream population and traditional fisher people. For example, educational dropout is almost nil as the state as a whole, while the same for fisher people is 14.60 in 2004 and 8.31 in 2013.

ii. The figures given in table 16.1 are for the fisher people as whole, covering both forward and backward categories within the community as well as mechanized sector. The standard of living of traditional fisher people vary significantly between districts also

between villages within districts. As against these state averages, the real pathetic situation of traditional fisher people is better revealed by the micro studies.

Table 16.1
Marine Fisher People in Kerala: Deprivation Indicators

#	Indicators	2004[1]	2013[2]
1	Education: - Illiteracy (%) - Dropout (%)	 14.21 14.60	 6.54 8.31
2	Health: - Disease Affected (%)	 8.00	 13.00
3	Land Ownership: - Landless (%)	 25.35	 9.11
4	Drinking Water: - Drinking Water Scarcity	 23.10	 4.06
5	Sanitation: - Households without Toilet (%)	 11.00	 15.16
6	Energy: - Un-electrified Houses (%)	 8.90	 2.67

Source: 1. Govt. of Kerala, 2005; 2. Govt. of Kerala, 2016.

Pathetic Standard of Living - Micro Scenario

As mentioned, the working group on fisheries of Thiruvananthapuram Corporation during ninth five year plan has encountered the need for a study on education, health, and employment of coastal community. Study conducted accordingly revealed that the status of coastal community on education, health, and employment are not satisfactory. (See Table 16.2). In a literate state like Kerala, illiteracy among fisher people in 1999-2000 was 26.5 percent. The landless households account for 36 percent, houses without electricity 39 percent, without toilet 34 percent, and without own source of potable water 58 percent.

Table 16.2
Coastal Wards of Thiruvananthapuram Corporation
- Status of Education, health, and Employment (1999-2000)

#	Indicators	Indicator Value (%)
1	Illiteracy	26.5
2	Unemployed	7.6
3	Fisher People with prolonged illness	13.6
4	Housing:	
	Sheds	5.7
	Thatched	32.1
	Un-electrified	38.9
	Without Toilet	33.5
	Without own source of potable water	57.7
5	Landless	36.4

Source: Rajan.J.B, 2000.

The survey conducted by the Thiruvananthapuram Corporation, during eleventh five year plan, compared the status of fisher people with other categories in the coastal wards. It also showed the pathetic socio-economic conditions of fisher people. (Table 16.3). Illiteracy was 12 percent among the fisher people, as against 5 percent among other categories. Unemployment was not pronouncing and came down to 6 percent in 2010, compared to 8 percent in 1999-2000. The percentage of people with prolonged illness remains at 13 in both the surveys. The households of fisher people residing in shed have increased from 6 percent in 1999-2000 to 14 percent in 2010. This was due to the fact that many households lost their houses due to sea erosion.

Table 16.3
Coastal Wards of Thiruvananthapuram Corporation – Socio-Economic Status (2010)

#	Indicators	Indicator Value (%)	
		Fisher people	Other Category
1	Illiteracy	12.0	5.0
2	Unemployed	5.9	5.5
3	Disease Affected	13.0	14.0
4	Housing:		
	Sheds	14.0	11.5
	Thatched	13.0	10.1
	Un-electrified	7.0	5.0
	Without Toilet	15.0	8.0
	Without own source of potable water	56.7	42.7
5	Families:		
	Without *Pattayam*	7.0	5.0
	In *Poramboke*	9.0	5.0
	Without Ration cards	7.0	13.0

Source: Rajan.J.B, 2010.

The status of essential entitlements like *pattayam* (land possession certificate), ration cards, house ownership, and status of house and amenities like own source of potable water, electrification of house, and toilet facility indicates the poverty of fisher people. The households without *pattayam*, the most essential record of land ownership as well as households without ration card which is another essential document to every household were around 7 percent in the survey area. (Rajan.J.B, 2010). About 9 percent of fisher people's households in the area live on *Poramboke* lands.

The essential amenities like availability of potable water, electrification of house, toilet facility - the most often discussed issues - shows signs of inadequacy in the coastal area. The households without own source of potable water were 57 percent in 2010; remains almost the same even after 10 years. This is one of the acute problems of fisher people, that remain unresolved. However un-electrified households accounted for 39 percent in 1999-2000 were declined to 7 percent in 2010. And also households without toilet at 34 percent in 1999-2000 declined to 15 percent in 2010. This must be due to the schemes like Indira Awaas Yojana (IAY) and Total Sanitation Campaign (TSC). Even then there were un-electrified houses (7%) and houses without toilet (15%) in the coastal area!

