

**INSTITUTIONAL DYNAMICS IN COMMUNITY-BASED
FISHERIES RESOURCE MANAGEMENT FOR SUSTAINABLE
DEVELOPMENT OF MARINE FISHERIES IN KERALA**

**Thesis submitted to the
Cochin University of Science and Technology (CUSAT)
for the award of the degree of Doctor of Philosophy in Economics
Under the Faculty of Social Sciences**

By

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Certificate

This is to certify that the thesis entitled “INSTITUTIONAL DYNAMICS IN COMMUNITY-BASED FISHERIES RESOURCE MANAGEMENT FOR SUSTAINABLE DEVELOPMENT OF MARINE FISHERIES IN KERALA” is a bonafide research work done by Ranjini . R. Prabhu, under my guidance and supervision. Thesis is approved by the Doctoral committee for the submission for the degree of Doctor of Philosophy in Economics.

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Declaration

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CONTENTS

Page No:

CHAPTER-1

1 - 39

1 Introduction

1.2 Overview of the key issues in Marine fisheries

1.2.1 Exploitation level of fishery resources leading to un-sustainability

1.2.2 Excess capacity and Overcapitalization

1.2.3 World fishing fleet and increasing fishing intensity

1.2.4 By-catch and discards

1.3 State of world fish stocks

1.3.1 Fish trade

1.4 State of Indian fisheries sector

1.4.1 Marine fisheries development scenario

1.4.2 Marine fisheries scenario of Kerala

1.5 Institutions in Fisheries management – A form of social capital

1.6 Community participation in management

1.7 Sustainability issues

1.8 Statement of the problem

1.9 Objectives of the study

1.10 Hypothesis

1.11 Methodology

1.11.1 Sampling Frame

1.11.2 Tools for Analysis

1.12 Scheme of the study

1.13 Limitations

1.14 Review of Literature

1.14.1 Trends in Fisheries management and Development

1.14.2 Sustainability of fisheries and conservation

1.14.3 Institutions and Community Based Management

1.14.4 Fishermen community and livelihood issues

1.14.5 Gender role in fisheries

CHAPTER-2

Management of Fisheries and Institutional Dynamics- An Overview

40 - 72

2.1 Fisheries Management Institutions

2.2 Trends in Fisheries Resource Management

2.2.1 Right-Based Fisheries Management

2.2.2 Community Based Management in Fishery

2.2.3 Basic principles of CBFM

2.3 Institutions in Community Based Resource Management

2.3.1 INSTITUTIONS: Theoretical and operational definitions

2.3.2 Formal and informal Institutions

2.3.3 Formal and informal rules

2.4 Institutional dynamics in Indian fisheries resource management

- 2.4.1 State level fisheries management
- 2.4.2 Global fisheries mandate and initiatives-India's role
- 2.4.3 Participation in Regional Fishery Bodies
- 2.4.4 Indian fisheries legislation
- 2.4.5 Appointment of Expert committees and policies
 - 2.4.5.1 Majumdar Committee (1976)
 - 2.4.5.2 New Deep Sea Fishing Policy (1991)
 - 2.4.5.3 Murari Committee (1995)
- 2.4.6 Community-led initiatives

2.5 Institutional dynamics in Kerala's fisheries sector

- 2.5.1 Government interventions
- 2.5.2 Recommendations of various Committees

2.6 Evolution of Community Based Institutions in Kerala Fisheries

- 2.6.1 Fishermen Struggles and Dynamics of conflict resolution
- 2.6.2 Collective action
- 2.6.3 Resistance of artisanal fishermen towards mechanization
- 2.6.4 Mechanization of indigenous craft as a mean of resilience
- 2.6.5 Worker peasant alliance: Involving trade union to resolve the issue
- 2.6.6 Resistance of mechanised trawl operators and the resultant unrest in the area

CHAPTER-3

Community Based Fisheries Organizations in Kerala

73 - 106

3.1 Decentralization, Community Participation and Community Based Management System

3.2 Caste dimensions among the fishermen communities

3.3 Role of Fishery cooperatives in Fisheries management

3.4 Fisheries co-operative in India

- 3.4.1 National Federation of Fishermen Cooperatives Limited (FISHCOPFED)

3.5 Origin and growth of fishermen co-operatives in Kerala

- 3.5.1 The state initiated co-operatives
- 3.5.2 SHG movement and micro finance
- 3.5.3 National Cooperative Development Corporation (NCDC)

3.6 Analysis of zone wise societies of Matsyafed

3.7 Inter zone comparisons in Societies catch

- 3.7.1 Comparison of Catch Between Zones
- 3.7.2 One-Way ANOVA Analysis
- 3.7.3 Post Hoc Test Duncan's Test

3.8 South Indian Federation of Fishermen Societies (SIFFS)

3.9 Informal Institutions and Arrangement (Padu, Kadakkodi and Karinila):

An Assessment

- 3.9.1 'Kadakkody'
- 3.9.2 Karanila system

CHAPTER-4

Issues Regarding Livelihood and Gender - An Investigation /Analysis of Fishing Community and of Social Actors in Marine Sector of Kerala 107 - 155

4.1 Status

4.2 Government Initiatives Especially for Livelihood Security and Social Security

4.2.1 Debt Relief to Fishermen

4.2.2 Tsunami Rehabilitation program

4.3 An analysis of fishermen community on livelihood issues

4.4 Profile of fishermen

4.5 Quality of life

4.6 Various Stakeholders and Activities in the system

4.6.1 Various actors in the Marine Fisheries in Kerala

4.6.2 Women as a social actor

4.6.3 SAF-A case study

4.7 Nattika fishing village

4.7.1 Profile of fishermen community in Nattika

4.7.2 Inter group variation in catch value in Nattika

4.8 Kadapuram committee , a village institutional set-up

CHAPTER-5

An analysis of sustainability with its economic and ecological indicators 156 - 186

5.1 Developmental changes in fisheries sector

5.2 Assessment of Marine fisheries resources of Kerala

5.2.1 Impact of trawl ban

5.2.2 Increase in fishing activity

5.2.3 Extent of Depletion

5.3 Analyzing some social and economic aspects of fishermen community in the context of sustainability

5.4 Status of Sustainability of Kerala fishery

5.4.1 A preliminary assessment of the sustainability of Kerala fishery sector, 2009

CHAPTER-6

Findings and Conclusion

187 - 193

Appendix

Bibliography

Questionnaire

LIST OF TABLES

Page No:

Table 1.1 Estimates of illegal catches by trawlers in the artisanal zone (<5 km from shore)	7
Table 1.2 Per capita investments on fishing equipments per active fishermen in India 1997-2004	7
Table 1.3 Optimum fleet size and the present fleet size of fishing vessels in India	9
Table 1.4 World fish production, 1999-2008	11
Table 1.5 Marine fish production in India from 1996-2009	13
Table 1.6 Marine products export from India and Kerala (volume and value)	15
Table 2.1 International framework on fisheries	43
Table 2.2 Institutional dimensions	48
Table 2.3 Fisheries legislations and systems in Asian countries	50
Table 2.4 Functions of different layers of Department of Fisheries	61
Table 2.5 Expert Committees appointed in Kerala	64
Table 2.6 Snapshots of the various Institutions in Kerala Fisheries	67-68
Table 3.1 Fishermen co-operatives in Kerala	84
Table 3.2 Membership in co-operatives	84
Table 3.3 Membership in co-operatives at district level in Kerala	86
Table 3.4 Details of the SHGs	87
Table 3.5 Year wise and the amount allocation for IFDP	88
Table 3.6 NCDC funds allocated to fisheries sector in Kerala (Lakh Rs)	89
Table 3.7 Performance of Societies in zones	90
Table 3.8 Active fishermen involvement	91
Table 3.9 SHGs performance in society's, 2008	92
Table 3.10 Number of fishing crafts, gear and engine in the North zone	92
Table 3.11 Number of fishing crafts, gear and engine in the central zone	93
Table 3.12 Number of fishing crafts, gear and engine in the south zone	93
Table 3.13 Business development report, 2008	94
Table 3.14 Seasonal index	96
Table 3.15 Summary Statistics of Catch for Zones	97
Table 3.16 ANOVA for the Three Zones	98

Table 3.17 Post Hoc Test Duncan's Test	99
Table 3.18 Membership pattern FMC Kollam and the fish catch details, 2003-2004	101
Table 4.1 Occupational dependency / attachment	112
Table 4.2 Number in fishing as a percentage of total occupied	113
Table 4.3 Labour stickiness	113
Table 4.4 Average income from fishing	114
Table 4.5 Borrowings and Average interest burden	115
Table 4.6 Source of Credit	117
Table 4.7 Heterogeneous community	118
Table 4.8 Gender among fisher men households	118
Table 4.9 Family structure	118
Table 4.10 Distribution of family size	119
Table 4.11 Type of house	119
Table 4.12 Land possession	120
Table 4.13 Physical asset	120
Table 4.14 Educational achievement	121
Table 4.15 Average income among sectors	122
Table 4.16 Expenditure pattern	123
Table 4.17 Problems encountered by the fishermen	124
Table 4.18 Debt burden of the sectors	124
Table 4.19 Average debt burden of sectors	125
Table 4.20 Purpose of debt burden among fishermen community	126
Table 4.21 Saving pattern	127
Table 4.22 Membership pattern in various institutions	128
Table 4.23 Various Actors and Activities in the Marine fisheries in Kerala	130 - 132
Table 4.24 Nature of activity and employment	135
Table 4.25 Women in activity	135
Table 4.26 Assistance given by SAF for fisherwomen empowerment	137
Table 4.27 Physical Achievement of the scheme Economic Empowerment of Fisherwomen by providing Assistance to Fisherwomen for the year 2006-2008	137-138
Table 4.28 Fishing units in Thrissur district	139

Table 4.29 Caste dimensions	140
Table 4.30 Occupation wise distribution	141
Table 4.31 Educational profile	141
Table 4.32 Family structure	142
Table 4.33 Land possession pattern	142
Table 4.34 House type	143
Table 4.35 Ownership pattern of house	143
Table 4.36 Physical amenities	144
Table 4.37 Indebtedness	144
Table 4.38 Amount indebted	145
Table 4.39 Purpose of indebtedness	145
Table 4.40 Mode of savings	146
Table 4.41 Expenditure pattern of the fishermen households	147
Table 4.42 Problems or hindrances encountered by fishermen in Nattika	147
Table 4.43 Job mobility and labour stickiness	148
Table 4.44 Membership pattern	149
Table 4.45 Business development report of societies	149
Table 4.46 Gender, group involvement in societies	150
Table 4.47 Number of fishing crafts, gear and engine in Nattika	150
Table 4.48 Inter group variation in catch value in Nattika fishing village	151
Table 4.49 Catch value variations in Nattika- Engadiyoor FDWCS	152
Table 5.1 Potential fisheries resources and level of exploitation in Indian EEZ	156
Table 5.2 Marine resource Potential (000 tones)	157
Table 5.3 Development of Marine Fisheries of Kerala – a time line	158
Table 5.4 Marine fish landings of Kerala	160
Table 5.5 Sector wise per capita annual catch per unit over the years	161
Table 5.6 Marine production and gross earnings in Kerala	162
Table 5.7 Species wise landings of Kerala	163
Table 5.8 Trawl ban periods from 1998 to 2009	166
Table 5.9 Increase in fishing activity (1961-2006)	167
Table 5.10 Annual average catch, catch per unit operation and catch per hour of operation for different fleet during 2005-07	168

Table 5.11 Depletion Status of Important Species in Period 2, Period 3 and Period 4 on the Basis of the Initial Peak Periods (1970- 75) Landings	169-171
Table 5.12 Period wise Percentage Contribution of Different Species in the Total Landings	172
Table 5.13 Percentage contribution of the mechanized trawl net to the landings of major groups of fishes in 1997 and 2009	173
Table 5.14 Sector wise demographic profile and income pattern of fishermen households	176
Table 5.15 Sector wise per capita income	177
Table 5.16 Economic variables of sector wise in the survey zones	177
Table 5.17 Per capita savings per month	178
Table 5.18 Correspondence analysis on income and savings	178
Table 5.19 Correspondence analysis on per capita income and debt	179
Table 5.20 Distribution of savings according to purpose	179
Table 5.21 Occupational category codes and their quantification	180
Table 5.22 Economic indicators	183
Table 5.23 Social indicators of the community	184
Table 5.24 Ecological indicators	185
Table 5.25 Sustainability of catch structure	186

LIST OF FIGURES

	Page No:
Figure 1.1 Key issues in Marine fisheries	2
Figure 1.2 The Economics of Over-fishing	4
Figure 1.3 Fish stock depletion due to advances in fishing technology, high efficiency fishing practices	6
Figure 1.4 Schematic outline of institutional arrangements for fisheries sector in India	17
Figure 1.5 Fundamental linkages between Fishermen, Community and Region	18
Figure 1.6 Options for Sustaining and Increasing Marine Fish Production	21
Figure 1.7 Sampling Framework	25
Figure 1.8 Organisation of the study	26
Figure 2.1 Indigenous Perspectives on Cooperative, Community-Based, and Collaborative Categories of Co-management	45
Figure 2.2 Marine Fisheries: Legislative Framework	55
Figure 3.1 Model framework of Fisheries Management Committee	74
Figure 3.2 Seasonality of Catch in the Three Zones	96
Figure 3.3 Seasonal index of catch in three zones	97
Figure 3.4 Box Whisker plot of catch for three zones	98
Figure 3.5 SIFFS in Kerala	101
Figure 4.1 Sustainable Livelihood Framework	108
Figure 4.2 Occupational dependency / attachment	112
Figure 4.3 Average income among sectors	115
Figure 4.4 Borrowings and Average interest burden	116
Figure 4.5 Credit sources	117
Figure 4.6 Educational achievement	122
Figure 4.7 Debt burden of the sectors	125
Figure 4.8 Average debt burden of sectors	126
Figure 4.9 Inter group variation in catch value in Nattika fishing village	152
Figure 5.1 Marine fish landings of Kerala	160
Figure 5.2 Species wise landings of Kerala	164
Figure 5.3 Diagram illustrates indicators of sustainability	174
Figure 5.4 Hierarchical subdivision of a sustainable development framework	175

ABBREVIATIONS

ADB	– Asian Development Bank
AIKS	– All India Kisan Sabha
ANOVA	– Analysis of Variance
BDP	– Business Development Programme
BOBP	– Bay Of Bengal Programme
BOTH	– Motorised and Mechanised fishing labour
CBFM	– Community Based Fisheries Management
CCRF	– Code of Conduct for Responsible Fisheries
CFR	– Community Fishery Rights
CITU	– Centre of Indian Trade Union
CMFRI	– Central Marine Fisheries Research Institute
CRZ	– Coastal Regulation Zone
CSO	– Central Statistical Organisation
EEC	– European Economic Community
EEZ	– Exclusive Economic Zone
FAO	– Food and Agriculture Organisation
FEZ	– Fisheries Economic Zone
FISHCOPFED	– National Federation of Fishermen Cooperatives Limited
FMC	– Fish Marketing Centre
FWDCS	– Fishermen Welfare and Development Co-operative Societies
FWS	– Fishermen Welfare Societies
GDP	– Gross Domestic Product
GOI	– Government Of India
GOK	– Government Of Kerala
GRF	– Group Rights in Fisheries
GSDP	– Gross State Domestic Product
HP	– Horse Power
ICLARM Management	– International Centre for Living Aquatic Resources

ICSF	– International Collective in Support of Fishworkers
ICSSR	– Indian Council of Social Science Research
IFDP	– Integrated Fisheries Development Project
IIRR	– International Institute for Rural Reconstruction
IQ	– Individual Quota
ITQs	– Individual Transferrable Quotas
IUU	– Illegal Unregulated Unreported
JV	– Joint Venture
KDFSF	– Kanyakumari District Fishermen Sangams Federation
KM	– Kilo Metre
KMFRA	– Kerala Marine Fishing Regulation Act
KSMTF	– Kerala Swathanthra Malsya Thozhilali Federation
LIC	– Life Insurance Corporation of India
MATSYAFED Development Limited	– Kerala State Cooperative Federation for Fisheries
MEFL	– Mechanised Fishing Labour
MEFO	– Mechanised Fishing Operator
MFFS	– <i>Malabar</i> Federation of Fishermen Societies
MFIS	– Marine Fisheries Information Service
MFRA	– Marine Fishing Regulation Act
MFRA	– Marine Fishing Regulation Act
MFS	– Marine Fisheries Statistics
MOFL	– Motorised Fishing Labour
MOFO	– Motorised Fishing Operator
MPAs	– Marine Protection Areas
MPEDA	– Marine Products Exports Development Authority
MSY	– Maximum Sustainable Yield
MT	– Million Tonnes
NCDC	– National Cooperative Development Corporation
NDSP	– New Deep Sea fishing Policy

NFDB	– National Fisheries Development Board
NFWF	– National Fish and Wildlife Foundation
NGOs	– Non Governmental Organisations
NMF	– Non Motorised Fishing
OAL	– Over All Length
OBM/ IBM	– Out Board Motors / In Board Motors
PCO	– Programme for Community Organisation
PDS	– Public Distribution System
PFCS	– Primary Fishermen Co-operative Societies
RCC	– Reinforced concrete
SAF	– Society for Assistance to Fisherwomen
SHGs	– Self Help Groups
SIFFS	– South Indian Federation of Fishermen Societies
TAC	– Total Allowable Catch
TDFD	– Trivandrum District Fishermen Federation
UNCED	– United Nations Conference on Environment and Development
UNCLOS	– United Nations Convention on the Law Of the Sea
WFFP	– World Forum of Fisher Peoples
WSSD	– World Summit on Sustainable Development

Chapter-1

1.1 Introduction

Coastal fisheries have the characteristics of common pool resources and are subject to the problem of common pool resource dilemmas. Common property or common pool resource is a form of resource management in which a well-delineated group of competing users participates in extraction or use of a jointly held, fugitive resource according to explicitly or implicitly understood rules about who may take how much of the resource (Stevenson, 1991). For resolving such dilemmas, common pool resource management literature emphasizes the inevitability of institutions both formal and informal. The fishing industry, both traditional and mechanised, and the general public have a vital interest in safeguarding and sustaining the economic and nutritional role of fisheries. If sustainability and viability are to be ensured, there is an urgent need to strengthen and put in place efficient measures to limit fishing effort and rehabilitate coastal areas and aquatic resources.

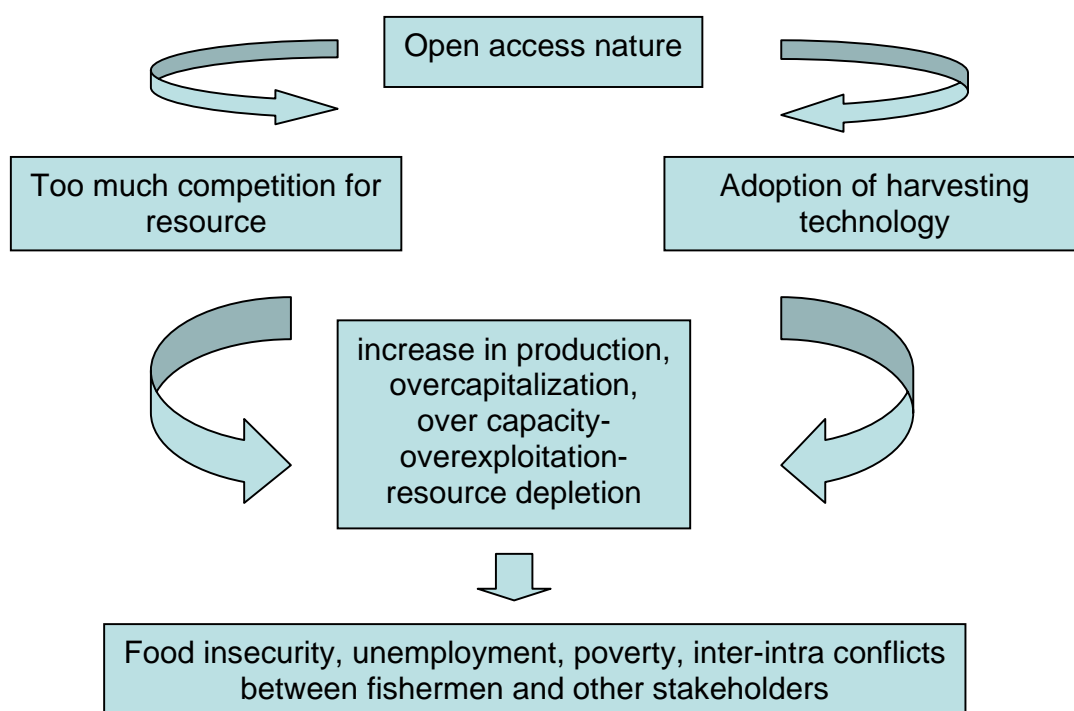
The fisheries sector in India is associated with the poor, illiterate and under-nourished population belonging to one of the economically weakest sections of the society. The sector immensely caters to the country's protein requirements and registered highest export earnings growth rate among agriculture commodities. Most of the fish stocks in inland and marine sector have either been over-exploited or reached their maximum sustainable yields. For the stocks to recover and continue to provide production at an optimal level, collaboration between fishers and public sector institutions is needed in observing closed seasons, shifting from open access system to the user right regime, reduction of fishing effort and capacity, establishment of marine protected areas/sanctuaries, participatory management etc. will lead to community-based fisheries management or co-management.

Community based resource management has emerged as away to involve resource users and to utilize indigenous institutional arrangements and knowledge in fisheries management. Under certain conditions, communities of fishers can regulate access and

enforce rules through community institutions and social practices to ensure fisheries resource sustainability. Community based fisheries resource management refers to the community level efforts, which seeks to elucidate how ecological and social dynamics influence the fisheries resource management activities of diverse groups of people and how these activities in turn helps to produce and shape particular kinds of environment. Available literature suggests the existence of community institutions organized along caste, kinship or religious lines, which, in some cases, played a role in regulating resource use, resolving conflicts, ensuring equitable access to resources and in providing some form of social insurance.

1.2 Overview of the key issues in marine fisheries

Figure 1.1 Key issues in Marine fisheries



Marine fisheries are characterised as multi species, multi gear and open access in nature. Open access or common property resource has led to the increased competition, which escalates the fishing pressure on the sea resources. This has also led to increasing

encroachment by the non-fishers in the fishing sector has led to the heavy exploitation of the resource leading to the depletion of certain species, reduction in biodiversity of fish resource etc is highlighted in figure 1.1. Increased demand and consequently the price have resulted in accelerated investment in the harvest operations as the increase in the price compensates even the decline in catch. Adoption of new fishing technology on the other part has led to the marginalization of many poor fishermen as a result of over capitalization and excessive competition in the industry. All these will finally contribute to food insecurity, unemployment, poverty, inter-intra conflicts among fishermen community and other stakeholders in the industry.

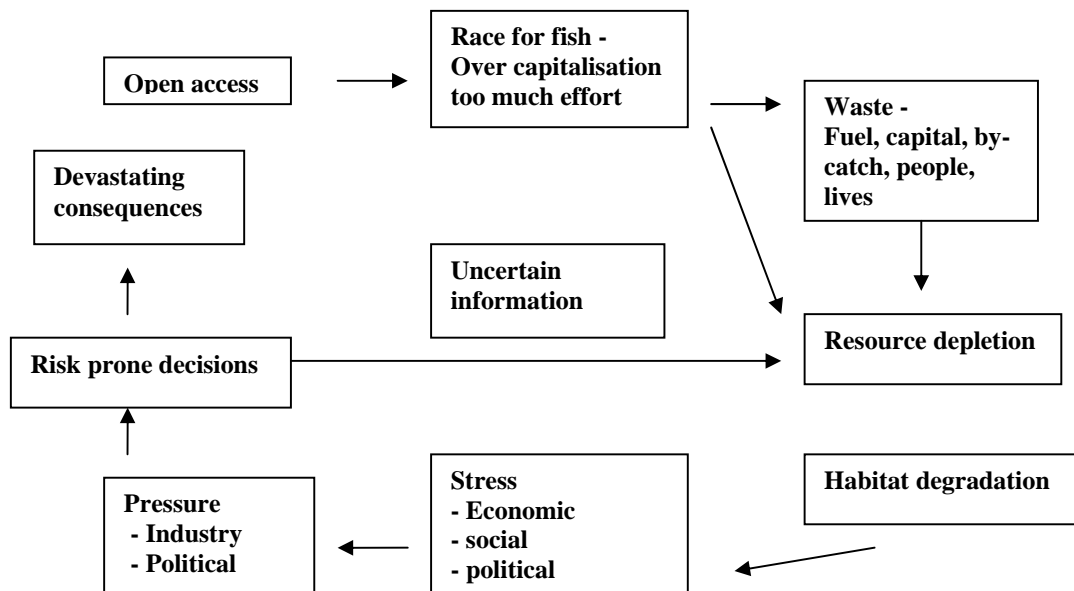
Issues in marine fisheries management in India are: declining trend in catch and catch rates of commercially exploited stocks; excess fleet size in terms of numbers; over-capitalization and unwarranted 'capacity over load'; ecosystem/ diversity degradation affecting the productivity and carrying capacity. Concerned with the dwindling catch rates, apprehensions of damage to the ecosystem and for ensuring sustainability of the exploited resources, the maritime states of India have imposed statutory regulations for fishing by imposing ban/restriction of fishing by certain gears and closure of fishery during specified periods.

1.2.1 Exploitation level of fishery resources leading to un-sustainability

Given the common property resource, the multi-species multi gear fishery and in the absence of some explicit institutional arrangements, fisheries will naturally become unsustainable. The major factors leading to un-sustainability of marine fisheries (FAO, 2002) indicates 1) inappropriate incentives in the form of fuel subsidies, market distortions etc. 2) high demand for limited resources leading to high value and unbridled expansion of trawl fishery in the country, 3) poverty and lack of alternatives, 4) complexity and inadequate knowledge of the fishery environment, 5) absence of suitable policies, institutions and regulatory mechanisms due to lack of appropriate and effective governance, 6) inter-sectoral interaction such as impact of coastal pollution effecting the anthropogenic activities and the development of coastal aquaculture threatening the

critical habitat of important species. Open access regulations and resulting excess capacity is the root cause of over-fishing, habitat damage, and critical levels of by-catch of non-target species, some of which are close to extinction. The economics of over-fishing as explained in the figure 1.2 depicts the cause, pressure, consequences and risks of resource exploitation. The problem of over-fishing was already recognized by the first FAO Fisheries Technical Committee in 1946 and was flagged recurrently in the successive FAO fisheries conferences, for example in Vancouver (1973), Rome (1984) and Reykjavik (2002).

Figure 1.2 The Economics of Over-fishing



Source: Indicello, *et al.*, 2009

Overall, 80 per cent of the world's fish stocks for which assessment information is available are reported as fully exploited or overexploited and, thus, requiring effective and precautionary management. In 2007, about 28 per cent of stocks monitored by FAO were either overexploited, depleted or recovering from depletion and thus yielding less than their maximum potential owing to excess fishing pressure. A further 52 per cent of stocks were fully exploited and, therefore, producing catches that were at or close to their maximum sustainable limits with no room for further expansion. Only about 20 per cent

of stocks were moderately exploited or underexploited with perhaps a possibility of producing more (FAO, 2008).

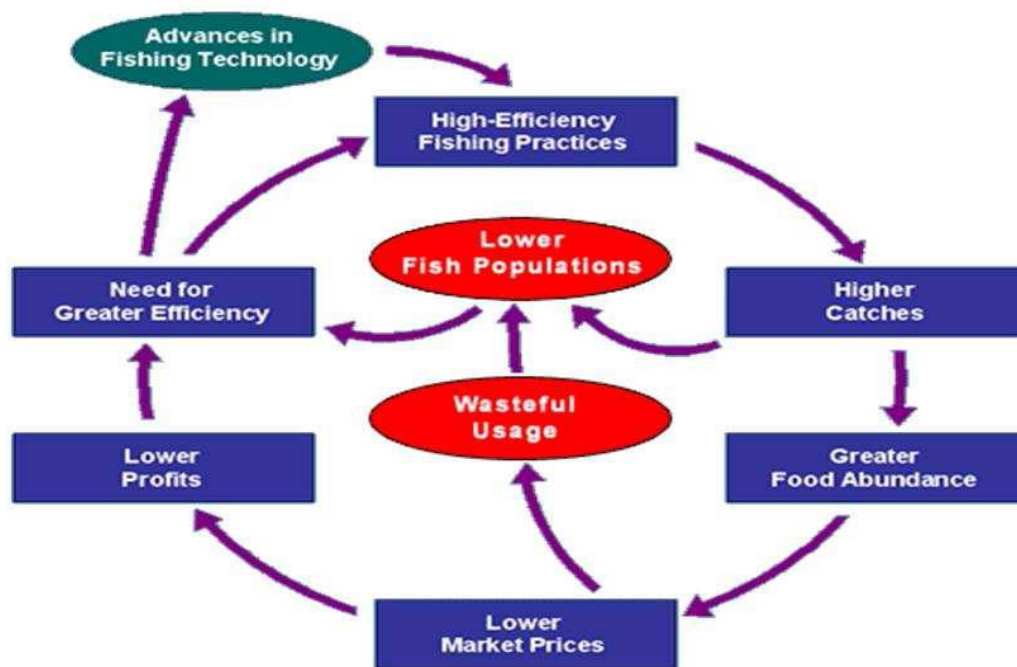
Out of the current fishery resource potential of 3.93 million tones of annual harvestable resources from the Indian EEZ, the available 2.2 million tones from the inshore area is almost exploited, leaving scope for further exploitation only in the offshore and deep sea zones. (Sathiadhas, *et al.*, 2001). The issues in the sector are excess coastal fishing fleet capacity and overexploitation, unregulated open access fisheries, discards at capture/indiscriminate capture and downgrading of juveniles and sub adults, environmental degrading, biodiversity loss and ineffective regulatory measures, increased fishing costs and decreased profitability, poor infrastructure and linkages for domestic marketing, underutilization of oceanic and deep sea resources and emerging inter and intra- sectoral conflicts. Kurien and Achari, (1990) identified five main contributory factors of over-fishing : (a) the current open access nature of the coastal commons (b) the use of inappropriate technology (c) the booming demand for fish from the domestic and international market (d) subsidies resulting in distorted incentives (e) increasing population pressure on the coastal waters due to lack of employment alternatives. The impact of over-fishing has been assessed as leading to (a) falling productivity and income of fishermen (b) growing income disparities between owners and workers (c) and less fish for the domestic consumers.

1.2.2 Excess capacity and Overcapitalization

Overcapacity or excessive fishing inputs are said to be the major contributors to the deterioration of fish stocks. In the global context by Ridgeway (2006) highlights serious threat to world fisheries due to overcapacity. Overcapacity undermines conservation and effects ecosystem due to over-fishing, illegal, unregulated and unreported fishing (IUU), which results in economic conditions and return on investment. Few controls, and unrestricted access in most fisheries, ultimately led to over-capitalization. Resource depletion caused by the size of the overall fishing effort, advances in fishing technology, high efficiency fishing practices as well as the utilization of indiscriminate fishing methods is shown in the figure 1.3. High efficiency fishing practices bring higher catches,

which may cause lower fish populations as well as greater food abundances. Greater food abundance may create lower market prices, which may lead to wasteful usage and lower profits. Lower profits and lower fish populations induce need for greater efficiency which in turn leads to adoption of fishing technology and high-efficiency fishing practices.

Figure 1.3 Fish stock depletion due to advances in fishing technology, high efficiency fishing practices



Source: Adapted from Mathew, 2008-09

Excess capacity has been a major cause of illegal, unregulated and unreported (IUU) fishing. According to a recent report, current losses due to illegal, unreported and unregulated fishing worldwide are estimated to be between \$10 billion and \$ 23.5 billion annually, representing between 11 and 26 million tonnes of catch (FAO, 2009). Most importantly, excess capacity leads to poor economic conditions in the fishery and related sectors such as processing and marketing in both developed and developing countries.

Estimates reveal the fact that nearly \$ 2.9 billion potential revenue is lost due to excess excess-capitalization in the United States. Even with a healthy target stock overcapitalization will lead to profit dissipation as too many fishers chase too few fish (Lent, 2006). The reported illegal catches by trawlers in India is estimated at a level of 17840 tonnes per year and share of Kerala is nearly about 2100 to 3320 as highlighted in the table 1.1

Table 1.1 Estimates of illegal catches by trawlers in the artisanal zone (<5 km from shore)

State	Illegal catches in tonnes / year
Gujarat	740 to 1,130 tonnes
Maharashtra	1,100 to 1,800 tonnes
Karnataka	1,200 - 1,950 tonnes
Kerala	2,100 - 3,320 tonnes
Tamil Nadu	460 to 1,220 tonnes
Andhra Pradesh	1,300 – 2,600 tonnes
Orissa	2,100 – 4,100 tonnes
West Bengal	820 – 1,920 tonnes
Total	9,820 – 17,840 tonnes / year

Source: Pramod, 2010

The overall per capita investments of an active fishermen in 2004 was Rs 86290 ranging from Rs 17024 in the non-motorised sector to Rs 219319 in the mechanized sector, showing rising trend in table 1.2. Whereas the investment per head in mechanized sector was Rs 125689, motorized and mechanized sectors invested Rs 26835 and Rs 13979 respectively.

Table 1.2 Per capita Investment on fishing equipments per active fishermen in India 1997-2004

Sector	1997-1998	2004
Non-motorised	13979	17024
Motorized	26835	19454
Mechanised	125689	219319
Overall	40363	86290

Source: Sathiadhas, 2005

The gross capital investment on fishing units in Indian marine fisheries sector during 2004 works out at Rs 10,532 crore in which mechanized sector constitutes about Rs 9049

crore, more than a three-fold increase from 1997-98. The increase in investment on mechanized trawlers and gill-netters are comparatively higher than other sectors. The capital investment on motorized sector also doubled from Rs 456 crore during 1996-97 to Rs 861 crore during 2004. However non-motorised sector has shown a decline in investment from Rs 923 crore during 1996-97 to Rs 622 crore in 2004 in tune with their decline in production and diminishing returns (Sathiadhas, 2005).

1.2.3 World fishing fleet and increasing fishing intensity

The number of motorized fishing vessels in 2006 was estimated to be 2.1 million, of which almost 70 per cent were in Asia. Almost 90 per cent of motorized fishing vessels are less than 12 metres long, and these vessels particularly dominate in Africa, Asia and the Near East. The number of industrialized fishing vessels and fish carriers (that is, above 100 gross tonnage) operational in 2007 was 23,000 and 740, respectively (FAO, 2008). The number of decked vessels has remained stable at around 1.3 million. In addition, there are about 2.8 million undocked vessels of which 65 percent are not powered. About 85 percent of total decked vessels, 50 percent of powered undocked vessels and 83 percent of total non-powered vessels are concentrated in Asia (WFFP, 2008). According to a 2008 UN report, the world's fishing fleets are losing \$50 billion each year through depleted stocks and poor fisheries management.

After the progressive mechanization of fishing fleets, the number of smaller mechanized craft of OAL 8 to 10 m are being gradually replaced by larger ones (OAL: 13 to 15 m), thereby considerably increasing the sea endurance, fish hold capacity and fishing efficiency of the vessels. Excess capacity in the fleet size of different fishing crafts operated could be higher, as the fishing power of the mechanized crafts especially trawlers have significantly grown due to advances in technology and enhancement in horsepower and capacities of the mechanized crafts. The excess capacity is the direct result of free and open access nature of marine fisheries in Indian waters as depicted in table 1.3. The fishing effort exerted for capture of fish is much more than what is required. This overcapacity is well reflected in all the fishing sectors. The non-

mechanised sector has 81 percent overcapacity, the motorised sector has 60 percent overcapacity and the mechanised sector has 55 percent overcapacity (Modayil, 2006).

Table 1.3 Optimum fleet size and the present fleet size of fishing vessels in India

	Optimum fleet size	Present fleet size
Mechanized trawlers	10998	29241
Mechanized purse seiners	784	983
Mechanized gill netters	3694	14183
Mechanized bag netters	2014	8862
Other mechanized boats	1558	5642
Total mechanized boats	19048	58911
Total motorized boats	14862	75591

Source: CIFT, ICAR, 2007

1.2.4 By-catch and discards

A problem usually highlighted in the sustainability debate is the issue of discarding by-catch. The amount of fish and other species caught as “by-catch” is estimated by FAO to be more than 20 million tonnes globally, which is equivalent to 23 percent of marine landings (FAO, 2008). Annual discards from the world’s fisheries were estimated to range from 17.9 million tones to 39.5 million tones. In an unregulated fishery, fisheries have an incentive to discard if the expected net price ie, the real price less landing costs is negative and if the resultant costs incurred in landing are greater and also due to limited holding capacity (Korakandy, 2008). During 1992–2002, FAO estimated the discard rate as 8 percent of the total catch, represented by 7.3 million tonnes. However, some of the major marine fish-producing countries, including India are under-represented in the discard database, indicating the possibility of higher levels of discards.

The annual economic loss generated due to catching of juvenile fishes by a single trawler in Kerala coast was estimated as 28.3 lakhs (Sathiadas and Narayana Kumar, 2002). One-third of the 1,800,000 non-shrimp catch was discarded, the total discards would be about 600,000 tonnes. By-catch represents 56.3 percent of the estimated total marine catch. Average discards at sea by the mechanised trawlers in Kerala was estimated at 429,074 tonnes and for India it was 1,217,931 tonnes. Discards at sea add up to 30 percent, other post harvest losses account for up to 15 percent, nonfood uses account for up to 9.73

percent in the marine sector. In other words, about 55 percent of currently 'wasted' marine fish could be saved and better utilised by appropriate interventions (Modayil, 2006). Around 2.4 lakh tonnes of discards are thrown back into the sea from bottom trawlers operating along the Kerala waters annually due to non-edible nature, unpopular nature of species and size, low market value and lack of storage facilities, etc. The edible portion of the discards is worked out around 0.85 lakh tonnes per annum (Chandrapal, 2005). About 94 percent of the bottom trawlers operated along Kerala coast are having a cod end mesh size of 18 mm and below against the statutory mesh size of 35 mm imposed by the Government of Kerala through KMFRA (1980). This situation calls for an effective implementation of KMFRA regulation. Establish “no trawling zones” in selective region of continental shelf and slope ecosystems along Kerala coast as a measure to recoup the benthic communities for the sustenance of demersal fishery. Marine Protection Areas (MPAs) may also be established for the protection of benthic habitats and conservation of marine fishery. Minimum landing size (MLS) system should be fixed and implemented to curb landings of juveniles and young ones (Kurup, 2003).

1.3 State of World Fish Stocks

According to the Food and Agriculture Organization of the United Nations (FAO, 2008), capture fisheries and aquaculture supplied the world with about 115 million tonnes of fish for human consumption in 2008, providing an apparent per capita supply of 16.7 kg, which is among the highest on record. Of this total, aquaculture accounted for 47 per cent. Total world fishery production reached at a level of 142 million tonnes in 2008 shown in table 1.4. World capture fisheries production in 2005 was about 92 million tonnes, with an estimated first sale value of US\$91.2 billion, comprising about 82 million tonnes from marine waters and 10 million tonnes from inland fisheries. In 2008, capture production declined to 89 million tonnes. Out of the total fish production, nearly 115089 tonnes are available for human consumption which is about 81 percent. The top ten fisheries producer countries in 2006 were China, Peru, the United States, Indonesia, Japan, Chile, India, the Russian Federation, Thailand and Philippines.

Fisheries and aquaculture play an essential role in the livelihoods of millions of people around the world and contribute to food security and poverty alleviation. In 2006, 43.5 million people were directly engaged in primary production of fish, either by fishing or in aquaculture. Most of the 34.8 million people engaged in fishing are small-scale, artisanal fishers, operating in coastal and inland waters.

Table 1.4 World fish production, 1999-2008 in thousand tonnes

Year	Capture	Aquaculture	Total fish production	Human consumption	% to total fish production	Other purpose	% to total fish production
1999		30730	122201	93987	76.9	28214	23.1
2000		32416	125921	95766	76.1	30155	23.9
2001		30730	125355	98561	78.6	26794	21.4
2002	91001	36782	127784	99487	77.9	28297	22.1
2003	88234	38915	127149	102255	80.4	24895	19.6
2004	92369	41904	134275	104433	77.8	29841	22.2
2005	92056	44305	136362	197266	78.7	29096	21.3
2006	89712	47351	137063	110742	80.8	26321	19.2
2007	89898	49903	139803	112749	80.6	27054	19.4
2008	89740	52546	142287	115089	80.9	27198	19.1

Source: FAO, "The State of World Fisheries and Aquaculture", 2009.

1.3.1 Fish trade

Developing countries play a major role in the fishery industry. FAO estimates that in 2006, 79 per cent of fishery production took place in developing countries, and accounted for 49 per cent of world exports of fish and fish products in value terms and 59 per cent in terms of quantity. World exports of fish and fishery products reached US\$85.9 billion in 2006, increasing in real terms by 103.9 per cent between 1986 and 2006, and 32.1 per cent between 2000 and 2006 (FAO, 2008).

1.4 State of Indian Fisheries Sector

India is one of major fish producing countries in the world, consists of 4.7 percent of global fish production with 9.92 percent in inland and 2.8 percent in marine. Among Asian countries, it occupies third position in capture fisheries and second in aquaculture. Presently, fisheries and aquaculture contribute 1.04 percent of the national GDP and 5.34

percent of agriculture and allied activities. Indian marine exports and its share in the global trade have shown a steadily increasing trend over the years (India's share in global trade is 2.5 percent in 2008). It is estimated that around US\$ 70 billion worth fish and fishery products were traded internationally during 2006-07 of which India accounted for 2.64 percent only. India's share in this trade was US\$ 1.85 billion (Rs. 8,363 crores). During 2001-07 period the increase has been 40 percent in terms of value. In the last decade the seafood trade doubled both in value and quantity. In 2006-07, India exported 6.12 lakh tonnes worth marine products valued at Rs. 8,363 crores, but in 2008-09, Indian marine export declined in terms of quantity to 602835 tonnes and export value increased to Rs 8607.94 crores.

Fisheries is an important sector in India--it provides employment to millions of people and contributes to food security of the country. With a coastline of over 8,000 km, an Exclusive Economic Zone (EEZ) of over 2 million sq km, and with extensive freshwater resources, fisheries play a vital role. In India, marine fisheries sector employs (around two million people of which 12.47 lakh people are in active fishing, 14.97 lakh in secondary sector avocations and two lakhs in tertiary sector). Out of the total employed, 59 percent of them hail from the coastal fishing villages alone. Seventy one percent of those employed in primary sector reside in coastal fishing villages. Similarly 51 percent of secondary sector workers and 42 percent of tertiary sector workers are from the fishing villages. The tertiary sector undertakes fishery allied activities in which non-fishermen dominate (Pratap, 2009). The fishing fleet of the country includes 2.38 lakh crafts, out of which 58,911 (24.67 percent) are mechanized, 75,591 are motorized (31.66 percent) and 1,04,270 (43.67 percent) are artisanal (MFIS, 2009).

1.4.1 Marine Fisheries Development Scenario

Three phases could be recognized in the development of marine fisheries in the Indian waters. The pre-developmental phase (1947-1962) was without any effective management with an average production below 0.8 million tones. The prolonged growth phase (1963-1988) witnessed intensive mechanization and steady increase in annual catches from 0.8 to 1.8 million tones. The full exploited phase (1989-1999) saw a further

boost in production from 1.8 to 2.7 million tonnes by exploiting the under-exploited resources and areas (Vijayakumaran, 2005). The substantial increase in fishing effort with current stagnation in production and insufficient management and control indicates an over-exploited phase. Growth over-fishing and economic over-fishing at several centres and inter-sectoral conflicts in the coastal belt have highlighted the need for caution and urgent remedial action. Marine fishing activity in India is an example of uncontrolled fisheries in the initial phase and inefficiently managed fisheries in the subsequent phases (Yadava, 2004).

It was estimated that the total marine fish production in the country during 1947-48 was only 3.73 lakh tonnes. The estimated total marine fish production in India had risen to about 2.6 million tonnes in the year 1997 and declined in 2001. Then it decline in 2005 and reached at 2295490 tonnes and in 2009 it increased to 32 thousand tonnes as highlighted in table 1.5.

Table 1.5 Marine fish production in India from 1996-2009

Year	Marine production (tonnes)
1996	2380842
1997	2692409
1998	2635670
1999	2401706
2000	2652928
2001	2292703
2002	2589645
2003	2587095
2004	2538105
2005	2295490
2006	2710988
2007	2888461
2008	3207205
2009	3205453

Source: CMFRI, 2009
Economic Review 2001, 2004 and 2005

Pelagic finfishes contributed 52 percent, demersal 28 percent, crustaceans 16 percent and molluscs 4 percent of the total landings. The mechanized sector yielded 74 percent, motorized 22 percent and artisanal 4 percent of the catches along the coastline. The oil sardine continued to be the largest contributor to the marine fish resources during this year also accounting for 3, 92,486 tonnes (12.4 percent) followed by penaeid shrimps 2,32,313 tonnes (8.9 percent). Indian mackerel, catfish and threadfin breams registered increased catches during 2009 while cephalopods suffered a setback by 20 percent (CMFRI, 2009). The projected per capita requirement of fish by year 2015 would be between 6.3kg and 7.9 kg and year 2030 between 6.9 and 9.2 kg. This means that the country's fish need could be of 5,514000 to 7,637000 tones in 2015 and 9,428000 to 12,611000 tones in year 2030. In other words, the fish production needs to be increased between 121 to 195 percent by year 2030 to reach these targets (GOI, 2004).

1.4.2 Marine Fisheries scenario of Kerala

Kerala which has a coastline of 590 km ranks first in marine fish production of India, contributing nearly 25 percent (5.81 lakh tonnes on average) to the total annual production. Fisheries sector contributes to less than 1 percent to the total GDP of the country and about 5 percent of the agricultural GDP in 2007-08. While in Kerala, fisheries play a significant role, contributing 1.68 percent of GSDP and 12.61 percent of agricultural GSDP. The per capita fisheries sector product for the State is Rs. 45,315 which is lesser than the per capita GSDP of Rs. 51,008. There are about 1.20 lakh fishermen families were there in the state living in 222 fishing villages along the coast. This sector employs around 3 million people of which 12.47 lakh people are in active fishing, 14.97 lakh in secondary sector avocations and 2 lakhs in tertiary sector. Out of the total active fishermen in Kerala, 34,307 are in mechanised sector, 86,111 are in motorised sector, 19,104 in non-mechanised sector. Per capita catch per active fishermen in the mechanised units worked out to 8,333 kg, motorised units 2792 kg and non mechanised units 419 kg .The non- mechanized units are being marginalized out from the scenario with declining share of catches (Pratap, 2009). The per capita consumption of fish in Kerala is 28 kg per annum, which is very high compared to the national average. During 1997-2008, the total marine fish production from Kerala varied from 5.14 lakh

tonnes in 2001 to 6.70 lakh tonnes in 2008, with an annual average landings of 5.98 lakh tonnes (Pillai, et al., 2009).

Marine fish landings along the Kerala coast in 2009 was estimated at 5,17,591 tonnes which showed a decrease of 22 percent compared to 2008. Pelagic finfish resources contributed 67 percent, demersal finfish 17 percent, crustaceans 11 percent and molluscs 5 percent. Sector-wise landings indicated that, mechanized sector contributed 59 percent, motorized 39 percent and artisanal sector 2 percent. The major gears that contributed to the fishery were ring seines 45.7 percent, multi-day trawlers 25.7 percent, outboard motor operated gillnet 7.6 percent and mechanized single day trawlers 4.9 percent. Catch per unit hour in mechanized ring seine was 975 kg compared to 575 kg in outboard ring seines and 958.5 kg in mechanized purse seines. Marine product export from the State has increased from 49,094 MT valued at Rs. 414 Crores in 1992-93 to 97311 MT valued at Rs. 1258 Crores in 2005-06. In 2008-2009, India's total marine export has reached to 602835 tonnes at a value of about Rs 86 crores and Kerala's marine export reached about 101000 tonnes in 2009 earning foreign exchange of Rs 1569 crores as shown in table 1.6. The State contributes 17 percent by volume and 18 percent by value to the country's Marine product export.

Table 1.6 Marine products export from India and kerala (volume and value)

Year	India		Kerala		% share of Kerala to India	
	Qty tones	value Rs crores	Qty tones	value Rs crores	Quantity	value
1999-00	343131	5116.67	92148	1146.96	26.86	22.42
2000-01	440473	6443.89	88852	104.47	20.17	16.24
2001-02	424470	5957.05	72756	950.55	17.14	15.96
2002-03	467297	6881.31	81393	1046	17.42	15.2
2003-04	412017	6091.95	76627	1099	18.6	18.04
2004-05	461329	6646.69	87378	1158	18.94	17.41
2005-06	512164	7245.30	97311	1258	19	17.36
2006-07	612641	8363.53	108616	1524	17.74	19.00
2007-08	541701	7620.92	100318	1431	18.52	18.78
2008-09	602835	8607.94	101000	1569.82	17	18

Source: Economic survey, 2010

1.5 Institutions in Fisheries Management – A form of social capital

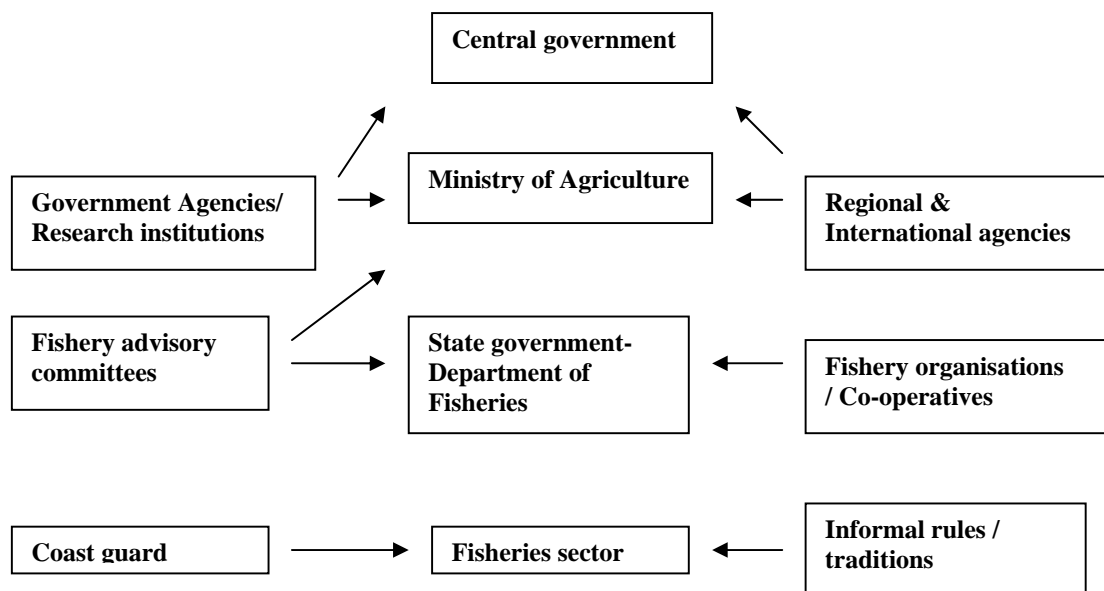
To a large extent the global crises in marine fisheries has been a crises in fisheries management. The typical institutional arrangement for managing fisheries has consisted of two main components. A scientific group is a working group and has a management or decision-making body. The scientific group obtains data or both, develops and fits models to the data, and formulates a set of recommendations for management. The management body then tries to reconcile these recommendations with the needs of the fishing industry, and determines the annual catch quota and other management regulations. In addition, an enforcement arm ensures that the quotas and regulations are obeyed. These three groups are established and financed by government, which may continue to play an overall supervisory role (Clark, 2006).

To be operational and allow for adequate governance, those arrangements and organisations should be determined and integrated into institutional support structures, ie the fisheries management institutions. The fisheries management institutions have been arbitrarily aggregated into fisheries management authority and the interested parties. In national systems, including federal systems, a fisheries management authority would usually take the form of a ministry, a department within a ministry or an agency. It can also be international in character and include fisheries management organisation or arrangement, either sub-regional, regional or global. The interested party refers to any party or group or community which has been accepted by the State or States or by management authority on behalf of the State or States as having a legitimate interest in the fisheries resources being managed (FAO, 1997).

The social capital/ institutional capital for fisheries development in India included the traditional community organisations and the modern multiple functional organisations created by the state authorities and other voluntary, national and international organisations in promoting and protecting the interest of the community as well as resources. The social capital consists of the community's inherited culture, traditions and values, and the social organisations. In the traditional social relations/ organizations, mode of production is controlled by community decisions and ethical code of conduct for

social behaviour (Korakandy, 2008). Some of the well known social institutions of fishermen community in Kerala are in terms of Karinila system- of income sharing, Kadakodi's of northern Kerala, state initiated community organisations in term of cooperatives and indigeneous community organisations of fishermen are prevalent. A formal governance of fisheries sector in India is outlined in figure 1.4. Fisheries sector in India comes under the purview of Agriculture Ministry and is supported by distinct institutions at various levels.

Figure 1.4 Schematic out-line of institutional arrangements for fisheries sector in India

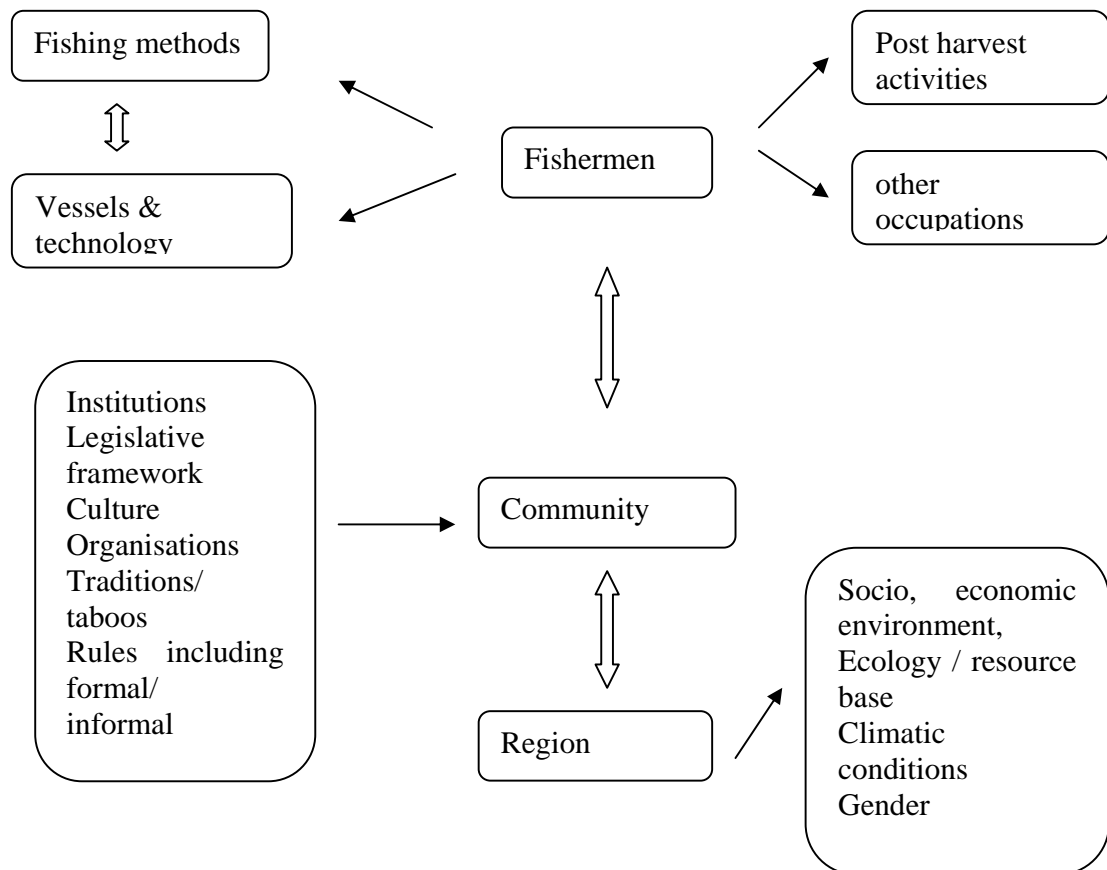


1.6 Community Participation in Management

An important function of any fisheries legal regime is to establish the institutional arrangements and procedures necessary to reduce potential conflicts and facilitate their resolution when they occur. In view of the social and economic nature of most conflicts related to fisheries management, attention should be given in achieving balance of interests in resolving conflicts. When the authority for managing a fishery is devolved to local or community levels, an instrument of agreement should ideally be negotiated prior to the devolution, by which interested parties accept binding dispute settlement mechanism among themselves and also with the management authority. Linkage between

the fishermen, community as well as region is placed for understanding their dependence or inter-connections with regional economy is pointed out in figure 1.5.

Figure 1.5 Fundamental linkages between Fishermen, Community and Region



The communities will have the right to restrict access and will create enough incentives for users to invest in it rather than overexploit it. De-centralized community management systems; customized to meet local needs will be required to tackle the problems that will be faced by the fishing community in the near future (Venkatachalam 2005). In India fisheries management is devolved to State control within territorial waters, and Union control outside territorial seas; existence of legislation or formal rules and traditional

mechanism are focusing on production, consultation, conflict resolution rather than on sustainability issues

Rights should be implemented by local communities, forming rules and regulations which are comfortable with, and which appeals to their good sense and wise use ideas. Under the Individual (tradable) fishing rights (IFRs) each traditional fisher family is individually given the percentage share of MSY calculated first time around as a right, the actual amount of fish varying depending on the MSY calculated every year. This would be an egalitarian allocation of fishing rights. The new communities with fishing rights would form cooperatives to monitor and enforce the legal rights.

In the Community fishery rights (CFRs) model fishing rights are given to communities, their share of rights on the TAC depending on the number of members of the community at the time of primary allocation. Cooperatives should be the body to which the rights are bestowed, who then proceed to distribute the rights amongst their members, as they deem suitable. Since most fishermen communities are generally formed into informal bodies, this would essentially mean formalization of the existing set up. The individual's right to fish is subject to the cooperative's right to disburse the right. Thus, there would not be any danger of any unknown person entering the fray.

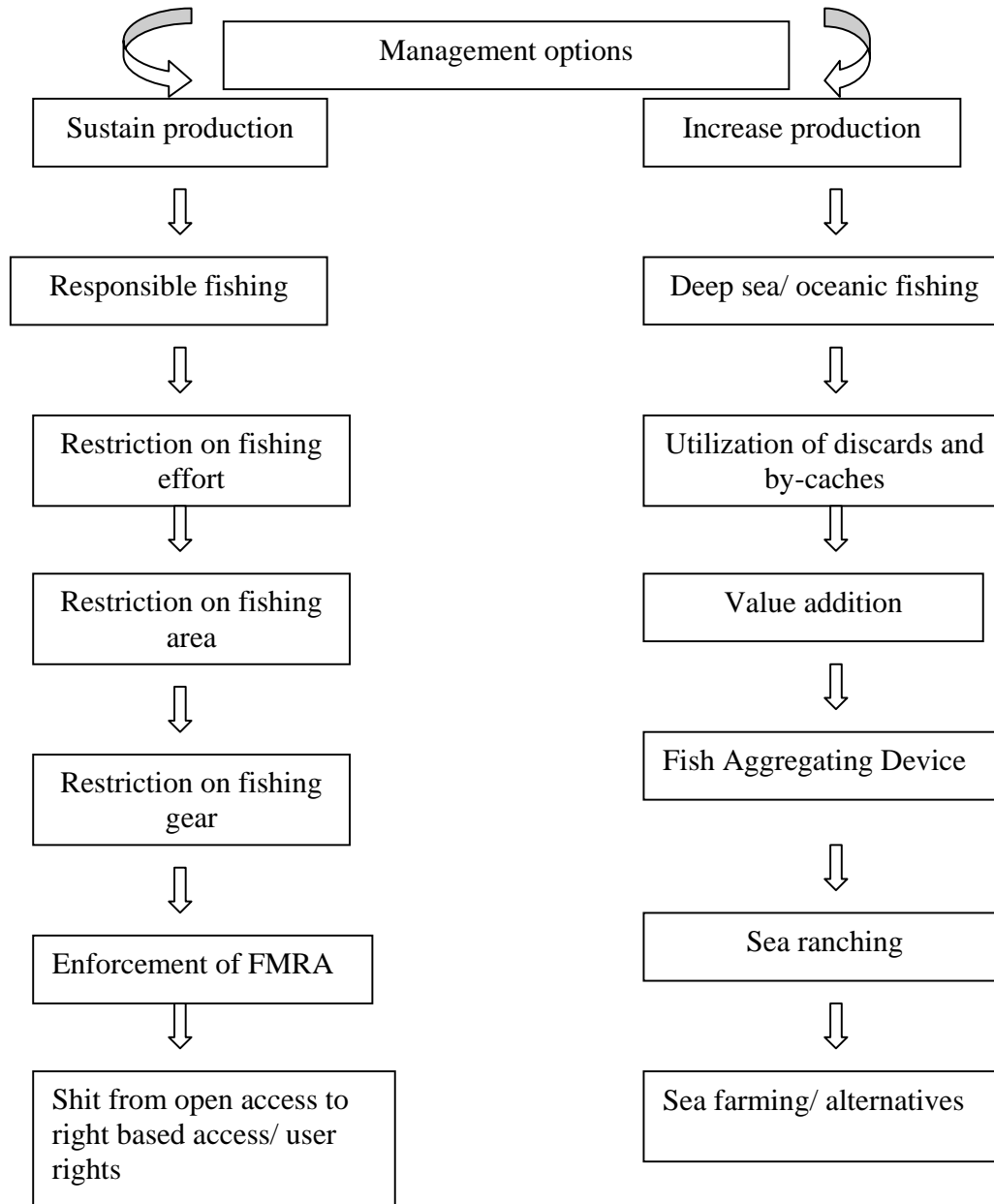
Community sea rights (CSRs) model is in which the community, formed into cooperatives, is given the right the sea and it is called as community sea rights model. Since state governments have a right to the sea up to 12 nautical miles, this would specify the length to which the cooperative can go into the sea to fish. All resources within this area would be the property of the cooperative. They would have the right to decide how to distribute their title among their members, what rules of use to put in place, what methods to employ to solve conflict and every other issue that may concern their title. They would also be empowered to stop any 'foreign' boat/ individual from entering their titled area. There is impossibility in the application of one single model to the whole of India. It need much attention and good theoretical knowledge of each model to suit local circumstances to identify the optimal combination that would lead to the protection of

fish populations, their habitat and to the betterment of livelihood opportunities for fisher folks.

1.7 Sustainability Issues

FAO (2005) in its report has identified factors contributing to un-sustainability and overexploitation, and analyzed why the fisheries management are unsuccessful in developing countries. Lack of transparency and participation of fishers in the management system undermines confidence and willingness to comply with management measures. High demand for limited resources and the prospects of making financial gains are likely to intensify pressures on governments to allocate more licenses. Over-capacity, over-capitalisation, lack of alternative employment opportunities lead to poverty and give rise to conflicts between long established coastal communities and new comers. The complexity of many fishery systems and inadequate knowledge make it hard for fishery authorities to identify the right course of action. Lack of governance, lack of co-operation between various department at the administrative level and lack of interaction between fishery, other sectors and its environment. It is high time to implement the code of conduct for responsible fisheries; utilize strong traditional wisdom and know-how by active community participation; address gender issues; explore areas of public-private partnerships; strengthen the institutional credit support and public investments; harmonise fisheries policies in concurrence with the recent developments both at national and international levels; and strengthening the inter and intra linkages between fisheries sector and other concerned departments for the development of fisheries sector. In the code of conduct for responsible fisheries, the primary responsibility for overseeing the fisheries management process is vested essentially with fisheries arrangements and organisations. The sustainable and rational exploitation of fishery resources implies harvesting of optimum number of fish without adversely affecting the stock recruitment and allowing the smaller individuals to achieve optimum growth (Vijayakumaran, 2005).

Figure 1.6 Options for Sustaining and Increasing Marine Fish Production



Source: GOI, 2006

For sustaining marine fish production, the management plan should explore the possibilities of (i) dispersing the existing fishing intensity in the inshore waters to the far-sea, (ii) providing support to the fisher-folk by locating potential fishing zones through

remote sensing, (iii) increasing the productivity of the coastal waters by installing artificial fish habitats and sea-ranching, and (iv) providing alternate employment opportunities such as mariculture (Vivekanandan, 2004). Interventions like introduction of by catch reduction devices, sea ranching, fish aggregating devices, along with mariculture practices are necessary to compliment and sustain marine fisheries for the future. The Government of India in 2006 also proposed a management strategy to sustain as well as increase marine fish production as depicted in figure 1.6 in detail.

1.8 Statement of the Problem

Kerala has been the first maritime state in the country that has implemented a fisheries management policy, imposing monsoon trawl ban on mechanical fishing in coastal waters in a bid to conserve its fisheries resources since 1980s. In spite of the measures, sustainability of resource is increasingly endangered in the capture fishery segment. Harvesting immature/under-size fish, destructive fishing, degradation of critical habitats, issues of equitability, inter-sectoral and intra-sectoral conflicts, post harvest losses, discards, by-catches, gender equity and poverty issues, lack of opportunities and pressures of credit system contribute to the added pressures on marine fishers and resources leading to depletion, economic waste and conflict among user groups. Without adequate control over access, these conflicts may prove to be a major obstacle to the sustainable management of fisheries resources. The most effective way to solve the fisheries problem is to allocate rights to stakeholders through participatory management. Management of fisheries can be made more effective if the principal stakeholders are involved in decision-making and its implementation. Fishery co-operatives can be vested with the responsibility of protecting the fisheries resources which community members harvest. Management of fisheries should entirely be in the hands of the communities, with governments serving as a technical advisor. In this scenario, the fishing communities are adapting to various alternative fishery management policies at the community level in terms of padu, karanila system, kadakodi etc; along with the state level institution and local community in terms community co-operatives connected with the Mastayafed

societies; and other fishermen co-operatives. An attempt is made to evaluate the effectiveness of these institutional arrangements and fishery resource sustainability.

1.9 Objectives of the Study

- To explore the institutional and organizational dynamics of individuals and groups in fisheries management.
- To find out formal and informal institutions in fisheries resource management and its impact on sustainability of resources so as to benefit future policy frames.
- To analyze the livelihood and gender issues of various social actors in community based fisheries management in poverty reduction and in sustainable resource use.
- To examine the sustainability issues relating to the nature and extent of depletion of resources, effectiveness of trawl ban etc.

1.10 Hypothesis

- There exists a link between trawling (new technology) and resource depletion.
- Resource sustainability is different in different institutional framework.

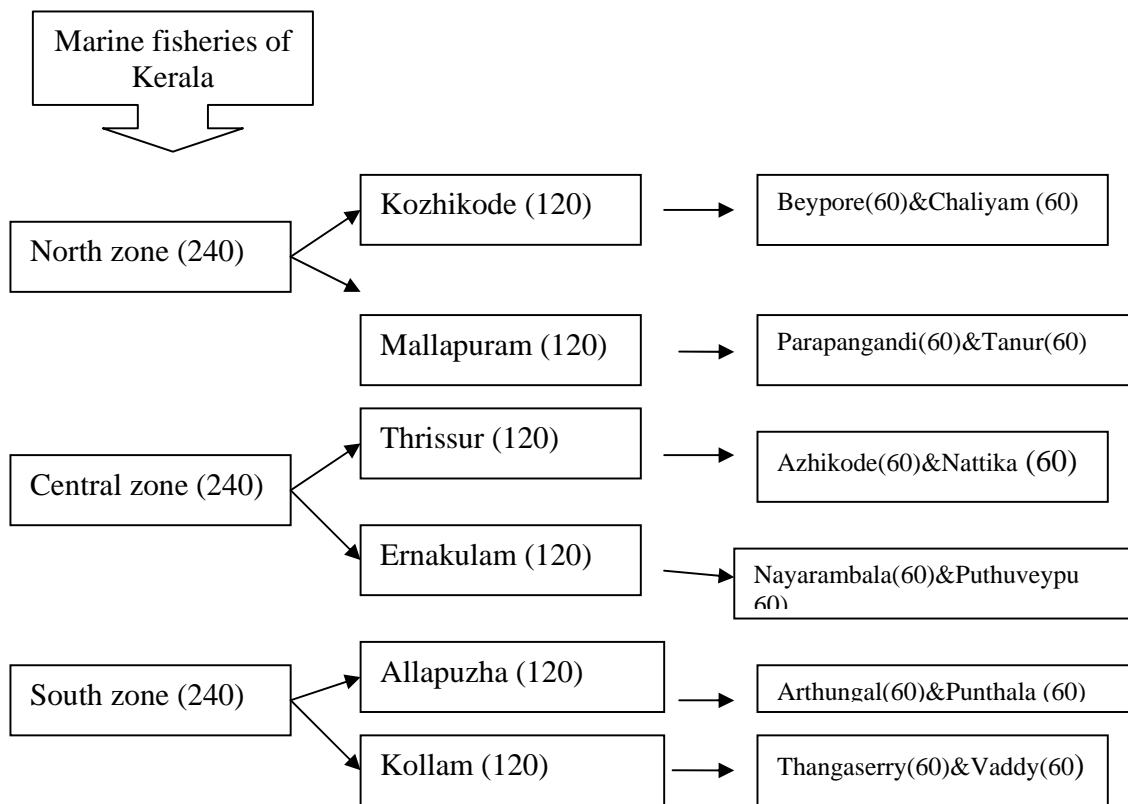
1.11 Methodology

The study was conducted using both the primary and secondary sources of data. Various secondary sources of data used include records and information collected from magazines, journals, published articles, newspapers, published thesis, unpublished data from research institutions, internet sources etc. Records were also collected from various Government Departments including Fisheries Department, MATSYAFED societies, FIRMA etc. and also from research institutions such as CMFRI, Fisheries College Panangad, University of Kerala, CDS (Centre for Development Studies, Trivandrum) and Fisheries Survey of India. Information regarding institutional arrangements and of various organisations were also collected. The primary survey of data collection includes the interviewing fishermen households and various social actors in the post harvest sector of marine fishery.

1.11.1 Sampling Frame

A sample size of 720 respondents have been surveyed for the proposed study. Multi-stage sampling method is followed in the selection of the locale. The area wise collection of primary data pertains to the coastal villages of Kerala from the three zones. Two coastal districts from North zone (Kozhikode and Malappuram), Central zone (Ernakulam and Thrissur) and South zones (Quilon and Alappuzha) are randomly selected. Two coastal villages from each district and from each village sixty respondents are surveyed, thus constituting a total of 720 respondents, which form the sample of the study. From the North zone, sixty respondents each from four villages of Beypore and Chaliyam in Kozhikode district and Tanur and Parapanangandi in Malappuram district; thus constituting 240 respondents from the North zone. Respondents from Nayarambalam and Puthuveypu in Ernakulam district and Azhikode and Nattika in Thrissur districts constituting sample size of 240 from the Central zone. Thangaserry and Vaddy in Quilon district and Artungal and Punthala fishing villages in Alappuzha districts were surveyed, thus 240 respondents were interviewed from the South zone. Framework of sampling undertaken for the survey is outlined in the figure 1.7. The selection was done on the basis of active fishermen population, co-operative involvement in the fisheries sector, number fishing crafts and gears used and the existence of formal and informal institutions in the management of Kerala fisheries sector.

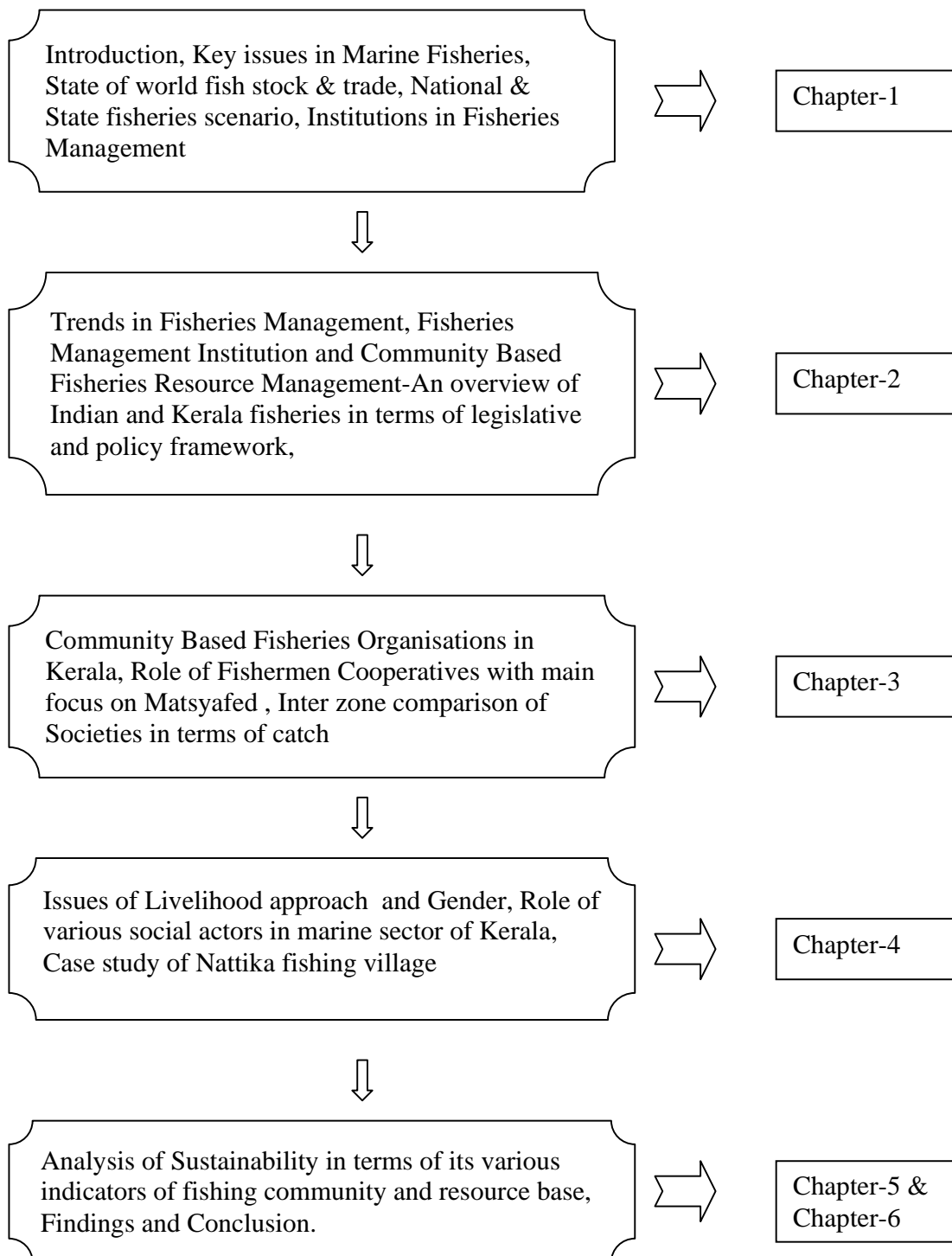
Figure 1.7 Sampling Framework



1.11.2 Tools for Analysis

Regression analysis has been used for analyzing the influence of variables of social differences on the sustainable fisheries resources management. Percentage analysis is used for depicting the socio-economic and psychological features of the social actors. ANOVA has been used to measure the inter group variations in catch within a zone and among various zones so as to explain the inter group dynamics and zonal differences in catch, resource availability and value of catch. The case study of formal and informal institutions have been conducted which will help to understand the institutional dynamics in community based fisheries management. Correspondence analysis is done to study the relation between the level of income, savings, expenditure and debt.

Figure 1.8 Organisation of the study



1.12 Scheme of the study

The organisation / scheme of the study implies the chapterisation of the study which is divided among six chapters as mentioned in detail in figure 1.8.

1.13 Limitations

The major limitation is that the nature of study restricts only to marine fisheries sector of Kerala and does not include the inland/ aquaculture fisheries, where there is further scope of conducting research. The social security contributions of the institutions involved are not considered in the study. Transaction cost involved in the institutional set up restricted due to the restricted time, lack of source etc.

1.14 Review of literature

Review of literature has been categorised into trends in fisheries management and development, sustainability of fisheries and conservation and institutions and community based management.

1.14.1 Trends in Fisheries Management and Development

John (2009) mentions choices for an Indian system of rights based fisheries management, can be limited to: Individual fishing rights and Community fishery rights. Community fishery rights (CFRs) entitle communities to their share of rights in the TAC, depending on the number of members of the community at the time of primary allocation. Soumya and Shah Parth (2005) suggest three ways to formalize fishing or sea rights. They are individual tradable fishing rights, community fishing rights and community sea rights. It is possible that no single model is applicable to whole India due to local circumstances, habitat and the livelihood of fisherfolk. Srinivasan (2005) examines the property rights of the Cochin estuarine fisheries in India, which in spite of having well-defined access and conservation rules imposed by the state, have failed to ensure proper resource management. Considering the resource characteristics and the causes for state's failure, co-management, which requires a redefinition of management functions by state as well

as users, has been proposed as an alternative. Rajasenan (2005) portrays the impact of the marine fishery development paradigm and its dynamics during the last five decades. This has been analysed in relation to technology and the resultant over-capitalisation and marginalisation of the traditional fishermen in Kerala.

Scott (2001) attempts to introduce property rights in terms of ITQs, as it can be the building-blocks for voluntary fisherman self-regulation and cooperation. In fisheries, one of the most crucial reasons for the relatively slow adoption of ITQ fisheries management system around the world is precisely the social opposition to extension of the system of private property rights. Maccay (2001) explores the reasons for resistance to ITQs in the fisheries of the world. ITQs are close to private property in the extent to which they limit access by assigning exclusive, and marketable, access rights to individuals. Symes (2000) focuses on the particular circumstances of Europe's fisheries, suggesting that the unique conditions affecting both the fisheries and their governance and unalloyed adoption of rights-based management. The study indicates the ways in which the three principal objectives of fisheries management - resource sustainability, economic efficiency and social equity - might be pursued through a system of differential management combining elements of both rights-based and community approaches.

Kurien (2000) attempts to question the approach in which current efforts mobilise the individual private property rights to fishery resources and urge for a re-discovery and re-establishment of a "community property right" in fisheries. Re-establishing property rights over coastal fishery resources in terms of community property rights is the most important need of the hour to ensure a secure future for small-scale fishing communities in the Asia-Pacific tropics. Katsuyama (1999) examines the role of ITQs (as well as TACs and IQs) as an option for fishery management measures, but they seem unable to fulfill proper management by themselves because of the shortage of measures to avoid the effects of the discard of small fish, or the proper compensatory or mitigation mechanisms needed, in cases of depleted fish stocks. An evolutionary perspective on individual human behaviour in fisheries management was sighted by Pitcher; Hart and Pauly (1998). They suggested that using evolutionary theory about behaviour can help to

design fishery management systems that have the consent of the fishers, encourage co-operation among them and between fisheries and management and reduce conflicts.

Crane and Draper (1996) recognise that resource stability in the coastal zone is affected by interactions between economic, social and ecological variables. They consider that scope reduction, co-management, community education and local participation may overcome the constraints. They also discuss the opportunities arising from an integration of structural and behavioural management solutions. Fisheries management enables communities and governments, together with their fisheries agencies to have control over a number of important factors: exploitation, conservation and sustainability of the fishery resources (Roy, 1995). An attempt is made to highlight fishermen's movement for livelihood and associated policy shifts for sustainable resource use.

1.14.2 Sustainability of fisheries and conservation

Mathew (2009) emphasizes the importance of the full implementation by India of all international fishery instruments, whether legally binding or voluntary, which promote the conservation, management and sustainable use of marine living resources. Korakandy (2008) highlights the political economy of unsustainable development of fisheries in India. The author had attempted to identify measure and discuss the impact of critical economic, social, institutional and technological factors affecting the sustainability of fisheries and the need for measuring the criteria for sustainable development. Resource conservation efforts in Kerala and the need to establish FEZ (Fisheries Economic Zone was envisaged by Hari Babu and Rajan (2006). The FEZ could be the best proposal co-ordinating the working of various among stake holders, agencies and institutional synergy for the benefit of the state and fishing community. Grafton,et al., (2006) presents a model of the economics of fisheries that describes why many fisheries are overexploited from both a biological and economic perspective. While analysing the impact of trawling by Biju Kumar, and Deepthi, (2006) focus on the need for adopting policies and practices that reduce the level of by-catch, the need for ecosystem-based management to ensure longterm sustainability of oceanic resources, and the adoption of a precautionary

approach with emphasis on reducing, and if possible avoiding discards. Thomas and Kurup (2006) studied the impact of experimental trawling operations along Cochin-Munambam area in Kerala during a period from December 2000-November 2002. The study emphasizes the need to improve the production and sustainability by imposing strong regulation on the bottom trawl fishing effort and casting the closure period of bottom trawling from present 45 days to 65 days.

Hilborn (2005) distinguishes three ways of defining a sustainable fishery in terms of long term constant yield, preserving intergenerational equity and maintaining a biological, social and economic system. Preikshot and Pauly (2005) comments that 'sustainable management of fisheries cannot be achieved without an acceptance that the long-term goals of fisheries management are the same as those of environmental conservation'.. Jennings, *et al.*, (2005) in the book 'Marine Fisheries Ecology' stresses the need for marine conservation and management, catch controls that give fishers right to the resource, used in conjunction with technical measures, are often the most effective management actions.

Owati, *et al.*,(2005) examine the relationship between productive efficiency and sustainable development of fishing industries through a case study of the mini purse seine fishery of the Java Sea, and finds that private technical efficiency does not depend on any measurable attributes of human capital, diverges substantially between the peak and off seasons, and differs between vessels more within the off season. Venkatachalam (2005) tries to examine the threat to the sustainability of the fisheries in India and in particular in the Gulf of Mannar region. One of the most commonly practiced techniques to sustain the fisheries resource is the blanket ban on fishing during specific months of the year, which is practiced in some coastal regions in India and has tried to evaluate its effectiveness.

D'Cruz (2004) attempts to assess the performance and to understand the problems and prospects of the small-scale fish workers engaged in deep-sea fishing in the south west coast of India. It indicates sustainable and more people-centred alternatives to exploitation of deep-sea fishery resources. The problem of over-fishing along the inshore waters of Kerala has been aggravated by the introduction of the ring seines units have been reported by Edwin and Hridayanathan (2004). In the context of indiscriminate

proliferation and use of ring-sein units led to changes in the species composition, length of important species and biomass landed.

Lodge (2004) stresses on the un-sustainability factors relating to international fisheries. To avoid un-sustainability, institutional arrangements need to involve interested parties in the decision-making process and develop an appropriate incentive structure. Hannesson (2004) discusses three issues of sustainability in Norwegian fisheries. First is difficulty to maintain the incomes of fishermen on par with other groups unless the number of fishermen declines, due to the limit nature imposed on the total catch of fish. Secondly, environmental variations make it difficult to sustain catches from specific stocks at an even level over long periods. Thirdly, specific and temporary subsidies in controlled fisheries may promote sustainability of incomes and reduce fleet overcapacity.

Ramakrishnan (2003) in her study of Kerala analyses the socio-economic issues and the criteria for sustainable development. As both the socio-economic sustainability is under threat, it is clear that seasonal trawl ban alone cannot protect the fisheries sector of Kerala for ensuring livelihood security to fishermen. Efforts should be taken to promote various aspect of social wellbeing such as community independence, gender equity etc so that an assured socio-economic sustainability could ensure ecological sustainability more easily, without an element of compulsion in it. Damodaran (2003) highlights the necessity of addressing the complexities of property rights for ensuring sustainable management of coastal zones. It explains how Kerala's Coastal Zone Management Plan meant for sustainable development of coastal areas, cannot achieve its stated purpose if it disregards community property rights.

A small change in the policy paradigm favouring the traditional fishery and conservation resulted in the recuperation of the fishery resource was highlighted by Rajasenana (1999). The problem of conservation measures viz., loss of income and employment in the mechanized sector is only short run. The objective of maintaining high employment and income in the long run can be realized only with regulation. Using the 'tragedy of the commons' concept, Kurien (1992) analyses the economic and ecological crises faced in

the coastal fisheries of Kerala state, India. It determines the impact of different stakeholders, including the traditional fishers and their interaction with the state.

1.14.3 Institutions and Community Based Management

Symes (2007) outlines the nature of institutional frameworks and explores the need to ensure coherence across different scales of governance. Co-management and participative governance, clarification of property rights, and development of an ecosystem-based approach are commonly regarded as important recent developments. Dey and Kanagaratnam (2007) outline the need for establishing community organisations for managing fisheries is a promising means of improving the resource condition, particularly for countries with large inland and seasonal floodplains. It is also necessary to set up legal framework for community-based management as to ensure and sustain community participation in fisheries management. Thomson (2007) provides a descriptive analysis of how traditional communities engaged in clam fishing in an island in Cochin estuary, Kerala resisted state sponsored development initiatives and demanded sustainable resource uses. The paper examines whether traditional communities possess customary rights over local resources and the responses of local communities against forced diversion of resources towards industrialisation.

Santha (2007) attempts to analyze the nature of social interfaces that emerge when local level formal organizations such as co-operatives and gram panchayats take up resource management or community welfare schemes on behalf of the traditional fisherfolk along the Pamba-Achankovil River Basin in Kerala, India. The findings show the relationship between formal institutions and traditional riverine fishing communities lack mutual trust. Berkes (2006) envisages cross-level institutions such as institutions of co-management, which provides ways to approach scale-related questions and deal with linkages in complex adaptive systems. Looking beyond self-governance, community-based resource management needs to deal with multiple levels of governance and external drivers of change. Sonak,*et al.*, (2006) in a case study of the monsoon fishing ban implementation in Goa, India provide insight into conflicts arising as a consequences

of various institutions and institutional arrangements affecting local fisheries management and their (in)effectiveness in protecting the ecosystem and marine resources.

Ramachandran and Sathiadhas (2006) present a case study about a unique institution called Kadakkody (literally means “sea court”) prevalent in Kerala, in Malabar Coast of India, focus its role as a Community Based Institution in marine fisheries management. The study examines the status and the validity endorsed by the institution. The interplay of factors that define its evolution as well as institutionalisation and the role of state, to implement policy are also discussed. Against the backdrop of a community-based fishery management institution called kadakkodi, Paul (2005) addresses the question of how institutions evolve, innovate, or disintegrate. It explains how institutional evolution is determined by factors like relative resource endowment, technology, cultural endowment, and inherited institutional structures. Cheasan (2005) in the project funded by ADB provides scope for institutional strengthening, empowering communities to benefit from community fisheries and community-based natural resource management, and evaluating technical packages in support of sustainable livelihoods. Lobe and Berkes (2004) examine the ‘padu system’ of community-based fisheries management in South India. As a common’s institution, the ‘padu’ system defines the group of right holders, resource boundaries and fishing sites which are caste specific, gear specific and species specific. The institution functions in providing equitable access, collective social responsibility, rule making and conflict resolution. Its emergence may be seen as a response of fishing communities to keep their options open i.e to be resilient. Atapattu (2004) implores the need for proper management of the coastal fisheries, as the open access system in most Sri Lankan fisheries remains a critical problem. The paper examines policies and programmes to strengthen the role Fisheries Co-operatives, by giving greater attention to marketing functions and by them fully in the fisheries management process. Sapovadia (2004) highlights strengths and weakness of present fishermen cooperatives and suggests ways to overcome it. It is the cooperative folds that can make enable fishermen to improve their skill, acquire knowledge about technology, market and management

Kurien (2003) in his working paper 'The blessings of the commons', discusses the technology and institutional arrangements through which coastal communities interacted with living resources and the political economy of the movement from small scale to large scale fishing operations and from community rights to open access. Khakhar (2001) examines the role of institutions in India's Marine Fisheries sector towards effective governance of sustainability of common pool resource, ie marine fish. It is a "communally-held" resource, which assures territorial use rights in fisheries. Possibility of co-management are also explored, wherein community based organisations can be used for resource management to suit the needs of local level fisheries. Baavinck (2001) in his study of fisheries along the Coromandel Coast of Tamil Nadu, notes that there is a notion of open access to fishing grounds, there exists as well a sense of territoriality, which allows each hamlet panchayath to impose restrictions on those fishing in its waters. In an article Korakandy (2001) views that the Government move to grant exclusive fishing right in common property fisheries of Kerala will be economically in-sound, even if politically expedient. It is likely to result in the elimination of many marginal and subsistence fishermen, who will be forced to sell their fishing rights to big business. The state should instead promote effective co-management by all stakeholders in the water resources under its control and supervision. Willmann (2001) briefly overviews some important characteristics and features of community-based rights in the use of fisheries resources as Group Rights in Fisheries (GRF). In economic terms, the advantages of GRFs lie in the potential of lower transaction costs in the management of a fishery compared to centralized management or individual property rights

Symes (2000) suggests a system of co-management in which fishermen's organisations are well represented and are given active roles in the policy implementation. Mccay (2000) emphasises on community-based management, including self-regulation by fishermen, cooperative arrangements between resource users and government agencies, and other manifestations of "community" in fisheries management. It also discusses new directions in marine fisheries management, including IQs/ITQs, the market-based alternative to top-down, command-and-control management, and various other institutional arrangements that can be seen as "community-based" alternatives. Kurien

(2000) refers to the role of the kadakodi, the “court of the sea”, an age-old community institution among the Hindu fishing communities in the northern part of Kerala State, India, which dealt with issues relating to access, conservation and conflict resolution in fisheries. He notes that this institution provides a forum for all fishermen of the village to participate, with the village elders, in discussions, and to arrive at decisions that could be imposed by social sanctions.

Wilson (1999) reports on facilitating community management of inshore fisheries of Pacific Island which has witnessed deterioration. Such deterioration is associated with a combination of natural disasters, localised population growth and changing societal conditions. He considers local problems require local solutions through local community empowerment and action. Crean (1999) focuses on the interaction between centralised and community-based fisheries management systems in the coastal fisheries of Solomon Islands and Shetlands. It shows that the evolution of management controls and access arrangements in coastal fisheries is not a uni-directional process. Indeed the process might better be modelled as an equilibrium, sensitive to the external pressures of the global trade and overall sectoral policy. Viswanathan (1999) argues that the movement towards individual rights of access and rights of harvest tends to ignore the role of the community in fisheries management. The community based co-management approach provides one way of reducing the conflicts and equity problems that may arise if private individual fishing rights are introduced into coastal small-scale fisheries. Rivera and Newbirk (1998) in a case study highlights the value of community commitment and participation in decisions regarding, and in the implementation of resource management in ways that consider not only the bio-physical aspects of resource management but the social, economic and legal implications.