A Rapid Rural Appraisal (RRA) in the survey area revealed that most of the places are congested, without any courtyard or front-yard for houses. And there are houses very close to sea front, with a high risk of sea erosion. The lack of permanent dwellings is linked to sanitation facilities too. Hence the coastal area is prone to epidemics and water-borne diseases. If the socio-economic condition of fisher people – revealed by two surveys - in the urban area is an indicator, the situation in rural areas can be assumed. The marginalization of traditional fisher people needs no further evidence.

(This chapter is the modified version of chapter 4.6 of my book published in Malayalam 'Changing Fisheries, Marginalising Fishermen' (2019)).

17
FURY OF THE SEA

The fury of the sea is not new for traditional fisher people. They witness it during every monsoon and unexpected changes in sea conditions. But the two natural disasters – Tsunami in 2004 and Okhi in 2017 – caused irrevocable loss to the fisher people.

Tsunami

The Tsunami which lead its origin near the Sumatra islands of Indonesia at Indian time 6.29 am on 26th December 2004, reached the north-east maritime states of India (West Bengal, Orissa, Andhra Pradesh) at 7.30 am, coast of Tamil Nadu at 9 am, and reached some part of south-west coast of India (Kerala State) only at 11 am of the day. Thus there was an interval of one to two-and-half hours between the occurrence of the Tsunami and its strike at the east coast and more than four hours at the west coasts. It means, there was sufficient time to signal and notify about the events. This valuable time available for precautionary measures could not be utilized by the authorities concerned, due to the laxity of the scientific community. We have to learn from others like the east African countries, U.S. Geological Survey and some other foreign countries who took timely measures to signal the disaster and follow-up actions. In Kerala, there are several scientific institutions that could forewarn the Tsunami, and there were mechanisms also to take precautionary steps. But in the absence of any forewarning, the opportunity of saving the lives of many was lost. This calls for a performance audit of all the scientific institutions, which enjoy the substantial chunk of the public exchequer.

A Few noteworthy cases of survival

The survival cases in some of the Tsunami hit areas also gave some tips for future thinking.

The Case of Tilly:

A 10 year old girl from UK saved the life of many tourists in south Thailand, where she had been enjoying X-mas holidays at Meycovo Island by sounding the Tsunami symptoms. (Mathrubhumi daily dated 2nd January 2005). Noticing the sudden changes in the surf, she could recall the old lessons on symptoms of Tsunami studied in geography class. Timely sharing of her knowledge with her mother Mrs. Penny and subsequent spreading of the message to the tourists in the area has helped evacuation of tourists immediately from the beach, thus saving the lives of thousands. Tilly's case points to the fact that even the class room lessons can be of help to alert and sensitize in a real world crisis situation. Does our present education system fulfill the requirements of practical oriented teaching-learning? Could it cultivate professionalism and sensitivity required for professionals? If it was so, the concerned scientific community would not have remained passive at the occurrence of *Tsunami*.

Manthottom saved three villages

Some news reports said that three coastal villages in Kadalur district of Tamilnadu viz. Pichavaram, G.S.Pettah, and Thirunelthoppu have surprisingly escaped from the disaster, though other neighbouring villages of the district were seriously hit by *Tsunami*. They attribute the reason to the presence of mango trees (*manthottom*) in these villges. But some experts have responded to this by pointing out those 'trees' could be 'mangroves' and might have been misspelt as 'mango trees'. There is sufficient reason to justify those responses because the mangroves are predominantly found in the water logged areas of coastal region. It is a proven fact that the mangroves together with wetland eco-systems diminish the fury of floods and govern the water systems. Unfortunately with the indiscriminate developmental interventions, the ecological regulators of wetland and mangrove forests are declining. An official document on 10th five year plan published jointly by the State Planning Board and Department of Fisheries in Kerala revealed that the mangrove in backwater mouths and estuaries of the state has declined from 70000 ha to 2000 ha. (Govt. of Kerala, 2002). As per the recent statistics, this has further reduced to 1,924 ha. (Govt. of Kerala, 2017). This would aggravate

the gravity of disasters. The estuarine areas along the coast that are the appropriate places for mangrove forestation have to be conserved seriously.