A study on community-based and co-management institutions for sustainable coastal fisheries management in South East Asia was done by Pomeroy (1995). The planning and implementation of (Community-Based and Co-management) systems will require the development of new legal, administrative and institutional arrangements at both national and community levels to complement contemporary political, economic, social and

cultural structures. An article by Kallie,*et al.*,(1995) on community-based fisheries management in Samoa promotes the re-instatement of customary marine tenure and tradition-based controls on fishing. A cultural respectful process, which deliberately involves all community groups in outlining problems and proposing solutions are initiated. The responsible management of marine resources will be achieved only when fishing communities themselves accept it as their responsibility. Institutional analysis has become a useful tool in the field of community based natural resource management for understanding how local communities manage resources, and how improvements in management can be initiated. Institutions are generally defined as “complexes of norms and behaviours that persists over time by serving collectively valued purposes” (Uphoff, 1986). The role of co-operative societies in the socio-economic development of fishermen community has been highlighted by Bal and Rao, (1984).

1.14.4 Fishermen community and livelihood issues

Divakarannair (2007) suggests resource management policies to improve the households' livelihood options and well-being in terms of access to social, political, physical, human and financial assets. Walmsley and Ninnes (2006) considers the linkages between fisheries management, livelihoods and poverty reduction and the way these have been incorporated in the poverty reduction strategy (PRS) approach being implemented in the Western Indian Ocean region. Ramachandran (2006) has made an attempt to examine the income disparity and extend of poverty among the small scale fishing communities in the context of resource depletion by examining the case of the coastal fishery of Kerala. An insight into the link between the identified risk factors and poverty will be useful in the formulations of intervention policies to reduce poverty and promote economic opportunities for the poor. The future of marine capture fisheries and their key parameters including potential harvest, stocks, supply and demand, trade, fishing technology and governance are reviewed in detail by Gracia and Grainger (2005). Dhanuraj (2004) works on the livelihood issues confronted by the fisheries community of Kerala. Encouragement should be given for small scale, selective sustainable harvesting technologies with strong back ward and forward linkages that enhance and maintain

employment opportunities within fishing communities and also increased people's participation and de-centralisation of investments and planning will give added impetus.

Bhatta (2003) observes symptoms of over harvesting such as stagnation of total production, decline in the catch per unit of fishing effort. This has negative socio-economic implications in terms of lack of fish availability to local community and nutritional insecurity. The emergence of social organizations and increasing politicization of marine fisherfolk in Kerala (India) and the role played by Roman Catholic priests in these processes by Halfdanardottir (1993). Under certain social circumstances, cultural/religious factors may play a decisive role in political mobilization. This article tries to shed some light on the interplay between socio-economic processes, technical modernization, and cultural/ religious factors in the organization and politicization of Kerala's fisherfolk. An attempt was made by Kurien (1991) to highlight economic and ecological crisis resulting from the ruin of a commons – the coastal marine fishing grounds of Kerala state, the south-western maritime province of India – and the responses of the commoners – the traditional, artisanal fisherfolk –resulting from a combination of economic, technological and social factors.

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1.14.5 Gender role in fisheries

Sathiadhas *et al.*, (2005) deal with the role of women in all spheres of fisheries development, their involvement in post harvest enterprises and the empowerment options through SHGs. The role of women in fishery operations along the coastal Kerala, socio-economic status of fisherwomen involved in fisheries, their occupational health hazards and suggestions for empowerment of womenfolk involved in fisheries has been highlighted by Hassan and Sathiadhas (2005).

The role of women in handling and management of coastal resources, their understanding of the reasons for environmental degradation and laws and regulations pertaining to use of coastal resources gender issues involved in sustainable development was conducted in Kerala and Tamil Nadu (Krishna, 2002). Enhancement methods include fisheries

management, habitat conservation, juvenile protection, strengthening of fisheries institutions and prevention of poaching. Community management roles of fisherwomen in Kerala was analyzed by Prameela (2002) found low wages, seasonal and temporary nature of the job, corruption in the industry, commercialisation etc were the factors which compel them to migrate. The women in the fishing communities must be equipped to cope with the new demands and their awareness, resources and opportunities for effectively participating in and decision making development process. Empowerment of women in fisheries development and initiatives for credit availability to them has been highlighted by Upare (2002). Effective fisheries management through community and development based participation of women in improving standard of living, and nutrition, to be self-reliant has been highlighted by Upare and Dalvi (2002). A case study on food and nutritional security of women among the traditional fishing households was conducted by Jaleela (2002) in Kerala. The women in the traditional fishing households do not get the security they deserve in terms of food and nutrition due to poverty, men folk's addiction to alcohol, poor quality of life, substandard living conditions and the liabilities of the fishing community.

A study was conducted to review the role played by women in marine fisheries sector of India by CMFRI (2001). Major issues confronting the women in capture fisheries such as social, economic, institutional etc. are discussed and their perception towards social, economic and institutional issues are discussed. Women empowerment and thereby the community development through combined efforts of men and womenfolk are the holistic approach required to overcome the constrained in the sector. A review of the role being played by women in marine fisheries sector of Kerala has been given by Ashaletha, *et al.*,(2001). The study envisages the the direct and indirect role of women in marine sector as well as their perception on various issues such as social, economic, institutional, technological etc. Gracy (1998) envisages the role of women in fisheries and the impact of technological advancement on socio economic conditions of women. It suggests proper policy implications to accord the role of women in fisheries. Nair (1998) aims at identifying the multi-faceted role of women in fisheries and the emancipation of women through co-operatives by focusing on the programmes of Matsyafed.

Institutional approaches in natural resource management in general and in fisheries in particular seldom address cultural aspects as well as social institutional set up. Fisheries management would benefit by broadening the institutional perspective to increase the efficiency of management. In fisheries, three known institutional pillars referred as cognitive (including research), normative (including fisheries legislation) and regulatory (including the fisheries management institution) plays significant role. The main focus or emphasis is placed on the regulatory pillar which embraces the fisheries management institutions as well as the processes and organizations that develop and implement management measures. Both sustainable development and responsible fisheries, imply that fisheries management institutions should perform their tasks taking into account conservation, ecological as well as economic aspect of fishery system.

Chapter-2

Management of Fisheries and Institutional Dynamics- An Overview

2.1 Fisheries Management Institutions

The term “institutional framework” therefore denotes the range of institutions that together form the decision-making environment, so helping to shape broad policies and specific instruments for governing fisheries. It will include particular organizations and the systems of beliefs, law, science, and social organization that legitimize, inform, and uphold it, as well as the outputs in the form of rights, responsibilities, and regulations (Symes, 2007). In a broader sense, the institutions may comprise the various sets of relations between individuals or groups of interested parties and the State or States which define their respective rights and responsibilities. These may include rules, mechanisms and the organisational support structures that develop and implement the rules affecting the use of fishery resources (FAO, 1997).

The governance of fisheries - the sum of the legal, social, economic and political arrangements used to manage fisheries, has international, national and local dimensions. It includes legally binding rules, such as national legislation or international treaties, and it relies on customary social arrangements as well as on the respective national framework provided for all economic activities. Since the 1950s, fisheries management has benefited from considerable development of institutions - the sets of rules used for the management of fisheries - and the processes and the organizations that develop and implement these rules. There has been a massive urge from policy makers as well as other stakeholders especially fishing communities for developing a sustainable resource management system in the marine ecosystem of the world.

Fortunately, there appears to be a growing international consensus supporting conservation of fisheries resources. At an international level, the sets of rules are treaties, both multilateral and bilateral, and other non-binding instruments which are being used by states. The FAO World Conference on Fisheries Management and Development was held in Rome from 27 June to 6 July 1984. The Strategy endorsed by the 1984 World

Fisheries Conference placed primary emphasis upon the need for better use and management of the world's fishery resources. It drew attention to the fact that the successful exercise of national authority to extract greater benefit from fish resources depends in large measure upon the ability of coastal States to manage their resources more effectively. It underlined that rational management is the essential basis for sound, sustainable development of fisheries.

The Declaration of Cancun (May 1992) made at the International Conference on Responsible Fishing, helped to set the stage for the UN Conference on Environment and Development (UNCED) and for further enunciation of the concept of the sustainable development of fisheries and other marine resources. The fisheries policy framework has significantly improved with the entry into force of the UNCLOS 1982, the 1993 FAO Compliance Agreement, the 1995 UN Fish Stocks Agreement and the 1995 FAO Code of Conduct. Additionally, a number of new fisheries commissions have been established, thereby putting practically all the world resources, including in the high seas, under some sort of management framework. Members to FAO are showing a greater awareness of fisheries issues and a commitment to act to resolve them both with International Plans of Action (IPOAs) on capacity, sharks, by-catch of birds, illegal fishing that have been endorsed by the FAO Committee on Fisheries and with requests for radical improvements to national fisheries policies and legislation.

Central to these international instruments in fisheries governance is the 1982 United Nations Convention on the Law of the Sea (UNCLOS), a comprehensive treaty covering all aspects of ocean governance, including fishing gave coastal states around the world to come under the jurisdiction of new EEZ. The need for a strengthened emphasis on the management of world fisheries led to major FAO inputs in the 1992 International Conference on Responsible Fishing in Cancun, Mexico, and the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Another important achievement during this period was FAO approval in 1995, for the Code of Conduct for Responsible Fisheries, which sets principles for countries in the world on how they could develop appropriate fisheries management policies based on sustainable

harvesting of fisheries resources. The precautionary approach prescribed here is also implemented in concrete management rules as minimum spawning biomass, maximum fishing mortality rates, etc. In 1993 FAO compliance Agreement to promote compliance with International Conservation and Management measures by Fishing Vessels on the High seas enable the States to flag State vessels that are authorized to fish on the high seas and thus they operate in accordance with international conservation and management measures as well and exchange information on high seas fishing and their activities. The 1995 Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA) was one of the concrete results to UNCED. It elaborates the fundamental principle that States should cooperate to ensure conservation and promote the objective of the optimum utilization of straddling and highly migratory fish stocks both within and beyond the EEZ (FAO, 1999).

There are four International Plan Of Action's (IPOA) which are voluntary instruments within the framework of the CCRF. Three IPOAs were adopted by Committee On Fisheries at its 23 Session in February 1999 and include the IPOA on Seabirds which concerns the reduction of incidental catch of seabirds in longline fisheries, the IPOA on Shark which concerns conservation and management of sharks, and IPOA on capacity which concern the management of fishing capacity the subject of management of fishing capacity. The fourth IPOA, addressing IUU fishing was adopted at Committee On Fisheries the 24 Session 2001 (Mathew, 2009).

In addition, there are a large number of bilateral agreements and regional multilateral agreements which form part of the international set of rules governing fisheries. In December 1995, 95 states met in Kyoto, Japan, to hold the International Conference on the Sustainable Contribution of Fisheries to Food Security. The principles of the Kyoto Declaration, if fully implemented, would bring the world's fisheries much closer to their full potential. Johannesburg Summit 2002 – the WSSD target's to maintain or restore depleted fish stocks to levels that can produce the maximum sustainable yield on an urgent basis and where possible by 2015; and to achieve by 2010 a significant reduction in the current rate of loss of biological diversity. A brief picture of International framework on fisheries is presented in table 2.1.

Table 2.1 International Framework on fisheries

<ul style="list-style-type: none">• Legal framework 1982 UNCLOS 1995 UN Convention Agreement on Straddling Fish Stocks and High Migratory Fish Stocks• Institutional Framework 1993 FAO compliance Agreement to promote compliance with International Conservation and Management measures by Fishing Vessels on the High seas 1995, for the Code of Conduct for Responsible Fisheries• Political framework Agenda 21 of 1992 UNCED Johannesburg Summit 2002- World Summit on Sustainable Development (WSSD)• Regional framework RFMO/ As Indian Ocean Tuna Commission (IOTC) Asia Pacific Fishery Commission (APFC) Commission for the Conservation of Antarctica Marine Living Resources (CCAMLR) INFOFISH
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Source: Mathew, 2009

Institutional development during the last few decades has included the establishment of fishermen cooperatives, professional associations (including non-governmental organizations), international regional fishery bodies, intra-national regional fishery councils and the International Tribunal of the Law of the Sea (ITLOS). For the national governance of fisheries, these sets of rules may take a number of forms, such as national legislation, local regulations or long-standing customary arrangements.

2.2 Trends in Fisheries Resource Management

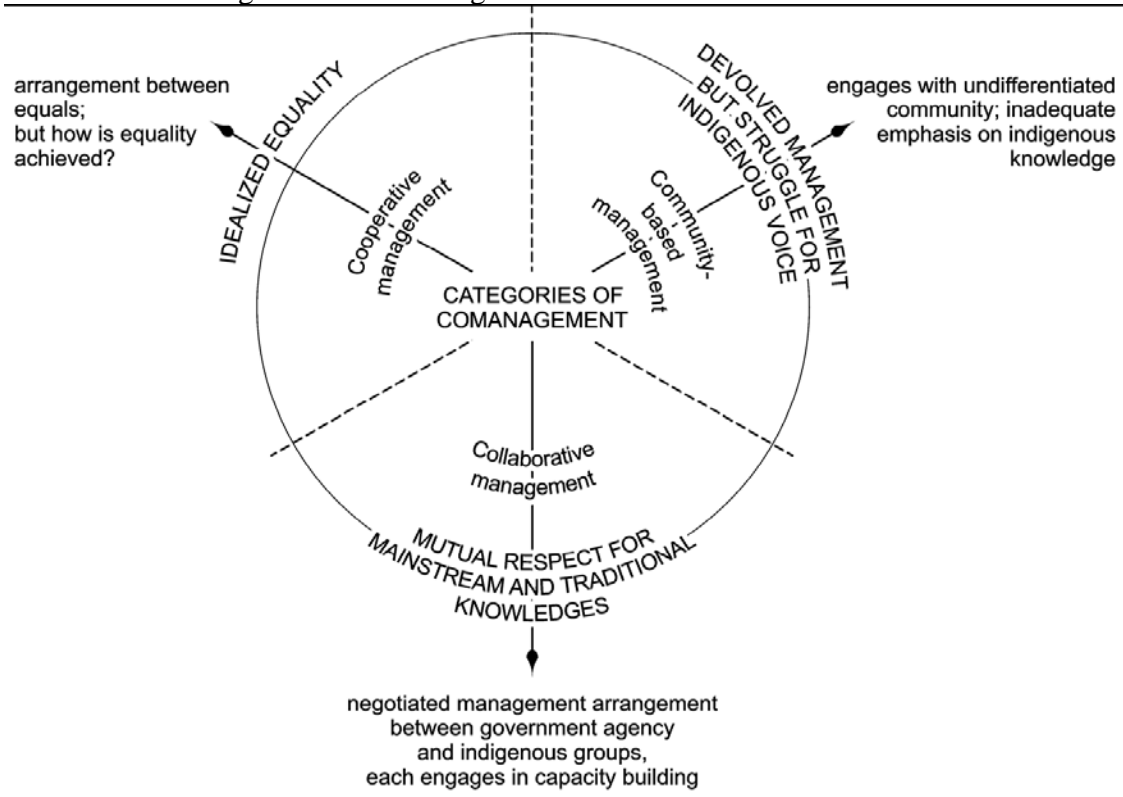
Fisheries management experts recognise that the underlying cause of over- exploitation in the marine fisheries are often of social, economic, institutional and political in origin. The prime concern of fisheries management, therefore, should address the relationship of

fisheries resource to human welfare and the conservation of the resources for use by future generations. It is thus, has become increasingly evident that fisheries management cannot be effective unless the people who harvest the resources (communities and fishers) are effectively involved in the management process. A sound fisheries management requires: 1) a clear definition of policy goals for the fishery such as long term biological sustainability and maximization of sustainable economic returns; 2) a set of institutions for achieving these goals. Without these policies and institutions, there is likely to be resource conflict and over exploitation, both biologically and economically (Peterson, 2006).

Arnason (2001) argues that, a management system that is based on property rights is a promising one in developing countries since this reduces or eliminates the incentives for over - exploitation in the open access fishery. Recently it has been recognized that a community based management system, which is based on property rights approach is a viable option for sustainable resource use and improving the lot of fishermen (Wilson, 2001; Pomeroy and Berks 1997).

Cooperative management as shown in figure 2.1, idealize the formulations predicated on interaction between equal partners in decision making, each of whom retains distinct identity and independence throughout the process of cooperation. Community-based management engages with both the concept of shared management and the parallel movement toward community-based decision making. It significantly people centered; is often considered alongside concepts such as self-determination, self-government, autonomy, and sovereignty; and has considerable initial appeal for indigenous groups. Collaborative management draws heavily on the wider principles of collaboration. Participation in the process of decision-making and an emphasis on power sharing are closely aligned with the process of collaboration (Tipa and Welch, 2006).

Figure 2.1 Indigenous Perspectives on Cooperative, Community-Based, and Collaborative Categories of Co-management



Source: Tipa and Welch, 2006

2.2.1 Right-Based Fisheries Management

The concern of marine resource management is how to maintain species of fish at an ecologically sustainable level while at the same time, assuring the livelihood of those who depend on marine resources. There is no specified set of users or rules governing the management of natural resource and an attempt could be made to solve the problem is through the allocation of rights among stakeholders, and thereby invoking their accountability. The choices for an Indian system of rights based fisheries management, can be limited to: 1) Individual (tradable) fishing rights (IFRs) where each traditional fisher family is individually given the percentage share of MSY calculated the first time around as a right, the actual amount of fish varying depending on the MSY calculated every year. 2) Community fishery rights (CFRs) entitle communities to their share of rights in the TAC, depending on the number of members of the community at the time of primary allocation.

The adoption of an ecosystem-based approach to fisheries management may also provide the opportunity for creating closer links between fisheries science and local ecological knowledge generated through the practical experience of fishers (Symes, 2007). An ecosystem approach could help manage fisheries by the (i) Conservation of fisheries resources, protection of fish habitats, and allocation to fishers are the three most important considerations in fisheries management. (ii) The approach can facilitate a better understanding of the tropho-dynamics in an ecosystem, and also the impact of fishing gear selectivity on marine living resources (Mathew, 2001).

2.2.2 Community Based Management in Fishery

Market failure, high excludability being a public good and unsuccessful conventional centralized management, were the immediate cause of the emergence of Community Based Resource Management in fishery resource of the world. The idea that the resource users and resource based communities should have primary responsibility for managing their resources is what makes Community – Based Fisheries Management different from other source of management approaches which has very less involvement of resource dependent people and communities. The inherent idea that resource users should give the primary responsibility of managing the resource base is that, they will have the willingness to do so, since any mismanagement will adversely affect their livelihood. Again they have the capacity to better manage the resources since they know the resource better. They know the systems productivity, need for conservation, extent of resilience, adaptability to shocks and stress etc. Thus community based fisheries management does not aim solely on harvesting the benefits rather they must strive to achieve ecosystem's health and promote conservation and sustainable use of the resources.

Community-based management systems have the potential of solving the commons dilemma by internalizing the high information and transaction costs. The community has a built-in incentive of social capital that can be used to overcome the problem caused by asymmetrical information and lower opportunity costs of their time than that of state machinery. The community also has at its disposal the requisite social coercive

mechanisms to force compliance with expected harvest (Grima and Berkes, 1989). Two basic aspects are prone in the case of Community Based Fisheries Management (CBFM) is the empowerment aspect and the capacity building aspect. In the former case it empowers the coastal communities and resources users to gain greater economic, social and political power. The latter case, it equip them to develop certain skills and brings new innovations in the management of fishery resources.

2.2.3 Basic principles of CBFM

In 1998, a grass roots project known as ‘Writing the rules’, developed two fundamental fisheries management principles. They are 1) Stakeholders must hold the authority in Management and 2) Management decisions should be made at the most local level possible. The Stonington Fisheries Alliance in Stonington, Marine later added two additional principles. 1) Authority comes with participation and 2) Rules must protect both resource and community. The general principles of community – based fisheries management adapted from IIRR (1998) are Empowerment, equity, Ecosystem Based Management, Respect for local Knowledge and inclusiveness. It is believed that these principles in operation will reduce poverty and sustainable resource use.

2.3 Institutions in Community Based Resource Management

2.3.1 Institutions: Theoretical and Operational definitions

Institutions are rules of the game: the humanly devised constraints that structure human interaction. These are structures and mechanisms of social order and cooperation governing the behavior of a set of individuals. Institutions are identified with a social purpose and permanence, transcending individual human lives and intentions, and with the making and enforcing of rules governing cooperative human behavior. The term, institution, is commonly applied to customs and behavior patterns important to a society, as well as to particular formal organizations of government and public service. Actors, the players of the game, may be individuals or organisations. According to North (1995), organisations ‘consist of groups of individuals bound together by some common objectives’, and he identifies economic, political as well as social organisations.

2.3.2 Formal and Informal Institutions

Formal institutions are made up of formal constraints (such as rules, laws, constitutions), and informal institutions are informal constraints (such as norms of behavior, conventions, self-imposed codes of conduct), and their enforcement characteristics (Coase, 1988). Thus, there are formal rules, such as constitutions, laws and regulations, and informal ones – behavioral norms, codes of conduct and routines. The institutional dimensions presented in table 2.2 will essentially increase ones understanding on institutions.

Table 2.2 Institutional dimensions

Institution type	Meaning/Description	Examples
Associative	Institutions as mechanisms facilitating prescribed or privileged interaction among different private and public interest.	Business networks, kinship groups, social classes, associations, interest groups.
Behavioral	Institutions as standardized (recognizable) social habits – manifested in activities of individuals and groups as reflections of social norms.	Habits, routines, artifacts, ways of doing things, shared beliefs, theories in use, "how the game is played."
Cognitive	Institutions as mental models and constructs of definitions – manifested primarily in what society expects of individuals.	Cultural and social values, superstitions, "wisdom", "how the game ought to be played."
Regulative	Institutions as prescriptions and proscriptions.	Written and unwritten "rules of the game"; state as rule maker, referee, and enforcer.
Constitutive	Institutions setting the bounds of social relations	Collective actions initiated by the state agencies, firms, unions, or citizens groups; language; property rights structures; agreements; arrangements; marriage; family

Source: Parto, 2005

2.3.3 Formal and Informal rules

An enabling policy and legal framework ensures that, where there is political will, governments can facilitate and support management. Typically, the state is entrusted with the management of the fishery resource, but it can assign responsibility to local communities/individuals to manage at the local level, or recognize their competence in this respect. Local ownership improves compliance with locally agreed rules and greatly improves the alignment of these rules with national legislation. It is essential that governments (either locally or nationally) demonstrate a willingness to change policy, involve communities and help define the roles and responsibilities of the different players. Communities involved in management must be empowered to ensure effective participation and sustained involvement. The strengthening of organizations and institutions so that they fully recognize their role in the management process is a prerequisite for success of community based management.

Numerous examples of coastal communities around the world have evolved, often-unwritten rules to regulate their fisheries. The Cocamilla people in the Peruvian Amazon, observing that their lake was being over-fished by commercials from other regions, ruled that only subsistence fishermen be allowed to fish there. In Newfoundland and Japan, some communities hold annual lotteries for the best fishing areas. Among the Cree people of St. James Bay, Canada, and in Donegal, Ireland, fishermen competing for particularly good spots agree to fish in turns. The Boston-based Conservation Law Foundation is currently working with fishermen in developing economic structures for them to take on greater responsibility as ecosystem managers (Simon, 1995).

The call for developing countries to make the best use of the EEZ regime introduced in the 1970s played an important role towards fisheries management. Many fisheries administrators were saddled with the problem of over-capitalisation, resource rehabilitation and resource conservation for sustainable use. To meet the demand, a host of integrated fisheries management regimes were instituted to further reduce the excessive fishing effort. The major policies targeted to reduce effort reduction include limited licensing programme, gear restriction, area closure and to restraints on mesh size.

One of the most effective tools used during the period was the zone regulation, which specified the fishing areas. Fisheries legislations and systems prevalent in Asian countries were highlighted in table 2.3.

Table 2.3 Fisheries legislations and systems in Asian countries

Country	Type of system	Current legislation
Bangladesh	Centralized	Marine Fisheries Ordinance of 1983.
India	Mixed	Fisheries Act of 1981 and ensuing individual State Fisheries Acts.
Indonesia	Devolved	Fisheries Law No: 9/85 and Conservation Law No: 5/90 as well as Autonomy Laws 22/99 and 25/99 for devolution.
Malaysia	Centralized	Fisheries Act of 1985 (amended in 1983) and EEZ Act of 1984.
Myanmar	Centralized	Myanmar Marine Fisheries Law of 1990.
Sri Lanka	Centralized	Fisheries and Aquatic Resources Act of 1996 and Fisheries (Regulation for Foreign Fishing Boats Act) of 1979.
Thailand	Centralized	Fisheries Act B.E. 2490 of 1947

Source: FAO, 2006

Restricted fishing zones were also introduced in countries such as Thailand, and Myanmar. In Thailand, its 12 mile territorial water remained closed to trawlers. The centralized management approach focused on open access, production and only large mobile fisheries was being countered by the need for the government to take responsibility for its fishing fleet outside its waters and to regulate its fleet inside in order to prevent increased conflict and pressure on coastal resources. The new Fisheries Law under the consideration of the Parliament intended to move towards sustainable fisheries and encourage greater stakeholder participation.

India's coast had a split management strategy because of the devolved coastal management authority to the states. This strategy resulted in a high variance of management systems in zoning and the adoption of regulatory measures (eg: differing

coastal definitions, licensing regime and closed seasons). Minor gear restrictions and spatial restrictions were in place but enforcement appeared to be ad hoc. In areas of national jurisdiction, the focus was on eliminating illegal foreign fishing with little compliance of local vessels. India have a significant track record in the use of NGOs as a management tool ensuring participatory consultation at the state level with fishers who were well represented by associations and community groups.

2.4 Institutional Dynamics in Indian Fisheries Resource Management.

In most of the countries, however, the production trends in respect of the commercially important fishery resources have been showing gradual decline. The situation is no different in India. The phenomenal increase in production was achieved through adoption of modern methods for exploitation and extension of fishing from the traditional near shore waters to deeper regions. This has also brought in its wake regional and sectoral imbalances in the exploitation of the common resources. India distinguishes between two types of marine capture fisheries (coastal and deep-sea fisheries), each one ruled by its particular legal regime. Coastal fisheries fall under state jurisdiction and take place within the first 12 nautical miles from the base line to the sea. Deep-sea fisheries are those operations taking place between 12 nautical miles and the outer boundary of the EEZ, falling under the jurisdiction of the union government. Fisheries management in India can be categorized into management of fisheries in the EEZ and in the territorial waters. According to the Constitution of India, the Central (Federal) government has jurisdiction over the fisheries in the EEZ, while the State (Provincial) governments have jurisdiction over fisheries in the territorial waters (ICSF, 2009).

It follows that control and regulation of fishing and fisheries within territorial waters is the exclusive province of the State, whereas beyond the territorial waters, it is the exclusive domain of the Union. The Ministry of Agriculture as per its allocated business, helps the coastal States and Union Territories in development of the fisheries within the territorial waters, besides attending to the requirements of the sector in the EEZ. Therefore, management of fishery resource in the country, including exploitation in the EEZ requires a retrospection in terms of the present policy and legal framework

supporting fisheries sector and also a close coordination between the Centre and the States.

2.4.1 State Level Fisheries Management

- Fisheries management is undertaken mainly through licensing, prohibitions on certain fishing gear, regulations on mesh size and establishment of closed seasons and areas, under the Marine Fishing Regulation Act (MFRA).
- Zones are demarcated by each State based on distance from the shoreline (from 5 km to 10 km) or on depth. These inshore zones, where trawling and other forms of mechanized fishing is not permitted, are perhaps the most important space-based fisheries management measure in place.
- The closed season or ‘monsoon fishing ban’ is another important ‘temporo-spatial’ management measure implemented on both the east and west coasts of India for a period of 47 days and 65 days respectively, during, what is considered to be the spawning and breeding season.

2.4.2 Global Fisheries Mandate and Initiatives-India’s Role

The 1990s have witnessed important international agreements and accords relating to the intentions of the international community to achieve sustainable fisheries and to which India has been a party. These agreements represent milestones in international efforts over many years and include Chapter 17 of Agenda 21 of the UN Programme of action which includes programme areas relating to coastal areas and the oceans; the 1992 International Conference on Responsible Fishing (held in Cancun, Mexico) and the 1993 Agreement to promote compliance with International Conservation and Management Measures by fishing vessels on the high seas. All these contemporary global initiatives to which India has been a signatory, call for concurrence and compliance and a greater interaction with the countries in the sub-region, region and at the international level.

The participation of India in the global and regional level can be summarised under the legal and legislative framework, and the policy framework including appointment of committees by the government. India signed the UN Convention on the Law of the Sea

(UNCLOS) in 1995 and ratified the convention in 1996. It has also ratified the UN Fish Stock Agreement in 2003, but has yet to ratify the UN Compliance Agreement. India also takes an active interest in and participates in the global fisheries initiatives at a policy level, including taking up of challenges represented by a host of International Programme Of Action (IPOAs) that have been launched by FAO under CCRF in 1999. A coordinated project for the Conservation and Management of Coastal and Marine Biodiversity was launched in 1999-2000. However with the advances in policy development, Code of Conduct for Responsible Fisheries have not been incorporated into national or state fisheries legislation (FAO, 2006).

2.4.3 Participation in Regional Fishery Bodies

India is party to a number of regional bodies, programmes, and projects dealing with fisheries management and the protection of coastal habitats, communities and resources (FAO, 2006). These include:

- Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Co-operation (BIMSTEC)
- Bay of Bengal Large Marine Ecosystem (BOBLME)
- Bay of Bengal- Inter-Governmental Organisation (BOBP-IGO)
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Indian Ocean Rim Association for Regional Cooperation (IOR-ARC)
- The South Asian Association for Regional Cooperation (SAARC)

2.4.4 Indian Fisheries Legislation

The need for fisheries legislation was emphasized as long back as in 1873 when the attention of the Government of India was drawn towards widespread slaughter of fish, fry and fingerlings. The Government of India enacted the Indian Fisheries Act in 1897 to regulate riverine fisheries and fisheries in inshore waters, to prohibit the use of poisons and dynamite in fishing, and to protect fish resources in selected waters, restricting the creation and use of fixed engines for catching fish, the construction of weirs, to put a

limit on mesh size, size of fish and catch and the declaration of closed season and sanctuaries. The Indian fisheries legislation, in general, seems to target the fishing vessel rather than the fishery per se. For sustainable development of the marine resources, India amended its Constitution in 1976. The Indian Parliament enacted the Territorial Sea, Continental Shelf, Exclusive Economic Zone (EEZ) and other Maritime Zones Acts in 1976, pursuant to which a 200 nautical mile EEZ was established with effect from 15 January, 1997 (Sathiadhas, 2005).

In the marine sector, the enactments include Merchant Shipping Act 1958, Marine Products Export Development Authority Act 1972, Indian Coast Guard Act, 1978, the Marine Fishing Regulation Act of the Maritime States 1980 as well as the Maritime Zone of India (Regulation of Fishing by Foreign Vessels) Act 1981, the Environment Protection Act, 1986; the Coastal Aquaculture Authority Act, 2005, etc The main emphasis of MFRA of maritime states of India is on regulating fishing vessels in the 12-nautical mile territorial sea, mainly to protect the interests of fishermen on board traditional fishing vessels. Kerala and Goa were the first to enact the Marine Fisheries Act in 1980, followed by Maharashtra 1981, Orissa 1982, Tamil Nadu 1983, Karnataka 1986, West Bengal 1993 and Andhra Pradesh 1994. Gujarat as well as Andaman and Nicobar islands enacted the Act in 2003 while Lakshadweep in 2004. The Government of Pondicherry has issued executive orders. Conservation and management of fisheries resources should go in hand with the protection of fish habitat. The Water (Prevention and Control of Pollution) Act, 1974 has provisions to protect the coastal sea from land-based sources of pollution but subject to the discretion of the State Government. This Act, in conjunction with the Coastal Regulation Zone Notification of 1991 under the Environment (Protection) Act, 1986, could contribute to regulating land-based sources of pollution in the coastal waters up to a maximum distance as decided by the State Government (Silas, 1996; Malhotra and Sinha, 2007). An overview of legislative framework in India is given in figure 2.2.

Figure 2.2 Marine Fisheries: Legislative Framework

<i>LAND</i>	<i>TERRITORIAL</i>	<i>OCEAN</i>
COASTAL ZONE	WATERS	EXCLUSIVE ECONOMIC ZONE
Coastal Regulation Zone Notification, 1991	State-level Marine Fishing Regulation Acts	The Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981
		Guidelines for fishing operations in Indian Exclusive Economic Zone, 2002
	<ul style="list-style-type: none"> • Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976 • The Coast Guard Act, 1978 • Merchant Shipping Act, 1958 • Offshore Areas Mineral (Development and Regulation) Act, 2002 • Indian Ports Act of 1908 • Major Port Trusts Act of 1963 	
	<ul style="list-style-type: none"> • Environment (Protection) Act, 1986 	
	<ul style="list-style-type: none"> • The Indian Wildlife (Protection) Act 1972 and Amendment Act, 2002 	
	<ul style="list-style-type: none"> • The Water (Prevention and Control of Pollution) Act, 1974 • Biological Diversity Act, 2002 	
		<ul style="list-style-type: none"> • Indian Forest Act, 1927 and its Amendment Act, 1984 • Forest (Conservation) Act, 1980 • The National Environment Appellate Authority Act, 1997 • Mines and Minerals (Development and Regulation) Act, 1957

Source: www. ICSF. net

The Central government has brought Biological Diversity Act, 2002 with the purpose to regulate access to biological resources of the country, to conserve and sustainably use biological diversity and in securing equitable share in benefits arising out of biological resource etc. The Coastal Aquaculture Authority Act, 2005 encompasses the farming of shrimp, prawn, fish or any other aquatic life under controlled conditions in ponds, pens, enclosures or any other brackish water bodies, but excludes fresh water aquaculture. The Act is expected to give an impetus to sustainable development of aquaculture and to an environment conducive for species diversification. Besides, Government of India is also planning to introduce Model Bill for Inland Fisheries and Aquaculture Sector. Code of Conduct for Responsible Fisheries is also being introduced at the state level so as to carry out management aspects in the fisheries in a responsible manner (Ayyappan and Diwan, 2006).

2.4.5 Appointment of Expert Committees and Policies

2.4.5.1 Majumdar Committee (1976)

The committee was appointed to study the situation regarding conflicts between traditional and modern workers. It proposed the Marine Fishing Regulation Bill, and suggested a seasonal ban on trawlers. The committee suggested the bill should be passed by the Parliament. The Government shifted the responsibility to the state and for state it became a problem because whenever there was a ban it was challenged on the grounds that they were fishing beyond 22 kilometers

2.4.5.2 New Deep Sea Fishing Policy (1991)

In March 1991, the Indian government announced NDSP as part of the economic reforms programme. The policy involved three schemes - leasing out of foreign fishing vessels to operate in the Indian EEZ, engaging foreign fishing vessels for test fishing and forming joint ventures between foreign companies and Indian companies on 49:51 equity basis in deep sea fishing, processing and marketing. Government of India started giving licenses to joint venture, lease and test fishing vessels. This was opposed by millions of fishers all over the coastal states.

2.4.5.3 Murari Committee (1995)

The committee studied the proposal of the NDSP and the opposition that was made to it. The parliament members from all the political parties were members of the Committee. It came up with 21 recommendations, some of them being:- No renewal, extension or new licenses be issued in future to joint venture/ charter/ lease/ test fishing vessels; The present licenses be cancelled as per going through the legal procedures; Up grade the skill of the fishing community to equip them with exploiting the deep sea resources; Stop pollutions; Supply of fuel at subsidised rate; Fishing regulations in the entire EEZ; A separate ministry to deal with the entire fisheries and Monsoon trawl ban. The area already being exploited or which may be exploited in the medium term by fishermen operating traditional craft or mechanized vessels below 20m size should not be permitted for exploitation by any vessels above 20m length except currently operated Indian vessels which may operate in the current areas for only three years.

The Deep Sea Fishing Policy of the government of India was opposed by various organizations of the fishers as well as mechanized fishing vessel owners in the country because their operational area was being encroached upon by the larger chartered vessels and the vessels operating through joint ventures, lease etc; there was over-exploitation of resources by these large mechanized vessels and under-reporting of catch. These also caused damages to the craft and gear of traditional fishers. The government appointed the Murari Committee to review the deep-sea fishing policy, made 21 recommendations, which were approved by the cabinet in 1997. These included placing limits on the operation of shrimp trawlers, deep-sea fishing regulations for the conservation and management of marine resources, assistance for the traditional and small mechanized sector by providing fuel subsidies, and no renewal or issue of fresh licenses to charters or JVs. However, few of these recommendations have been implemented. In 1999, an expert group led by K. Gopakumar, then Deputy Director of Fisheries, Indian Council of Agricultural Research, was constituted to elaborate a comprehensive marine fisheries policy. The report was submitted to government in late 2001 (FAO, 2006).

The Sudershan committee had also called for regulation of deep-sea and coastal fishing, mandatory catch-reporting system for deep-sea vessels operating in India's exclusive economic zone (EEZ), comprehensive legislation covering conservation and utilization of marine fishery resources and a code of conduct for fishing vessels, at the state and national level. New guidelines for fishing operations in the Indian EEZ, issued in November 2002, allow large deep-sea fishing vessels to employ foreign crew, do not require them to land with their catch in Indian ports, have no specifications regarding age of the vessel and have no quotas or fees to judge the value of the haul. In July 2004, an expert committee headed by Prof. M.S.Swaminathan to carry out a comprehensive review of the CRZ and submitted its report in February, 2005. The Committee had observed that CRZ legislation should be established and recognized the traditional rights of the fishing community. It recommended the expansion of Coastal Zone to include the territorial waters. It also recommended to introduce Coastal Management Zones by replacing the concept of Coastal Regulation Zones. The zone demarcation proposed by Swaminathan Committee could not be accepted by a state like Kerala where the population density is high. The new coastal regulation guidelines (CRZ) have not met with the approval of the traditional fishermen community of the Kerala coast for different reasons. One of the reasons for the opposition of these communities to the guidelines is their fear that they might impact on their traditional systems of livelihood (Damodaran, 2003).The Kerala Government has also been for changing and relaxing the plan. Some important issues regarding the CRZ highlighted by the fishermen are as follows:

- CRZ precludes the possibility of obtaining title deeds and allotment of numbers by the panchayats to fishermen settlements situated on the shore adjacent to the sea;
- Since setting up or renovating fish processing units in the coastal area is prohibited by the CRZ notification, the small-scale industrial units in the fisheries sector are facing many practical problems;
- The housing and colonisation schemes and schemes for construction of schools and hospitals for the fisherfolk, sponsored by the central and state governments, are facing practical difficulties in their implementation;

- The permission granted in the CRZ notification for the mining of sand from the coastal areas leads to indiscriminate removal of sea sand, thereby resulting in severe sea erosion problems,
- The prohibition of extracting ground water using pumps from the coastal areas adversely affects the drinking water schemes for the fisherfolk,
- Bunding and construction of barriers for saltwater extrusion permitted in the CRZ leads to large-scale reclamation of water bodies and damage to the ecosystem and aquatic biota, and
- Brackish water aquaculture will be adversely affected by CRZ restrictions.

Marine fishing policy (2004) adopted the strategy 1) to augment marine fish production of the country to the sustainable in a responsible manner so as to boost export of sea food from the country and also to increase per capita fish protein intake of the masses, 2) to ensure socio-economic security of the artisan fishermen whose livelihood solely depends on this vocation, 3) to ensure sustainable development of marine fisheries with due concern for ecological integrity and biodiversity. It also highlighted to promote exploitation in the deep-sea and oceanic water for reducing fishing pressures and resources within 50m depth zone are showing the symptoms of depletion. Stringent fishery management system is needed.

In January 2004, Government of India, Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries constituted a national level committee under the chairmanship of Prof.Mohan Joseph Modayil, Director, CMFRI, Kochi to study and report the impact of closed fishing season, on the marine fishery resources of the country. The committee was of the strong view that a closed season is very essential for the recovery of the fish stock as well as biota and recommended a mandatory closed season shall be imposed along the west coast of India from 15th June to 31st July (47 days) and 15th April to 31st May (47 days) every year along the east coast of India. The committee also recommended that only sustenance fishery using traditional non-motorised or motorised with OBM/IBM of less than 10 HP vessels should be permitted for fishing during the closed season (Kurup, 2006).

Establishment of the National Fisheries Development Board (NFDB) during the Tenth Plan is a major fillip to the Indian fisheries sector. NFDB was formed by a decision of the Union Cabinet on June, 2006. It has been registered under the Andhra Pradesh Societies Registration Act, 2001. It aims to increase fish production from aquaculture and culture based fisheries, to enhance the value of fish output through better post harvest practices, and to provide effective marketing prospects and employment opportunities. It also intends to undertake conservation and management of fisheries resources, as well as to provide diversified income earning opportunities for fishers, especially women (Sebastian, 2006). It reflects the keen interest of the Government as also the potentials that the sector holds in ensuring domestic nutritional security. The proposed outlay for fisheries development during the XI Plan is Rs 4,013 crores, intended to also include the budgetary allocation made to the NFDB to the extent of Rs 2,069 crores for the XI Plan period. There is a clear delineation of the functions with the Department to focus on marine fisheries programmes, Database and Information networking, Quality brood bank and seed certification, policy and welfare programmes, whereas the Board would address the production-consumption chain, with an emphasis on marketing, in partnerships with Government and private agencies (GOI, 2006).

2.4.6 Community-led Initiatives

Community-level institutions also play an important role in fisheries governance along the coast. Examples that have been documented include the Kadakodi system of northern Kerala, Pedhaloo in southern Orissa, and the federated structure of the traditional Panchayat system of the Pattanavars community of Tamil Nadu/Andhra Pradesh coast (ICSF, 2009).

Some of the community-led initiatives include

- Alternate-day fishing regulation in the Gulf of Mannar and Palk By areas of Tamil Nadu.
- Self-regulation by women seaweed collectors in the Gulf of Mannar region of Tamil Nadu seaweed collectors.
- Maharashtra fishing community initiatives on conserving coastal and marine resources.
- Community-based fisheries management in Nagapattinam District, Tamil Nadu.

2.5 Institutional Dynamics in Kerala's Fisheries Sector

2.5.1 Government Interventions

The governance of the fisheries sector is vested with the Ministry of Agriculture and the chief executive is the Secretary to the Government (Fisheries). However, it is the State Department of Fisheries that carries out all the development and management programs envisaged in the fisheries sector. The Director of Fisheries heads this department which is structurally stratified and organized under Executive Officers whose responsibilities and functions. Among modern state institutions, the Department of Fisheries is a key asset for the coastal fishing communities and its various layers are hierarchically outlined in table 2.4. There are various agencies functioning under the Department of Fisheries. They are Matsyafed, Kerala Fishermen Welfare Fund Board (KFWFB), Agency for Development of Aquaculture, Kerala, (ADAK); Fisheries Resource Management Society (FIRMA); Brackish water Fish Farmers Development Agency(BFFDA); Fish Farmers Development Agency (FFDA); National Institute of Fisheries Management and Administration (NIFAM); Coastal Area Development Corporation (CADC); Society for Assistance to Fisher Women (SAF).

Table 2.4 Functions of different layers of Department of Fisheries

State	Directorate of Fisheries headed by the Director of Fisheries and Additional Director of Fisheries (Technical)
Zonal Level	Joint directorate of fisheries (has three zones - south/ central/north and are headed by a joint director each for each zone)
District	Deputy Directorate of fisheries (headed by 14 deputy directors)
Panchayat	Matsyabhavans (spread around the entire coast and are headed by about 200 Matsyabhavan officers)

Source: Adapted from www.DepartmentofFisheries,GOK.com

Marine Fisheries in Kerala has been, for the last many years, in the grip of a turmoil. At stake are the interests of the traditional fishers whose sole means of livelihood is fishing. The technological advancement have unleashed unhealthy competition with the traditional fishing methods essentially owing to the open access nature of the resources. The overall decline in total fish landing during the late seventies resulted in growing conflicts between the fishermen belonging to the mechanised and non-mechanised

sectors, for fishing time, space and resources. Trawling, purse seining and ring seining, were identified by the traditional fishermen as the major destructive fishing methods which led to clashes and confrontations among the fishermen. The artisanal fishermen engaged in fishing by means of their traditional craft and gear protested collectively against mechanised means of fishing and demanded total ban on such fishing methods.

Both formal and traditional mechanisms for consultation and conflict resolution are in place; fisheries management is devolved to State control within territorial seas, and Union control outside territorial seas; legislation focuses on production, and sustainable fisheries management principles are not yet fully included in the fisheries law. The Government of Kerala adopted a multi-faceted strategy to improve fisheries and fishermen's life under pressures from the fishermen's union. The measures included enactment of Kerala Marine Fishing Regulation Act (KMFR Act of 1980), The Kerala Fishermen Welfare Societies Act (KFWS, 1980), Enactment of Kerala Fishermen Welfare Fund Act, (1985).

The Kerala Marine Fishing Regulation Act (KMFR Act) the first of its kind in the country, was based on the 'draft bill' of the Majumdar Committee constituted by the government of India in 1976 for examining the question of delimiting the areas of fishing for different types of boats. This act provides for a regulation of fishing in the territorial sea along the coastline of the State through registration and licensing, mesh size regulation, prohibition of certain fishing methods, delimitation of fishing zones and declaration of closed seasons. Under the provision of the KMFR Act, the coastal waters up to 20 m depth from the shore north of Quilion to Manjeswar (about 512 Km coast) and 30 m depth south of Quilion (78 Km) were declared to be the exclusive reserve of the artisanal craft while the mechanized boats were to operate beyond this depth and the purse seiners were banned from operating in the territorial waters. The KMFR Act aimed at protecting the interests of the artisanal fishermen, establishing law and order in the sea and ensuring regulation of marine fishing and conservation of resources.

The KMFR Act provided for a grass root level nodal agency of the fishermen to organize production, marketing, welfare and credit in order to provide a real thrust to artisanal

fishing. Accordingly, the coastal villages were delimited into 222 villages and an equal number of Fishermen Welfare Societies (FWS) were constituted, one for each fishing village. Each society was conceived as an autonomous body to administer the activities and a fishery official was posted as its Secretary. A nominated Managing Committee drawn of fishermen's representatives was made responsible for its management. For want of development funds, the activities of the FWS during the first 2-3 years confined to merely distribution of welfare funds previously handled by the Department.

In 1984, a Kerala State Cooperative Federation for Fisheries Development Limited (MATSYAFED) was set up under the Kerala Cooperative Societies Act to activate, coordinate and guide the working of the village societies. Three District Cooperative Societies were registered as primaries to the federation as the FWS were formed outside the Cooperative Societies Act. Although the National Cooperative Development Corporation (NCDC) initially provided certain funds for the working of the FWS, they insisted on the reorganization of the welfare societies under the Cooperative Societies Act for easy inflow of cooperative funds. Accordingly the FWS were replaced in 1988 with 81 Fishermen Development Welfare Cooperative Societies covering the entire coast of Kerala. The State Government also enacted another legislation viz. the Kerala State Welfare Fund Act (1985) to implement all the welfare schemes handled by the Department. Old age pensions, lump sum grant to fisher children, compensation against loss of life and other welfare schemes were brought under Welfare Board.

2.5.2 Recommendations of Various Committees

Kerala's annual monsoon trawl ban follows international trends in fisheries resource management, where fishing closures are used to revive nearly collapsed fisheries or sustain potentially over-fished fisheries. Honduras, Peru and Indonesia are some of the countries where such annual fishing bans are in position (Kumar, 2006). The State of Kerala is very much concerned about the protection of the marine fishery resources and to achieve the said object, Kerala has introduced trawling ban as early as in 1988. Kerala is the first State in the country to introduce a trawling ban. The trawling ban thus

introduced was pursuant to various scientific studies carried out by Expert Committees, appointed by the Government of Kerala is presented in table 2.5.

Table 2.5 Expert Committees appointed in Kerala

Name of Committee	Year
Babu paul Committee	1981
Kalawar Committee	1985
Balakrishnan Nair Committee I	1987
Balakrishnan Nair Committee II	1990
P.S.B.R. James Committee	1993
Silas Committee	1994
Balakrishnan Nair Committee III	1999
D.K. Singh Committee	2006

There have been frequent clashes between the fishermen belonging to the traditional and mechanised sectors leading to very serious law and order situations and even loss of life and property. Committee appointed under the Chairmanship of Shri. D. Babu Paul, I.A.S, the then Government Secretary to Fisheries was appointed in 1981. The committee was of 'unanimous opinion' in respect of recommendations of general nature for the conservation and management of fishery resources of the state. But with regard to the specific need for adopting a closed season for trawling boats as a management measure, the opinion of the Committee was divided. Some of them recommended that trawl fishing should be banned in the territorial waters of Kerala during the months of June, July and August. A few members of the committee impugned the imposition of closed season as a management measure maintaining that there was no sign of biological over fishing but there were indications of economic over-fishing owing to the unregulated entry into fishing and insufficient management measures. The Babu Paul Commission Report was submitted the following year. The report did not recommend a ban on bottom trawling during the Monsoon months. The Commission's main recommendations were - Mesh size of the trawl nets should not be less than 35mm, the Marine Regulation Act of 1980 should be strictly enforced, registration of all the trawling boats should be ensured, purse

seine, ring seine, pelagic and mid-water trawls should be banned within 22 km of the in-shore waters. As the Commission was silent on the issue of the ban on bottom trawling during the monsoon period, which essentially meant that the harmful fishing practices during the spawning season would continue leading to the peril of the marine eco-system, the Federation launched a series of agitations from 1982 to 1983.

Considering the persistent unrest in the artisanal fisheries sector the Government of Kerala constituted in 1984, another Expert Committee (Kalawar Committee) consisting of three Fishery Experts from outside the State. The Committee studied the ban issue with special reference to the breeding season of prawns and they opined that since the breeding season of prawns is protracted, shrimp trawling during June, July and August need not be banned but strongly recommended to limit the number of trawling boats in the state to 1145 with a strict regulation of the mesh size of the cod end of trawl nets to be not less than 35 mm. It recommended that only 1140 number of trawlers are required in Kerala for exploiting the fishery wealth while the permitted fleet size of OBM fitted canoes and traditional canoes was 2620 and 20000 respectively. The committee also recommended in unequivocal terms that shrimp trawling during monsoon season (June, July, and August) be permitted, but restricted to daytime and beyond a depth of 20m.

In 1987 the Government appointed yet another Commission - the Prof. Balakrishnan Nair Commission to study the issue of trawl ban. In 1988, the Commission recommended a ban on trawling during the monsoon period, of 90 days, on an experimental basis for three consecutive years. The Commission suggested that the impact of the ban should be studied subsequently. Though the Government accepted this recommendation in principle, the spirit of the recommendation was diluted by announcing a partial ban for 45 days. However, since 1997, the duration of the ban became uniform for all the years which lasted for a period of 45 days barring 2006 during when the ban was extended to 62 days in compliance with the verdict of the Supreme Court. The Committee recommended a mission oriented study called Save Coastal Resources Project (SCORP). The Government of Kerala constituted two more committees under the chairmanship of Prof. Balakrishnan Nair during 1990 and 1999 to make scientific evaluations on the impact of trawling ban along Kerala coast. These committees were of the view that the

ban on trawling during monsoon should be continued it was found to be an effective measure for enhancement of marine fisheries resources of Kerala. The other expert committees constituted in between Prof. Balakrishnan Nair 1 and 2 committees were P.S.B.R.James committee in 1993 and Dr.E.G.Silas committee in 1994. The Silas Committee recommended the demarcation of a separate zone as an artisanal exclusive fishing zone (EAFZ) for the exclusive fishing of non motorised and motorised crafts of less than 15 HP and standardization of overpowered artisanal fishing gears like mini trawls and ring seines (Kurup, 2006).

The Aquarian Reforms Committee (2000) headed by Dr K Ravindran, constituted by the Kerala government to recommend basic reforms in the fisheries sector submitted their report to the State Fisheries Minister S Sarma. The Committee, in its report said 'the state government shall adopt and implement some basic reforms in the fisheries sector for securing the livelihood and occupation of *bona fide* traditional and artisanal fisher folk and for assuring sustainable growth and development of the sector through effective and participatory management and good governance'. The objective for such an enactment was to protect the water bodies and to conserve the natural fisheries resources at sustainable levels, to ensure the rights of traditional/artisanal fisher folk for occupation and livelihood in the fisheries sector, to establish a 'regulated marketing system' in Kerala and to ensure availability of appropriate quality and quantity of fishes to the consumers in the state. Other objectives of enactment were to bestow legally, the right of fishing in the inland and territorial waters exclusively to the traditional/artisanal fisher folk, to evolve an appropriate and to reserve legally, the right of first sale of raw fish caught by fishermen exclusively to those who fish and to reserve the right of ownership of fishing crafts and gears being deployed for fishery in the inland and territorial waters exclusively for the traditional/artisanal fisherfolk (Suchitra and Venugopal, 2006).

The latest study by the 12-member committee headed by T.K. Singh to study the extent of habitat destruction and evaluate the suitability of introducing uniform fishing ban along Kerala coast taking into consideration the magnitude of monsoon fishery prevalent in Kerala and livelihood and employment associated with this sector. The report

submitted in July 2007, recommended for the continuation of the present 47-day ban. The purpose of Kerala Monsoon Fishery (Pelagic) Protection Act, 2007, is to grant traditional fishermen the right to conduct pelagic fishery during the monsoon season using traditional and modified traditional crafts and gear within the territorial waters. Authorized officers may enter, search and confiscate any vessel if they have reason to believe that the misuse of such fishery has been harmful to fish breeding and fish wealth, and the Government may order to ban the right to conduct pelagic fishery. A snap shot of various institutional dynamics is highlighted in the table 2.6.

Table 2.6 Snapshots of the various Institutions in Kerala Fisheries

1950--The Indo-Norwegian Project (INP) for Fisheries Community Development in the States of Travancore-Cochin signed by the UN, India and Norway. The INP is the world's first bilateral development assistance project to focus on technology.

1950s Shrimp export boom in Kerala. INP introduces bottom trawling-techniques to increase productivity and opens large-scale freezing plants.

1970s Competition between traditional and mechanized fishing gives rise to the fishermen's movement.

1976 The Majumdar Committee appointed to study the conflict between traditional and mechanized fishers.

1978 The leaders of the fishers' movements in Kerala, Tamil Nadu and Goa form the National Fishermen's Forum to press for the rights of traditional fishermen and for the conservation of marine wealth.

1980 The Kerala Independent Fish Workers Federation (KMSTF) formed.

1980 Kerala Marine Fisheries Regulation Act passed based on the recommendations of the Majumdar Committee. The Act sets out rules on trawlers' access to inshore waters, provides for seasonal closure of fisheries for the sake of resource conservation, and entrusts protection of the exclusive fishing zone to the police and coastguard.

1988 After many years of protests by the fishermen movement, the Kerala government announces a partial ban on monsoon trawling throughout the state.

1989 Based on the report of the Balakrishanan Nair Committee Kerala government imposes total monsoon trawling ban, initially for a period of three years. The length of the ban becomes the object of new struggles between artisanal and mechanized fishers in the following years.

1991 Congress Party returns to power. India's new economic policies focus on liberalization, deregulation and privatization.

1991 New Deep Sea Fishing Policy (NDSP) grants permits for deep-sea fishing to foreign vessels. Artisanal fishers, trawler owners, and fish merchants form the National Fisheries Action Committee Against Joint Ventures and stage nationwide protests against the new policy.

1994 Kerala formulates a fishing policy focusing on resource sustainability, economic viability of the industry, the provision of a decent level of living to the workers, and a good supply of fish for local consumption and export. Implementation, however, remains imperceptible in the years following the report.

1995 Central government appoints the Murari Committee to study the NDSP and the opposition to it. The committee's recommendations include a cancellation of the joint-venture policies, and a ban on future licenses.

1997 Central Cabinet accepts all the recommendations of the Murari Committee, although they remain unimplemented.

2002 Biological Diversity Act aims to promote conservation, sustainable use, and equitable sharing of the profits of India's biodiversity resources.

2004 Draft New Environmental Policy (NEP) released by the Ministry of Environment and Forests. NEP does not contain any direct discussion on fisheries management.

2004 Comprehensive Marine Fishing Policy announced. This is the first national fishing policy to cover both coastal and deep-sea water fishing. The policy aims to 1) increase fish production 2) ensure the socio-economic security of artisanal fishermen 3) ensure the sustainable development of marine fisheries with due concern for ecological integrity and bio-diversity. The new policy proposes a review of the existing legal framework on fishing, and the introduction of new fishing legislation in areas such as resource conservation, limited access fishery, fishery harbor management etc.

2.6 Evolution of Community Based Institutions in Kerala Fisheries

The presence of well-established fishermen organisations is a unique and important feature of the Kerala fisheries. Artisanal fishermen in various part of Kerala have organised themselves into independent trade unions which has helped in confronting and pressurizing the state and mechanised sector. This has resulted in various positive responses from the state in favour of the artisanal sector, such as the ban on fishing by trawlers during monsoon for three months.

2.6.1 Fishermen Struggles and Dynamics of Conflict Resolution

Kerala marine fishery sector has witnessed lot of straggles and confrontations. Confrontation with various stakeholders in the system especially community- artisanal fishing community, and mechanised trawl operators are often, and this has resulted in persistent unrest in these area. The conflict among various stakeholders, are for the access to resources. There is always a trade off between economic profit and resource sustainability. Industrialisation of fishery which taken place in the marine fishery of the state at the end of 1970s, the traditional/artisanal sector, who is concerned more about sustainability than on economic profit, is in confrontation with mechanised sector- the mere rent seekers.

Phase I

There was firstly a formative period in the 1960s and 1970s when the fishers' organisations- at a district, state and national level - were being formed. This was a period which was to have important implications for leadership and direction in the Kerala movements because of the close connection between these movements and the Roman Catholic Church.

Phase II

The second period was the period of agitation and struggle in the 1980s and into the 1990s as the fishers brought pressure on successive Kerala governments - and, on occasion, on the central government - to address their concerns. In these campaigns they particularly targeted the impact which mechanised fishing made both on their livelihoods and on fish resources. It was a period in which they experienced great difficulty in combating vested interests in the state and in getting an adequate response from the coalition governments which were a feature of Kerala politics throughout the period.

Phase III

The last period comes in the 1990s when the issues which the Kerala fishers had been fighting for increasingly become national issues. In this third period the national-level organisation formed in the 1970s, an organisation in which Kerala fishers and their supporters are leaders, has come to play an increasingly militant role on fisheries' policy, to the extent that the Government of India has been forced to consider how to meet the political opposition and how to protect fish resources (Revees, *et al.*, 1997).

2.6.2 Collective Action

Faced with failing fish production and heavily exploited resources, the fishermen started forming unions of their own. A number of unions which were formed during 1970-80 functioned mostly as social service societies. In 1977 the Latin Catholic Fishermen Unions in different districts were amalgamated to form a Kerala Latin Catholic Fishermen Federation. In 1980 this federation changed its name to Kerala Independent Fishermen Federation (KIFF) in order to give it a secular colour. At this time the different castes of Hindu fishermen like Valan and Arayan joined together as one organization under the banner of All Kerala Dheevara Sabha. These unions were united under an

umbrella body, Kerala Swathanthra Malsya Thozhilali Federation. This process was motivated largely by political compulsions. The Kerala Swathanthra Malsya Thozhilali Federaton (Kerala Independent Fishworkers Federation) is a unique movement. It is a non-party trade union with community-based organisation, working in the unorganised sector of fisheries.

The Kerala Swathanthra Malsya Thozhilali Federation is affiliated to the National Fish workers Forum, which is active in all marine states of India. The National Fish Workers Forum is involved in addressing the issues faced by the fish workers at the national level. In 1978, 13 major regional fishermen unions met in Madras and set up a National Forum for *cattamaram* and country boat fishermen's rights and marine wealth. These unions, coordinated by the National Forum, had been protesting and striking against the deleterious fishing by large number of mechanized boats and trawlers in the already heavily exploited coastal waters (Archari, 1990).

2.6.3 Resistance of Artisanal Fishermen towards Mechanization

The Kerala Independent Fishermen Federation undertook several prolonged struggles, hunger strikes, and long marches to bring pressure on Governments. It compelled the authorities to declare several measures designed to protect the interests of the fishermen and conserve the fishery resources. Today, this union is one of the most powerful and militant fishermen's political organizations in Kerala. In the wake of this movement, all the political parties, including the Indian National Congress, Communist parties, Muslim League and Revolutionary Socialist Party, have formed their own trade unions of fish workers who constitute a good vote bank in the coastal constituencies. As the artisanal fishermen united into strong political unions, the owners and operators of the mechanized boats also formed their associations. The boat owners' and operators' associations wield a powerful lobby in Government. Between the two factions there are frequent clashes and a number of litigations are going on the courts of the State as well as in the Supreme Court (KSMTF, 2007).

The fishing industry became increasingly polarised between a 'modern' ('mechanised') sector able to make considerable profits from exports and a 'traditional' ('non-mechanised') sector confined to a domestic market with declining catches and fish stock. In the 1980s the increasing industrialisation - and internationalisation - of the fisheries by mechanisation and by trawling by still larger vessels, both by Indian companies and by trawlers of other nations, heightened this polarisation and posed dangers which threatened to do serious damage to the both the fisheries and the artisanal fishers.

2.6.4 Mechanization of indigenous craft as a mean of resilience.

To counter the challenges posed by the trawling boats, the traditional fishermen turned to mechanization. They started off with low power outboard engines and gradually to engines with 25 hp. Some even began to use two or three engines. These were not really affordable - the engines used a fuel mix of petrol and kerosene, and operational costs were quite high. But at least, they hoped, it would allow them to scoop up fish they would otherwise never be able to find by their traditional ways alone. Towards the end of the nineties, country crafts of 80 ft and more in length began to be fitted with inboard Leyland truck engines. These crafts can accommodate 50 to 55 fish workers, use ring seine nets weighing up to 4000 kg. Their high fuel capacity enables the craft to go farther out into the sea, cutting the operational costs greatly.

2.6.5 Worker Peasant Alliance: Involving Trade Union to Resolve the Issue

The formation of the All India Fishers and Fisheries Workers' Federation (2001) is a remarkable effort to develop worker peasant alliance in the country, at the initiative of the CITU and the AIKS. The Kerala State Matsya Thozhilaly Federation (CITU) is affiliated to All India Fishers and Fisheries Workers Federation is a federation of 22 registered unions of fishers in Kerala. The federation is not registered, but all the 22 affiliated unions are registered under the Trade Unions Act. The total; membership of the state level federation is 75, 999. the federation mainly tries to bring the fishers into the fold of the trade unions. Earlier, the fishers in Kerala were under the control of religious and communal organizations. The Kerala Fisheries Coordination committee is functioning under the leadership of the federation (Shasheendran, 2007).

2.6.6 Resistance of mechanised trawl operators and the resultant unrest in the area.

The motorised sector is subdivided into small-scale motorised sector using low engine power and the other using bigger crafts with inboard engines for ring seine operations and is often comparable with boats. Such bigger fishing units which fall beyond the jurisdiction of zoning restriction, are attracting huge investment and could pose threat not only to small scale fishing units, but also to resource conditions as well. Although zoning was intended to provide an equal entitlement to a uniform group of technology users (traditional sector), but exogenous technological progress has brought in heterogeneity and economic inequality within the traditional sector (Joe, 2008).

Trawling and Purse seine boat owners approached the High Court against trawl-ban and Purse seine ban. Trawling boat owners strongly argue that the 500-odd crafts with inboard engines should also be banned. The KSMT Federation fought this legal battle and won it in 2007. When they approached the Supreme Court, again the Federation fought at the national level and the final verdict favoured the ban (KSMTF, 2007).

Since there is less incentive for the mechanised sector to adhere to the rules, often there is a care of violence. Till last year, the majority of the Kerala-based mechanized boats had not taken the license from the Fisheries Department seriously. They were mainly operating on the basis of registrations issued by the MPEDA. Under the KMFR Act, a specific registration from the department was mandatory. Fishing license will allow mechanized boats to fish only in the deep sea to fish in Kerala's territorial waters, which is already crowded might lead to unrest between two sections of workers (Basheer, 2008). From a policy perspective, it is imperative to comprehend the ongoing divisions within the traditional sector also. The revision of zoning regulations becomes crucial for including some of the traditional sector units within its framework. In order to further enhance the benefits of zoning it is suggested that the period and duration of temporal zoning should be decided in a manner that would facilitate the maximum regeneration of resources and their economic worth (Joe, 2008).

Chapter-3

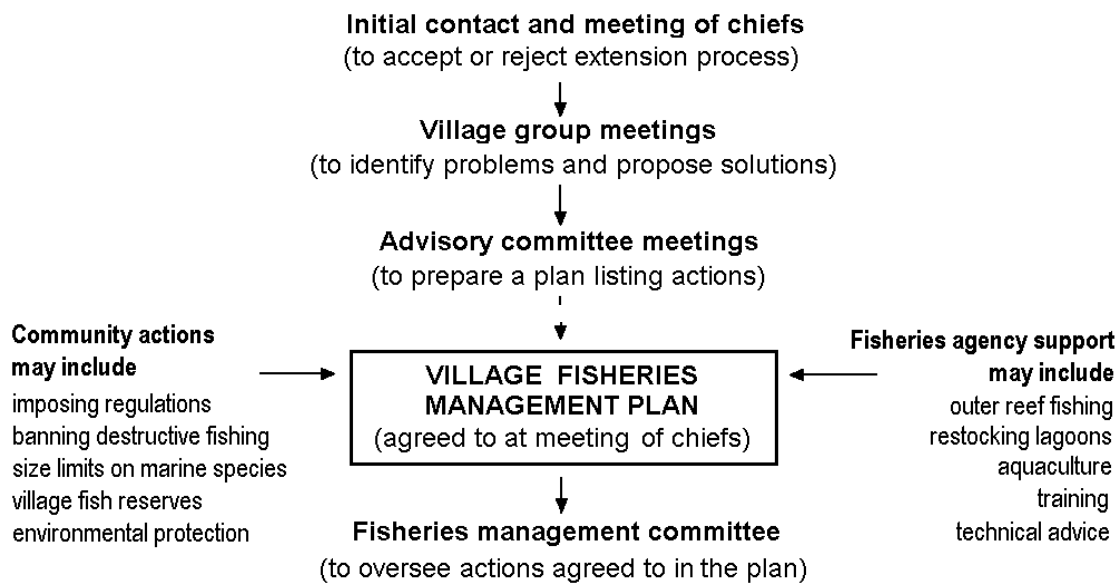
Community Based Fisheries Organizations in Kerala

Institutional arrangements concern the rights and rules which applies to and regulate the fisheries in which community members take part. It focus on power structures at the local level, decision making arrangements, participation of fishers and stakeholders, legitimacy, mechanisms for enforcement and compliance with rules. Organisational arrangements concern the characteristics of the group in which decisions are made and collective action taken at the local level. Important issues are representation, decision-making procedures, implementation of decisions in the field, and interface with other related areas. Some community level institutional arrangements (e.g. the establishment of operational rules for fishing in waters adjacent to the local community) may have been subject to constitutional approval and may be supported by both enabling legislation and government enforcement. Other institutional arrangements at the community level may not have that legitimacy viz-a-viz fisheries and other authorities at municipal, district, regional or higher levels. Organisational arrangements at the community level may have been developed and designed at a higher level to meet higher level needs and fit into a multiple layer, nested structure (ICLARM, 1998).

Community based fisheries management can be developed and successfully established only when fishers understand that they own the fishery resources. Granting fishing rights to fisher's, and a limited entry scheme provides the best opportunity for them to establish their own organizations (Shotton, 2000). Co-operative management of marine fisheries seems to hold high promise as an instrument of managing it on sustainable yield basis as well as improving the socio-economic wellbeing of marine fishermen (Singh, 1994).

Community-based fisheries management has gained popularity due to the failure of government management approaches, which do not involve local people most affected by deterioration of their coastal resources. Marine reserves, in turn, are generally established to enhance fish yields in areas adjacent to reserves and protect critical spawning stock biomass so larvae are exported to fished areas.

Figure 3.1 Model framework of Fisheries Management Committee



Source: Alcala, 1997

3.1 Decentralization, Community Participation and Community Based Management System

Decentralization can be defined as the transfer of authority and responsibility for public functions from the central government to subordinate or quasi-independent government organisations and community associations (Cohen and Peterson, 1999). It is a strong institutional arrangement for improved community participation in fishery management and their empowerment. Implementing decentralization a bridge to increase local communities participation in fisheries management. In Kerala, marine sector is govern through Kerala Marine Fisheries Regulation Act of 1980. In each village there is fisheries office with a staff. Their main task is to monitor and see to it that there is no encroachment and violation of the rules. They are not participating in the management. Unlike, marine fishery, local government is highly involved in the management of inland fisheries in Kerala. There are instances of successful involvement of management in the inland fisheries of Kerala. Probably a better option to in the marine fishery management is the involvement of community based management empowered by decentralization. A

model framework of fisheries management committee and its functioning in coastal villages is given by Alcalá (1997) and is presented in figure 3.1.

3.2 Caste Dimensions Among The Fishermen Communities

Kerala's fishing community is a heterogeneous mix of Hindus (51 per cent), Muslims (21 per cent) and Christians (23 per cent) having a significant presence. The Muslim fishing communities dominate the northern coastal region, the Hindus are concentrated in the central region and the Christians are the majority in the south. Hindu fishing communities are concentrated in regions in the northern area of Kollam, Alappuzha, Thrissur and Kasargod districts. They are predominantly Araya caste, though there were originally two sub-castes, the Arayars and the Mogaviras. However they all united under the name of Dheevaras, mainly in response to reservation policies. Unlike the Muslim and Christian communities, the priests are also involved in fishing activities and are elected by the community. The existence of religion based institution is a peculiarity of the traditional fisheries sectors. Some of them are 'KaraYogams' of Dheevara community, 'Karithas' of Latin Catholic Church, 'SNDP Yogams' of Ezhavas, Mutual Aid Societies of Islam Wakhaf etc.

The Arayars are one of the patrilineal castes of Kerala, the community appears more homogeneous and closely-knit than Christians, where class distinctions are more visible. The village chief is head of the community. Village committees called Karayogams decide most issues relating to the village. These are local legislative and executive councils made up of elders who are either nominated or elected by the group of villages they represent. The Karayogams function in a democratic manner, and the councils have maintained their records well, having systematically kept track of all the events concerning the community. They have functioned independent of the State apparatus, and are in a way, the embodiment of the cultural tradition of the community. Women are not members of the council, but are allowed to attend the meetings.

Akhila Kerala Dheevera Sabha (AKDS) the most prominent union of Dheevera community was formed in 1974. Today, it had around 600 branches all over Kerala. AKDS aims to bring Dheevera community into the forefront of development by giving job security, education and be a part of policy formulation with regard to fishing and fishing communities. Dheevera community is now fragmented under various organizations named Anandodayini Karayogam, SVS Karayogam, Dheevera Parishkara, AKDS.

The Muslim community is predominantly settled around in the northern districts of the state. Mosque councils that deliberate on all ethical matters keep the community together. However, they do not interfere in the economic activities of the community. Besides the mosque councils, the villages also have a council of elders who take decisions regarding other aspects of village life. They are periodically elected on the basis of their wisdom and ability to provide guidance. Their fishermen do not exhibit a great degree of dynamism, as the innovations in fishing gear have penetrated the southern districts, but few takers among the Muslim community.

Christain community is concentrated in the Central and southern coastal regions of Kerala and are affiliated to the Latin Catholic church. The church is the central institution, the very heart of the community. The priests are the ex-officio leader of the village and there are other leaders, who are mere figureheads of authority. Internal organizations of the community reflects, in that the church has a big say in politics, economics as well as the social life of the people. The church is closely associated with the fishing community and levies a tax on the fishermen, usually about 5 percent of the money they earn from their daily catch.

The Social Service Society (SSS), a unit of the Catholic Diocese, was established in 1962 for the socio-economic development of the poor of the region. Its intended activities were to provide credit for the fisherflok to acquire craft and gear (unsuccessful because of the hold of middlemen) and to ensure welfare inputs. It had various branches in many parts of Kerala. Ernakulam Social Service Society (ESSS), the official organisation for social

action of the Archdiocese of Verapoly has along history of 39 years since 1962. Even before it has been registered as a formal legal entity of social action 1962, the Archdiocese had been thoroughly involved in the social and cultural development of the marginalised through relief and welfare services, educational services, formation and promotion of people's movement etc. Ernakulam Social Services Society exists for the empowerment of the poor and marginalises women, landless agricultural labourers, fishermen, construction workers and the slum dwellers of Ernakulam District especially in the coastal areas and undeveloped islands located near the city of Kochi by sustaining their development initiatives through people's participation. ESSS advocates the development of the society through people's participation at the village level. In the past ESSS initiated people's organisation in the eco-operative model which led to the formation of fishermen co-operatives in the marine villages.

Quilon Social Service Society is a registered voluntary organisation established in 1960 with Headquarters at Quilon for social action in the Latin Catholic Diocese of Quilon. Its area of operation extended over the Revenue District of Quilon (Kollam) and part of Alleppey (Alappuzha) district. It mainly focus on the weaker sections of the population, fishermen population, women empowerment etc.

Kerala Social Service Forum (KSSF), a Non-Government Organization (NGO) working under the aegis of Catholic Church in Kerala was thus formed in 1981. The Forum coordinates the activities of all the 28 Catholic Diocesan Social Service Societies of Kerala. It acts as an instrument for the exchange of ideas, sharing of experiences, co-ordination, networking, and monitoring and participatory evaluation of the member societies.

Evangelical Social Action Forum (ESAF) was established in 1992 as a Christian response to the social and economic needs of people. Evangelical Social Action Forum is a registered charitable society, born out of deep conviction that teaching and preaching should go hand in hand with social action. Launched in 1992 under the patronage of Kerala Evangelical Graduates Fellowship. ESAF provides loans to the economically

challenged people for micro enterprise development, animal husbandry, business expansion, house construction, house repairing and for consumption purposes. Lending activity of the ESAF include providing micro-finance, loans to the fishermen community but also to the women SHGs in the area of operation includes southern and northern districts of Kerala, particularly Kollam, Punthala, Ernakulam and Thrissur districts.

3.3 Role of Fishery Cooperatives in Fisheries Management

To manage coastal fishery resource, it is necessary to encourage the local fishermen community to build their own organization to participate in organizing management activities, to co-ordinate with the Government and other institutions, and to share benefits from the resources among themselves. A fishing right can be granted to local organizations and Government can devolve its authority to manage the marine resources, which belong to the fishermen by regulation and practice. Fishery co-operatives are one of the possible means of organization.

Co-operatives can make full use of the local knowledge and experience of local fishers in formulating management regulations that fit local conditions. Rules and regulations agreed upon by fishermen in advance, thus do not need to be enforced by an outside agency (Shotton, 2000). The members of a co-operative are real members by law and practice. The members have rights to be involved in the co-operative's activities and to monitor and select their own leaders. This can guarantee that the benefit of the co-operatives will be shared equally among the members.

The challenging answer to the social and economic problems confronted by fishermen community is to organise various type of fishery co-operatives by fishermen themselves. Co-operation among fishermen has greatly contributed towards increasing income, achieving rapid modernisation of fisheries and substantially raising the social standards of fishermen. Though fishery co-operatives differ from one country to another, they have common aim of improving the economic status of the fishermen. Japan had a good network of 5682 fishery co-operatives of different types, inland co-operatives accounting about 999 at the primary level and 29 societies at the prefectural level. Exclusively for

fishery co-operatives societies a law had been enacted which is termed as “Fisheries Cooperative Association of Law of 1948, which was amended in 1975. In Norway, co-operatives had been under statutory control, ie Raw Fish Act of 1951. Norwegian Fishermen’s Union (Norges Fiskarlag) and the National Fisheries Bank, a state institution which supply bulk of finance to fishermen’s co-operatives have also leading role to play. In Canada, Fishery Credit Cooperatives known as “caisses populaires” have much importance and is granting loans under the Fisheries Improvement Loan Act. In some countries, fisheries co-operatives are financed by trade union organisations. In case of Federal Republic of Germany and United States, trade unions provide the requisite finance to co-operative bodies. In United Kingdom, Sea Fish Industry Authority a Statutory Body, is allowed to give loans to fishermen’s co-operatives.

In some cases governments have assigned special management tasks to fishermen's organizations. The most far-reaching example of this kind is the Japanese fishing rights system. In Britain the Producers' Organizations have been given the task of managing the British share of the annual EEC quota, but this falls far short of fish conservation as such. In yet other countries, fishermen's organizations are consulted extensively on matters of fisheries policy. This consultative process may be informal or highly formalized, as is the case in Norway, and the degree of influence that fishermen have on fisheries policy likewise differs widely from one country to another (Hannesson, 2004).

The fishery co-operative is a legal organization that has the authority to run businesses concerned with fishery production and marketing. Mostly, activities of the co-operatives are involved with marketing and processing of fish and fishery products, providing members with fishing equipment and other necessities at cheaper prices compared to the market, and in providing loans at low interest rates to their members.

The modern social organizations are mainly the creation of state powers or governments to promote fisheries development and enhance their production. These organizations include Department of Fisheries of the Central and respective State governments and the co-operative organizations of fishermen which are semi-governmental or controlled by the State. State and Government policy focuses on developing fisheries at all levels, with

the aim to sustain or increase production and to guarantee continued growth of the sector. Modernization of the fleet and upgrading of infrastructure receives attention through subsidies, though amounts are modest and one-time payments. This production-oriented focus applies especially to the activities of the Ministry of Agriculture and related Departments responsible for capture fisheries, at both Union and State levels, with significant variations across States and Union territories.

Fishermen co-operatives were established at primary (village), central (district) and apex (state) levels to promote savings, credit and also to enhance production, processing and marketing of fish and for the management of fisheries in the country. The introduction of these co-operatives also necessitated to eliminate the middlemen, to improve the socio-economic condition of the fishermen and for their up-liftment in the society.

3.4 Fisheries Co-operatives in India

The fishery co-operative movement in India began in 1913 when the first Fishermen's society was organised in Maharashtra followed by West Bengal and Madras in 1918. The structure of fishery co-operatives in India today consists of one national level federation namely, National Federation of Fishermen Cooperatives Limited (FISHCOPFED), state level federations, central level federations at district/ regional level and primary level societies. Basically, the fishery cooperatives were organised to meet the needs of local fishermen community. They undertake various activities like fish production, transportation, preservation, processing, marketing etc. The co-operatives carry out supportive activities such as credit distribution, manufacturing and supply of occupational requisites like craft and gear, ice production, fuel distribution, consumer article distribution etc. However, with the development of fresh water/ brackish water, aquaculture and marine fisheries activities, the scope of fishery co-operatives has enlarged (Salim, et al, 2005; Malhotra and Sinha, 2007).

3.4.1 National Federation of Fishermen Cooperatives Limited (FISHCOPFED)

National Federation of Fishermen Cooperatives Limited (FISHCOPFED) is the apex organisation of fishermen cooperatives in India. It came into being in 1980 and started its

activities of the agencies include organizing conferences on various aspects, supporting training initiatives, demonstration of scientific fish culture, transfer of intermediate technology, introducing marketing techniques, liaison with member organisation and various agencies, providing knowledge on health care and hygienic living etc. Federation is also involved in implementation of Centrally Sponsored Schemes on Group Accident Insurance of active fishermen. At present, the Federation undertakes business activities on a limited scale because of its limited financial capabilities. These include inter-state and retail marketing of fish, fish seed and fishing requisites. With the Federation at the top of the Cooperative structure, there are 17 Federations at the state level, 108 Central Societies at the district and regional levels and over 11,847 primary fishermen cooperatives societies. Membership of primary societies is about 13.78 lakhs covering about 21 percent of active fishermen in the country (Salim, *et al.*, 2005).

3.5 Origin and Growth of Fishermen Co-operatives in Kerala

The government of Kerala was perhaps the first in India to promote fishermen's co-operatives. The history of co-operatives dates back in 1917 when co-operatives were formed in the erstwhile Travancore State. Successive governments were convinced that the co-operative enterprise was the best means for fish workers to improve their socio-economic standards. The earliest economic organizations of fishermen were Government sponsored cooperatives. The first cooperative society for fishermen in Kerala was registered in 1917. The societies of those days were based on castes (Arayan, Valan and Christian). The performance of these caste-based societies was disappointing. The real thrust to fishermen cooperatives came in 1956 with the formation of the present Kerala State and the beginning of the Second Five-Year Plan onwards. In the wake of this, a three tier structure of fishermen cooperatives was set up. At the primary level, there were the producer cooperatives (Matsya Utpadaka Cooperative Societies - MUCS) through which the Government issued mechanized fishing boats. At the regional level, marketing societies were established to manage marketing of fish as well as supply of fishing requisites (Archari, 1990). Towards the second half of the seventies, voluntary agencies started entering the fisheries sector in an organized manner, working among the fishermen. It was the time when marine fish production in Kerala declined and the

fishermen tried to organize themselves to protect their interests and save the resources from depredation. The Programme for Community Organisation (PCO) formed in 1977 was a pioneer among the voluntary agencies.

The idea of having a co-operative to free themselves from the exploitative forces gripped the minds of the fish workers. Accordingly, the fish workers in Trivandrum district set up a co-operative mainly with the intention to gain control over the selling of its member's catch on the sea shore. Thus the first fish marketing society called Marianad Matsya Utpadaka Co-operative Society (MUCS), Trivandrum was set up in 1970. The society was a member-based, marketing-oriented, with membership open only to active fish workers who managed the society themselves. They started arranging credit facilities, subsidies and loans to purchase gear. The society began to sell nylon nets and other fishing requisites. To help fish workers repay the loans, a percentage of the daily earning being automatically deducted.

3.5.1 The State Initiated Co-operatives

The government linked the organization of co-operatives to attractive incentives like the provision of mechanized boats, long term loans and grants. The possibility of acquiring mechanized boats and the government's urgency to achieve targets led to a proliferation of co-operatives. Subsequently, the Kerala Fishermen Welfare Societies Act, 1980 provided for the constitution of Fishermen Welfare Societies (FWS) and initiation of welfare and development programmes exclusively for fishermen. Consequently 222 FWS were organized along the Kerala coast, which remain inactive until the formation of MATSYAFED. In 1984, the State government established the Kerala State Co-operative Federation for Fisheries Development Limited came to be known as MATSYAFED, with the clear mandate of co-operativisation of traditional fish workers and spearheading development programmes for them. It took up the task of reorganizing the FWS into Fishermen Welfare and Development Co-operative Societies (FWDCS).

MATSYAFED has a three-tier structure with Primary Fishermen Co-operative Societies at the village level, district level and the state level federation. The main activities of the

MATSYAFED include organization of the PFCS, procurement of fishing equipments and inputs, establishment and operation of manufacturing facilities such as net factory, ice plants, implementation of fisheries development programmes through the PFCS and development of infrastructural facilities.

Matsyafed, is the Apex Federation of 654 Primary Fishermen Co-operative Societies spread over 10 districts of Kerala - of the 653 primary societies 334 are in the marine sector, 186 in the Inland sector and 133 women co-operatives. The Federation has a District Office in each of the maritime districts and one in the Inland district each headed by a District Manager. The District Manager with a team of supporting staff co-ordinate and supervise all the activities in the district. The total membership in these societies is more than three lakhs. The primary societies are clubbed into 60 clusters for administrative convenience based on geographical area. The number of primary co-operatives varies from 4-8 in a cluster. The administration and management of Matsyafed is vested with a Board of Directors having 19 members of whom are elected from the Primary Co-operatives, 5 official members and 3 non-officials members nominated by the Government. The Chief Executive is the Managing Director of the Kerala State Cooperative Federation for Fisheries Development Ltd. (Matsyafed) regulates auctions at fish landing centres through primary fishermen cooperative societies. The member-fishermen sell their catch to potential buyers only through the auctioneer, employed by the society. This ensures a better price and immediate payment to the fisherman from the society. Presently, Matsyafed-regulated auctioning is prevalent only in the non-mechanized sector in Kerala. Poor management, lack of marketing strategy and well defined lending policy, and absence of vertical integrations of different activities were found to be the reasons for losses in the co-operative sector (Ganesh Kumar, *et al.*, 2008).

The district wise fishermen co-operative societies affiliated to Matsyafed and other co-operatives are presented in the table 3.1. The maximum number of Matsyafed societies are functioning in the Alappuzha district with 128 societies. The Ernakulam district has 102 societies. In the Northern districts of Kerala, such as in Kozhikode and Malappuram

district the societies formed were 67 and 65 respectively, which is less compared to the central and the south zone.

Table 3.1 Fishermen Co-operatives in Kerala

Districts	Affiliated to Mastyafed	Others	Total
Trivandrum	86	12	98
Kollam	82	27	109
Pathanamthitta	0	10	10
Alappuzha	128	39	167
Kottayam	29	12	41
Idduki	0	9	9
Ernakulam	102	33	135
Thrisuur	41	23	64
Palakkad	0	7	7
Malappuram	65	29	94
Kozhikode	67	23	90
Wayanad	0	2	2
Kannur	25	11	36
Kasaragode	29	5	34
Total	654	242	896

Source: Directorate of fisheries, 2007

Promotion of co-operative management of marine fisheries calls for substantial extension of welfare activities and to promote education among the fishermen communities in the coastal areas. The main idea was to create among the fishermen a shared awareness of problems, action alternatives, and opportunity cost of indiscriminate fishing (Singh, 1994). Besides the promotional support, the co-operatives also impart skill to the fishermen communities and also conduct training programmes for social and economic well being of the communities.

The main focus of the Federation is to equip the traditional fishermen to achieve control over the first sale of fish. The system of beach level fish auctions developed across the State through the primary co-operatives has enabled fishermen to exercise first right over sale of fish. The fishermen are also ensured of getting cash-down payment at the beach itself through the primary co-operatives. A tie-up has also been made with seafood exporting companies for procurement of high value and bulk quantity of fishes through the primary societies so that the producers get a reasonable price for their catch at the beach itself. This has ensured that there is no price fall during bulk landings. The fishermen are also assured timely assistance for replacement of their fishing inputs and working capital requirements. Matsyafed also provides working capital assistance to the primary co-operatives for strengthening the beach level auction.

Every year, Matsyafed implements the Personal Accident Insurance Scheme for the fishermen members of the affiliated primary co-operatives with the assistance of insurance companies by collecting a nominal insurance premium. The scheme provides compensation of Rupees One and a half lakh to the dependants of fishermen who have suffered accidental death, permanent disability, loss of both limbs/ eyes etc.

Table 3.2 Membership in cooperatives

	Kerala	India
Fisheries co-operatives	119406 (19.83)	514703 (14.63)
Other co-operatives	61479 (10.20)	234353 (6.66)
Total fishermen population	602234	3519116

Source: Marine Fisheries Census, CMFRI, 2005

The membership pattern in Kerala and India level shown in the table 3.2, depicts that in Kerala nearly 30 percent of the total fishermen population are members of the fishermen co-operatives or in other co-operatives. It throws light on the fact that nearly 70 percent of the fishermen does not comes under the purview of the co-operative organisation.

Table 3.3 Membership in cooperatives at district level in Kerala

District	Membership in fishery co-operatives	Total fishermen population	Percent
Trivandrum	32659	143436	23
Kollam	10557	43210	24
Alappuzha	24819	101341	24
Ernakulam	10267	42069	24
Thrissur	6507	34078	19
Malapuram	8496	79858	11
Kozhikode	13211	87690	15
Kannur	5385	36686	15
Kasargode	7505	33866	22
Total	119406	602234	20

Source: Department of Fisheries, 2006

The table 3.3 highlights the fishermen membership in co-operatives in the districts in Kerala. More participation in co-operatives are seen in the districts of Kollam, Alappuzha, Ernakulam etc. The participation of fishermen in co-operatives are low in the northern districts compared to other districts.

3.5.2 SHG Movement and Micro-Finance

As a part of building a strong Co-operative institution with the participation of fishermen and their family members, Matsyafed started organising Self Help Groups (SHGs) associated with Primary Fishermen Co-operatives. Now, it have a total number of 10162 Self Help Groups (2840 Men Groups and 7322 women groups) with 122434 members (33140 Men and 89294 Women) in 2007-08. These groups have generated Rs 1207.07 Lakhs as thrift which is utilized for giving short term loans to the members. In 2008-09, Matsyafed organised more than 12169 SHG groups with 145450 members. Out of the 12169 groups, 3029 groups are male SHGs having 35623 members and 9140 groups are

female SHGs having 109827 members. The groups have mobilized Rs 2199.23 lakh as thrift. A detailed performance of SHGs of Matsyafed societies are highlighted in table 3.4. The SHG movement has acquired momentum, which resulted in the increased level of participation of fishermen and their family members. Being together as self help groups has considerably changed the organizational culture of fishermen considerably.

Table 3.4 Details of the SHGs

No.of societies	270
No.of Groups	10162
No.of members	122434
No.of groups with grade >100	6469
No.of groups started enterprises	466
Thrift generated	1207.07
Amount used for internal lending	662.01
Bank loan availed	431
Business turnover	2632
income generated	266

Source: MASTYAFED, 2009

The thrift generated is used by the groups for internal lending to the members at low interest rates. Within a year around Rs. 1600 lakh is revolved in the sector without any assistance from the federation or any other external agencies. This is very helpful to the fishermen families who are otherwise forced to borrow from private moneylenders at exorbitant interest rates. Rs. 900 Lakhs was released as micro finance loan last year to these SHGs. The beneficiary gets the loan at the interest rate of 6 percent. At the end of last financial year 466 SHGs have started enterprises.

The details of Integrated Fisheries Development Projects implemented are highlighted in table 3.5. The amount allotted through IFDP has increased through the implementation of

the projects. But during the period 2006-07 and 2007-08, there was a small decrease in the amount disbursed.