Okhi

Very severe cyclone storm Okhi had devastating effects in the parts of Sri Lanka and south-west coast of India. Originated from Bay of Bengal on 28 November 2017, Okhi organized into depression off south-east coast of Sri Lanka on 29 November 2017, and intensified into a cyclonic storm along the south-west coast of India including south Kerala on 30 November 2017. The cyclonic storm wreaked havoc in the Thiruvananthapuram, Kollam, Alappuzha coast of Kerala. This was against the predictions of Indian Metereological Department (IMD) that low waves would form off coast of Sri Lanka and moves towards west.

Okhi caused widespread loss to life and livelihood and brought normal life to a halt. Even though 1,116 fishermen's life were rescued, the fishermen who lost their lives and yet to be identified together numbered 155. (Table 17.1).

Table 17.1
Okhi Cyclone – Loss of Life and Rescued
(As at 11.00 am on 20th January 2018)

#	Particulars	Number
1	Fishermen yet to be found, who	
	- Ventured on Fibre Canoe	71
	- Ventured on Mechanised Boat	32
	Total (1)	103
2	Died	
	- Identity recognised	51
	- Identity not recognised	1
	Total (2)	52
3	Rescued from disaster	1,116

Source: Department of Fisheries, 2018.

Those who are rescued from Okhi also face health and mental problems. The survivors have not mustered the courage to go back to sea. Many of them got post-traumatic or high depression. Many were in the extreme cold sea water for days affected by partial paralysis, lost sight, shattered ear drums, lost memory, etc. It would be no wonder to say that many of the survivors are 'living dead'. Children are the worst affected. The sudden loss of their father has left many of the children in a state of distress. There are children dropouts from education and engaged in temporary means of living, as their bread winner is no more.

The fisher people have the double shock of loss of relatives on the one hand and declining means of livelihood on the other. The decline in fishery also has impacted the fish vending women adversely. Number of houses damaged due to Okhi were 530; 72 houses completely damaged and 458 houses suffering partial damage. Fishermen also suffered damage of fishing crafts; 384 crafts completely damaged and 103 crafts partially damaged. Complete or partial loss of fishing gear was suffered by 367 fishermen. (Table 17.2).

Table 17.2
Okhi Cyclone – Loss of Properties
(As at 11.00 am on 20th January 2018)

#	Particulars	Number
1	Houses damaged:	
	- completely	72
	- partially	458
	Total (1)	**530**
2	Fishing Crafts damaged:	
	- completely	384
	- partially	103
	Total (2)	**487**
3	Number of fishermen suffered complete or partial loss of fishing gear	367

Source: Department of Fisheries, 2018.

Precautionary Measures

The Parliamentary Standing Committee of Ministry of Home Affairs in its report presented before Rajya Sabha on 7th February 2019 has mention about the occurrence of cyclones like Okhi due to the impact of global warming. (Indian Parliament, 2019). Considering this, the need for precautionary measures also emphasized. For this, IMD was asked to study the best practices of other countries. Improving the forecasting systems by operationalizing Numerical Weather Prediction (NWP), Global Ensemble Forecast System (GEFS), etc. were also suggested. Considering the limitations of Standard Operating Procedure (SOP) of IMD, it needs to be modified in collaboration with international agencies. Another suggestion was to continuous awareness to the coastal people, especially the fisher people. Effective implementation of Vessel Tracking System (VTS) in association with Indian Space Research Organisation (ISRO) was also suggested. It shall be the responsibility of Central Government for the timely implementation of these.

The Parliamentary Standing Committee has lauded the mobile based fishermen application developed by the ISRO. Collection of cell phone numbers of all fishermen and opening a state level control room is another suggestion. Special attention of State Government is required on this. Under the leadership of such control room, the Matsya Bhavans can be functioned as the decentralized warning centres. In the context of climate change and consequent natural disasters, the role of Matsya Bhavans needs to be redefined in this direction. The registration of all fishing vessels to be made compulsory and the Matsya Bhavans shall maintain the record of sea going fishermen. This will provide exact information on the fishermen who are off sea.

The fishermen used to go for fishing on the faith that no mishaps happen. Because of this faith, they do not assess the climatic conditions and bring with them the safety instruments like life jacket. To change this attitude, Matsya Bhavans have to function as Village Information Centres. They shall ensure that sea going fishermen are carrying safety instruments and disseminate daily the

information from IMD. Continuous monitoring shall be made on the precautionary and safety measures on natural disasters. Village Rescue Army shall be formed in every fishing village under the auspices of Matsya Bhavan.