Table 3.5 Year wise and the amount allocation for IFDP

Project	Period of implementation	Block Cost Rs.in lakhs
Integrated Fisheries development project Phase -1	1985 - 1991	555.84
Integrated Fisheries development project Phase - II	1987 - 1994	1034.28
Integrated Fisheries development project Phase - III	1991 - 1997	4228.68
Integrated Fisheries development project - Inland	1998 - 2000	636.37
Integrated Fisheries development project - 1998	1998 - 1999	1989.75
Integrated Fisheries development project - 1999	1999 - 2000	1690.00
Integrated Fisheries development project - 2000	2000 - 2001	1634.85
Integrated Fisheries development project - 2001	2002 - 2003	2702.00
Project Matsyafed – 2004.05	2004 - 2005	2458.00
Integrated Fisheries development project 2006-07	2007 - 2008	1504.50
Integrated Fisheries development project 2007-08	2008 - 2009	1449.00

Source: MATSYAFED, 2009

3.5.3 National Cooperative Development Corporation (NCDC)

NCDC has been promoting and developing fisheries cooperatives after its Act was amended in 1974 to cover fisheries within its purview. The Corporation has formulated specific schemes and pattern of assistance for enabling the fishery cooperatives to take up activities relating to production, processing, storage, marketing, etc. Assistance is provided to fisheries cooperatives on liberal terms treating the activity as weaker

section programme (Salim *et al.*, 2005). Assistance to fishery cooperatives is provided for the following purposes:

- Purchase of operational inputs such as fishing boats, nets, and engines
- Creation of infrastructure facilities for marketing, transport vehicles, ice plants, cold storages, retail outlets, processing units, etc.
- Development of inland fisheries, seed farms, hatcheries, etc.
- Preparation of feasibility reports.
- Integrated Fisheries Projects (Marine, Inland and Brackish Water)

Table 3.6 NCDC funds allocated to fisheries sector in Kerala (Lakh Rs)

Year	Fisheries	Total	%
1962-63 to 2000-01	88.92	155.57	57.16
2001-02	1659.36	5161.48	32.15
2002-03	562.500	5018.183	11.21
2003-04	1521.430	9657.897	15.75
2004-05	1619.63	10924.3	14.83
2005-06	546.37	19099.60	2.86
2006-07		310598.8	
2007-08	1356.97	33073.46	4.10
2008-09	974.63	30869.6	3.16

Source: Economic Review, 2010

The NCDC fund allocation to the fisheries sector in Kerala over the years is shown in table 3.6. It is observed that no fund was allocated to the fisheries sector in 2006-07. In 2005-06, it was only 2.86 percent allocated to the fisheries. In succeeding years it is increased to about 3-4 percent.

3.6 Analysis of Zone Wise Societies of Matsyafed

Matsyafed initiated societies or sangams were functioning as the community institutions in the marine villages of Kerala. The focus on Matsyafed sangams or societies operations seems to be providing equitable access to marine resources through the supply of fishing craft and gear at subsidized prices. 7 societies each from the North, Central and South zones were taken for analyzing their operations and the involvement of communities in the management of the resource. Table 3.7 highlights the membership pattern within the society's jurisdiction and the society's membership pattern in Kerala.

Table 3.7 Performance of Societies in Zones

Membership		North zone	Central zone	South zone
jurisdiction	male	18669	17052	13850
	female	12444	6327	5760
	total	31113	23379	19610
society's mem	male	7346	9601	5085
	female	335	2222	1033
	total	7681	11923	6118
mastyafed assis	male	1819	2948	1668
	female		499	495
	total	1819	3447	2163
society's assi	male	1147	4598	933
	female	230	1645	172
	total	1377	6243	115

Source: FDWCS, 2007-2008

40 percent of the fishermen in the north zone are the members in the societies affiliated to Matsyafed. Women involvement in the society is only 4.4 percent in the north zone. 31 percent fishermen have membership in the Matsyafed societies in the south zone. Highest membership is seen to be in the central zone not only among the male fishermen but also among the female membership pattern.

In case of Matsyafed assistance, 23.7 percent (only males) of the fishermen members have received assistance from the North zone and 85.5 percent of male fishermen members have availed assistance from the central zone as shown in the table 3.8.

Table 3.8 Active fishermen involvement

Active fishermen		North zone	Central zone	South zone
	male	13007	13198	10273
	female	40	1226	1450
	total	13045	14424	11723
society's mem	male	4420	7481	4270
	female	152	506	439
	total	4572	7927	4709
mastyafed assis	male	1813	2407	1370
	female		270	117
	total	1813	2677	1547
society's assi	male	819	2169	624
	female	126	256	102
	total	945	2425	736

Source: FDWCS, 2007-08

13.3 percent of the females in the northern districts have availed assistance from the society and 86.7 percent of the males have acquired the assistance. Whereas in the central zone, nearly 10.6 percent females have received assistance from the society and 89.4 percent males have availed assistance. In the south zone, 84.8 percent of the males have acquired assistance from the society and 13.9 percent females have received assistance from the society.

Matsyafed societies have also initiated SHG groups of both the male fishermen and females in various coastal districts of Kerala. Presently there are 28 fishermen groups and 70 female groups functioning in the north zone, as highlighted in the table 3.9. The male members constitute 346 and female members to 765. In terms of savings accumulated by the females is estimated to be Rs 288521/ in 2008 and males have accumulated Rs 158000/. Central zone societies have established 172 male SHG groups and 127 female SHG groups with 1561 and 1183 male and female members respectively. In the south zone, 279 male SHG groups and 329 female SHG groups were functioning in the year 2008, with 2118 and 3588 males and females members respectively.

Table 3.9 SHGs performance in societies, 2008

	North zone		Central zone		South zone	
	Male	female	Male	Female	Male	Female
Groups	28	70	172	127	279	329
Members	346	765	1561	1183	2118	3588
Accumulated Savings	158000	288521	630113	208056	1803122	2761368

Source: BDP report of the societies, 2008

In the north zone, 35 the ring seine units were operating, 14 tanguvallam, 21 chhoda vallam, 59 ozhuku vala and the artisanal craft of 38 units. The details of fishing units, gear and the types of engine used by the various fishing units in the North zone are presented in the table 3.10.

Table 3.10 Number of fishing crafts, gear and engine in the North zone

No: of crafts	Small	Medium	Large
	46	72	49
Engine	9.9 H.P	25H.P	40 H.P
	28	52	76
Gear	In the order of dominance	Units	Quantity
	Ring seine	35	2950tonnes
	Thanguvallam	14	182
	Chooda vala	21	72
	Ozhuku vala	59	159
	Ayiala vala/ chala vala	38	29

Source: BDP report of the societies, 2008

Table 3.11 Number of fishing crafts, gear and engine in the Central zone

No: of crafts	Small	Medium	Large
	71	75	45
Engine	9.9 H.P	25H.P	40 H.P
	49	89	47
Gear	In the order of dominance	Units	Quantity
	Ring seine	38	4506
	Thanguvallam	6	80
	Chooda vala	13	22
	Ozhuku vala	75	59.27
	Ayiala vala/ chala	59	37
	vala		

Source: BDP report of the societies, 2008

In the central zone, ring seine units, ozhuku vala and the small artisanal canoes were the dominant crafts and gears used in the central zone. The details regarding gears used, fishing units and the horse power employed by the fishing units in the Central zone is stated in the table 3.11.

Table 3.12 Number of fishing crafts, gear and engine in the South zone

No: of crafts	Small	Medium	Large
	59	232	32
Engine	9.9 H.P	25H.P	40 H.P
	42	200	35
Gear	In the order of dominance	Units	Quantity
	Ring seine	32	5100
	Chooda vala	17	42
	Ozhuku vala (plywood)	215	820
	Ayiala / chala vala	59	39

Source: BDP report of the societies, 2008

The table 3.12 discloses the details regarding the fishing crafts, gear and horse power employed by fishing units in the south zone. When compared to three zones, the quantity harvested is highest in south zone with 5100 tonnes by the ring seine, followed by the plywood fishing units with 820 tonnes. The presence of small canoes is lower in the southern districts of Kerala.

Table 3.13 Business Development Report, 2008

	North zone	Central zone	South zone
Fishermen households	7651	10446	8326
Active fishermen	6280	8505	5709
Active members in FRAs	1306	3574	1567
Fishing units	308	215	337
Fishermen	2184	2141	2034
Qty available in auction	2804.8 tonnes	5483.81tonnes	6501.6 tonnes
Fish price available in auction	509.56 lakhs	1129.62 lakhs	2974.33 lakhs
Commission for society	5.85 lakhs	16.82 lakhs	18.17 lakhs
Commission for mastiyafed	6.12 lakhs	17.97 lakhs	18.93 lakhs
Savings from auction	3.98 lakhs	9.33 lakhs	10.23 lakhs

Source: FDWCS, 2007-08

The fishermen households are highest in the central zone with 10446, followed by 8326 in the south zone and 7651 households engaged in fishing in the north zone. The members who engage in fish related activities is also more in the central zone and less in north zone. In terms of fishing operating under the society seems to be highest in south zone with 337 fishing units followed by 308 units in the north zone and 215 fishing units in the central zone. The variation has been identified in terms of fish quantity available for auction and catch value in three zones.

3.7 Inter Zone Comparisons in Societies Catch

Inter zone comparison between south, central and north zone Societies were made with regard to the catch structure. Data relating to the catch were collected from respective zones for a period starting from April 2007 to December, 2008. Each of the data set was collected on a group basis which consists of 30-50 fishermen working in the fishing unit. This was further classified into compact groups of 12 for analytical purpose and hence has a total of 13 compact groups (each with 12 having a total of 146 groups consisting of 30-50 fishermen in a unit). Groupings were made initially in an arbitrary manner and subsequently checked for the homogeneity/ heterogeneity based on statistical background.

Data pertaining to the same zone's compact groups also shows considerable variation in catch and income earnings. Income from the catch of the fishermen is based on the sale proceeds of the catch auctioned under the supervision of the Society officials in order to safeguard the earnings of the fishermen from any exploitation by the middlemen in terms of inter-locking of credit etc. For the service provided Societies are getting 1 percent commission from the sale proceeds and this becomes the major working capital of the Societies, which in turn is used for the social nesting of the communities.

An attempt has been made to work out seasonality of catch, seasonality index, inter group variation in catch within a zone and among various zones so as to explain the inter group dynamics and zonal differences in catch, income, resource availability and the value of the catch. This is explained using box Whisker plot, ANOVA, Posthoc test-Duncan's test.

Seasonality influence is a demonstrable factor in all the 3 zones as well as intra marginal trends in catch in all the zones inter-alia the homogeneity/ heterogeneity influences. Figure 3.2 represents the seasonality of catch in three zones, shows seasonality influence of catch in all the regions with peaks for South and Central zones in August and North zone in January in table 3.14 highlighted by the seasonality index. Figure 3.3 represents the seasonality of catch, seasonality index for the 3 regions following the seasonality of factor.

Figure 3.2 Seasonality of Catch in the Three Zones

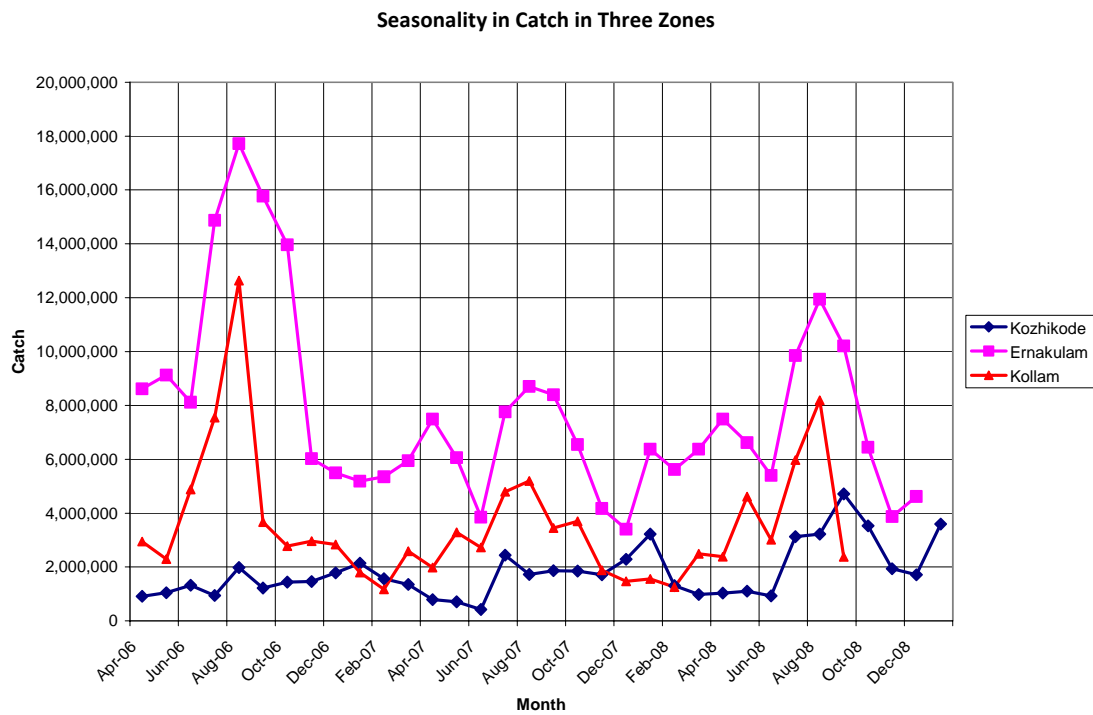
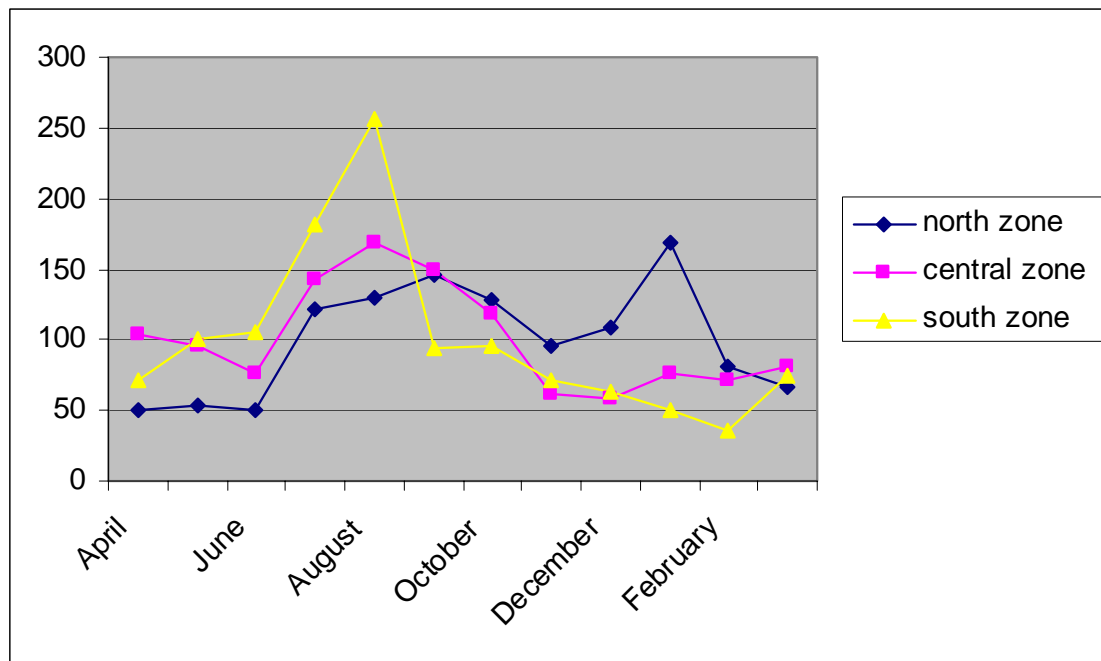


Table 3.14 Seasonal index

<i>Month</i>	<i>North zone</i>	<i>Central zone</i>	<i>South zone</i>
April	51	103	72
May	54	95	101
June	50	76	105
July	122	142	181
August	130	168	257
September	146	150	94
October	128	118	96
November	96	61	72
December	108	59	64
January	168	76	50
February	81	72	36
March	66	81	75

Source: Matsyafed societies, 2006-08

Figure 3.3 Seasonal index of catch in three zones



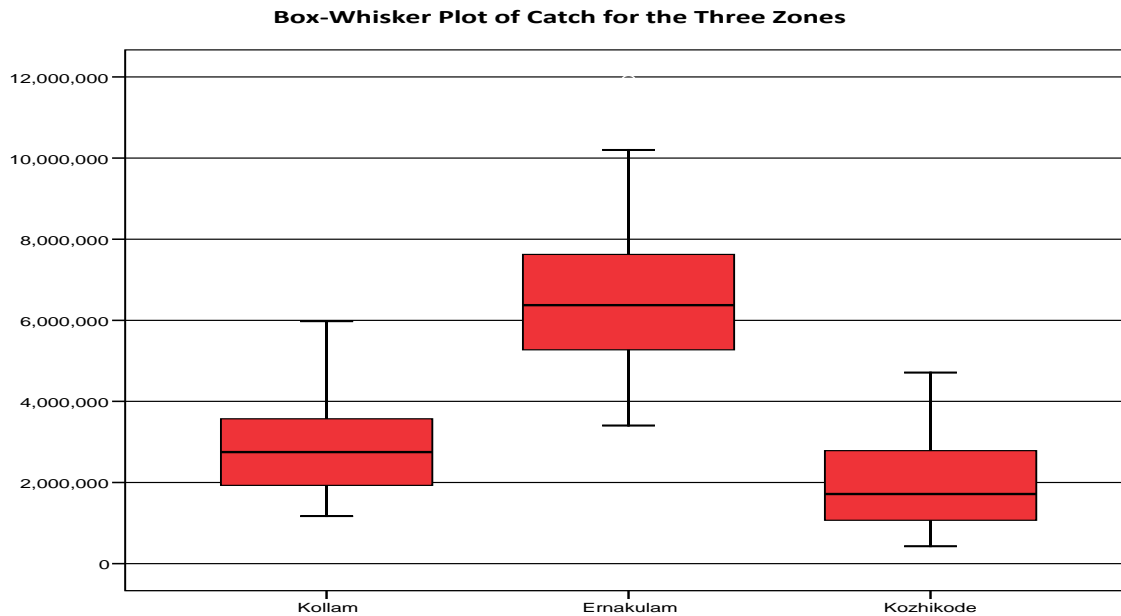
3.7.1 Comparison of Catch between Zones

CV for explaining the comparison of catch between zones is given in table 3.15. Summary statistics reveal that there is wide variation of catch in Central zone in comparison to the other zones. However, there is some similarity between the CV values in South and North zone which shows the amplitude of catch between the upper and lower bound by Box Whisker plot depicted in the figure 3.4.

Table 3.15 Summary Statistics of Catch for Zones

Zones	<i>N</i>	<i>Sum</i>	<i>Mean</i>	<i>CV</i>
North	24	47113569	1963065	55.9
Central	24	157,668,402	6,569,517	32.4
South	24	74,451,860	3,102,161	53.3
Zones	<i>N</i>	<i>Sum</i>	<i>Mean</i>	<i>CV</i>

Figure 3.4 Box Whisker plot of catch for three zones



F value of ANOVA in table below is significant in 3 zones and hence we reject the null hypothesis and conclude that there is difference in the means between regions and the result is shown in the table 3.16.

3.7.2 One-Way ANOVA Analysis

Table 3.16 ANOVA for the Three Zones

Source of Variation	Sum of Squares	df	Mean Square	F	P-value	F crit
Between Groups	276315918290227	2	138157959145113	48.88802	0.00000	3.129644
Within Groups	194994589142705	69	2826008538300			
Total	471310507432932	71				

The table 3.17 confers that there are no homogenous groups in the inter zone analysis using Duncan's test, since in each subset there is only one zone. All the 3 zones are heterogeneous as resembled by their means.

3.7.3 Post Hoc Test Duncan's Test

Table 3.17 Post Hoc Test Duncan's Test

Homogeneous Subsets for the Zones

Duncan ^a

Zone	N	Subset for alpha = .05		
		1	2	3
Kozhikode	24	1963065		
Kollam	24		3102161	
Ernakulam	24			6569517
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 24.000.

Performance comparison at inter zone and intra zone level shows wide variations. There are considerable difference among the fishing communities and their institutional set up in Kerala. The South zone has more Latin catholic communities having church based institutions, the Central zone with Hindu communities having temple connected institutions and finally in the north zone where majority are Muslims have mosque based institutions are prominent. There are differences in craft- gear combinations in all the zones and this, results in the associated difference in efficiency in converting the inputs into output. The analysis points at statistically significant differences in performance indicators (catch value) at zone level and at group level. This could be regarded as indicative of the effectiveness of community based fisheries resource management with respect to societies and even at SHGs level.

3.8 South Indian Federation of Fishermen Societies (SIFFS) - A Case Study

Started off as an apex body of ten societies of Trivandrum district in 1986, SIFFS is an apex body of a three-tier structure of autonomous organizations of small scale artisanal fish workers. It has links and activities in several coastal districts of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and Pondicherry. The SIFFS is a non-governmental organization (NGO) registered under the Travancore-Cochin Literary Scientific Societies

Act XII of 1955. The main objectives of SIFFS are to organize fishermen into co-operatives societies, facilitate the marketing of fish collected by its members societies, assist member societies with funds in the form of loans and grants, establish and run manufacturing units for fishing craft and gear, processing units for fish and fish products and other activities in the interest of its member societies. At the base level, there are over 100 primary village level societies in seven districts which function on co-operative basis. They undertake fish marketing and cater to the credit requirements of over 8000 small-scale fish workers. These village societies are in turn affiliated to independent district federations which monitor and support the village level activities. At the apex level, SIFFS focus attention on technology for small scale fish workers and assists in the co-ordination and management of district level federation. It also provides vital inputs for fishing like boat, motors, and spares, as well as credit. The marine plywood boat produced and diffused by SIFFS after a decade of research and development has been a major contribution to the artisanal fishing sector of South India.

SIFFS tends to demonstrate that marketing co-operative societies at the coastal villages are viable and sustainable. It has succeeded in designing and developing varieties of fleets, which serve as alternative to mechanised boats and compete with them. At the same time, unbridled growth of plywood boats with outboard motors and their over-presence and over-fishing also contribute towards the perpetuation of already depleting marine resources. It has facilitated for the emergence of an active and democratic leadership among the community at the village level. The leadership is not only conscious of the socio-economic and political developments, but also responds to such developments through a variety of ways, whenever they tend to affect them adversely. Fourth, it encourages the emergence of other organisations in the fishing sector and complements them through networking these organizations (Jose and Kanna, 2004).

But by 1993, its area of operation was confined to Quilon and Trivandrum districts of Kerala and Kanyakumari district in Tamil Nadu only. In 2002 SIFFS started concentrating in establishing its base in Malabar area of Kerala. Present scenario highlights the existence of 46 societies of KDFS in Kanyakumari district, 20 societies of

TDFF in Trivandrum, 6 societies of FWS in Kollam district and 10 societies of MFFS in Malabar area. The operational level of SIFFS in Kerala is shown in the figure 3.5.

Figure 3.5 SIFFS in Kerala

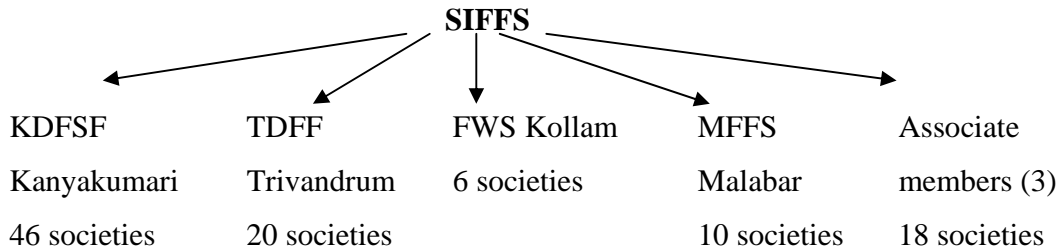


Table 3.18 Membership pattern FMC Kollam and the fish catch details, 2003-2004

Member, Catch details for the year 2003 - 2004		
Name of Sangams	No.of Members	Fish Catch
Pallithottam	39	11,373,890.00
Port Kollam	29	5,742,170.00
Moothakkara	18	8,328,950.00
Vaddy	52	13,746,490.00
Thangassery	36	13,159,185.00
Total	174	52,350,685.00

Source: SIFFS, Annual Report, 2003-04

The table 3.18 explains the membership pattern and fish catch by the member societies of SIFFS for the year 2003-2004. The highest membership exists in Vadi FMC with 52 members. The least in the Moothakkara FMC, with 18 members.

A case study of Fish Marketing Centre (FMC), which is the primary level society of fishing village Vadi is undertaken. It is formed in 1983. Presently, FMC has 42 fishing units and 210 fishermen as its members. It is interesting to note that membership decreased from 52 in the year 2003-04 to 42 in the year 2007-08 in the Vadi FMC. It is an exclusive organization of fisher folk and no female members are there. The three core activities of the model are:

▶ Marketing of fish caught by members

This was an important activity of the Centre. The Centre appointed its own salesman. This salesman carried out the auction and was also responsible for collecting and remitting dues from the buyers. This proved to be a new way of life for the member fish workers. Uncertainties and exploitative practices became a thing of the past. They just had to present the sales bill at the society office and collect their earnings.

▶ Providing credit for renewal of fishing equipment

Bank credit was tapped by societies and routed to members. Repayment was made through deductions in the range of 10-15 percent on the sales value of the daily catch. Presently, Maximum amount of 1lakh and minimum of Rs 75000/ is given as credit at a 10 per cent interest rate.

▶ Promoting savings and provide relief fund

Two per cent of the daily sales value was deposited in the members name at the society. The member could withdraw the accumulated amount at a later date in accordance with stipulated rules. During lean season, an amount up to Rs 8000/ is given to the fishermen. The running expenses of the Center were mobilised through a 3 percent contribution on each sales bill of its members leave the unit when the fishing season is bad, to seek better employment opportunities. This provision ensured prevention of undue fishing pressure during lean season.

3.9 Informal Institutions and Arrangement (Kadakkodi and Karinila): An Assessment

There are several institutional arrangements in Kerala's fisheries that define access and conservation norms within the community. Majority of these informal arrangements are in inland sector, where community participation is comparatively high. Yet, there are some informal institutions, such as the *kadakkodi*, the "court of the sea", have long histories in the extent of extinction existed in the marine fisheries of Kerala. Other, institutional innovations to manage artificial reefs are more recent in origin. These arrangements are basically community-based in nature and are embedded in the specific

ecological, a social and cultural context in which they have arisen. They have evolved in the process of the community's attempts to define the nature of their relationship with the sea and the living resources therein. The prime social foundation of these institutions is to ensure livelihood security through arrangements that ensure justice and fairness in an occupation that is highly risk prone and with considerable uncertainty of outcome (Campbell, 2003 and Paul, 2005).

3.9.1 'Kadakkody'

The literal translation of the word *Kadakkodi* means 'sea-court', but it is more than a conventional judicial court. This traditional institution existed for centuries and is still functional within some coastal communities in the northern parts of Kerala. 'Kadakkody' functions more as a court as it has legislative, executive and judiciary roles to play in the *Arya* and *Dheevara* communities of Hindu fishermen belonging to the northern parts of Kerala. Each Kadakkody is an adjunct to the temple of the fishermen community in each village. It consists of three distinct bodies, the members of which sit separately. They are *Sthanikans*, *Kadavanmar/ Sahayiees* and *Temple committee*. *Sthanikans* are permanently authorized 11-13 members who are directly involved in the conduct of temple rituals. They constitute the 'jury'. The *Sthanikans* are composed of four separate constitutional groups, namely *Karanavanmar* (4 members), *Achanmar/ Kshethresanmar* (6 members), *Kodakaran* (1 member). *Kadavanmar* are assistant priests take the role of 'police' in accosting the complainant to the court at the command of the jury apart from providing services passing errands and making announcement of holding of the court. The *Temple committee* is a democratically elected body which looks after the administration of the temple. The committee has a president, a secretary and a treasurer. The norms evolved by the institutional arrangement for the management of the fisheries resources across the area include: Night fishing is banned during the months of June, July and August; Gillnets are not allowed and fishing in the area is prohibited during the monsoon; Fishing related disputes or conflicts should be first brought to the sea-court (Ramachandran, and Sathiadhas, 2006). Paul (2005) identified three distinct types of *Kadakkodi* based on administrative structure – temple centric *Kadakkodi* of northern district of Kasargod. Here, the administrative structure consists of a magistrate (*achanmar*) and a general body

(*poduyogam*) that the community entrusts with the judicial power to regulate the fishery. The second one is multi-community *Kadakodi* consisting of members from different religions. This secular institution consists of a general body of members of the community, an elected president and a vice-president. The third set of *Kadakodi* is concentrated around the Vadakara Taluk of Kozhikode district. These *Kadakodi* consist of an action committee headed by a sepoy.

3.9.2 *Karanila* system

The *Karanila* system of income distribution among the members of the communities prevailed in southern Kerala during 1940s and 1950s. Alappuzha region where encircling-net fishery is in vogue there is a system by name, *karanila* that is discussed in length by Vijayan and Kurien (1995). This system ensures that the total number of fishermen present at the seashore and who “touch the craft” at the start of the fishing trip, are considered the crew of the respective unit for that day and have a claim on the harvest. From those present, the required number will get into the craft and go fishing, which generally include owners and group of semi-permanent workers. The remaining “temporary” worker-fishermen stay back on the shore and granted *karanila* or “shore status”. The role of *karanila* fishermen in the fishery gains extra importance in two specific situations. When the size of the ownership group is small, the permanent and semi-permanent fishermen together are not sufficient to operate a fishing unit and in such circumstance *karanila* fishermen are crucial. During *chakara* season it becomes necessary and lucrative to make more than a single trip per day, which necessitates number of crew, more than the usual one. As the *karanila* fishermen are not “attached” to any particular unit meant that they are free to leave the unit when the fishing season is bad, to seek better employment opportunities. This provision ensured prevention of undue fishing pressure during lean season. This *karanila* system was a recent custom-created mechanism (just over 50 years old) for ensuring an adequate supply of labour to the fluctuating needs of fishery. It was also a system for income spreading as it provided the basis for fuller work opportunities. It ensured a fair degree of distributive justice so long as there was community control on the number of fishing units in the village and good, stable fishery. By 1991, it was estimated that about half of the 120,000 active fishermen

in the State were employed on these motorised encircling-net units (ring seines). This spurt resulted in erosion of community control over nature and level of investment in the fishery, drop in catch rates and unemployment of large number of people, as many fishing units left fishery. The existing units were confronted with the situation of having large number of *karanila* fishermen than those working at sea. This way continuance of *karanila* system is under threat due to current over-capitalised pelagic fishery and due to break down of community institutions (Kurien and Vijayan, 1995 and Campbell, 2003).

In the northern and southern districts of Kerala, certain mutual aid associations exist among the traditional fishermen. Locally it is known as *Kuri kalyanam* (fund raising festival). The fisherman in need of funds calls all friends and relatives to a festival at which each participant donates any amount to the promoter according to his mite. Even though these donations are not treated as loans the fisherman who benefits from the *Kuri kalyanam* is morally bound to reciprocate when others in the community invite him for such festivals. This interesting method of support within the community is restricted to very specific areas and seems to be successful because of a certain equality of economic status among the participants in the *Kuri kalyanam* (Archari, 1999).

Community management is then effective, when there is proper participation of the communities in the management of the fishery. Traditional and modern institutional arrangements are among the most important social assets available to coastal fishing communities. The *Karinila* system was concerned with the income sharing pattern in south Kerala, mainly in Alappuzha region. The *Kadakodi* of northern Kerala were concerned with conflict resolution. This century old traditional management system prevailed as late as 1980s. Conflicts were often related to the sharing of resources. *Kadakodi*, therefore, was a powerful institution that dealt with resource management.

There are many issues in the co-operative management of fisheries which includes: a) fishermen involvement, participation in co-operatives needed to be strengthened; b) conditions under which fishing co-operatives can attain economic viability and become self-sustaining without any external support are to be considered; c) how co-operatives can acquire and maintain exclusive rights to fisheries falling in their jurisdiction are relevant

in terms of open access nature; d) to reconcile the conflicting interests and claims of members using traditional craft and gear, and those using mechanised craft and gear are matters needed to be attended as a form of conflict resolution; e) to ensure equitable access to fish stocks and equitable distribution of benefits from the catch and also to ensure fair and remunerative prices to members and retain their loyalty to the co-operatives are the issues to be stressed. In situations where communities are the predominant social unit, systems of community-based transferable quotas will need to be designed to allocate utilization rights and responsibilities to communities (FAO, 1997).

Chapter-4

Issues Regarding Livelihood and Gender - An Investigation /Analysis of Fishing Community and of Social Actors in Marine Sector of Kerala

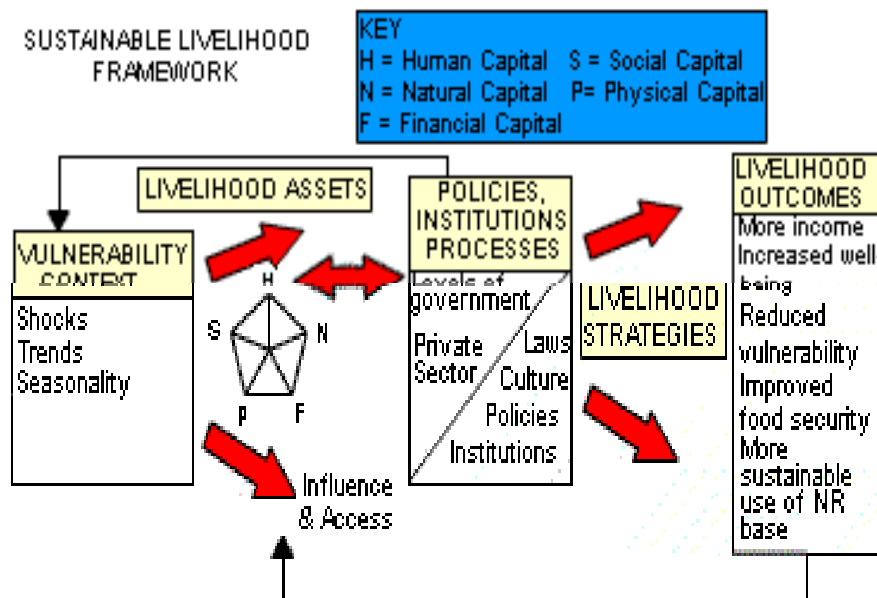
Coastal areas are among the poorest of the poor, particularly in developing countries. The poor have relatively free access to the coastal seas; therefore, fishing is an opportunity of last resort to make a living. According to Berkes, *et al.*, (2001) the total number of fishers (coastal marine and freshwater) is over 51 million in the world, amongst which 99 percent are small-scale fishers, and 95 percent from developing countries. Three million people, spread over 3600 near-shore villages, depend on capture fisheries for their livelihoods (ICSF, 2005). Degradation of resources (such as water scarcity, declining fish catch) and overcrowding or the lack of opportunities (absence of entitlement to physical, financial, social and health assets), uncertain employment and earnings, limited livelihood assets and subsistence almost entirely from fishing impacts these community's livelihood options. Therefore, a better understanding of the status of physical, economical, social, cultural, political and institutional factors is critical to suggest resource management policy measures that improve the household's livelihood options and well-being.

Increasing competition in terms of more fishing fleets for limited stock of available fish brought more financial liability to fishers. Open access nature and weak governance further contributed to the heightened vulnerability among fishing communities. Other factors affecting vulnerability include trends in resource and market dependency and social exclusion due to caste hierarchy or belonging to a religious minority. Because of this open access nature, fishing is considered an activity of last resort.

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, without undermining the natural

resource base on which they rely. A detailed livelihood framework is explained in figure 4.1.

Figure 4.1 Sustainable Livelihood Frameworks



Source: Divakarannair, 2007

Vulnerability encompasses trends, shocks and seasonality. *Trends* in resource/market dependency (trade liberalization), social exclusion (caste, religion), lack of/or no physical assets (housing, infrastructure), high population densities (large family size), having no political assets (marginalized and powerless) place the poor households of the fishing community in a vulnerability context. Being low in caste hierarchy, members of fishing communities have limited access to assets particularly, political and financial assets. Their increased vulnerability is also due to lack of proper housing. Often they live in overcrowded thatched shacks that need basic amenities. This is particularly true among those with large family sizes. Communities engaged in small-scale fishery in developing countries are often marginalized from mainstream population and they lack representation to voice their powerlessness. *Shocks* such as changes in bio-physical environment, competitions for limited resource, depletion of fish stocks, changing technology, financial liability, fluctuating prices for their produce (fish landed) and weak

governance increase the vulnerability context. Policy and institutions refers to both the formal and informal institutions and organizations that shape the livelihoods of individuals and households by influencing access to assets, livelihood strategies and vulnerability. These policies, institutions and processes exist at multiple levels: local, regional and national. Livelihood strategies include within or outside the sector; borrowing to improve technology. Long-term: protecting habitat; investing in implant of artificial reef; sending children for higher education. A short-term strategy could be also to borrow money to buy better fishing gear or craft.

4.1 Status

The Kerala Fisheries Development and Management Policy of 1993 is one of the few policy documents that have strong focus on issues of poverty and livelihood security. The policy highlighted the need for aquarium reform legislation in the territorial and inland waters to ensure the fishing right in terms of ownership of fishing assets and right first sale to be ensured to the first harvester. The policy also stresses the need to improve coordination among various governmental institutional set-ups, improving credit availability, improve skill and productivity of fish workers, to raise socio economic status of those involved in fisheries related activities including women in the management of fisheries resources (GOK, 1997).

The Government of Kerala subsequently set up a Task Force on Livelihood Secure Fishing Communities in 1997. However, the recommendations of the Task Force are unfortunately, yet to be implemented meaningfully. According to the ADB (2003), in the Draft Proposal on Fisheries Policies, announced in February 2002 and the new draft policy titled “Fisheries Development and Management Policy” issued in September 2002, the “revolutionary programmes, viz., aquarium reforms, Matsya Bhavan, women empowerment, formation of district-level fisheries management committees, etc. envisaged in the fisheries policy of 1994 are totally missing in the present policy document.” Despite this, however, Kerala remains the only coastal State with has put a strong policy emphasis on livelihood issues in the fisheries sector.

Fisheries are one of the main sources of livelihood for the rural poor, particularly the fisher community. Inland aquaculture has witnessed the highest growth rate and emerged as the most important and contributing activity to fisheries sector. The livelihood options exist for both the poor and large fish farmers through horizontal and vertical integration of the enterprise. Similarly, marine fisheries are a major source of livelihood for lakhs of people along the coast. The total output of fisheries sector was Rs 31,672 crores during 2003-04 with net domestic product valued at Rs 27,026 crores (CSO, 2005). With this level of output, over 90 lakh people may be employed at subsistence level of annual income of Rs 30,000/ Fisherman. The share of marine and inland sector is 54 and 46 percent respectively.

4.2 Government Initiatives Especially for Livelihood Security and Social Security

A number of programmes are under implementation for providing social security and livelihood support to the fishermen community. The State Government enacted another legislation viz. the Kerala State Welfare Fund Act (1985) to implement all the welfare schemes handled by the Department. Old age pensions, lump sum grant to fisherchildren, compensation against loss of life and other welfare schemes were brought under Welfare Board. The Kerala Fishermen Welfare Fund Board is the implementing agency for welfare and relief schemes to the fishermen in the state. The Board has 221526 members registered contributing allied workers. There are 31577 old age pensioners and 4860 widow pensioners.

In order to provide social security and livelihood support to the fishermen community programmes like saving-cum-relief scheme, NFWF housing, Group insurance to fishermen, insurance coverage for fishing implements etc. The saving cum relief scheme is for providing assistance to fishermen during lean period by mobilizing their savings during the peak season. During 2008-09, 138000 beneficiaries were assisted through this scheme. Under NFWF in 2007-08, 1500 houses were constructed by spending an amount of Rs.16 crores. All active fishermen are covered under group accident insurance scheme. About 2.28 lakh fishermen were insured under the scheme. Assistance is provided to

accidental death/missing of fishermen while fishing, permanent and total disability and partial disability. About 2.36 lakh fishermen were insured under the scheme.

4.2.1 Debt Relief to Fishermen

Fishing community are the most vulnerable sections which are in a debt trap. As a substantial effort to relieve them from the sufferings, the Government constituted The Kerala State Fishermen Debt Relief Commission with 5 members. The Kerala Fishermen Debt Relief Commission Act, 2008 is expedient to provide for urgent relief to the fishermen who are in distress due to indebtedness by constituting a Commission for recommending appropriate relief measures to such fishermen and for solving their problems. It has been estimated that fishermen have a debt liability of Rs 524 crore. During 2008-09, an amount of Rs 10 crore and during 2009-10 an amount of Rs 10 crore were provided with budget for debt relief measures for fishermen. Government have waived of the debt outstanding with 9891 fishermen with an amount of Rs 1182.6 lakh during 2008-09 (Economic Review, 2009).

4.2.2 Tsunami Rehabilitation Program.

To restore the livelihood of the Tsunami affected population, Tsunami Emergency Assistance Project is at implementation with the help from Asian Development Bank. In the project, Rs. 38.62 crores has been provided for fisheries sector, out of this Rs. 29.07 crores has been expended for livelihood restoration activities up to December 2008. Planning commission has approved Tsunami Rehabilitation Programme (TRP) for an amount of Rs 1441.75 crore for reconstruction of damaged physical and social infrastructure and for the revival of livelihood.

Under the Special area Development Programme a new project viz., Integrated Coastal Area Development Project was started in 2007-08 with an outlay of Rs 727 lakhs, which was undertaken in Kasargode and Kannur districts. The project include providing water supply, fish landing centres, public health center and dispenserries, biogas plant, anganawadies etc. Another agency namely coastal area development agency was constituted in 2004, to accelerate the pace of development of the coastal areas and in

2008-09 the Coastal Area Development Corporation Limited was reconstituted. An amount of Rs 9 lakh was allotted for the Corporation.

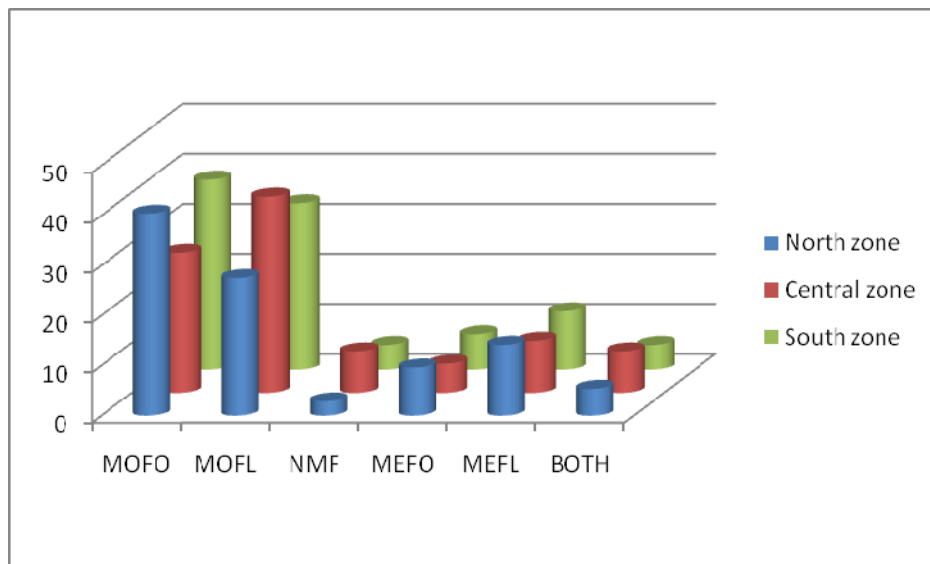
4.3 An analysis of fishermen community on Livelihood issues

Table 4.1 Occupational dependency / attachment

Sectors	North zone		Central zone		South zone		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
MOFO	97	40.4	67	28	91	38	255	35.4
MOFL	66	27.5	94	39.2	80	33.3	240	33.3
NMF	7	2.9	20	8.3	12	5	39	5.4
MEFO	23	9.6	14	5.8	17	7.1	54	7.5
MEFL	34	14.2	25	10.4	28	11.7	87	12.1
BOTH	13	5.4	20	8.3	12	5	45	6.3
Total	240		240		240		720	

Source: Survey data

Figure 4.2 Occupational dependency / attachment



Source: Survey data

Sector wise distribution in the table 4.1 reveals that majority are employed in the mototised sector followed by mechanised, then employed in both the sectors and finally in the artisanal sector is represented in figure 4.2. The case is equally same in all the three

regions as well. Nearly 48 percent of the respondents are motorized fishing category. mechanized fishing labourers constitutes the second category.

Table 4.2 Number in fishing as a percentage of total occupied

	No: occupied	No: in fishing	No: in non-fishing	%
North zone	428	344	84	80.37
Central zone	400	272	120	68
South zone	408	294	114	72.05
Total	1236	910	318	

Source: Survey data

High level of dependency on fisheries by the households can be witnessed from the table 4.2. The total household surveyed, 73.6 percent are attached at fishing as a full time occupation and remaining 25.7 percent are involved in non-fishing activity. The high level of dependency is observed in the northern districts of Kerala, followed by south zone and finally central zone. Nearly about 80 percent are depending on fishing for a livelihood because of large family size and large number of dependents.

Table 4.3 Labour stickiness

Attempted to change			Willing to change			In future, fishing will be			Children perspective			Job other than fishing		
	No:	%		No:	%		No:	%		No:	%		No:	%
Yes	144	20	Yes	288	40	Better	20	2.80	Yes	28	13.6	Yes	300	41.7
No	576	80	No	432	60	Worse	572	79.40	No	622	86.4	No	420	58.3
						No	128	17.80						

Source: Survey data

Lack of alternative and viable employment opportunities remain as a big hindrance in the diversification of occupation among the fishing community. Lack of necessary skills and entrepreneurship also limits the employment diversification. This situation combined with

regional concentration and low mobility of fisher-folk has direct effect on increasing pressure on sea resources and increasing competition in already existing occupations.