The lessons from Okhi point to the need for policy decisions. When the safety agencies like the Navy could not move to deeper waters and could not stay for longer, it was the fishermen who rescued many. This point to the need for inclusion of skilled fishermen in sea rescue operations. The Central Government has to take appropriate decision on this.

In the context of repeated natural disasters and climate change impacts, Government of Kerala has envisaged the local governments to constitute a Working Group on Biodiversity Management, Climate Change, Environment Conservation, and Disaster Reduction (G.O. (Rt.) No. 2462/2018/LSGD dated 19.09.2018). Those local governments that cover fishing villages have to include traditional fishermen in that Working Group. This Working Group has to take initiative for preparing Coastal Action Plan on Climate Change (CAPCC). The precautionary measures for disaster mitigation, warning mechanism, etc. can be included in CAPCC.

(This chapter is the modified version of chapters 2.8 and 2.9 of my book published in Malayalam 'Changing Fisheries, Marginalising Fishermen' (2019)).

GLOSSARY

Active Gear

Fishing gears are classified in two main categories: active and passive. Active Gear is not specie-specific that capture shoals of fish. Eg. Trawl Net, Ringseine.

Passive Gear *is described separately*.

Boat-seine

The Boat-seine is a bag like shaped net operate with the help of two crafts. Along the Kerala coast, two types of Boat-seine are in vogue: '*Thattumadi*' and '*Kollivala*'. '*Thattumadi*' is predominant in the districts of Thiruvananthapuram and Kollam. *Kollivala,* which was predominant in the north coast of Kerala viz. Malappuram, Kozhikode, Kannur, and Kasaragode, is extinct now.

Co-management

Fisheries co-management is a partnership arrangement in which Government agencies, the community of local resource users (fishers), non-Government organisations, and other stakeholders (fish traders, boat owners, business people, etc) share the responsibility and authority for the management of fishery.

Continental Shelf

The area of seabed around a large land mass where the sea is relatively shallow compared with the open ocean. The continental shelf is geologically part of the continental crust.

CPUE (Catch Per Unit Effort)

CPUE is a widely applied tool for measuring fish productivity. It is a derived quantity obtained from the independent values of catch and effort per fishing trip. CPUE is computed by dividing average catch per trip by the unit effort (UE). Unit effort is computed by multiplying the average crew size and time spent in a trip. CPUE

measures catch per unit effort of manhour. This manhour can be expressed as either: manhour of trip time (T.T), or manhour of fishing time (F.T).

Deep sea

See inshore

Demersal

The largest difference between pelagic and demersal fish is where they feed in the water column. Demersal fish feed at or near the bottom whereas Pelagic fish feed and swim in the open waters of the sea.

Pelagic is described separately.

Encircling Net

The encircling net or ring seine is usually aimed at free swimming species of schooling fish. The net is of long size and is shot around a shoal. It is closed below from the craft by ropes through the rings fitted at the bottom of the net. Ring seines operating along the coast of Kerala are of different types depending on the dimension of net, method of operation, number and type of craft involved, etc. Because of these differences, local names of the net also differ viz., '*thangu-vala*', 'disco-*vala*', '*rani-vala*', and '*mandu-vala*'. However, the basic principle behind the ring seine is one and the same. Based on the number of craft used, Ring-seines can categorised into two types: Ring seine which operate with a single craft (locally called '*Thanguvala*'), and Ring seine which operate with multiple crafts usually 4 or 5 craft (locally called '*Rani vala*').

FAD (Fish Aggregating Device)

Fish aggregating devices are floating objects that are designed and strategically placed to attract pelagic fish.

Fishing Craft

Fishing craft is the vessel used for fishing such as plank canoe, dugout canoe, plywood canoe, *kattamaram*, etc.

Fishing Gear

Fishing gear is the equipment used for fishing such as hook and line, gillnets, encircling net, etc.

Fishing Unit

The fishing technology, a complex of fishing units, comprising a variety of composite systems of two factors – craft and gear – constitutes the means of production. The craft provides the platform for the fishing operation. It holds and carries the crew and fishing gear, and transports the crew from shore to fishing area and back. The gear is the instrument used for catching fish.