In analyzing the matter concerned with labour issues, labour stickness and future perspective in the sector is stated in the table 4.3. Occupational attachment has been witnessed with 80 percent have not attempted to shift the occupation. Concern about the future prospects in the fishing, nearly 79.40 percent are expecting that the situation will be worse in the coming years and only 3 percent are hoping of better or improvement. About 86.4 percent fishermen families are not interested in continuing with fishing occupation. They are trying for alternative employment opportunities. 58.3 percent are exclusively depending on fishing without having any other skill and 41.7 percent are engaged in fishing and are also involved non-fishing activity during off-season.

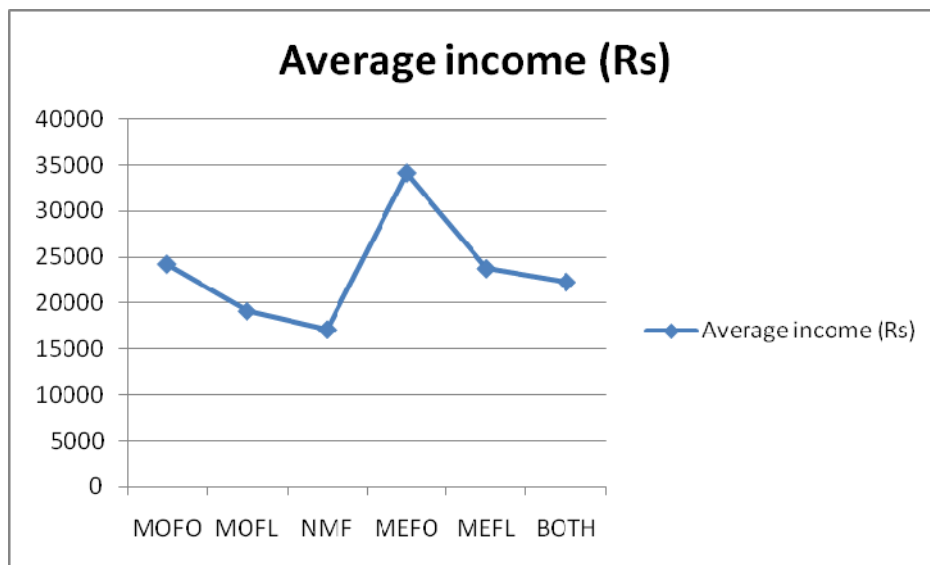
Average income of the different sectors in fishing mentioned in table 4.4 as well as in figure 4.3 highlights the fact that mechanised fishing operator ranked the position followed by motorised operator, then mechanised labour etc. Mechanised operator receive average income of Rs 34105/- and motorised receive nearly Rs 24199/-. Non-motorised or traditional sector earn income of Rs 17089/-

Table 4.4 Average income from fishing

Sectors	Average income (Rs)	Rank
MOFO	24199	2
MOFL	19087.7	5
NMF	17089.7	6
MEFO	34105.3	1
MEFL	23722	3
BOTH	22260	4

Source: Survey data

Figure 4.3 Average income from fishing



Source: Survey data

Table 4.5 Borrowing and average interest burden

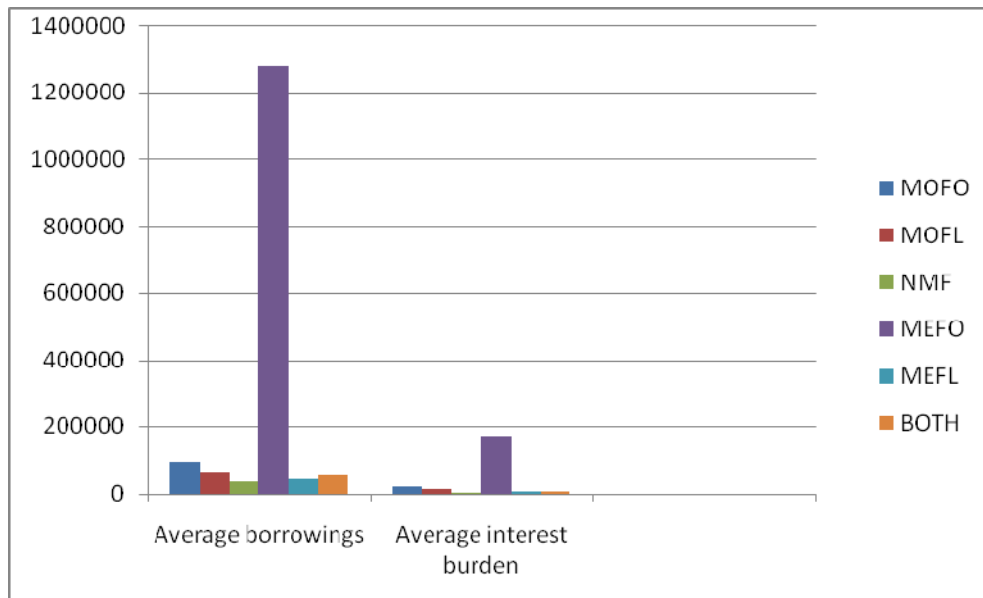
Sectors	Average borrowings	Rank	Number of respondents	%	Average interest burden	Rank
MOFO	94962	2	233	38	23832.3	2
MOFL	62172	3	199	32.4	14262.3	3
NMF	38283	6	31	5	4741	6
MEFO	1275280	1	52	8.5	170596	1
MEFL	46232.7	5	70	11.4	7110	4
BOTH	55342.7	4	29	4.7	6078	5

Source: Survey data

One of the important problems related to credit is that it is tied to conditions other than merely the paying off interest. Generally, it is linked to the sale of fish. Pressure to use higher fishing efforts are intense among fishermen who has high indebtedness and in many a times they (Fish merchant fish auctioneer) exerts huge pressure on the fishermen to extract more of the resources, with out considering the sustainability of the resources. Table 4.5 and in figure 4.4 stresses on the overcapitalization of the mechanized sector and

resulting indebtedness. Both the average burden and average borrowings are generally lower for fishermen belonging to any co-operative societies. Thus, one can argue that being associated to any co-operative society, reduces ones indebtedness. The probable reason could be with the better source of credit available to members in the co-operatives.

Figure 4.4 Borrowing and average interest burden



Source: Survey data

Credit requirement is necessary economic up-liftment of any community especially the backward community who are exclusively depending on fishing for their livelihood. Earlier, community were in the clutches of money lenders. But due to the emergence of Government co-operatives, community initiated co-operatives, nationalised banks etc the problem of credit has been tackled up to a certain limit. The main problem is concerned with the repayment capacity of the community because of seasonality of their employment.

Since credit is one of the most important input to ensure a sustainability in the fishery, it can be seen that fishermen community mostly depend on institutional credit mechanism, rather than informal credit mechanism from the table 4.6 as well as in figure 4.5. But in central zone especially Ernakulam, informal credit mechanism play a crucial role. This may be because of over capitalization and urban influence. Credit needs are inadequately

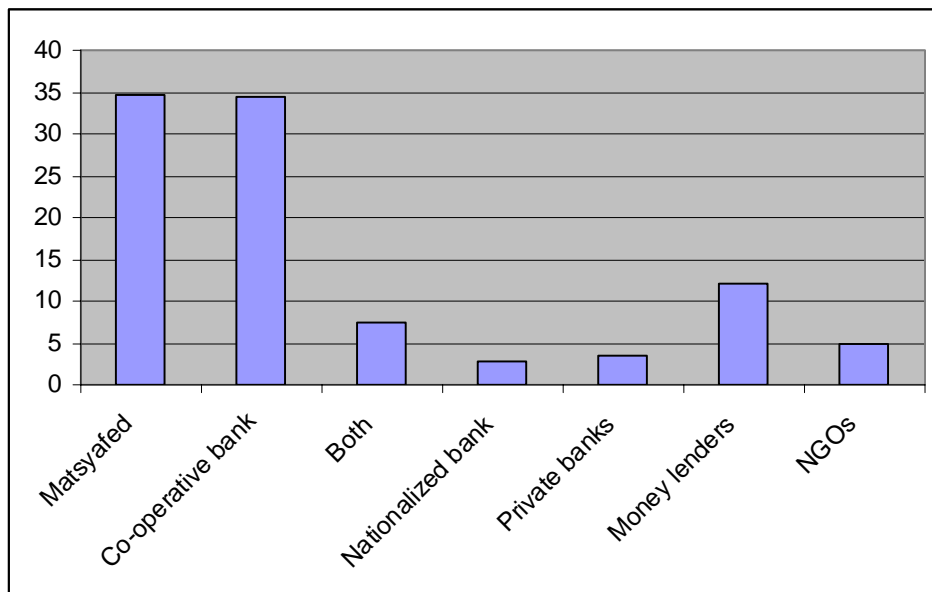
met (i) their low repayment ability; (ii) lack of own institutional arrangements; and (iii) their inadequate access to institutional credit (Campbell, 2003).

Table 4.6 Source of credit

Source	North zone	Central zone	South zone	Total	%
Matsyafed	81	60	72	213	34.7
Co-operative bank	66	69	76	211	34.4
Both	8	21	17	46	7.5
Nationalized bank		8	9	17	2.8
Private banks	17	3	2	22	3.6
Money lenders	10	39	25	74	12.1
NGOs	19		12	31	5

Source: Survey data

Figure 4.5 Credit sources



Source: Survey data

4.4 Profile of Fishermen

Kerala is the only maritime state in India where the Muslim, Hindu and Christian marine fishing communities have a significant presence. The Muslim fishing communities dominate the northern coastal region, the Hindus are concentrated in the central region

and the Christian are in the majority in the south. The caste dimension in the study area is in table 4.7, which highlights the heterogeneity among the fishermen community in Kerala.

Table 4.7 Heterogeneous community

Caste	North zone	Central zone	South zone
Hindu	14	158	60
Muslim	226	52	
Christain		32	180
Total	240	240	240

Source: Survey data

There is also a strong gender bias in favour of male children. This is evident from the sex ratio of 972 females to 1000 males of Kerala fishermen population. The dependents are high in the northern districts and less in southern districts. The gender difference is prevalent in north zone than in other zones, is conferred in table 4.8.

Table 4.8 Gender among fishermen households

Gender	North zone	Central zone	South zone
Males	602	446	452
Females	567	440	405
Children	771	300	271

Source: Survey data

Table 4.9 Family structure

Nature of family	North zone	Central zone	South zone
Joint family	104	36	28
Nuclear family	136	204	212

Source: Survey data

The nature of family pattern given in table 4.9, highlights the existence of nuclear families in all zones. The emergence of nuclear families are due to changes in life style, limited homestead plots in coastal areas and preference of small family size for giving proper upbringing of their children. Distribution of family according to the size clearly points the emergence of nuclear family system in northern districts of Kerala.

The distribution of family size in Table 4.10 gives the picture of the emergence of nuclear family even in the northern districts. Majority of fishermen community have a family size

of 2-6 members, followed by 7-11 members. It can be seen that family size is declining from north to south.

Table 4.10 Distribution of family size

Size	North zone	Central zone	South zone	Total
2-6	98	200	212	510
7-11	96	38	28	162
12-16	38	2		40
17-21	8			8
Total	240	240	240	720

Source: Survey data

4.5 Quality of Life

One of the paramount reasons for the poor quality of life and the sub-standard conditions of habitat of the marine fishing communities in Kerala state is the crowding of the whole community on a narrow coastal belt. This is a result of the highly dispersed nature of the fishery resource and the consequent de-centralised nature of fishing operations using beach-landing crafts. Every fisher prefers to live on the seafront near the point where he lands his craft and from where he can observe the sea.

Table 4.11 Type of house

House type	North zone	Central zone	South zone	Rank
Thatched	4	20	20	4
Sheet	16	14	44	3
Tiled	188	148	92	1
RCC	32	72	62	2

Source: Survey data

In most of the coastal areas, the prevalent of tiled houses followed by concrete roofed houses, sheet roofed houses are visible in table 4.11. A large section of households have built thatched huts on land even beyond the cadastral survey (land beyond the cadastral survey on the seafront is under Central Government jurisdiction). Consequently they are always prone to the perennial risk of their huts being damaged as a result of natural disasters.

Table 4.12 Land possession

Land plot	North zone	Central zone	South zone
0-4 cents	44	46	128
5-8cents	142	102	68
9-12 cents	34	54	38
13 cent and above	8	24	4
Total	228	226	238

Source: Survey data

In case of land possession pattern in table 4.12 highlight a large number of fishermen households in the fishing villages have small land holdings. Such meager land holding patterns have a bearing on both the spatial settlement pattern and quality of housing and related amenities. Nearly 3.8 percent does not possess the land. They are either living in rented house or in encroached land. With regard to the land pattern majority possess up to 4 cents of land in south zone. While in the north and central zones, majority possess land plot of 5-8 cents.

The basic amenities related to housing such as electric lighting, toilet facilities and access to water in the fishing villages mentioned in the table 4.13, are also at far lower standards when compared to the state as a whole. The major source of water is the public tap. Pipe water connection facility is also available in all the zones. Most houses in the coastal villages are electrified. The major source of information is through television and based on the information from neighbours. Newspaper as source of information found its presence only in the central zone.

Table 4.13 Physical asset

Source		North zone	Central zone	South zone
Water	Own well	40	4	32
	Public tap	160	212	126
	Pipe water	40	24	82
Light	Electricity	220	216	238
	Kerosene	20	24	2
Information	Newspaper		14	
	Radio	18	30	24
	T V	136	100	154
	Neighbours	92	96	62

Source: Survey data

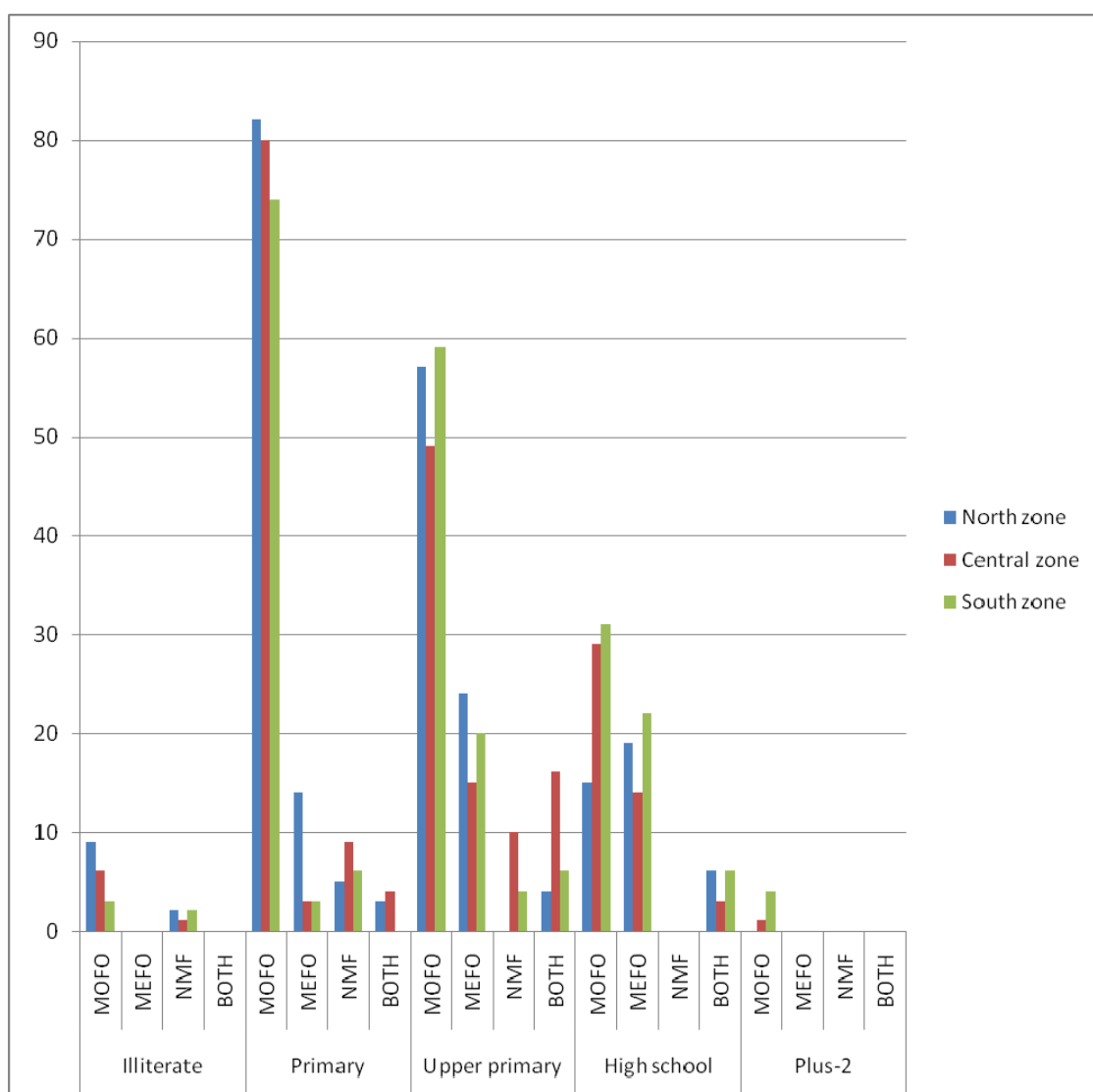
Table 4.14 Educational achievement

Education		North zone	Central zone	South zone
Illiterate	MOFO	9	6	3
	MEFO			
	NMF	2	1	2
	BOTH			
Primary	MOFO	82	80	74
	MEFO	14	3	3
	NMF	5	9	6
	BOTH	3	4	
Upper primary	MOFO	57	49	59
	MEFO	24	15	20
	NMF		10	4
	BOTH	4	16	6
High school	MOFO	15	29	31
	MEFO	19	14	22
	NMF			
	BOTH	6	3	6
Plus-2	MOFO		1	4
	MEFO			
	NMF			
	BOTH			
Total		240	240	240

Source: Survey data

Though significant improvement have occurred in the standard of living in the last two decades, compared to the general standard of living of Kerala, the fisherfolk's condition remains relatively poor in terms of housing, health, sanitation, sex ratio and education. The matter concerned is with the educational achievement as stated in table 4.14 and is depicted in figure 4.6 that most of the fishermen have either primary or secondary level of education. In the central and south zone some fishermen have attained the educational qualification of plus-2 level. Illiteracy level is also prevalent in all zones, but it was visible more in north zone compared to other zones.

Figure 4.6 Educational achievement



Source: Survey data

Table 4.15 Average income among sectors

Sectors	North zone	Central zone	South zone
MOFO	26652	22875	23070
MOFL	19384	17447	20432
NMF	14500	18100	18669
MEFO	34250	32100	35966
MEFL	29000	22500	19666
BOTH	22436	22845	21500

Source: Survey data

In case of income received by different fishing sectors given in table 4.15, mechanised receive highest followed by motorised. Due to prominent role in technological innovation, south zone receive more income compared to other zones. In case of mechanised labourers north zone receives higher income because most labourers are migrated from neighbouring states of Tamil nadu etc.

Table 4.16 Expenditure pattern

Source	North zone	Central zone	South zone
Food	76.54 %	72.81 %	73.72 %
Clothes	6.90 %	10 %	9.05 %
Medical	0.80 %	2.80 %	2.11 %
Interest burden	7.60 %	8.98 %	8.60 %
Others	8.16 %	5.73 %	6.50 %

Source: Survey data

As being pointed from the table 4.16, top most priority in their expenditure basket is for food, clothing, interest payment and others. Others in the list consist of expenses for social events, meeting emergency and education expenses of their children. It is witnessed that even with larger family size, north zone's expenditure is low in terms of clothes, medical treatment etc. It is to be mention that north zone's expenditure on other items is mainly for social events, festivals and in conducting marriage of female children. The urbanisation effect is visible in case of other two zones, but it is felt more incase of central zone. A typical motorized fisherman's family spends about 67.2 to 77.9 percent of his income on nonfood items. The indebtedness ranges from Rs.33, 454 - Rs.76,401 (across the states average). PDS dependence was found to be less (CMFRI, 2009).

The high density of population along the coast with limited accessibility of land resources lead to over dependence on marine resources for their sustenance. Many of the coastal fishing villages are vulnerable to sea level rise as they are located close to the seashore. A large number of coastal fishing villages (about 200) within 100 m are in Kerala. The problems encountered by the fisherfolk are ranked according to its priority or which need immediate action are listed in table 4.17, include water supply shortage, over crowding of coastal areas, in-availability of proper fish landing centres, sewage problems, poor health conditions, high risk of natural disasters.

The lack of basic amenities, the excessive crowding caused by cluster settlement pattern and the use of beach for excretionary purpose etc give rise to strong negative reciprocal externalities between households, Contagious diseases in fishing villages spread very rapidly under these physical conditions lead to poor health conditions of the fishing communities. Skin infections, diarrhea disorders are much prevalent in coastal areas.

Table 4.17 Problems encountered by the fishermen

Problems	North zone	Central zone	South zone	Total	Rank
Health	22	36	20	78	5
Water	50	44	52	146	1
Sewage	30	48	20	98	4
Crowded	36		74	110	2
Harbour/ Landing	40	76		116	3
Fishing	42	28		70	6
Natural calamity			54	54	7
Housing	20	8	20	48	8

Source: Survey data

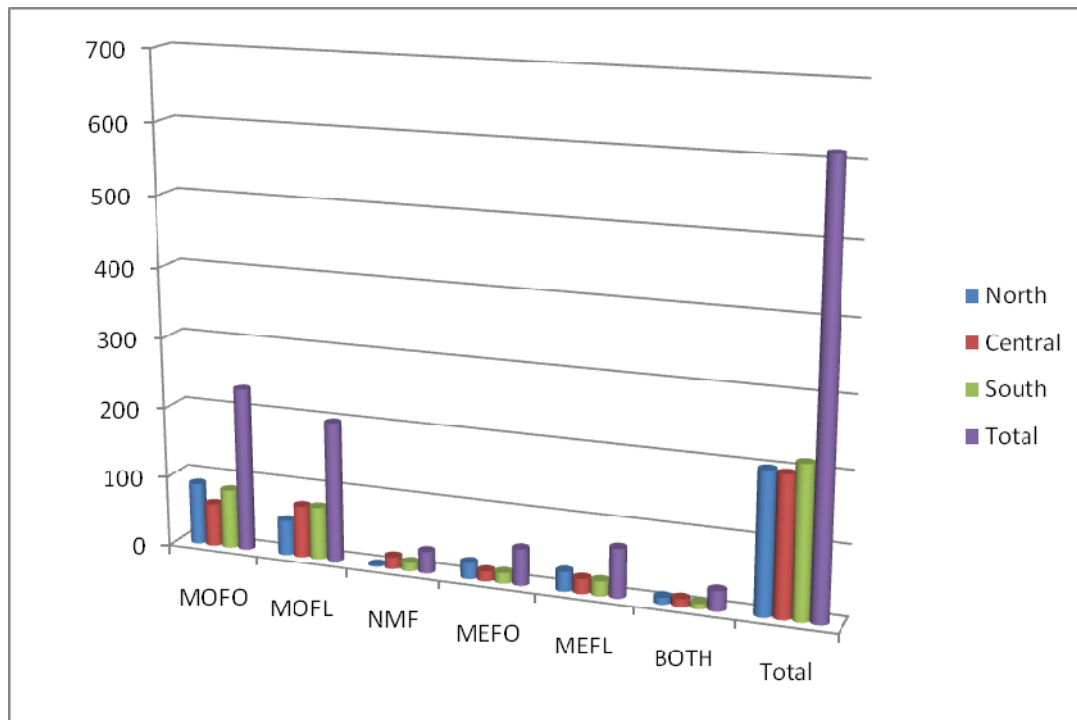
Table 4.18 Debt burden of the sectors

Sectors	North	Central	South	Total
MOFO	88	61	84	233
MOFL	50	74	75	199
NMF	2	17	12	31
MEFO	23	14	15	52
MEFL	28	21	21	70
BOTH	10	11	8	29
Total	201	198	215	614

Source: Survey data

Increased demand and competition has resulted in significant increase in price and so the capital needed to be in business. This result in either getting credit at exorbitant interest rates due to non-availability of institutional sources leading to outflow of hard earned money as interest repayment or lead to marginalisation of the fishermen community. Of the total household surveyed about 85.3 percent of the households are in debt. The debt burden is found highest among motorised sector with 37.9 percent, followed by motorised labour and the mechanised sector. In the mechanised sector the debt burden is only about 5 percent, which is shown in table 4.18 as well as represented in figure 4.7.

Figure 4.7 Debt burden of the sectors



Source: Survey data

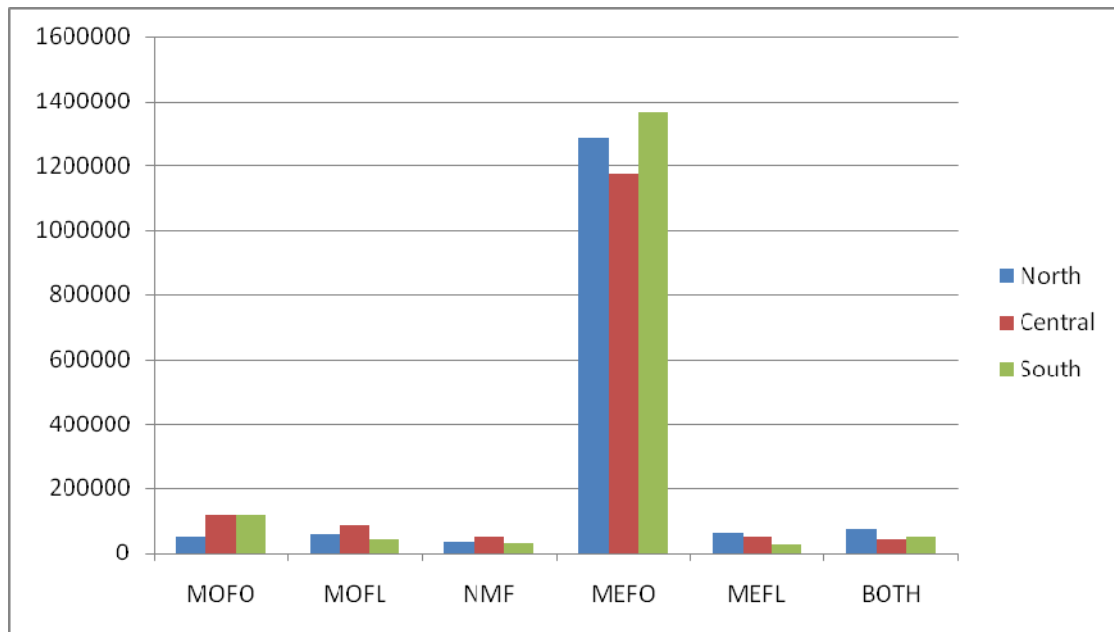
The average debt payment mentioned in table 4.19, states that highest in the south and central zones which is depicted in figure 4.8. In terms of repayment of debt, the amount to be repayed is highest for the mechanised sector with Rs 1275280/-, followed by motorised with amount Rs 94962/- and labourers in both the mototised and mechanised sectors. The interest repayment is low for the artisanal sector with Rs 38283/-.

Table 4.19 Average debt burden of sectors

Sectors	North	Central	South	Average
MOFO	52090	115325	117471	94962
MOFL	57000	85920	43596	62172
NMF	34500	49100	31250	38283
MEFO	1287500	1175800	1362540	1275280
MEFL	60000	50000	28698	46232.7
BOTH	75000	42505	48523	55342.7

Source: Survey data

Figure 4.8 Average debt burden of sectors



Source: Survey data

Purpose of indebtedness

The purpose of borrowings is mainly for the buying inputs, which is considered as investment. It is ranked first for input purchase followed by meeting household expenditure, conducting marriage, house construction etc in the table 4.20. Huge investment is made for inputs due to intense competition in the fishing sector, cost escalations of raw materials and fall in price of resources. Indebtedness is more in south zone followed by north and central zone.

Table 4.20 Purpose of debt burden among fishermen community

	North	Central	South	Total	Rank
Input	112	68	78	258	1
Household exp	45	72	77	194	2
House cons	20	27	17	64	4
Marriage	22	15	31	68	3
Medical treatment	2	9	8	19	5
Education		7	4	11	6

Source: survey data

Table 4.21 Saving pattern

		North zone	Central zone	South zone	Total
Pattern	Daily		4	2	6
	Weekly	2	8	6	16
	Monthly	46	52	40	138
	Annual	24	16	38	78
Purpose	Input	30	20	38	88
	Edu	8	8	2	18
	Marriage	16	8	14	38
	Income	12	18	12	42
	Business	6	26	20	52
Where	Bank	18	26	10	54
	Post Office	30	24	31	85
	Chitty	14	14	4	32
	Cooperatives	10	14	35	59

Source: survey data

The main purpose of undertaking saving is for buying inputs, education as well as in conducting marriage of female members is shown in table 4.21. The saving pattern is taking place on monthly basis followed by annual basis. The location where savings are deposited are in the post office followed by co-operative institutions. Chitties as well as the existence of financial intermediaries in inculcating saving habits are also prevalent in coastal areas.

The involvement of fishermen community in the institutions managed by community itself as well as state promoted institutions such as fisheries department and Matsyafed societies has been highlighted in Table 4.22. It is relevant to highlight the role of fisheries department in all the three zones. High level of membership in the department is mainly for availing social welfare benefits and also for identity purpose. Nearly 98 percent are membership in community level organisations and the remaining 2 percent are either migrated for job opportunities. In terms of Matsyafed societies, the membership is almost equal in all three zones. That is nearly 76 percent of the fishermen are members of the

Matsyafed societies prevalent in their region. Involvement of non-governmental organisations is witnessed in south zone followed by central zone.

Table 4.22 Membership pattern in various institutions

Institutions	Pattern	North zone	Central zone	South zone	Total
Fisheries Dept	Member	234	220	226	680
	Not Member	6	20	14	40
Matsyafed Society	Member	172	188	187	547
	Not Member	57+11	39+13	45+8	141+32
NGOs	Member	70	186	204	460
	Not Member	170	54	36	260
Community	Member	234	236	236	706
	Not Member	6	4	4	14

Source: survey data

4.6 Various Stakeholders and Activities in the System

Community–Based Fisheries Management is not static. It is dynamic. Overtime the core component of CBFM, that is, the community, the resources and resource boundaries, various activities involved in the extraction of resources, management, conflict resolution etc, varies across time and space.

The government, mechanized and traditional sector are the contestant currently involved in the planning, fishery resource exploitation, marketing and export. The relationship between these players is more antagonistic than cordial. Often the mechanized and the traditional sectors are in conflict arguing that the former held responsible for the miserable socio economic status of the latter. Intergenerational legitimacy is claimed by the traditional sector for their rightful share, authenticated by traditional wisdom and safe fishing rights. The mechanized sector on the other hand represents the advanced technology and market driven economy. Lack of balanced policy, dismal implementation and monitoring are some of the causes, for deepening the crisis in fisheries sector.

4.6.1 Various actors in the Marine Fisheries in Kerala

Onboard the trawlers, the post-harvest activities of the crewmembers related to sorting the catch according to species, size and value, chilling the high quality varieties in insulated ice containers, drying a part of the catch onboard, and adding salt to the fish meal grade by-catch for preservation. Onboard the traditional boats post-harvest work was generally confined to icing and/or keeping the catch away from direct sun. The crew also transports the catches to the auction site. Income of the crew depends on the sharing pattern that exists. In the artisanal fishery the income after deducting common expenses, i.e. expenses on fuel, food, auctioning commission, etc. is broadly apportioned into an equipment share (return to capital) and a crew share (return to labour). In the case of mechanised sector crew share range 33 to 35 per cent of the net income and it is shared based on division of labour, between sirangu, the leader (9 percent), driver (6 percent) etc.

The wholesalers buy fish in bulk from auctioneers and sell it to retailers or other traders. The wholesaler assumes the risk of selling the fish and therefore keeps a higher margin as compared to auctioneers. Ice and transportation form the largest share of the wholesaler's costs. The retailers sell the fish directly to consumers. Fish Vendors are a major source of supply of fish for the communities within and close to the coastal areas. This is mainly due to predominance of artisanal fishery and largely decentralised nature of landings in the region. There are three male fish vendor types: head load fish vendors, cycle fish vendors and M-80 fish vendors. The first two categories can easily be placed among the poor in post harvest sector

With fish resources becoming scarce, competition becomes stronger and whatever is available is at higher prices consequently leading to an increase in the working capital required. The fish auctions were increasingly conducted on a ready-cash basis, which again leads to marginalisation of women, as they were not able to participate in auctions when the landings are large.

The key intermediaries in fish marketing are: auctioneer, wholesaler, retailer and the vendor. Several other intermediaries like local fish collectors and fishermen cooperatives also exist in several markets. The fisherman brings his catch to auctioneer, who auctions the fish to various traders at the landing centre. The auctioneer sometimes advances money to the fisherman and in turn gets the right to auction his fish. Auctioneers charge 5-10 per cent of sales value as their commission from the fishermen. The commission agent purchases fish from landing centres and sends the fish for sale to the auctioneer. The agent charges 5 -10 per cent of the sale value as his commission from the fisherman. To maintain the crafts and gears, the fishermen approach the middlemen who lend out the money at large. The middlemen retrieved the money by auctioning the fish while the fishermen return from the sea. In Kerala, it has been in the practice over the years. The fishermen do not have any voice in the price of the fish, which they caught. It is happening in both traditional and mechanised. The nature of activity and the level of employment of various social actors in the marine fisheries are stated in table 4.23.

Table 4.23 Various Actors and Activities in the Marine fisheries in Kerala

Actor	Nature of Activity	Nature of employment / Wage level
Traditional Fishing Village		
Fisherman-crew in artisanal craft	Does not have a boat, goes as wage labourer for fishing and gets a share.	Attached to the fishing unit. Average Income is Rs 12000-18000/- depending on number of days.
Fisherman, artisanal craft & net owner	Arranges fishing trip, goes with the same, gets share for his craft, engine and also his own wage share	Mainly goes for work during season. Average annual income ranges between Rs 16800-25000/-.
Auction agents	He is responsible for collection from the purchaser and gets commission for his services. He advances money to the fishermen for their fishing trips in turn for selling rights of fish harvested. Fishermen societies have taken up this role for reducing commission and to	Traditional auction agents of the various community organisations in marine villages. they are entitled to get 2-4 % of the commission of the catch value.

	get good prices for breaking the credit bondage.	
Village level commission agent	Buys from the auction at fishing village to supply to large-scale wholesale merchant Gets a commission for his services.	In some regions some community institutions and local self bodies appoint commission agents.
Society's auction agent	Mainly appointed by the fishermen co-operative societies to auction the catch landed by the fishermen who are members	Gets 2-3 % commission
Net makers/menders	Work as a group operated by the master net maker; Has business relations with certain number of boat owners.	This group include mainly elders among the community and women. the employment is on the daily basis during off-season and gets income between Rs750-1200.
Head load fish vendors	From fishing community; Purchase fish directly from auction at the fishing village/ mechanised landing centre/ wholesale market and they cater to nearby retail markets or directly to the households in the nearby area.	Employment activity is high during peak season. average annual income ranges between Rs 8000-10000.
Cycle/ fish vendors	Mostly from outside community and place; Purchase fish directly from auction at the fishing village /mechanised landing centre/wholesale market and they cater to nearby retail markets or directly to the households in the nearby area	No transportation cost is needed. get nearly Rs 9500-12000/-.
Mechanised Fishing Centre		
Fisherman-crew	Go as wage labourer for fishing and gets a share; Share depends on their position of the division of labour	Daily employment labourer/ worker in the units on a contract basis. income between Rs 15000-22000/-.

Mechanised boat owner	Owns the craft; employs people for operation; Gets the share pertaining to the craft.	Self employed/ an exporter. average income varies between Rs 25000-Rs 35000/.
Auctioneer (commission Agent)	Auction the fish harvested and ascertain the value of catch. He is responsible for collection from the purchaser and gets commission for his services. He advances money to the fishermen for their fishing trips and investment for the mechanised boat in turn for selling rights of fish harvested.	Mostly regular employment. average income range between Rs 28000-Rs 40000/-.
Labourers	Does all the manual work involved from transporting the auctioned produce packing the same in the trader's vehicle(s). Work as group on the basis division of labour and share the earnings	Contract labourers/ daily workers. average income between Rs 8000-Rs 14000/-.
Wholesale merchants	Purchase fish directly from Auction at mechanised / Traditional fishing centres through commission agents; Transport the same to distant wholesale (transmarket for sale).	Self employment/ employ labourers. average income ranges between Rs 35000-70000/-.
Exporters	They have their own processing unit, where they process, pack and sell direct abroad or through their clearing and forwarding agents. Employ mainly women for processing operations.	Mainly companies, individuals etc.
Processors	They mainly earn profit from exporting marine/ seafood products.	They are supposed to make an annual profit above Rs 50000/-.

Source : survey data

4.6.2 Women as a Social Actor

The role of women in the economic activities of coastal fishing communities is substantial in sustaining the region's livelihood. In India, the contribution of women in fisheries both in aquaculture production and their role in post harvest sector is substantial. About 5 lakh women are involved in the post harvest sector of marine fisheries. Women play an active role in secondary sector of marine fisheries. In Kerala, almost 50 percent of the post harvest activities are undertaken by them. They are involved in an array of activities in pre harvesting (net making), harvesting to post harvesting, with the majority of them in post harvesting that too in fish vending. Women involvement is highest in activities like marketing of fish, curing/ processing and peeling.

Many traditional fishing communities are characterized by a gender-based division of labour, in which women take on several shore-based tasks in the fisheries, ranging from fish vending, processing (mainly salting and drying), making and mending nets, weaving baskets, and, more recently, collecting and selling shrimp seed for aquaculture, peeling shrimp, sorting by-catch and preparing fish meal. While women's participation in actual fishing is known to be limited- given also the taboos associated with women going to sea—in several areas, it is common for women to fish in inshore, inter-tidal and mangrove areas, particularly for subsistence purposes. The women with different coping strategies like flexibly grouping among themselves, trying their best to stick to their livelihood, as there are no viable alternative jobs. They are facing additional burden in terms of increased distance traveled, the time spent for their trade and indebtedness. Developments in processing industry have given opportunity to diversify as peelers and hands in processing industry

In the dry fish trade, traditionally in north Kerala, women produce and sell directly to consumers or supply merchants. A few self- help groups have promoted production and marketing. But hundreds of others, wives of fishermen, work for low wages as cheap labour to sort and dry fish for large establishments. Women in Kerala also work for wages as processors and sorters in landing centers in the unorganized sector as well as in the organized sector where they dominate in prawn/shrimp processing and specialize in

peeling work (Bhatta, 2003). In recent years, highly developed peeling facilities have led to the decrease in the demand for such workers. In Kerala, peeling work dominates the occupation scene with nearly 45 percent of the total work force, followed by small fish traders (23 percent), processing plant workers (16 percent), fish curers/ dyers constituting 7 percent, beach workers (6 percent), and remaining constituting inn value addition (Sathiadhas, 2005).

Fish meal processors are usually women, who buy from the auction at fishing village, process the same and supply the end product to wholesale merchant sell on her own. Small-scale women dry fish processors buy low and medium value fish from the auction either in traditional/mechanised fishing centre or in wholesale fish market, process the same and sell either locally or to merchants associated with large dry fish markets. The vending pattern also varies. Some women sell in big markets, some in strategic roadside markets, which they have created for themselves and some engage in house-to-house vending. On an average, women spend eight to ten hours outside the home, traveling and vending. This is in addition to the time they spend on home management, which is on the increase as their male counterparts spend more time at sea than before due to multi-day fishing. The bamboo basket (kutta), which they were using earlier, is now replaced by aluminium vessel. Peelers are women who peel prawn for the export companies. There are two kinds: those that offer their skilled labour and those that procure prawn at auction, peels the same and sells the end product to an export company. Peeling sheds are pre-processing plants supplying to export processing plants. Fish sorters are usually women seen in mechanised landing centres sorting by-catch of trawlers. Nature of activity and wage pattern of women engaged in fish related activities are clearly highlighted in table 4.24.

Table 4.24 Nature of activity and employment

Occupation	Nature of activity	Nature of employment & wages
Fish meal processors	They are found in major landing centres and utilizes fish waste and surplus.	Self employment/ contract but intense during peak season. average income ranges between Rs1200-3000/-.
Peeling work	Mainly in export centres/ major landing centres. mostly seasonal in nature.	Work is mostly contract/ daily basis. average income varies between Rs 2500-4200/-.
Sorting/ grading	Mainly found in mechanised centres, throughout the year.	Contract basis of employment. income ranges between Rs 1800-3500/-.
Dry fish processors/ curing	Highly seasonal and found in all landing centres.	Self employment/ on contract basis. income ranges between Rs 1500-2500/-.
Fish trading/ vending	Employment throughout the year and in all landing centres/ marketing centres.	Self employment. income between Rs2500-5000/-.
Peeling sheds	Found near the landing areas and seasonal in nature.	Employment on the contract basis. income varies between Rs 700-2800/-.

Source: Survey data

Table 4.25 Women in activity

Activity	North zone	Central zone	South zone	Total	%
Saving	54	54	72	180	53.7
Peeling/ drying	2	16	26	44	13.1
Food products	4	12	2	18	5.4
Wood	22	8	15	59	17.7
Soap making	4	4	2	10	2.9
Others		8	16	24	7.2
Total	100	102	133	335	100

Source: Survey data

It is clear from the table 4.25, that most of the activity carried out by fisher women was by forming themselves into SHGs or neighbourhood groups and undertaking savings

activity. This gives them some degree of economic empowerment to them. The other activities in which women's participation/ involvement is more, includes wood followed by peeling/ drying etc. Larger participation of women is seen in Southern districts of Kerala followed by Central districts and Northern districts. It is impressive to see that fisher women in northern districts are not backward in terms of involvement and initiatives.

4.6.3 Society for Assistance to Fisherwomen

Society for assistance to Fisherwomen is an agency registered under Travancore-Cochin Literary and Charitable Societies Act 1955. This Society was registered in June 1, 2005. Area of operation of SAF is entire Kerala state. SAF is a registered society for encouraging and strengthening the locally organised social organisation among fisherwomen in coastal areas. Major objectives of SAF are. to help, strengthen, coordinate the fisherwomen to avail the development schemes and women welfare schemes, women empowerment schemes; to start micro enterprises for traditional fisherwomen in the neighbourhood groups framed by Local Self Governments/ NGO's and assist them technically/ financially to start new micro enterprises and to organize activities under the leadership of women for health, education and developmental programmes in fisheries sector.

Executive Committee of SAF is chaired by Government Secretary to Fisheries, and other members are Government Secretary, Fisheries, Director of Fisheries, Managing Director, Matsyafed, Executive Director of ADAK. Joint Director of Fisheries (SZ) and Executive Director, SAF. Executive Director of SAF is supported by the following staff strength. Assistant Director of Fisheries is the District Nodal Officer of SAF in all coastal Districts, supported by one Assistant Nodal Officer. All the officers of SAF are Fisheries Department Officials. These officers are co-coordinating the activities of fisherwomen SHGs with the help of Matsyabhavan Officers, who are the field level officers of Fisheries Department. At present nearly 5000 women SHGs are registered with SAF, along nine coastal Districts.

Projects undertaken by SAF

Economic Empowerment of Fisherwomen by providing Assistance

This scheme is being implemented based on the principle that Economic empowerment is the basic of social, educational, cultural and all other empowerment for any society. This scheme is to provide assistance for the women groups including fisherwomen for the development of Micro enterprises. To select the SHGs for financial assistance, received applications are scrutinized based on the guidelines approved by Governing Body. SHGs thus selected for assistance will be getting financial assistance as subsidy in the rate of 50 percent of the total project cost with a maximum limit of Rs 25,000 and the details of SAF beneficiaries are listed in table 4.26. Constant field level interactions with the beneficiaries are carried out by SAF officials with the assistance of Matsyabhavan officers at each Grama panchyaths. Physical achievement of the scheme for year 2006-2008, in all districts in Kerala is highlighted in table 4.27.

Table 4.26 Assistance given by SAF for fisherwomen empowerment

year	Amount sanctioned	No. of beneficiary groups
2005-2006	80 lakhs	382
2006-2007	80 lakhs	300
2007-2008	5 lakhs	10
2008-2009	10 lakhs	Skill training, Management training and beneficiary meet for 150 groups

Source: SAF, 2008

Table 4.27 Physical Achievement of the scheme Economic Empowerment of Fisherwomen by providing Assistance to Fisherwomen for the year 2006-2008

Districts	<u>2005-06</u>		<u>2006-07</u>		<u>2007-08</u>	
	No. of units	Amount of Cheque issued	No. of units	Amount of Cheque issued	No. of units	Amount of Cheque issued
Thiruvananthapuram	60	1500000	40	975000		
Kollam	36	825000	32	662500		

Alappuzha	91	1050000	80	1127500	<u>10</u>	62500
Ernakulam	39	843750	37	925000	<u>5</u>	112500
Thrissur	28	655000	20	250000		
Malappuram	32	787500	18	415000		
Kozhikode	39	865000	27	650000		
Kannur	35	450000	17	365000		
Kasargod	22	342000	16	87500		
Total	382	7318250	287	5,457,500	10	175000
Training to SHG's				Rs. 42765		

Source: SAF, 2008

Interest free Financial Credit to Fisherwomen

The fisher folk often get caught in the clutches of the middlemen by borrowing small amounts for meeting their short-term livelihood purposes. Such loans are usually borrowed at 4-10% interest per day and such informal borrowings very often result in life-long bondage to the middlemen. In order to liberate the fisher folk from such informal credit systems, it is planned to channelize short term working capital assistance from financial institutions. This project aims to promote a sustainable self-renewing community support system to enable the fisherwomen to gain access to institutional credit for stable livelihood. This project is also intended to prevent erosion of income on account of huge interest to informal credit thereby creating the means to secure livelihood and continuous improvement in quality of life for the coastal community. In this scheme 40,000 fisherwomen will be given assistance in the form of revolving fund for fish vending. 14 districts will be covered in this scheme and each selected fisherwoman is entitled to get Rs. 5000/- as interest free loan from the fisheries Co operative societies affiliated to Matsyafed. The credit is given to them in groups. The beneficiaries have to remit a minimum of Rs.100/week from their profit to the Bank weekly towards the principal amount as repayment. The scheme is implemented jointly with Fisheries department, Matsyafed and SAF.

4.7 Nattika Fishing Village

Nattika fishing village in the Thrissur district is the area where the case study is conducted. Thrissur district which is centrally located has a coastal area of 54 Km, which is 9.15 percentage of the total coastline of Kerala. The total fishermen population of the Thrissur district is 78671, which is 9.2 percent of the state's fishermen population. The active fishermen in the district is 8507, that is, 10.81 percent of the state's percentage of active fishermen. The male in the Thrissur district consists of 30479 fishermen, female as 30709 and 17483 children.

Table 4.28 Fishing units in Thrissur district

Sector	Fishing units
MECHANISED	
Trawlers	47
Gill netters	2
Ring seines	92
Others	118
MechanisedTotal	259
MOTORISED	456
NON-MOTORISED	306
Total	1021

Source: Fisheries Department, 2007

Growing size of fishing unit and excessive use of energy pose great concern due to technological up-gradation resulting in habitat degradation, over investment in the industry resulting in economic burden etc. though the use of seines with a width below 20 mm is banned, under KMFR Act, they are still being used frequently resulting in over-fishing. The size of the seines has become wider and bigger, requiring more manpower and effort. Increased among different sectors, accentuated the problem of over-fishing and over-capitalisation. The boats engaged in fishing use engines of 120 hp, while less

than 50 hp engines are needed for effective operation. The details regarding fishing units existent in the district is presented in the table 4.28.

Out of 60 fishermen selected in Nattika fishing village, 10 are working in crafts with co-operative or group ownership. Each group consists of 30-42 fishermen each. In these fishing units co-operative ownership share are in terms of 12-18 fishermen. Other fishermen in the group work as fishing labourers. 8 fishermen in small fishing boats with 3 or 4 crew members with a co-operative or group ownership, 4 fishermen have his individual ownership of fishing boat (Mudduvetty with OBM) with a crew of 2-3 workers and 32 fishing workers or labourers working in large or small fishing boats were selected. 6 Non-motorised fishermen were also interviewed.

The survey is conducted during month of March-April, which is considered to be off season with occasional small catches. Most fishermen in the village were seen relaxing, getting their crafts repaired and mending the nets. In June-July, the sea is very rough and they are not in a position to get a breakthrough to go for fishing. During these months some fishermen will go to south in search of catch, as the sea is quite there. But in terms of fish landings, the trend shows an increase from 651 metric tonnes in 2003 to 956 metric tonnes in 2004-2005 and a slight decline in to 941 metric tones in 2005-2006, as compared to population. Thus Nattika contribute 6.1 percent of the total fishermen and 1.4 percent of total fish landings in Thrissur district (MFS, 2006).

4.7.1 Profile of fishermen community in Nattika

Table 4.29 Caste dimensions

Caste	Frequency
Dheevera	50
Muslims	4
Sc	6
Total	60

Source: Survey data

Majority of fishermen in the village represented in table 4.29 are from Dheevara community. Presence of Muslims and scheduled caste are also seen. With respect to gender, male outnumbered the females.

Table 4.30 Occupation wise distribution

Occupation wise	Frequency	Percent
MOFO	22	36.7
MOFL	32	53.3
NMOFO	6	10
Total	60	100

Source: Survey data

Out of the respondents surveyed, 53.3 percent are from motorized fishing labour, followed by motorized fishing operator contributing 36.7 percent and remaining 10 percent from non-motorised sector as in table 4.31. The main reason of increasing fishing labour force in the village is due to increasing indebtedness, over-capitalisation in the sector etc.

Table 4.31 Educational profile

Education level	Motorized	Non-motorised	Total
Primary	19	4	23
Upper primary	26	2	28
High school	7		7
Illiterate	2		2
Total	54	6	60

Source: Survey data

With the level of educational attainment, in table 4.32, Motorized sector consists of 3.7 percentage of illiterate. 48.1 percent having upper primary education, followed by primary education level of 35.2 percent from the motorized sector. In the artisanal sector, 66.7 percent having primary educational level and 33.3 percentage possess upper primary educational qualification.

Table 4.32 Family structure

Family size	Family structure		Total
	Joint	Nuclear	
2-6	2	50	52
7-11	2	4	6
12-16	2		2
17-21			
Total	6	54	60

Source: Survey data

With regard to family size of 2-6, 3.8 percent are from joint family and 96.2 percentage from the nuclear family. With a family size of 12-16, 3.3 percent are from the joint family, 10 percent from a family size of 7-11. Thus, 10 percent are from joint family and 90 percent constitute nuclear family as highlighted in table 4.32.

Ownership of physical assets

Assets owned by the household include land, house, latrines, consumer durables and other facilities. It is clearly indicated in the table 4.33, that 42 percentage of the household possess 5-8 cents of land, followed by 26 percentage holding 9-12 cents of land, 18 percentage possessing nearly 4 cents of land holdings and 9.4 percentage holding more than 13 cents of land..

Table 4.33 Land possession pattern

Size	Land possession				Total
	0-4 cents	5-8 cents	9-12 cents	13-16 cents	
2-6	10	16	12	5	43
7-11		6	2		8
12-16			2		2
17-21					
Total	10	22	14	5	53

Source: Survey data

Table 4.34 House type

Type of house	Frequency	Percentage
Thatched	2	3.3
Sheet	2	3.3
Tiled	40	66.6
RCC	16	26.7
Total	60	100

Source: Survey data

In terms of type of house occupied by the fishermen households in Nattika as shown in table 4.34, 66.6 percent of the household occupy tiled house, followed by 26.7 percent occupying RCC house and remaining living in thatched and sheet roofed houses.

Table 4.35 Ownership pattern of house

Ownership of house plot	Frequency	percentage
Owned house	53	88.3
Rented	2	3.3
No title deed	5	8.4
Total	60	100

Source: Survey data

With regard to the ownership pattern of homestead plots as depicted in table 4.35, 88.3 percent are residing in their own property. And only 3.3 percent are residing in rented houses and about 8.4 percent of the fishermen surveyed where residing in the houses with no title deed.

Assets owned collectively by the fishermen household include mainly infrastructural facilities such as road connectivity, electricity, piped water, transportation facilities etc. The physical amenities possessed by the fishermen community is stated in table 4.36

Table 4.36 Physical amenities

Source of water	Frequency	Percentage
Public tap	50	83.3
Pipe connection	10	16.7
Source of light		
Electricity	52	86.7
Kerosene	8	13.3
Source of information		
Radio	6	10
Television	40	66.7
Neighbours	14	22.3

Source: Survey data

Source of water available through public tap contributing 83.3 percentage and 16.7 percentage possessing pipe connection. In terms of source of light, 86.7 percent are electrified houses and remaining use kerosene, as a source of light. 66.7 percent have television facility as an entertainment and information source. Neighbours (22.3 percent) and radio (10 percent) are the media for collecting or gathering information.

Table 4.37 Indebtedness

Indebtedness	Frequency	Percentage
MOFO	18	40
MOFL	23	51.1
NMOFO	4	8.9
TOTAL	45	100

Source: Survey data

Nearly 75 percent of the respondents are indebted in the village. Sector wise indebted is more in motorized fishing labour, about 51 percent. 40 percent are found in the motorized fishing operator and remaining 8.9 percent in the non-motorised sector which is shown in table 4.37.

Table 4.38 Amount indebted

	Average amount	Average interest
MOFO	86666.67	10399
MOFL	32739	4256
NMOFO	52500	6300

Source: Survey data

The average burden in terms of amount is shown in table 4.38, and is highest for the motorized fishing operator with Rs 86666/-, followed by Rs 52500/-, and Rs 32739/- in the motorized fishing labour. Average interest burden calculated will be Rs 10399/- for the motorized fishing operator, Rs 6300/- in the non-motorised sector and Rs 4256/- for the motorized labour.

In terms of purpose justified for indebtedness in table 4.39, 37.8 percent was availed for meeting household expenses, followed by 35.6 percent for availing input, 13.3 percentage for buying land/ construction purpose. 13.2 percent have availed for purposes such as marriage, medical treatment and education purpose.

Table 4.39 Purpose of indebtedness

Purpose of indebtedness	Respondents	Percent
Input	16	35.6
Household expenditure	17	37.8
Land/house construction	6	13.3
Marriage	2	4.4
Medical	2	4.4
Education	2	4.4
Total	45	100

Source: Survey data

Table 4.40 Mode of savings

Saving pattern		
Monthly	10	
Annually	10	
Purpose of savings		Rankings
Input	4	3
Education	8	1
Income generation	6	2
To start small business	2	4
Where		Rankings
Bank	6	2
Post office	2	4
Chitty	4	3
Co-operatives (LIC,)	8	1

Source: Survey data

Due to seasonal employment scenario of the employment, and variations in the catch, price level will have a impact on their income pattern. As a result, less saving option is available to them. Out of the total respondents surveyed which is highlighted in table 4.40, only 33.3 percent have inculcated saving habit among themselves. The saving pattern are in the form of monthly or annually. The purpose outlined for saving are in terms of education, income generation for meeting household expenses in times of urgency, to buy input and also for starting a small vending activity within the village itself. The place where the savings made are in the LIC (co-operatives), Nationalised banks, chitties and also in the post office.

The expenditure pattern of the fishermen households in Nattika village, which is illustrated in table 4.41, states that out of their annual income, nearly 75 percentage is spend for their food expenses, clothes contribute 8.8 percentage. The amount paid as interest burden by respondents is 7.1 percent and 6.42 percent for social events, education

and other activities. Thus food expenses rank first in the expenditure basket, followed by clothes, interest burden, other activities and medical purposes.

Table 4.41 Expenditure pattern of the fishermen households

Expenditure	Percentage
Food	74.38
Clothes	8.8
Medical	3.3
Interest burden	7.1
Others	6.42

Source: Survey data (others: social events, education etc)

The main hindrance they face today is their occupational field in terms of lack of proper landing facilities for the motorized as well as traditional crafts in the area. They have to land their craft 10-15 Km away from their village which incurs the additional cost of transportation to them. The need to resolve problems of fishermen households in Nattika as enlisted in table 4.42, affects their livelihood pattern includes health problems due to changing lifestyles, occupational hazards, climatic changes in the sea and also on the land etc.

Table 4.42 Problems or hindrances encountered by fishermen in Nattika

Problems	Frequency	Rankings
Health	18	2
Water	10	3
Sewage	5	5
Landing/ Harbour	19	1
Fishing	8	4

Source: Survey data

Water availability followed by sewage problem due to lack of proper sanitation is also a major problem. Another hindrance encountered by the fishermen in the village are in their occupational field in terms of increase in the number of crafts compared to less labourers in the village, catch decline due to fishing methods in terms of size, taste etc

and also price variations resulting in low profit pressurizing them to exit the industry. Gulf migration is also a cause for non-availability of labour in the field.

Table 4.43 Job mobility and labour stickiness

Attempted to change current occupation		Are you willing to change?			In future your occupation in fishing will be?			Your children in future should take fishing?		Can you take any job other than fishing?	
Yes	No	Yes	No	Situ	Better	Worse	No Change	Yes	No	Yes	No
16	44	10	30	20	4	50	6	8	52	16	44
26.7%	73.3%	16.7%	50%	33.3%	6.7%	83.3%	10%	13.3%	86.7%	26.7%	73.3%

Source: survey data

The main peculiarity of this occupation is that labour is sticky. 73 percent have not attempted to change their current occupation. This fact highlight the labour stickiness in the sector as highlighted in table 4.43, is due to poor quality of life available, low educational profile, absence of skill, lack of additional knowledge regarding any other occupation, lack of alternative employment opportunities etc which attribute to occupational attachment. In the village due to migration and catch decline, 50 percent are willing to change. According to the fishermen (83.3 percent) are of the view that their occupation in the future will be worse. 10 percent are of the opinion that there will be no change in their occupation. 4 percent expects that their occupation will be better. 86.7 percent are not in a position to allow their children to take the occupation in terms of employment generation.

Due to the lack of additional skill, 73.3 percent are not willing to take any job other than fishing. 26.7 percent are able to undertake any job due to maintain their family, low return from this occupation, debt burden etc.

Table 4.44 Membership pattern

Society	Male	Females	Total	No: of beneficiaries
Nattika FDWCS	576	259	935	341
Nattika- Engadiyoor FDWCS	1895	425	2320	246

Source: Survey data

Matter concerned with membership pattern in societies in Nattika as depicted in table 4.44, shows that nearly 59.2 percent are receiving benefits from the society.

Table 4.45 Business Development Report Societies

	Nattika FDWCS	Nattika-Engadiyoor FDWCS
Fishermen households	705	1440
Active fishermen	470	1565
Active members in FRAs	113	375
Fishing units	11	37
Fishermen	132	563
Qty available in auction	83	980
Fish price available in auction	19	148
Commission for society	0.285	2.22
Commission for mastyafed	0.285	2.22
Savings from auction	.19	1.48

Source: BDP report of societies, 2007-08

A comparison of development report for the year 2007-2008 for the two FDWCS in the Nattika was analyzed in table 4.45. It is very interesting that these societies show a two fold increase in the Nattika- Engadiyoor society compared to Nattika and also in terms of active fishermen, fishing units, and members engaged in fish related activities.

Table 4.46 Gender, group involvement in societies

	Nattika FDWCS		Nattika-Engadiyoor DWCS	
	Male	female	Male	Female
Groups	2	8	5	2
Members	31	80	68	31
Accumulated Savings	-	26000	52000	138450

Source: BDP Report of Societies, 2007-08

Gender, group involvement and savings accumulated by societies are highlighted in table 4.46. The crafts and gear used in fishing village are highlighted in table 4.47, shows the dominance of motorised sector. It is not a mechanised centre but a traditional fishing village.

Table 4.47 Number of fishing crafts, gear and engine in Nattika

No: of crafts	Small	Medium	Large
	8	36	9
Engine	9.9 H.P	25H.P	40 H.P
	39	45	72
Gear	In the order of dominance	Units	Quantity
	Ring seine	9	21.60
	Chooda vala	4	4.20
	Ozhuku vala	11	8.05
	Ayiala vala/ chala vala	45	.75

Source: BDP Report of Societies, 2007-08

4.7.2 Inter Group Variation in Catch Value in Nattika

In order to compare the differences in earnings of two societies in Nattika fishing village, catch value data of 12 groups in each society have been collected. This would help us to understand the efficiency in management and use of the resources inter alia, the socio economic differences of the members and groups within the society itself. The society1 is considered as Nattika- Engadiyoor FDWCS and society 2 is Nattika FDWCS.

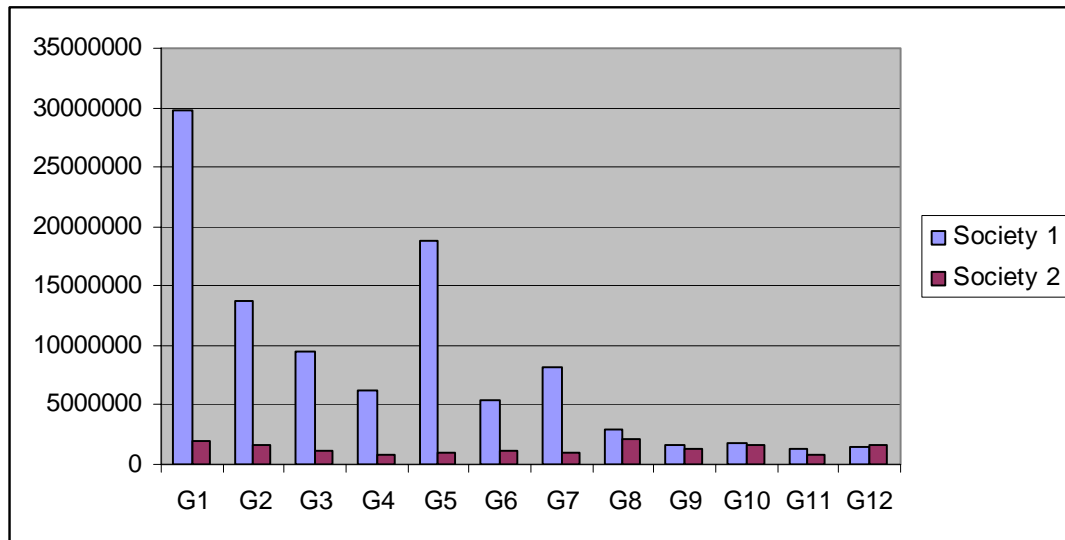
Table 4.48 Inter group variation in catch value in Nattika fishing village

Groups	Society 1	Society 2
G1	29830803	1991515
G2	13729160	1561480
G3	9535012	1101461
G4	6188785	882524
G5	18775132	993751
G6	5449727	1118443
G7	8126204	918514
G8	2865568	2142899
G9	1696551	1339677
G10	1718049	1592572
G11	1229371	840190
G12	1548869	1591728

Source: Matsyfed societies

The data in table 4.48, have been presented using bar diagram in figure 4.4. The inter group variation in the two societies / sangams which is highlighted in table 4.48, shows the catch value fluctuations in both the societies and also catch value variations within the groups in each society is analysed for the year 2006-2008. The result shows that the catch value variation in society 1 is comparatively far better than in society 2, where catch values are low. This highlights the involvement and participation of fishermen community in societies and their contribution to total production.

Figure 4.3 Inter group variation in catch value in Nattika fishing village



Source: BDP Report, 2006-08

Table 4.49 Catch value variations in Nattika- Engadiyoor FDWCS and Nattika FDWCS

Year	Nattika- Engadiyoor FDWCS		Nattika FDWCS	
	Value	%	Value	%
2006- 07	20351531	24	145215	21
2007-08	63900280	76	556989	79

Source: BDP Report of Societies, 2006-08

The catch value variation among 12 groups in the Nattika- Engadiyoor FDWCS and Nattika FDWCS represented in table 4.49 shows a change in the Value for the year 2006-2008. The catch value for the year is estimated at 24 percent and 76 percent in 2006-07 and 2007-08. The variation is two fold increase as a result of increased in catching and rise in price of the fish resources in Nattika- Engadiyoor FDWCS. The case is also little bit same with respect to Nattika FDWCS.

4.8 Kadapuram Committee, A Village Institutional Set-up

The case study is conducted on the institutional arrangement in the Nattika-Vallapad area in Thrissur district. The administration of Nagayakhsi Temple, Nattika and Brahmahejomayam Temple, Vallapad are under the Kodiampuzha Devaswom Committee. This Devaswom committee is functioning as a Kadapuram committee in the coastal village of Nattika- Vallapad area. The institutional arrangement of 'Kadakodi' existed in the early sixties. But due to the social and developmental changes in the area, its relevance weakened. Kadakodi system is still prevalent in the Chavakad area of Thrissur district.

The Kadapuram committee, as it is called is a community institutional arrangement with a 50 years of existence. The membership in the organization is exclusively for the artisanal Dheevera fishermen in the fishing village. Presently, there are 1200 members in this village-level institutional set up. The rule system of the artisanal fishermen relates to sea territories. The most important type of rule controls technical innovation such as introducing fishing craft, gears etc and also prohibiting the certain gears which may prove to be unsustainable to the fishery. There are 15 inboard vallams under the committee supervision and 13 members from these inboard vallams are selected to the Kadapuram Committee. 5 members from Mudduvetty vanchies are also represented in the Committee. Thus, there are 18 members in the Executive committee. There are local Legislative and Executive councils made up of elders, who are either nominated or elected by the village members in the area. As it is an informal institutional arrangement in th area, it functions with the consent, support, trust from the members without making any prejudice on any sections of community in the area. Women apparently have never been eligible for membership, but are permitted to attend the meetings. The money for collective expenditure comes from 2 percentage of each day's catch from individual member.

The Kadapuram committee decided most issues relating in the area at the earliest. This coastal village is mostly dominated by Dheevera and other members from Ezhava caste

and Muslim religion in the area also approach the Committee for conflict resolution. There is a Conflict Resolving Committee consisting of 7 members. This institutional set up maintains the details of revenue-expenditure estimates in the general body meeting conducted annually in March every year. Discussions involving inter-labour dispute, family disputes, intra-labour disputes are also settled by the Kadapuram committee. Their decisions are implemented not in force, but an obligation of every member. They maintain track records of all events concerning the community and every fisherman submits the details of catch per day. It is from this Committee, the Fisheries Department in the area collects catch details, active fishermen population, price details etc.

In spite of this, the Kadapuram Committee also provides social welfare benefits exclusively for fishermen the area. They provide upto Rs 50000/ as a debt at a lower interest rate. Student's endowment fund is given to fishermen's children as an encouragement for continuing their education. Financial assistance upto Rs 5000/ is provided for medical treatment for the fishermen family.

There is a sort of bonded labour system still existing in the village. On Edavam, 16th of Malayalam Era, there is a 'Kootayma' of fishermen worker and the boat owner. On that day any fishermen has the right to change his boat. Bit it is almost always certain that he is indebted to the owner. If he decides to change his boat, the new boat owner has to repay all his outstanding debt. It is an oral agreement between the fishermen and the boat owner. Generally, nobody breaks the agreement, though there is a provision to break the bondage by paying off debt.

The catches made by the fishermen are shared in such a way that for every Rs 100 earned, they donate one rupee to their place of worship. Then 5-6 percent goes to the 'Tharakan' as their commission. 40% is given to the craft and net owner. Balance is divided among the fishermen for their work.

The number of fishing crafts has increased to an alarming rate. Production shows a declining trend and catch size of some high quality fishes showed a declining trend. The

indiscriminate use of banned gears resulted in the over-exploitation of juveniles and undersized fishes in huge quantities. Dwindling catches followed by non-availability of labour and hiring labour from near by villages at high price and providing transportation cost is also a cause of concern.

Co-operatives are seen as a form of community organization to participate in the management of marine fishery of Kerala. The above analysis has proved that the fisher folk who are associated to any society have better socio economic condition than the general population. It is also seen that many of the formal institutions has succeeded in attaining the twin objective of poverty reduction and resource sustainability. But, due to over capitalization, mechanization and urge for mere economic profit there is over exploitation creating un-sustainability to the resources

Chapter-5

An analysis of sustainability with its economic and ecological indicators

India has an Exclusive Economic Zone (EEZ) of 2.02 million sq. km. The harvestable potential of marine fishery resource in the EEZ has been estimated at about 3.9 million tonnes. An estimation of the depth-wise potential (as shown in table 5.1) shows that about 58% of the resources are available in 0-50 m depth, 35 percent in 50-200 m depth and 7 percent in depths beyond 200m.

Table 5.1 Potential fisheries resources and level of exploitation in Indian EEZ (Exclusive Economic Zone)

Depth range (m)	0-50 m	50-200 m	Beyond 200 m	Total (in million tonnes)
Demersal	1.28	0.625	0.028	1.933
Neretic Pelagic	1.00	0.742	-	1.742
Oceanic Pelagic	-	-	0.246	0.246
Total (%)	2.28 (58%)	1.367 (35%)	0.274 (7%)	3.921 (100%)
Present level of exploitation	2.08 (91%)	0.820 (60%)	0.020 (7%)	2.920 (75%)
Available for exploitation	0.20	0.547	0.272	1.001

Source: Economic Review, 2007

With respect to India's total fisheries potential which is 39 lakh metric tonnes, Kerala's share is 7.50 lakh metric tonnes constituting 28.84 percent. Both the pelagic and demersal resources are concentrated in the 50m depth. Of the total marine potential of 7.50 lakh metric tonnes, 2.29 lakh metric tonnes are demersal species and 3.42 lakh metric tonnes are pelagic resources are found in a depth of below 50 m as seen from table 5.2.

Kerala has all the natural endowment for building a strong and vibrant fisheries economy. The natural setting of the state with a long cost line (590 Km) extensive lake and backwaters, two monsoons and numerous west flowing rivers are the contributing factors to the fishery resource. The coastal region within the 50m depth is 12570 sq.km and the remaining is the offshore/ deep sea area (50m.--200m depth). OF the total inshore

potential in the south west coast of India the share of Kerala is placed at 5.71 lakh tones against 4lakh tones in 1997.

Table 5.2 Marine resource Potential (000 tones)

	Demersal		Pelagic		shelf region Total	300-500 depth resources	Total
	0-50 m	Beyond 50 m	0-50 m	Beyond 50 m			
Indian EEZ	10.36	6.49	11.74	7.42	3601	299	3900
SWC	3.61	1.12	5.89	2.49	1307		1307
Kerala	2.29	.56	3.42	1.24	751		751
%	22.10	0.8	29.13	16.71			28.84

Source: Economic Review, 2004

5.1 Developmental Changes in Fisheries Sector

During the period of 1950's, Kerala fisheries were dependent upon external assistance programmes such as Technical Cooperation Mission Programme (1947), FAO Technical Assistance Programme (1947), the Indo-Norwegian project (INP-1953) and other internal schemes like the General Mechanisation Scheme and the Small Boat Mechanisation Programme. In 1953, however, saw the advent of an Indo-Norwegian project that emphasised capital-intensive fishing technology. The project, implemented on the southwestern and southeastern coasts, was a three-party agreement signed by the United Nations, Norway, and the Government of India. It was first implemented along the Travancore-Kochi coast during 1959-63, followed by the Karnataka and Tamil Nadu coasts in 1963-73. The project was based on a model quite successful in Scandinavian fishing countries like Norway and Sweden. It promoted a western-style industrial fishery development strategy that focused on exports, and led to over-exploitation and speedy depletion of marine resources. The policy had a number of long-term effects. First, over-exploitation led to a decline in marine wealth. The second major impact of the new developments was irreparable ecological destruction. The third impact was the pauperisation of traditional fishing communities. Fishermen today are not considered important stakeholders; many have been reduced to wage labourers. The common ownership pattern which once was the mainstay of life along the coast, has been replaced by a new class that includes powerful boat-owners-cum-moneylenders, trade unions,

community organisations, middlemen and traders, political parties, and communal organisations.

Table 5.3 Development of Marine Fisheries of Kerala – a time line

Year	Events
1953	Establishment of Indo-Norwegian Project (INP)
Mid 50s	Mechanized fishing started by Indo- Norwegian project
1962	Introduction of shrimp trawling
1963	Exploratory and experimental fishing by INP and introduction of new craft designed by Central Institute of Fisheries Technology
Late 60s	Entry of Individual entrepreneurs into fishing paving way for fast development of trawl fishery
Early 70s	Large scale commercial trawling in the inshore waters
1974	Motorization initiated by Marianad Fisheries Co-operative Society in Trivandrum, Increased Foreign exchange earnings through sea food exports
1979	Introduction of commercial purse seining
1980	Motorisation programme adopted by fishermen of Alapuzha, Ernakulam & Kollam districts Promulgation of the Kerala Marine Fishing Regulation Act-1980 (KMFRA-1980) by Govt. of Kerala
1985	Introduction of outboard ringseining - Introduction of mini trawling
1988	Introduction of ban on trawling during the monsoon period
1996	Introduction of multi- day voyage fishing
1999	Conversion of small trawlers for deep sea prawn fishing
2003	Introduction of inboard ringseiners
2007	Conversion of shrimp trawlers for tuna longlining

Source: Pillai, et al., 2009

Technological changes in the fishing industry in terms of trawling and purse seining and diversification of the coastal economy has led to the unsustainable development is presented in table 5.3. Introduction of motorized traditional crafts and mass harvesting

gears like purse seines and ring seines in recent years have enabled fishing to be carried throughout the year. Under the Marine Fishing Regulation Act (1986) passed, fishing by mechanized vessels, especially purse seiners are banned during monsoon to protect spawners. Moreover, traditional motorized crafts continue to engage in seining operations using extremely small meshed nets during this period, which destroys both spawners and young fish. Voluntary adoption of mesh size regulation for trawl and purse seine nets will be helpful for conservation of resources and avoiding harvesting juvenile fish. It is imperative that destructive fishing practices using small meshed seines are effectively controlled by enforcing mesh size regulation (minimum 18 mm), closed season and restricted fishing (June-September) besides strict licensing and optimum deployment of fishing units especially ring seines and purse seines. Technological solutions involve the introduction of low energy passive fishing techniques, minimizing the cost and the damage occurring to the resource.

5.2 An Assessment of Marine fish Resources of Kerala

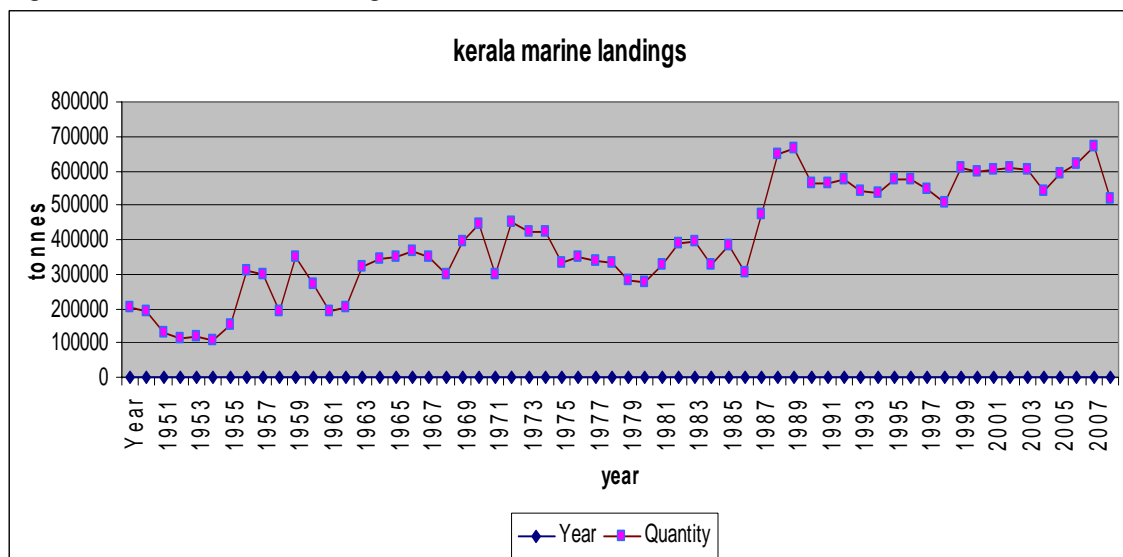
Marine waters offer lucrative fishery. South-West monsoon coupled with northwesterly winds and the oceanic currents cause upwelling along the coast brings the nutrient rich deep waters to the surface, which flourishes the primary production and followed by a good fishery. Kerala coast have major fisheries of the shrimps, cuttle fish, sardines, mackerels, anchovies, soles, sharks, rays, etc. On an average 6.02 lakh tones of marine fish is produced annually by the State which accounts for about 25 per cent of the National's total marine fish production. Marine fish production in Kerala from 1950 to 2009 was given in table 5.4 and also on figure 5.1.

Table 5.4 Marine fish landings of Kerala

Year	Quantity	Year	Quantity	Year	Quantity
1950	202047	1971	445347	1992	560742
1951	191032	1972	295618	1993	574739
1952	129345	1973	448269	1994	540813
1953	111999	1974	420257	1995	531646
1954	117034	1975	420836	1996	572005
1955	105457	1976	331047	1997	574774
1956	152213	1977	345037	1998	542696
1957	309926	1978	333739	1999	507287
1958	294655	1979	330509	2000	604113
1959	191375	1980	279543	2001	593783
1960	344605	1981	274395	2002	603286
1961	267494	1982	325367	2003	608525
1962	191421	1983	385817	2004	601863
1963	202380	1984	394372	2005	536215
1964	317974	1985	325536	2006	591902
1965	339173	1986	382791	2007	619255
1966	346744	1987	303286	2008	670095
1967	364829	1988	468808	2009	517720
1968	345301	1989	647526		
1969	294787	1990	662890		
1970	392880	1991	564161		

Source: CMFRI Annual reports 2000-09
ICCSR project, 2009

Figure 5.1 Marine fish landings of Kerala



Source: CMFRI Annual reports 2000-09
ICCSR project, 2009

The mechanized sector play an important role in the fishery contributing to about 66 percent followed by the motorized sector contributing 27 per cent and the artisan sector contributing 7 per cent in 2000. Sector-wise landings in 2009, indicates that, mechanized sector contributed 59 percent, motorized 39 percent and artisanal sector 2 percent. There is continuous structural change in the craft and gear combination depending upon catch intensity, catch composition, per capita earnings as well as price of different varieties is depicted in table 5.5. There is definite declining trend in the number of mechanised as well as non-mechanised crafts. Motorised crafts are increasing and mechanised crafts increased up to 2005 with 5504 units and in 2009 it was declined to 3451. The overall picture of per capita annual catch (kg) per uinit of fishing over the years has indicated reducing fish stocks and overcapitalisation in the fishing sector. With decline menahanised crafts and traditional sector, annual per catch unit has increased to 88 kg for the former and for the latter it was 1087 kg 2009.

Table 5.5 Sector wise per capita annual catch per unit over the years

Indicators	1973-77	1980	1990	2005	2009
Mechanized					
No: of units	1026	983	3742	5504	3451
Catch (tones)	116067	135305	231572	285890	305378
Per capita annual catch per unit (tones/unit)	113	138	62	52	88
Motorized					
No: of units	NA	NA	11374	14151	14151
Catch (tones)	NA	NA	388624	242345	201860
Per capita annual catch per unit (tones/unit)	NA	NA	34	17	14
Traditional					
No: of units	21718	26271	26137	9522	9522
Catch (tones)	249573	144238	42694	7980	10352
Per capita annual catch per unit (tones/unit)	11492	5490	1633	838	1087

Source: Compiled from Sathiadhas, 2005
 CMFRI, 2007,
 Economic Review, 2010

Earnings from the marine fisheries landings and the value at last sales showed that there was marginal decline in 2000 at Rs 4272 crores to Rs 2493 crores in 2007. A declining trend was experienced in the landings of major species. The decline in revenue can be due to the significant reductions in landings of penaeid and non-penaeid prawn. The landings of Cephalopods have been declining consistently. The significant difference in the first sales and last sales indicated in table 5.6 shows the high involvement of intermediaries between producers and consumers.

Table 5.6 Marine production and gross earnings in kerala

year	Catch tones	Value (Rs crores)	
		First sales	Last sales
2000	604113	2438	4272
2001	514139	2169	3747
2002	589519	2303	3990
2003	623293	2497	4309
2004	616839	2386	3886
2005	536215	2167	3538
2006	591902	1328	2223
2007	619255	1472	2493
2008	670095		
2009	517720		

Source: Sathiadhas, R; 2005
CMFRI, 2007

The potential yield estimates were 2,21,608 tonnes for the demersals 39,056 tonnes for large pelagics 4,15,631 tonnes for small pelagics, and 22,775 tonnes for others. The total potential yield estimate for Kerala was 6.99 lakh tonnes against the average landings of 5.81 lakh tonnes. During 1997-2007, the annual average landings of the demersals, large pelagics and small pelagics were 1,85,876 tonnes, 31,601 tonnes and 3,52,512 tonnes respectively (Sathianandan, et al, 2008).

The overall contribution of pelagic fin fishes constitutes 56 per cent of the total marine landings while the demersal fishes constitute 22 per cent, crustaceans 17 per cent and molluscs 5 per cent in 2000. Declining trend was experienced in landings of major species such as Pelagic finfish resources contributed 67 percent, demersal finfish 17

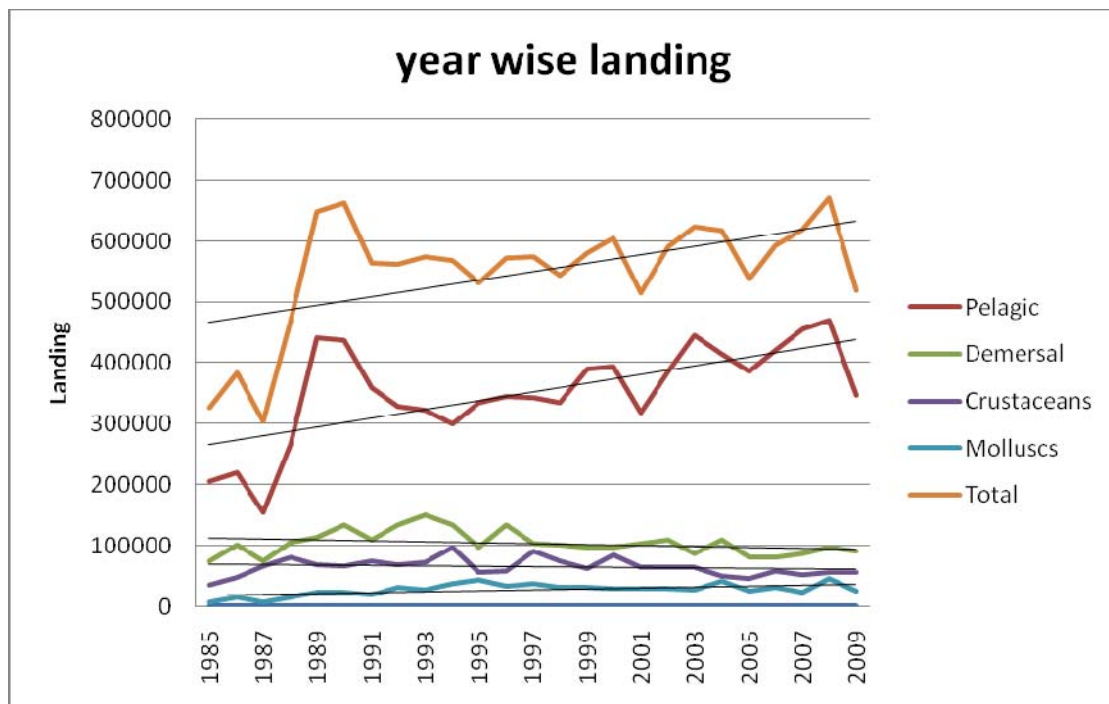
percent, crustaceans 11 percent and molluscs 5 percent as seen in table 5.7 and also in figure 5.2.

Table 5.7 Species wise landings of Kerala

Year	Pelagic	Demersal	Crustaceans	Molluscs	Total
1985	205969	75511	35771	8283	325534
1986	219229	100731	47844	14987	382791
1987	154108	74596	67047	7535	303286
1988	266835	105345	81473	15155	468808
1989	440748	113695	69385	23698	647526
1990	436473	134716	67340	24361	662890
1991	359459	109923	75177	19602	564161
1992	327108	133279	68931	31424	560742
1993	322803	150115	72916	28905	574739
1994	299388	133145	97226	38275	568034
1995	333946	96652	57106	43942	531646
1996	343947	134464	59087	34557	572055
1997	343158	102480	91347	37789	574774
1998	333433	101248	74739	33276	542696
1999	388691	97126	63075	31881	580773
2000	392401	96258	84361	31093	604113
2001	317074	102446	64065	30554	514139
2002	386185	108778	64773	29783	589519
2003	443869	87685	64044	27695	623293
2004	414723	108766	50588	42762	616839
2005	384835	80219	45658	25503	536215
2006	419950	81243	57758	32951	591902
2007	455248	87544	52539	23924	619255
2008	469061	97709	56412	46913	670095
2009	346398	90128	55450	25744	517720
Total	5772919	1472746	941002	498367	8685034

Source: CMFRI Annual report, 2009.

Figure 5.2 Species wise landings of Kerala



Source: CMFRI Annual report, 2009

5.2.1 Impact of Trawl Ban

The trawling ban was first enforced in Kerala and other southern states in 1988 when studies proved the depletion of fish resources owing to trawling by mechanised boats. Although there was stiff resistance from the mechanised boat segment in the initial days, in the past decade, a ban varying from 30 to 62 days has been imposed on them. Traditional fisherfolk in their small vessels are allowed to venture out to sea. State government figures show that the trawling ban did augment fish stocks. At the peak of heavy trawling through the years, from 1977 to 1986, annual average fish landings in Kerala declined to around 3.49 lakh tonnes. With the implementation of ban, a sudden increase in the landings were registered in 1988 to 4.93 lakh tonnes and further to 6.37 lakh tonnes during 1989 and 1990 respectively. The period 1988 to 1997 show that fish landings increased to 4.58 lakh tonnes, and from 1998 to 2005 to 5.75 lakh tonnes. (Kapuria, 2005). It is reported that the annual per capita income of earnings of active fishermen increased steadily from Rs. 7,025 in the pre-ban period (1980) to Rs. 38,636

during the ban period. Similarly the average per capita income of the secondary sector in 1980 was Rs.18,522 which became Rs. 61,646 in 2005 (Sankaran, 2010).

The ban on monsoon trawling came to stay in the state in 1988, following years of agitation by the traditional fishermen. Traditional fishermen were of the view that the depletion in the landing was caused by the operation of trawl net, purse seine and ring seine. They demanded a total ban of these types of destructive gears at least during the monsoon period, which coincides with the spawning of many species of fishes and shrimps. The state government was forced to appoint an expert committee to study the impact of monsoon trawling on marine wealth, and the committee - headed by Professor N Balakrishnan Nair- recommended a 90-day ban during the monsoon for three consecutive years, followed by a re-evaluation of the situation. No mechanised vessel above 25 HP capacity will be allowed to fish during the ban period, though in Kerala, traditional fish workers using valloms (with inboard engines of much higher capacity) are not restricted. The ban is no longer applicable to the traditional fish workers as the Kerala Monsoon Fishery (Pelagic) Protection Bill 2007 exempted them last year. Over a lakh traditional fishermen stand to gain from the Act as it enables them to catch pelagic fish - such as oil sardine and mackerel - in the State's territorial waters that stretch to 12 nautical miles. A time span of the trawl ban period from 1988 is explained in table 5.8.

Other studies too have clearly pointed out the devastating effects of trawl fishing. It has direct and indirect impacts on the marine ecosystem and microorganisms. "Trawlers operating along the Kerala coast kill and destroy an average 2.5 lakh tones of marine organisms annually, comprising of 232 species Separate studies which he conducted from 2001 to 2004 for the state government and also for the Central Government on the "Impact of Trawling on the Sea Bottom and its Living Communities" reveal that trawling destroys 2500 tonnes of juvenile squid and cuttle fishes, 5000 tonnes of shrimp juveniles, 80,000 tonnes of juveniles of low quality fishes and 700 tonnes of eggs,"(Kurup, 2006). There are nearly 4,000 trawl boats in the State and together they are estimated to catch roughly 2.5 lakh tonnes of fish. Along with this, they also catch more than one lakh tonnes of young ones which are unfit for consumption or industrial use (Basheer, 2009).

Table 5.8 Trawl ban periods from 1988 to 2009

YEAR	FROM	TO	DAYS	REMARKS
1988	02.07.1988	31.08.1988	61	Except Neendakara
1989	20.07.1989	31.08.1989	43	Complete
1990	28.06.1990	21.07.1990	24	“
1991	15.07.1991	13.08.1991	30	“
1992	21.06.1992	03.08.1992	44	“
1993	15.06.1993	15.07.1993	45	“
1994	15.06.1994	29.07.1994	45	“
1995	15.06.1995	29.07.1995	45	“
1996	15.06.1996	29.07.1996	45	“
1997	15.06.1997	29.07.1997	45	“
1998	15.06.1998	29.07.1998	45	“
1999	15.06.1999	29.07.1999	45	“
2000	15.06.2000	29.07.2000	45	“
2001	15.06.2001	29.07.2001	45	“
2002	15.06.2002	29.07.2002	45	“
2003	15.06.2003	29.07.2003	45	“
2004	15.06.2004	29.07.2004	45	“
2005	15.06.2005	29.07.2005	45	“
2006	15.06.2006	29.07.2006	62	“
2007	15.06.2007	31.07.2007	47	“
2008	14.06.2008	31.07.2008	48	“
2009	14.06.2009	29.07.2009	45	“
2010	14.06.2010	31.07.2010	47	“

Source: Department of Fisheries, 2007
The Hindu, 2010

5.2.2 Increase in fishing activity

The increasing fleet strength has led to a decline in catch per unit effort over the years. Declining catch per unit effort and increasing cost of operation have resulted in uneconomical operation of the fishing fleet, even forcing a few fishers out of the business (MFIS, 2009) and the described in table 5.9.