Gillnets

These are long curtains of netting into which fish swim and become caught by their gills. These nets are in various sizes and meshes with different names depending on the species it targeted viz. Mackerel net, Sardine net, Pomfret net, Anchovy net, etc.

Hook and Line

Hooks are suspended from lines to catch fish, they may be hand lines, demersal long lines, or pelagic long lines. Hook & Line operation is predominant in the districts of Thiruvananthapuram and Kollam and some pockets of other maritime districts in Kerala.

IBM (In Board Motor)

An inboard motor (IBM) is permanently placed inside the boat and helps power a prop shaft through the hull. The mechanised boats use IBM. An outboard motor is placed outside the boat, generally hung by clamps at the stern of the boat.

See also OBM.

Inshore, offshore, deep sea

The water area upto the depth of 50 m from the shore line is inshore, water area from 50 m to 200 m depth is offshore, and water beyond 200 m depth is deep sea.

Kattamaram

Kattamaram or *Kattumaram* is near shore craft, used by traditional fishermen, made of three or four logs (Alphis wood) tied together.

MATSYAFED

Matsyafed is an apex body of fishermen cooperatives, set up in 1984 under the Kerala Co-operative Societies Act to activate, co-ordinate and guide the working of the village societies. It is a Government agency.

Mechanisation

Mechanisation means propulsion of fishing crafts with the aid of In Board Motor (IBM). They venture harbor based landing. Eg. Mechanised Boats with trawlers.

Motorisation *is described separately*

Motorisation

There is a difference between Motorisation and Mechanization of fishing crafts. Motorisation means propulsion of fishing crafts with the aid of Out Board Motor (OBM). Traditional fishing crafts are motorized. Eg. Motorised Plywood Canoe, Plank Canoe, Dugout Canoe, etc.

Mechanisation *is described separately.*

Mud Bank (*Chaakara*)

The calm, turbid regions in the coastal waters of Kerala are called the mud banks; *Chaakara* in vernacular Malayalam. The well known mud banks are formed along the coast of Kochi (Cochin, in Anglical) and Alappuzha (Alleppy, in Anglical). The mud banks appear during the south west monsoon season. The mud gets churned up and this mud is kept in suspension making the water highly turbid.

OBM (Outboard Motor)

An outboard motor is a propulsion system for boats, consisting of a self-contained unit that includes engine, gearbox and propeller or jet drive, designed to be affixed to the outside of the transom. They are

the most common motorized method of propelling small watercraft. As well as providing propulsion, outboards provide steering control, as they are designed to pivot over their mountings and thus control the direction of thrust. The skeg also acts as a rudder when the engine is not running. Unlike inboard motors, outboard motors can be easily removed for storage or repairs. Small outboard motors, up to 15 horsepower or so are easily portable.

See IBM (In Board Motor)

Offshore

See inshore

Otter Board

One of the two large boards or metal plates that keep the net of an otter trawl spread and that are attached to each side of the mouth of the net and are caused to flare apart by pressure of the water.

Over capacity

The imbalance between the energy use and output can be either over capacity or under capacity. If energy use is more than the output, then it is called over capacity.

Passive Gear

Fishing gears are classified in two main categories: active and passive. Passive Gear is specie-specific that capture only targeted specie. Eg. Gill Nets, Hook and Line, etc.

Active Gear *is described separately*.

Pelagic

The largest difference between pelagic and demersal fish is where they feed in the water column. Pelagic fish feed in the open waters and swim at the surface of the sea whereas demersal fish feed at or near the bottom.

Demersal *is described separately.*

Reef

A reef is a habitat for fish and other aquatic animals. It can be natural reef or artificial reef. Natural reef is a result of natural, abiotic process and form shoal of rock, sand, coral or similar material, lying beneath the surface of water. Artificial reef is the formation of habitat through the deposit of external objects.

Ring-seine

See Encircling net.

Shore-seine

Shore-seine or Beach-seine (*Kara-madi* in Malayalam vernacular) is a seine net operated from the shore. The gear is composed of a bunt (bag or lose netting) and long wings often lengthened with long ropes for towing the seine to the beach. The headrope with floats is on the surface, the footrope is in permanent contact with the bottom and the seine is therefore a barrier which prevent the fish from escaping from the area enclosed by the net.

REFERENCES

Achari, Thankappan.T.R. (1986). *Kadal Matsyolpadanam – Keralathil*. [Marine Fish Production in Kerala]. Thiruvananthapuram, Kerala: Fisheries Research Cell, PCO.

Achari, Thankappan.T.R. (1986a). Emerging Trends in Small Scale Fisheries. Trivandrum, Kerala: Fisheries Research Cell, PCO Centre.

Achari, Thankappan.T.R. (1980). Evolution of Fishermen's Organisations in Kerala – from Co-operatives to Welfare Societies (Mimeo). Trivandrum: Govt. of Kerala.

Andrews, A. (Year unknown). *Kadal Muthu* (Sea Pearls). Mavelikkara, Kerala: MJM Centre.

Babu Paul,D. (1982). Report of the Committee to study the need for conservation of marine fishery resources during certain seasons of the year and allied matters. Trivandrum: Government of Kerala.

Bavinck, Maarten. (2001). Why Alternative Approaches to Fisheries Management: A Social Science Perspective. The Netherlands: MARE.

Belshaw.H. (1965). Agricultural Credit in Economically Underdeveloped Countries. Rome, Italy: Food and Agricultural Organisation.

Department of Fisheries. (2018). Records on Okhi of Department of Fisheries, Thiruvananthapuram.

Dixon.W.J and Massey.E.J. (1969). Introduction to Statistical Analysis, McGraw-Hill.

Fernandez, John. (1994). Artificial Fish Habitats: A Community Programme for Bio-diversity Conservation. Thiruvananthapuram, Kerala: Fisheries Research Cell, Programme for Community Organisation.

Ghosh, Sanjeeva.D. (1998). Fisheries Sector of Kerala and the Traditional Fishworkers, Paper presented in the seminar

jointly organized by Kerala Fisheries Society and World Fishworkers Day Celebration Committee on 16-11-1998 at Thiruvananthapuram.

Gotz Hoeppe. (2007). Conversations on the Beach: Fishermen's Knowledge, Metaphor and Environmental Change in South India. New York: Berghahn Books.

Govt.of Kerala. (2017). Kerala Fisheries Statistics At A Glance. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt.of Kerala. (2017a). *Grama, Block, Zilla Panchayathukal Pathimoonaam Panchavalsara Padathiyile Aadya Vaarshika Padathy (2017-18) Thayyarakkal – Maarganirtheshangal*. [Guidelines on First Annual Plan of Thirteenth Five Year Plan for Grama, Block, and Zilla Panchayats] G.O (MS) No. 72/2017/LSGD, Thiruvananthapuram, dated 29.03.2017. Thrissur, Kerala: Kerala Institute of Local Administration.

Govt. of Kerala. (2016). Socio-Economic Survey of Fisherfolk in Kerala – 2013. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2012). *Pandrandaam Panchavalsara Padathy (2012-17): Thadeshaswayambharana Sthapanangalude Padathy Asootrana Margharegha*. [Twelfth Five Year Plan (2012-17): Local Self Government Institutions' Planning Guideline] G.O (MS) No. 168/12/LSDG. Thiruvananthapuram; dated 15/6/2012. Thiruvananthapuram, Kerala: Local Self Government Department.

Govt. of Kerala. (2011). Kerala Fisheries Statistics At A Glance. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2007). Kerala Fisheries Statistics-At A Glance. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2005). Socio-Techno-Economic Survey of Fisherfolk in Kerala – 2004. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2003). Kerala Fisheries Statistics At A Glance. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2003a). Marine Fisheries of Kerala – At A Glance 2003. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (2002). Patham Panchavatsara Padaty (2002-2007) – Thadesha Bharana Sthapanangalude Padaty Asoothranam. (Tenth Five Year Plan (2002-2007) – Local Government Institutions' Plan Formulation). Thiruvananthapuram: State Planning Board & Fisheries Department.

Govt. of Kerala. (1998). Fisheries Sector-Planning Helper 4, People's Plan Campaign. Department of Fisheries & State Planning Board, Thiruvananthapuram.

Govt. of Kerala. (1997). Report of the Task Force on Livelihood Secure Fishing Communities (Ninth Five Year Plan, 1997-2002). Thiruvananthapuram, Kerala: State Planning Board.

Govt. of Kerala. (1992). Kerala Fisheries Statistics At A Glance. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (1987). Kerala Fisheries – An Overview. Thiruvananthapuram, Kerala: Department of Fisheries.

Govt. of Kerala. (1966). Fisheries Officer's Guide Book. Thiruvananthapuram, Kerala: Department of Fisheries.

Indian Parliament. (*Rajya Sabha*). (2019). Action Taken Report on the Report on the Cyclone Okhi – Its Impact on Fishermen and Damage Caused by It (No. 216).

Johnson, Derek. (2001). Wealth and waste: Contrasting legacies of fisheries development in Gujarat since 1950s. Economic and Political Weekly XXXVI (13): 1095-1102.

Kalawar (1984). Expert Committee Report on Kerala Marine Fisheries. Kerala: Govt. of Kerala.

Kalawar. (1984). Expert Committee Report on the Kerala Marine Fisheries. Government of Kerala.

Kurien, John. (2000): Investment, Capacity and Production in the Small-Scale Fisheries of Kerala. Centre for Development Studies, Thiruvananthapuram.

Kurien, John. (1985). Technical Assistance Projects and Socio-Economic Change: The Norwegian Intervention in Kerala

Fisheries Development Experience. Trivandrum, Kerala: Fisheries Research Cell, PCO Centre.

Kurien, John. (1980). Fishermen's Cooperatives in Kerala: A Critique. Madras, Tamilnadu: FAO/BOBP.

Kurien, John and Jayakumar.S.R.J. (1980). Motorisation of Country Craft-Purakkad Experiment. Trivandrum, Kerala: Fisheries Research Cell, PCO Centre.

Kurien, John & Vijayan.A.J., (1995). Income Spreading Mechanisms in Common Property Resource: Karanila System in Kerala's Fishery. Economic and Political Weekly. Volume 30, No. 28 (July 15, 1195). p. 1780-1785.

Kurien, John & Wilman, Rolf. (1982). Economics of Artisanal and Mechanised Fisheries in Kerala. Trivandrum, Kerala: PCO in collaboration with Bay of Bengal Programme (BOBP) of FAO.

Mahesh. R. (2000). Labour Mobility in Rural Areas. Thiruvananthapuram Kerala Institute of Environment and Development,.

Nair, Balakrishnan.N. (2000). Expert Committee Report on Kerala Marine Fisheries. Kerala: Government of Kerala.

Nair, Balakrishnan.N. (1989). Report of the Expert Committee on Marine Fishery Resources Management in Kerala. Thiruvananthapuram, Kerala: Government of Kerala.

Nalini.N and Gabriella.D. (1985). Transition or Transformation: A Study of the Mobilisation, Organisation and Emergence of Consciousness among the Fishworkers of Kerala. Trivandrum, Kerala: PCO Centre.

Peter.E.G. (1995). *Kadalinte Thalamai Jnan* (I am Along the Rhythm of Sea). Thiruvananthapuram: Fisheries Research Cell, PCO.

PCO & SIFFS. (1991). Techno-economic Analysis of Motorisation of Fishing Units: A Costs and Earnings Study Along the Lower South-West Coast of India. Trivandrum, Kerala: Fisheries Research Cell, PCO, and South Indian Federation of fishermen Societies.

Rajan.J.B. (2019). *Marunna Matsya Mekhala, Pranthavalkkarikkunna Matsya Thozhilalikal* (Changing Fisheries, Marginalising Fishermen). Thrissur, Kerala: Kerala Institute of Local Administration.

Rajan.J.B. (2013). Furthering the Decline of Indigenous Knowledge in Fisheries. In Biju.S.K. *et al.* (Editors). Free Trade Agreements and Indian Economy: Prospects, Potentials, Problems, and Experiements. Nagercoil, Tamilnadu: B-Digest Publications.

Rajan.J.B. (2010). Household Survey of Coastal Wards, Thiruvananthapuram Corporation, Study Conducted for the Corporation of Thiruvananthapuram; A Project of People's Plan Campaign-2007-08 & 2008-09. Kerala: Corporation of Thiruvananthapuram.

Rajan.J.B. (2002). Declining Indigenous Regulations on Fishery: A Case of Kadakkodi (Sea Court) in Kerala, South India, paper presented in the XIIIth International Congress 'Legal Pluralism and Unofficial Law in Social, Economic and Political Development' at Chiang Mai, Thailand on 7-10 April 2002. Organized by the Commission on Folk Law and Legal Pluralism, Nepal.

Rajan.J.B. (2002a). Employment Diversification of Fishing Community: Potentials, Problems and Possibilities. Proceedings of the International Seminar on Income Generating Activities. Department of Applied Economics (CUSAT) in association with Development Research Institute (IVO), Tilburg University, The Netherlands. 9th August 2002.

Rajan.J.B. (2002b). Labour Mobility in the Small-scale Fisheries Sector of Kerala. Discussion Paper No. 44. Thiruvananthapuram, Kerala: Kerala Research Programme on Local Level Development, Centre for Development Studies.

Rajan.J.B. (2002c). *Matsya Samskarana Shalakalile Sree Thozhilalikalude Prashnangla* (Problems of Women Workers in Fish Processing Units). (Unpublished Monograph). Thiruvananthapuram, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (2001). Appraisal of Artificial Reef Programme in Pozhiyoor. Trivandrum, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (2001a). People's Plan Campaign in the Fisheries Sector-Thiruvananthapuram: Comparison of Four Phases (1997/98-2000/01). Thiruvananthapuram, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (2000). Labour Mobility in the Small Scale Fisheries Sector of Kerala. Working paper No. 44. Thiruvananthapuram, Kerala: KRPLLD, Centre for Development Studies.

Rajan, J.B. (2000a). Over Capacity in Fisheries and Its Impacts. Seminar on the occasion of World Fisheries Day on 21st November 2000 at YMCA Hall, Thiruvananthapuram organized by Kerala Swathantra Matsya Thozhilali Federation (KSMTF).

Rajan.J.B. (2000b). Status of Education, Employment and Health in the Coastal Area of Thiruvananthapuram Corporation, Study Conducted for the Corporation of Thiruvananthapuram; A Project of People's Plan Campaign-1999/2000. Thiruvananthapuram, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (1999). Impact of Credit Market Structure on the Earning Capacity of Small-Scale Fishing Units in Kerala. PhD Thesis, Kerala University, Thiruvananthapuram.

Rajan.J.B. (1995). Fish Attracting Lanterns (FAL) Off Trivandrum Coast and Allied Problems. Trivandrum, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (1994). An Assessment of Productivity of Fishing Gears in Kerala. Commerce and Business Researcher, Vol.II-No 7&8 June 1994; Department of Commerce, University of Kerala.

Rajan.J.B. (1994a). Appraisal of Artificial Reef Programme in Pozhiyoor: An Interim Report. Trivandrum, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (1993). Techno-Socio-Economic Study on Ring-seine Fishing in Kerala. Thiruvananthapuram, Kerala: Fisheries Research Cell, PCO.

Rajan.J.B. (1993a). Structural Impact of Ring Seine Fishing Technology on the Economy. Proceedings of the Sixth Kerala Science Congress (January 1994). Trivandrum, Kerala: Science, Technology & Environment Committee.`

Rajan.J.B. (1990). Credit and Capital Structure of Small Scale Fishing Units in Kerala State, The Second Indian Fisheries Forum Proceedings, May 27-31, 1990. Mangalore, India. p. 349-351.

Rajan.J.B and Biju.S.K. (2014). Life and Labour of Fish-vending Women in Kerala: A Case Study of Pulluvila, Thiruvananthapuram District. Thiruvananthapuram, Kerala: Kerala Institute of Labour and Employment (KILE).

Rajan.J.B and Haribabu.T.P. (2012). *Matsya Sabha* [Exclusive Assembly of Fisher People]. Thrissur, Kerala: Kerala Institute of Local Administration.

Rajan.J.B and Haribabu.T.P. (2005). Fading Images of Decentralisation in Kerala. Kozhikode, Kerala: Malabar Coastal Institute of Training, Research and Action (MCITRA).

Rajan.J.B, Maglin Peter, Wilfred.N, and Wilfred.V. (1998). Fish Attracting Lanterns: Some Facts. Trivandrum, Kerala: Fisheries Research Cell, PCO.

SIFFS. (1998). A Census of the Artisanal Marine Fishing Fleet of Kerala. Thiruvananthapuram, Kerala: South Indian Federation of Fishermen Societies.

SIFFS. (1991). A Census of Artisanal Marine Fishing Fleet of Kerala. Trivandrum: South Indian Federation of Fishermen Societies.

Willmann, Rolf. (1987). Role of Fishermen's Organisations in Fisheries Management and Development. Rome, Italy: Food and Agricultural Organisation.