Table 5.9 Increase in fishing activity (1961-2006)

Year	No: of trawlers	No: of purse seiners	No: of gill netters	Ring seiners	Others	Total mechanized crafts	Total motorized crafts	Total non-motorised	No: of active fishermen
1961	172							21000	80700
1966	729		196		18	943			
1972								23708	110492
1973	1325	>90	200						
1980	2630	37	362		9	3038		30000	131101
1982	2747	60	567		59	3433			125008
1987	2510	51	846		141	3548	9657	26137	147875
1989	3497		728			4225	10858	18931	
1999 - 2000						4194	28829	21751	185000
2000 - 2001						4150	29144	21854	
2001 - 2002						4150	29395	21956	
2003						4510	29395	21956	1.79 lakh
2006	3982	54	428	443	597	5504	14151	9522	190483

Source: ICSSR project, 2009
MFS, 2008

The annual average catch by different fleet for the three categories during 2005-2007 is given in table 5.10, along with average catch rates both in terms of unit operation and hours of operation. It was estimated that for catching the potential of demersals, about 63.3 lakh hours of operation of the fleet that exploit the demersals is necessary. Similarly, for the large pelagics, about 8.9 lakh hours of operation and for the small pelagics about 46.6 lakh hours of operation is needed to exploit their potential yield. The estimates of unit operations necessary to catch the potential of each category are 5.64 lakh for the demersals, 2.37 lakh for large pelagics and 15.27 lakh for small pelagics.

Table 5.10 Annual average catch, catch per unit operation and catch per hour of operation for different fleet during 2005-07

Fleet	Catch (t)	Catch / unit (kg)	Catch / hour (kg)
Mechanized multi-day trawlers (demersals)	89122	1154	44
Mechanized single-day trawlers (demersals)	65872	408	46
Outboard trawlers (demersals)	5453	65	15
Mechanized gillnetters/ driftnetters (large pelagics)	1754	1177	23
Outboard hooks and lines (large pelagics)	10826	67	21
Other mechanized craft (large pelagics)	432	1318	29
Mechanized purseseiners/ringseiners (small pelagics)	101763	2716	1253
Outboard ringseiners (small pelagics)	163147	1082	625
Other outboard craft (small pelagics)	57726	126	32

Source: Sathiandan, 2008

5.2.3 Extent of Depletion

To study the extent of depletion in species in different time periods annual catch data of each specie in period 1 (1976-1987), period 2 (1988-99) and period 3 (2000-2008) are compared with its average catch in the initial peak period or period 1 (1971-75) ie (peak period average current year catch/ peak period coverage). If the mean and upper and lower bounds of confidence intervals for a period are negative are considered as species having no depletion in the period. The species for which only the upper bound is positive and the mean and lower bound are negative are taken as species having mild 'depletion' The species for which only the lower bound is negative and the mean and the upper bound are positive are termed as species having 'moderate depletion' and the species for

which all the three coefficients are positive are termed as species having 'heavy depletion'.

In the analysis it is clearly seen that oil sardine is only moderately depleting in period 1976-87, has heavy depletion in the period 1988-89, while croakers, which have moderate depletion in the period 1976-87, have no depletion in 1988-89. Other sardine, ribbonfish, catfish, elasmobranchs, big jawed jumper, silverbelly, etc are having heavy depletion in both the periods. Similarly, tunnies, seer fish, perches and cephalopods are species having no depletion in both the periods. Whereas in the third period 2000-08, Tunnies, Cephalopod are showing the no depletion, while Mackerel and seer fish are showing signs of mild depletion. Other sardines, cat fish, ribbon fish are showing heavy depletion. In table status of depletion of each species in each period is given in table 5.11.

Table 5.11 Depletion Status of Important Species in Period 2, Period 3 and Period 4 on the Basis of the Initial Peak Periods(1970- 75) Landings.

Fish	Period	Mean and C interval	Remark
Oil Sardine	1976-1987	0.1254 (-0.0807 0.3316)	Moderate Depletion
	1988-1999	0.3331 (0.0224 0.6437)	Heavy Depletion
	2000-08	0.1788 (-0.0536 0.4112)	Moderate Depletion
Mackerel	1976-1987	0.5128 (0.4242 0.6014)	Heavy Depletion
	1988-1999	-1.1552 (-1.6352 -0.6752)	No Depletion
	2000-08	-0.4787 (-1.5123 0.5549)	Mild Depletion
Other Sardine	1976-1987	0.5989 (0.4104 0.7874)	Heavy Depletion
	1988-1999	0.3224 (0.097 0.5452)	Heavy Depletion
	2000-08	0.4121	Heavy Depletion

		(0.1730 0.6512)	
Carangids	1976-1987	-0.7627 (-1.9243 0.399)	Mild Depletion
	1988-1999	-5.7184 (-6.8399 -4.5968)	No Depletion
	2000-08	0.255	Moderate Depletion
		(-1.3211 1.8311)	
Tunnies	1976-1987	-1.2079 (-1.7425 -0.6733)	No Depletion
	1988-1999	-2.922 (-3.818 -2.0259)	No Depletion
	2000-08	-2.1521	No Depletion
		(-2.3780 -1.9261)	
Seerfish	1976-1987	-0.7731 (-1.1235 0.4227)	No Depletion
	1988-1999	-1.0412 (-1.4761 -0.6063)	Heavy Depletion
	2000-08	-0.6087	Mild Depletion
		(-1.5231 0.3057)	
Ribbon fish	1976-1987	0.3307 (0.2118 0.6249)	Heavy Depletion
	1988-1999	0.4183 (0.2118 0.6249)	Heavy Depletion
	2000-08	0.4184	Heavy Depletion
		(0.3226 0.5142)	
Catfish	1976-1987	0.553 (0.4608 0.6451)	Heavy Depletion
	1988-1999	0.9176 (0.8369 0.9984)	Heavy Depletion
	2000-08	0.8198	Heavy Depletion
		(0.7263 0.9133)	
Perches	1976-1987	-0.9524 (-1.6896 -0.2152)	No Depletion
	1988-1999	-4.008 (-4.8187 -3.1829)	No Depletion
	2000-08	-0.4419	Mild Depletion

		(-2.731 1.8392)	
Elasmobranches	1976-1987	-0.1937 (0.0859 0.3015)	Heavy Depletion
	1988-1999	0.4386 (0.3438 0.5334)	Heavy Depletion
	2000-08	0.4896 (-0.1891) .1682)	Moderate Depletion
Penaeid Prawn	1976-1987	0.3759 (0.2656 0.4862)	Heavy Depletion
	1988-1999	0.0718 (-0.0318 0.1767)	Moderate Depletion
	2000-08	0.0359 (-0.1416 0.2134)	Moderate Depletion
Cephalopod	1976-1987	-2.99 (-4.8118 -1.1797)	No Depletion
	1988-1999	-21.1374 (-24.932 -7.3431)	No Depletion
	2000-08	-5.2574 (-6.2231 -4.2918)	No Depletion
Total	1976-1987	0.1688 (0.106 0.2317)	Heavy Depletion
	1988-1999	-0.4055 (-.4836 -0.3275)	No Depletion
	2000-08	-0.3391 (-0.3923 -0.2859)	No Depletion

Source: ICSSR Project, 2009
CMFRI, 2007-09

Carangids, whitebait, perches, cephalopods, oil sardine, lizard fish and perches others maintained the total catch in several years in spite of considerable decline in the catch of oil sardine, which contributed nearly half of the total landings in 1960-75, along with decline in landings of catfish, silver bellies, cephalopods, other sardines, etc. The period-wise percentage shares of different species in the total landings highlighted in table 5.12, depicts that white bait, other sardine, catfish, ribbonfish, silver bellies, goat fish, elasmobranchs etc are showing their declining contribution in total landings from 1960 to 2009. From the analysis done, it is able to accept and reach at a conclusion that there

exists a link between trawling and resource depletion which is the null hypothesis in the study.

Table 5.12 Period wise Percentage Contribution of Different Species in the Total Landings

Period	1960-1975	1976-1987	1988-1999	2001-2006	2009
Oil Sardine	47.6	32.4	14.1	28.08	32.3
Mackerel	8.09	5.09	13.15	7.78	10.9
White Bait	2.97	5.89	6.55	5.51	3.6
Other Sardine	4.31	3.5	3.51	12.66	0.7
Carangids	2.25	4.92	11.59	3.78	10.9
Tunnies	0.79	2.81	2.86	2.14	3.5
Seerfish	0.66	1.56	1.08	0.44	0.8
Ribbonfish	2.65	3.93	1.99	2.84	1.2
Catfish	2.91	2.98	0.34	0.03	0.03
Perches	1.15	5.96	9.07	5.51	5.4
Croakers	1.5	2.32	2.13		1.7
Lizardfish	0.43	1.62	1.93	0.03	2.2
Elasmobranchs	2.26	1.97	0.82	0.52	0.6
Flatfish	2.7	2.5	3.24	2.02	1.5
Big Jawed Jumper	0.77	0.3	0.25		0.2
Silverbellies	2.87	1.52	0.93		0.9
Goatfish	0.31	0.12	0.78		0.2
Penaeid Prawn	10.49	10.86	9.52	8.75	8.7
Cephalopod	0.17	1.56	5.21	2.98	4.9
Others	5.14	8.22	10.96		9.77
Total	100	100	100		100

Source; ICCSR Project, 2009
CMFRI Annual report, 2009

The depletion can be attributed to the deleterious impact of trawl gear, particularly on the bottom dwelling species due to its incessant and indiscriminate scraping method of sea bottom. It is the near shore trawling in the pre monsoon period damaging new recruitment of catfishes by removing the juveniles and sub-adults from the feeding. The annual percentage contribution of trawl to the landings of important species will make it clear in table 5.13, that among the 14 species where most of the landings are contributed

by trawl, which has resulted in either of moderate or heavily depletion of many species. Major species contributed by trawl gear are penaeid prawn, cephalopod, lizard fish, perches etc.

Table 5.13 Percentage contribution of the mechanized trawl net to the landings of major groups of fishes in 1997 and 2009

Name	% of contribution in 1997	2009
Elasmo branches	43	36
Catfishes	32	
Oil Sardine	1	1
Other Sardine	1	
White bait	20	25
Lizard fish	98	97
Perches	88	
Goatfish	85	
Croakers	59	
Ribbon fish	59	55
carangids	31	31
silver Belly	56	
Big jawed jumper	41	
Mackerel	4	7.9
Seerfish	8	1
Flat Fishes	70	76
Penaied prawns	76	81
Cephalopods	83	90

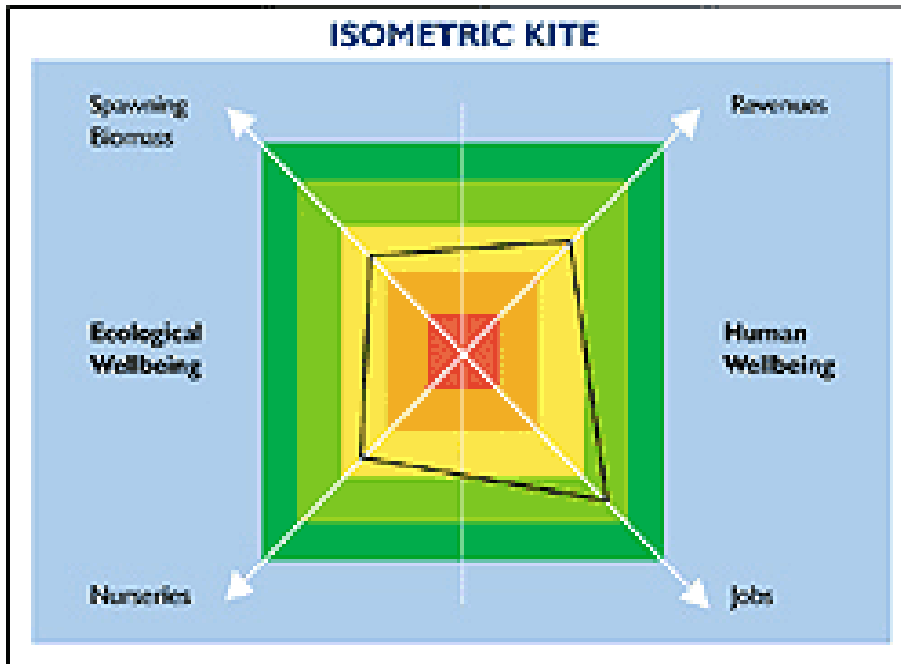
Source: CMFRI, Annual reports 1998 and 2009

5.3 Analyzing Some Social and Economic Aspects of Fishermen Community in the Context of Sustainability

The Plan of Implementation of the World Summit on Sustainable Development specifically urges the need to "Maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015"(FAO, 1995). There are various ways of representing the interdependent components of a fishery sector in a sustainable development paradigm. The minimum critical components are the ecosystem, the economy, society and governance. The ecosystem comprises the fishery resources as well as other aspects of ecosystem that control / dependent on the productivity of the resource. The economy reflects in terms of benefits and costs that are derived from the use of

ecosystem. The society component consists of non-monetary costs and benefits, which are important elements of human welfare.

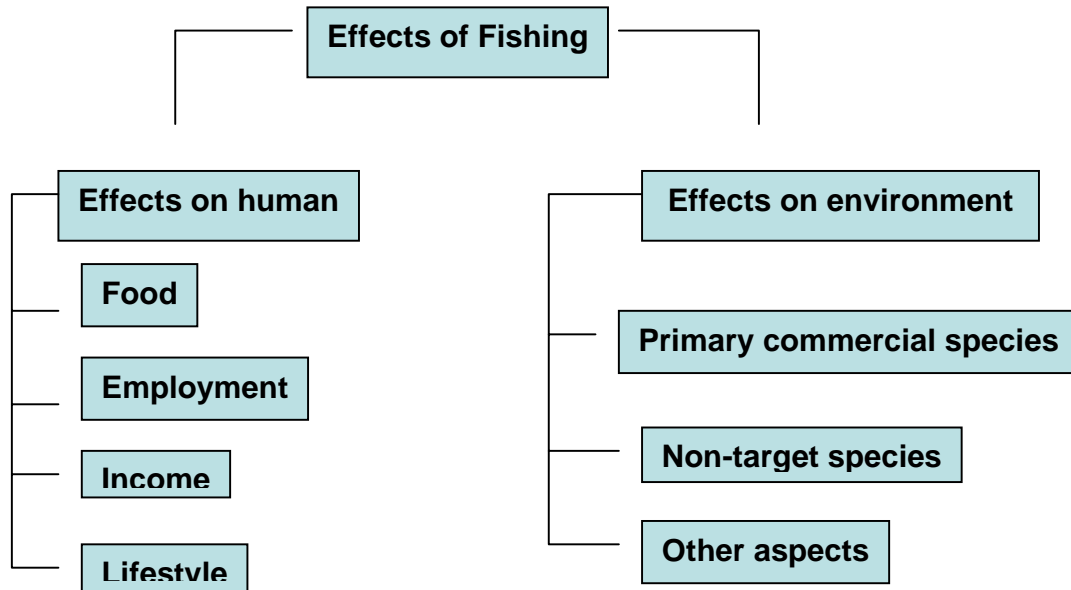
Figure 5.3 Diagram illustrates indicators of sustainability



Source: Gracia and Staples, 1996

The Kite diagram (FAO,1997) as depicted in figure 5.3, is a simple representation of fishery system and its indicators of sustainable development, in which spawning biomass and revenues are represented in each axis. It illustrates that fishery is satisfactory, so far as it creates a high job opportunities and adequate revenues, although its spawning biomass is inadequate in size and its nursery areas are threatened. A complete system of sustainable development indicators should include mechanisms for effective communication among fisheries stakeholders, those responsible for governance and the general public. All dimensions of sustainability (ecological, economic, social, and institutional) are considered as well as the key aspects of the socio-economic environment in which fisheries operate. The indicators of sustainability should reflect the ecological as well as the human well being. A sub division of sustainable development framework and the effect of fishing is reflected in figure 5.4. It depicts the effects of fishing on human as well as on the environment.

Figure 5.4 Hierarchical subdivision of a sustainable development framework



Source: Chesson and Clayton, 1998.

Sector wise profile of fishermen community with focus on demographic and income pattern is highlighted in table 5.14. The number of dependence as a percentage of total members and number occupied in fishing are almost high in case for all sectors or fishing categories. Food is the largest single component in their expenditure basket for all sectors in the fishing industry. Saving as a percentage of income is too low. Saving is mainly incurred for either acquiring fishing inputs or in enhancing existing craft or gear. Motorised sector occupies maximum number in fishing followed by mechanised and artisanal. Saving as a percentage of income is highest for mechanised followed by motorised sector and artisanal.

Table 5.14 Sector wise demographic profile and income pattern of fishermen households

	MOFO	MOFL	MEFO	MEFL	ME&MOFL	NMFO	NMFL
Female /male ratio	870.07	914.73	866.31	940.54	833.33	803.92	956.52
No: in fishing as a % of total No: of members	29.02	25.71	28.86	24.23	27.27	34.78	31.11
No: in fishing as a % of total occupied	81.09	78.88	85.59	79.09	92.31	86.49	77.78
No: occupied as a % of total number of members	35.40	32.59	33.71	30.64	29.55	40.22	40.00
No: of dependence as % of total no: of members	64.60	67.41	66.29	69.36	70.45	59.78	60.00
Expenditure on food as a % of total expenditure	80.82	84.67	82.10	85.39	86.99	84.34	89.29
Interest burden as % of income	6.04	3.33	5.24	3.52	3.43	2.24	2.62
Saving as a % of income	32.25	9.57	49.83	11.15	15.99	34.16	3.30

Source: survey data

Data sources on distribution of income and savings, as highlighted in table 5.15, shows a wide disparity. The disparity in income distribution among sectors may be due to the entry of non-fishermen capitalist class who make huge investment in crafts and gear technology, thus initiating unhealthy competition in the sector. Motorised fishing operator household stood next to mechanized in terms of per capita income, total

household income, household savings, proportion of household income and proportion of income spent on food.

Table 5.15 Sector wise per capita income

Sector	MOFO	MOFL	MEFO	MEFL	ME&MOFL	NMFO	NMFL
PCI (Rs)	10918	7819	15206	7485	8262	10518	9471

Source: Survey data

Table 5.16 Economic variables of sector wise in the survey zones

Sector	North zone			Central zone			South zone		
	Total income (year)	Debt	Savings (month)	Total income (year)	Debt	Savings (month)	Total income (year)	Debt	Savings (month)
MOFO	44875	52090	1214	52625	115325	2747	46070	117471	602
MOFL	39384	57000	910	34347	85920	96	40432	43596	11
MEFO	68250	1287500	2799	74100	1175800	3848	82966	1362540	3934
MEFL	48966	60000	820	44500	50000	65	38666	28698	204
ME&MOFL	42436	75000	582	45245	42505		47500	48523	644
NMFO	14500	34500		18100	49100	1607	18669	31250	

Source: Survey data

Table 5.16 highlights the economic situation in the fishery sector where almost all sectors lower proportion of savings per month of the household income as well as higher proportion of debt burden in the total income. The results also reveals that mechanised sector earn more income, have debt burden and more savings in south zone rather than in other two zones. Motorised sector earn maximum in central zone rather than in other two zones. But in case of mechanised labourers north zone have more participation in terms of annual income and savings. Per capita savings and per capita debt changes are shown in table 5.17.

Table 5.17 Per capita savings per month

Per capita savings per month					Per capita debt			
	Low	Average	Above average	Good	Low	Moderate	High	Very high
Low	68 (9.4)	25 (3.4)	11 (.4)		22 (3.1)	13 (1.8)	18 (2.5)	
Average	126 (17.5)	106 (14.7)	183 (25.4)	59 (8.2)	78 (10.8)	129 (17.92)	93 (12.92)	31 (4.3)
Above average	28 (3.9)	39 (5.42)	59 (8.2)	4 (.6)	183 (25.4)	56 (7.8)	17 (2.4)	19 (2.6)
High		7 (.97)	5 (.7)		12 (1.7)	15 (2.1)	11 (1.5)	23 (3.2)

Source: Survey data

A positive association has been found between per capita income and savings as well as per capita income and per capita debt. Higher income induces the fishermen community to save a proportion of increased income. In the contrary it also enables them to make large investment resulting higher debt. In other words, increased income corresponding to increased savings as well as increased debt. The relationship between higher income on savings and debt is showed with the help of correspondence analysis in table 5.18.

Table 5.18 Correspondence analysis on income and savings

Income	Savings				
	Low	Average	Above average	High	Active margin
Low	17	5	0	0	22
Average	62	106	107	9	284
Above average	4	13	42	45	104
High	0	2	3	35	40
Active margin	83	126	152	89	450

Source: Survey data

Table 5.18, highlights the fact that when income is low savings tends to be low. When income starts increasing or is average, savings increases among members in the fishermen community. After a certain point, even when income is increased savings is

not much increasing due to the investment in inputs or enlargement of vessels etc. The correspondence analysis between income and debt also shows a positive relation between the two is shown in table 5.19.

Table 5.19 Correspondence analysis on per capita income and debt

Income	Debt				
	Low	Moderate	High	Very high	Active margin
Low	3	4	0	9	16
Average	35	71	84	26	216
Above average	14	16	31	15	76
High	2	5	10	12	29
Active margin	54	96	125	62	337

Source: Survey data

Table 5.20 Distribution of savings according to purpose

Purpose of saving	To buy inputs	Education of children	Marriage purpose	To earn interest	To start business	Purchase durables	Do not save
Percentage	32.4	13.02	16	20.2	13.9	4.6	66.9
Numbers	77	31	38	48	33	11	482

Source: Survey data

The main purpose of saving is to buy inputs such as craft, nets, motors etc which is followed by income generation activity in terms of earning interest and to start business is seen from table 5.20. It is important to note the fact that saving for future education of their children is highlighting the changing attitude of the community in the back drop of backwardness and labour stickness, is a promising one. Savings and its varied determinants such as acquiring inputs, for interest earning etc among the fishing communities are studied with the help of categorical regression.

Result of Categorical Regression

$$Y = -0.305X_1 + 0.859X_2 + -0.244X_3 + 0.479X_4 + 0.066X_5 + -0.059X_6$$

(Here standardized coefficients are taken since they are independent of unit of measurement. Hence the constant or mean is zero).

With one unit increase in per capita income, savings increases by 85 percent of the original savings. Similarly a unit increase in occupational category can increase savings by nearly 47 percent. The explanations regarding other coefficients are given

Model Summary

Multiple R	R square	Adjusted R square
.821	.748	.745

ANOVA

	Sum of squares	df	Mean square	F	Significance
Regression	598.24	5	85.46	496.387	.000
Residual	121.76	713	.281		
Total	720.00	719			

Regression Coefficients

X1 = per capita expenditure on food
X2 = per capita income
X3 = per capita debt per month
X4 = occupational category
X5 = caste
X6 = education

Codes assigned to the categories of coefficients according to their quantification on the basis of savings are in table 5.21.

Table 5.21 Occupational category codes and their quantification

Code	Quantification	Frequency
7 = MEFO	1.377	96
6 = MOFO	0.544	330
5 = NMFO	0.206	26
4 = MEFL & MOFL	-0.818	13
3 = MEFL	-0.860	101
2 = MOFL	-1.240	140
1 = NMFL	-3.116	14

Caste codes and their quantification

Code	Quantification	Frequency
5 = others	2.993	32
4 = latin	1.766	227
3 = muslim	0.264	118
2 = araya	-1.467	317
1 = ezhava	-2.475	26

Zone codes and their quantification

Code	Quantification	Frequency
3 = zone 1	2.238	240
2 = zone 2	-0.832	240
1 = zone 3	-1.406	240

Educational levels and their quantification

Code	Quantification	Frequency
1	3.605	50
2	1.221	39
3	-0.277	82
4	-0.182	67
5	-1.358	80
6	-0.243	88
7	1.200	70
8	-1.184	103
9	-2.198	50
10	0.358	76
11	5.896	15

Per capita income has the highest amount of influence on per capita savings. With a unit increase in per capita income, per capita savings increases by 85 percent. It can be seen that per capita expenditure on food and per capita debt have negative impact on savings. With a level increase in per capita expenditure on food and per capita debt, the savings decreases by 30 percent and 24 percent respectively.

In terms of per capita savings, occupational categories are ranked in the descending order of MEFO, MOFO, NMFO, MOFL & MEFL, MEFL, MOFL AND NMFL. In the case of income, MEFO has the highest savings followed by MOFO. With a increase in the

occupational category, a shift from NMFL to MOFL increases the savings by 24 percent. In terms of per capita savings, the different caste groups can be arranged from Ezhava at the bottom with the lowest level of savings to Araya, Muslim, Latin and others at the top with the highest level of per capita savings.

5.4 Status of Sustainability of Kerala fishery

An attempt towards assessing sustainability status of the marine fishery sector has been highlighted in tables 5.22, 5.23, 5.24 and 5.25. The various dimensions of sustainability of the system have been adapted from the works of Charles (1995), FAO (2000), Korakandy (2008) and is analysed in the Kerala situation. Some important aspects of sustainability like long term food security and inter generational equity are omitted in the present study due to absence of required information.

5.4.1 A Preliminary Assessment of the Sustainability of Kerala Fishery Sector, 2009

A major threat to sustainable fisheries in Kerala, from the economic point of view are in terms of overcapitalization, over capacity, over investment in the harvest and post harvest sectors of the industry and the lack of alternative employment generation, which will be helpful to supplement their low income. The fishing operations in the inshore areas were intensified by the motorisation of small craft and the introduction of medium-size mechanized vessels and gears that has resulted in further exploitation of resources. Studies indicate that the overall exploitation of the resources in the fishing grounds in the 0-50 meter depth zone has reached the near-optimum level. There is no area to increase the fishing fleet of small trawlers (32'-36') as the inshore waters are already overcrowded with various types of fishing units (Sathiadas, 1996). Deep sea fishing should be intensified. Integration of small-scale mariculture with capture fisheries is a viable alternative to supplement their low income due to diminishing returns from capture fisheries and stopping all kinds of subsidies to the catching, processing and marketing units which will help the industry in the long run.

Table 5.22 Economic indicators

Factors	1994-95	2008-09	Ratio	Range	Comment
Fishery sector production	Rs 10010	Rs 154900	1.29	1 to Infinity	Promising
Contribution of fishery to SDP(FSP/SDP)	1.55	1.45	0.935	1 to Infinity	Very low
Contribution of fishery to primary sector product (FSP/PSP)	4.79	8.14	1.699	1 to Infinity	Promising
Employment including secondary & tertiary activities	262202	233779	1.4	1 to Infinity	Promising
Sustainability fleet capacity	Recommended	Actual	Surplus	Ratio	Comment
Trawlers	1145	3982	2837	.712	Far exceed the limit
Purse seiners	0	54	54	1	Far exceed the limit
Motorised crafts	2690	14151	11461	.809	Far exceed the limit
Non-motorised	20000	9522	-10478	-1.100	Below optimum

Source: Economic survey, 2008 and 2009

As economic sustainability is concerned, only 2 out of 5 indicators are showing promising trends in table 5.22. The contribution of fishery to primary sector product is showing a positive trend while its contribution to state domestic product is declining. Employment generation in the capture fisheries, inspite of problems are showing positive trends. Fleet capacity as an economic indicator warns for immediate action against excess capacity. Under fleet capacity is seen in non-motorised crafts which is at a below optimum level.

Table 5.23 Social indicators of the community

Total	Fishing occupation	Non-fishing	Ratio	Critical minimum	Comment
1036	782	254	0.325	0.5	Very low
Total	Fishing skills	Non-fishing			
720	592	128	0.216	0.5	Very low
Total	Education below SSLC	Above			
720	715	5	0.007	1	Very low
Total	Fishing income	Non-fishing income			
Rs 18242000	Rs 13545400	Rs 4696600	0.347	0.5	low
	Per capita fishing income	Per capita non-fishing income			
	Rs 18813.1	Rs 18490.6	0.98	1	Just below the critical minimum
Gender equity					
Sex ratio	Kerala	Fishermen community	Ratio	Critical minimum	Comment
	1058	886.57	0.896	1	Very low
Gender equity in decision-making power Total	Women do not have equal decision-making power	Women having equal decision-making power			
720	565	155	0.274	1	Very low

Source: Marine Fisheries Census, 2007-08

Social and gender issues in the coastal waters are in terms of poor housing, health and sanitation, illiteracy, poverty, indebtedness etc. Community indicators indicate high level of dependency on an over exploited resource due to the lack of alternative livelihood strategies. Any sudden fall of the fishery even due to climatic failure will undoubtedly affect the very existence of the coastal community coming up to 8.3 lakhs. The well being of a community will invariably be reflected in its gender status. Gender equity as an indicator of coastal fisheries sector is very low both in terms of sex ratio and equity in decision making. Two important dimensions adversely affecting the women in sex ratio

is the lower health status of both elder women and female children. The lower status of women is due to poverty, lack of sanitation facilities and unhygienic condition. The negligence of female children is due to preference of male children in post harvesting and income earnings. With respect to livelihood issues confers to the dependence on fishery and neither seeking alternative job opportunities either in village or outside. The situation with regard to social indicators is distressing as indicated in table 5.23.

Table 5.24 Ecological indicators

Change in area & ability of critical habitat	Area of backwaters in 1988 (ha)	Area of backwaters in 2009	Ratio	Critical minimum	Comment
	35000	46129	.759	1	Very low
Level of ecosystem understanding- Total	Have understanding	Don't have understanding			
720	674	46	0.936	1	Near optimum
Area in ha per active fishermen inshore 0-50m depth	1990	2009			
	6	3.2	0.5331	1	Very low
Area in ha per active fishermen inshore 50-200m depth	13	6.4	0.492	1	Very low

Source: GOK, 2008
 Economic Review, 2009
 Survey data
 Sathiadhas, 2005

Ecological sustainability has been studied in general as well as in the catch structure in table 5.24. The ecological issues threatening the sustainability are the use destructive fishing methods in the form of trawling, dynamitising, poisoning leading to biological over-fishing, habitat loss, environmental pollution, biodiversity loss etc. The possibility of biological over-fishing in the inshore waters of Kerala had been reported by Expert Committee on Marine Fisheries Management appointed by the Government of Kerala in

1989. Sustainability of catch structure is studied by computing the ratio of difference between MSY (maximum sustainable yield) and catch to MSY for each species from 2001-2009 and is depicted in table 5.25.

Table 5.25 Sustainability of catch structure

Resource	Mean	Confidence interval	Remarks
Oil sardine	.253	-0.086 .592	Not sustainable
Mackerel	-0.493	-0.772 -0.214	Not sustainable
Other sardine	-0.553	-0.993 -0.113	Not sustainable
Carangids	0.018	-.236 0.272	Not sustainable
Tunnies	.172	-0.077 .421	Sustainable
Seerfish	.376	.320 .431	Not sustainable
Catfish	.658	.486 .829	Sustainable
Perches	-0.019	-0.125 .087	Not sustainable
Elsa	.422	.331 .513	Sustainable
Penaied prawn	.198	0.081 .314	Sustainable
Cephalopds	-1.435	-.489 -2.38	Not sustainable
Total	0.025	-0.56 0.61	Not sustainable

Source: computed from secondary sources

In spite of the well understanding of the ecosystem, unsustainable practices such as pollution of backwaters due to the discharge of industrial waste, pollution from motorised boats, destruction of sea bottom by the trawlers, use of destructive gears and by-catch discards which results in depletion of resource both in number and size of some species. Ecological solution involves integrating fisheries management with the coastal zone management and the bio-diversity conservation.

Since indicators leading to different types of sustainability showing different values, the hypothesis-2 in the study is recommended.

Findings and Conclusion

A number of legal, legislative frameworks were enacted at the international as well as at the national level. India is a party to the International legal commitments to sustainable marine fisheries management and conservation. In India even after several years of planned development, the Central Government has not formed an independent Ministry for fisheries. At the state level, Department of Fisheries is concerned with fisheries sector.

For undertaking conservation measures, understanding the existing socio-economic conditions and ensuring the participation of the local community are important pre requisites. It is increasingly being realised that community based management results in better sustainable utilisation of natural resources. In traditional community based management systems, there are often unwritten and informal management and conservation guidelines enforced by the community. However, increased population pressure, social change and use of modern gear by commercial fisheries have caused the breakdown of the traditional conservation and management measures.

Caste and religious institutions managed all affairs on the coast. Most rules were related to conflict management rather than resource management. The Diocesan structure in the Christain fishing community, and temple centric among the Hindu community were the institutions that manage the fishermen communities in the marine villages of Kerala.

Institutional arrangements in the management of fisheries resources have evolved from a traditional community to government regulations over time. Various informal institutional set up including, sea courts or Kadakodi, Karinila system, a new form of system called Kadapuram committee in Nattika has been studied Traditional arrangements gave way to a number of a number of enactments including KMFRI Act of 1980. The 'Kadapuram Committee' is an institutional arrangement in the village which is

temple centric and is functioning in a democratic manner. With the prevalent of the community organization, the co-operatives are also playing a major role in providing equal access to the resource and in managing conflict mechanism. But unlike *Kadakodi*, which takes the local complexities into account, modern legal instruments are too general and therefore ineffective in regulating resource use.

Planned development based on introduction of mechanized boats, deep sea vessels and increased investment in the sector created a divide within the sector. Artisanal sector responded to the loss of catch by motorizing and expanding the area of operation. Lack of balanced policy, dismal implementation and monitoring are some of the causes, for deepening the crisis in fisheries sector. Arise of conflicts led to establishment of various institutions in the form of co-operatives, SHGs, NGOs, trade unions and also a set of regulations in the form of MFRA (Marine Fishing Regulation Act) in the state with exclusive artisanal zone. These developments weakened the traditional community institutions in the area.

Fish workers organisations have helped the community in confronting and pressurising the state and strong mechanised sector, which has resulted in various positive responses from state in favour of artisanal sector, like ban on fishing by trawlers during monsoon and an array of both promotional and protection social security measures. With the prevalent of the community organization, the co-operatives are also playing a major role in providing equal access to the resource and in managing conflict mechanism. Community based management is effective, when there is proper participation of the communities in the management of the fishery. Here, cooperatives seen as a form of community organization to participate in the management of marine fishery of Kerala, and turned to be successful

The co-operatives as a community organization of the fishermen have been analyzed with reference to Matsyafed affiliated societies in the northern, central and southern districts of Kerala. The primary fishermen co-operatives have a variety of roles to play in relation to artisanal fishermen. Basically they provide financial assistance to the poor artisanal

fishermen to gain access to motorization and modern gear for their traditional craft. The auction system where Matsyafed have been able to establish a nominal presence is expected to result in higher share of fishermen in the consumer's price.

The involvement of fishermen, assistance received from the society, directly from Matsyafed, fishing units undertaking their activity the society have been analysed. The highest number of participation has been found in the Central zone, followed by North and South zones respectively. With respect to assistance received, fishermen have availed nearly 75-80 percent of the assistance from the society in all the three zones. The women involvement is less compared to their male counterparts, which has also been reflected in availing the assistance from the society.

The seasonality features and trend with peak seasonal value are coming in August for South and Central zones. This is due to the fact that both the zones are mechanised fishing hub of Kerala. One reason is that the traditional fishermen would be able to get more catch during the monsoon season of June through August, may also due to trawl ban putting less fishing pressure results in the availability of more catch. However, seasonality of catch is high in January for North zone. This could be because like South zone, this zone is not an intensively mechanised zone and the effect of trawl ban may not reflect any immediate benefit to the traditional fishery. Another pertinent fact to be considered in this regard is the difference in craft-gear combinations in comparison to other zones or may be due to the south ward inshore drift of the pelagic species after the monsoon period from South zone to the Northern region.

Performance comparison at inter zone and intra zone shows wide variations. There are considerable difference among the fishing communities. The analysis points at statistically significant differences in performance indicators (catch value) at zone level and group level. This could be regarded as indicative of the effectiveness of community based fisheries resource management with respect to societies and even at SHGs level.

While analyzing the data on fishing activity in Kerala, the period 1961–2006 highlights the increase in fishing activity in terms of number of active fishermen and fishing vessels. The period witnessed an increase of active fishermen by 2.4 times and increase in the mechanized vessels by 5.8 times. With respect to motorized sector, an increase of 1.4 times was identified for the period 1987-2006.

Depletion status of harvested species, such as Other sardines, Cat fish, Ribbon fish are the species showing heavy depletion during the periods. Mackerel, Seer fish and Perches shows mild depletion. Carangids, Elasmobranches, Oil sardine and Penaid Prawn shows moderate depletion. Only Tunnies, Cephalopods have not shown any depletion.

As far as impact of trawl gear is concerned, it is noticed that among 12 species more than 20 percent of landings are contributed by trawl, 9 are either moderately or heavily depleted. Depletion can be attributed to the deleterious impact of trawl gear, particularly on the bottom dwelling species due to its incessant and indiscriminate scraping method of sea bottom. Analysis of the exploitation rate of all the commercially important species except Seerfish, Elasmobranchs, and Penaeid Prawns are found to be unsustainable, it should be understood that sustainability of the very catch structure itself is under threat.

The result of Correspondence analysis on savings, income and debt shows paradoxical phenomenon between income and debt with increased income corresponding to increased debt. Categorical regression is used to analyse the effect of per capita expenditure on food per month, per capita income per month, per capita debt per month, occupational category, caste, education and district on per capita savings per month shows that with one unit increase in per capita income savings increases by 85 percent of the original savings. Similarly a one level increase in occupational category can increase savings by nearly 47 percent. However, the per capita expenditure on food and per capita debt show a negative impact on savings. With a one level increase in per capita expenditure on food and per capita debt, the savings decreases by 30 percent and 24 percent respectively.

Economic and demographic aspects of the fishermen households in the context of sustainability have been studied. Sustainability assessment of the coastal fishery highlights the fact that due to limited livelihood alternatives exists in the coastal villages and also meager income for supporting the family at subsistence level calls for sustaining and preventing the exploitation of the resource base. As both the socio-economic sustainability and ecological sustainability are under threat, the seasonal trawl ban alone cannot protect the fishery sector of Kerala for ensuring livelihood security to the fishermen community.

The socio-economic analysis of fishermen community visualizes the importance of the sector for fishery management and community involvement in fishery management. An examination of occupational structure shows that 48.3 percent respondents have the ownership of assets and more than half of the asset owners are in motorized sector doing subsistence fishing. Ownership of fishing assets and the resultant indebtedness, low standard of living resulting in poor quality of life, lack of skill, lack of alternative employment opportunities, and the expectation of bumper catch prompt the fishermen to stick on to their employment leading to occupational attachment leading to labour stickiness.

Occupational category wise distribution reveals that 38 percent are motorized fishing operators, 8.5 per cent are mechanized operators and 5 percent are non-motorised operators are in the clutches of indebtedness. The reasons identified for the indebtedness includes excess capital in the sector, increase competition, over capacity resulting in increasing fleet size etc. The credit availability is the important factor needed for sustaining fishery and also for ensuring a satisfactory quality of life for the fishermen. The Matsyafed societies and Co-operative Banks are the major sources of credit. In terms of the average income earned, mechanized and motorized sectors earn more compared to traditional counterparts.

Lack of alternative viable employment opportunities remains as a big hindrance in diversification of occupation among the fishing community. Lack of necessary skills and

entrepreneurship also limits the employment diversification. This situation combined with regional concentration and low mobility of fisherfolk has direct effect on increasing pressure on sea resources and increasing competition in already existing occupations.

Analysis of social actors in the fisheries sector such as mechanized sector, motorized, traditional sector, including vendors, head loaders, auctioneer (commission agent), exporters, crew members in different sectors in Kerala, have been portrayed. A focus on fisherwomen in the post harvest sector and their increasing role as bread winner for the family have been highlighted. The women are mostly engaged in micro finance activity, drying, peeling, processing etc. A case study of SAF, an institution working under the Fisheries Department for the upliftment of the women in coastal communities has been undertaken. The institution focus on empowering the women in the coastal areas of Kerala, by financial assistance and training to undertake micro-enterprise and the interest free loans to the fisherwomen in the coastal areas.

There are many issues in the co-operative management of fisheries which are needed to be addressed, include: a) fishermen involvement, participation and to organise themselves into co-operatives needed to be strengthened; b) conditions under which fishing co-operatives can attain economic viability and become self-sustaining without any external support are to considered; c) how co-operatives can acquire and maintain exclusive rights to fisheries falling in their jurisdiction are relevant in terms of open access nature; d) to reconcile the conflicting interests and claims of members using traditional craft and gear, and those using mechanised craft and gear are matters needed to attended as a form of conflict resolution; e) to ensure equitable access to fish stocks and equitable distribution of benefits from the catch and also to ensure fair and remunerative prices to members and retain their loyalty to the co-operatives are the issues to be stressed.

Recommendations

- Strict implementation and enforcement of the conservation measures initiated such as MFRA 1980, seasonal trawl ban, mesh size regulation etc for safeguarding the traditional/artisanal fishing community and the periodic assessment of the resources.

- Community-based fisheries management has gained popularity due to the failure of government management approaches, which do not involve local people in the management of coastal resources. Link between traditional community and MATSYAFED need to be strengthened and initiated in the form of Co-management in the marine fisheries, where the Government should act as a facilitator for the management of resources.
- An evaluation of the depletion status of the resources warrants immediate action in terms of closed season for all fishing category, mesh size regulation, restriction on discard of juveniles and less important species and the regional restriction of catch along with species sustainability assessment.
- The empirical findings of the study indicate an alarming threat on the socio-economic and ecological sustainability. In this context, the seasonal trawl ban alone cannot be an ultimate solution for conservation problem in the fishery sector. Reduction in capacity of the crafts, limiting the size of the crafts, restricting the license given to non-fishermen community etc will lead to reduction in indebtedness and ensuring ownership of fishing assets to the fishing community.

Community-based resource management has, thus re-emerged as a way to involve resource users and to utilize indigenous institutional arrangements and knowledge in fisheries management. However, the future of community-based resource management seems to lie in a form of co-management, a sharing of responsibility and authority for resource management between the government and the local resource users/community.

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Interview schedule

1. Name of the village

Name & No: of the household
 Name of the head
 caste and community
 No: of household members

2. Details of household members

Name	Gender	Age	Relation to the head	Marital status	Education skills	Main occupation			
						A	B	C	D

A- fishing operator, B-fishing owner, C- fishing labour, D-non-fishing labour.

3. Land possession and housing pattern

- a) Is the house you presently living in
- () your own house () your relative's house
 () your parent's house () rented house
- b) No: of cents of land.....
- c) No: of rooms.....
- d) Is your crop area?
- e) If yes, mention the crop details.....

4. Physical amenities

- a) What is the main source of drinking water in the household?
- () canal/ river () public well () public pond
 () own well () public taps () house connection
- b) Source of light in the household?
- () electricity () oil lamps
 () kerosene lamps () others
- c) What is the main source of outside general information?
- () newspaper () radio () magazines
 () government officials () public leaders () neighbours/ friends

5. Earning patterns of the household

Type of occupation	Earnings from fishing	Earnings from non-fishing	Labour (family/hired)	Season/ months engaged in fishing and non-fishing

6. Assets

a) Fishing assets

Type	Present value	Economic life	Ownership pattern				Remarks
			A	B	C	D	

A- owner operated, B- co-operative ownership, C- absentee owner, D- company owner

b) Non-fishing assets

Land () Farm & machinery () Transportation ()

Livestock () other consumer durables (mention if any)

7. Household expenditure

Items	Annual expense	Monthly expense	Home production
Food			
Clothes			
Household durables			
Medical care			
Education			
Bills (electricity etc)			
House repairing			
Festivals/ social events			
Recreation			

8. Saving patterns

- a. Do your family save? No () Yes ()
- b. If yes, how often do you save?
() daily () weekly () monthly
- c. For what purpose do you save?
() input purchase () education of the children
() marriage of daughter () earning interest () to do business
- d. Where do you save?
() Banks () Post-office () Chit fund
() Co-operatives () others

9. Credit & Indebtedness

- a. Have you borrowed money / are in debt? Yes / No
- b. If yes, how much and for what purpose?

- c. From whom have you borrowed?

- d. At what interest rate? -----
Mode of payment:-----
Repayment period:-----
Mortgage kept:-----

10. Job experience and mobility

- a. Current ly engaged in which occupation:-----
- b. Experience in fishing occupation: -----
- c. Engaged in other occupation, if any?-----
- d. Attempted to change, if yes , give reason?

If no, why?-----
- e. Did you move away from the village last year? if yes, why-----
If no, why-----
- f. What kind of job do you think you can take in addition to fishing?

g. Whether inside/ outside the village?-----

h. Income from fishing and non-fishing income?-----

i. Do you know the wage rate in town?

11. Future outlook for occupation

a. In future do you think your occupation in fishing will be better/ worse/ no change? reason-----

b. Do you think your children should take up fishing as a occupation? If yes, why?

-----If no,
why?-----

12. Gender activity

a. Is women folk in the household involved in any fishing activity, rather than marketing?

b. Number of working days/ hours/monthly/ annual?

c. Remuneration received by them?

d. How many from each household and the income they receive in undertaking such activities?

e. Difficulties encountered by them in the sector?

13. Problems in the area where help is needed

Problems	Priority	Remarks
Health facilities		
Water		
Drinking water		
Sewage disposal		
Crowded condition		
Harbour		
Schools		
Technical education facility		
Fishing		
Land for cultivation		
Natural calamities		
Housing		
Land		
Transportation		

14. Resource depletion and conservation

- a. Over the last 25 years have you noticed depletion of any fish species?
- b. If yes, is it any particular season/ month or in the whole year?
- c. Type of species which are in the depletion state?
- d. Is depletion more prominent in the territorial waters, inshore area or any other areas?
- e. What are the reasons for the resource depletion and remedies which you can forward?

Reasons:

Remedies:

16. Impact of monsoon ban on trawling

- a. Do you think that the seasonal trawl ban has been effective in the conservation of depleting species?
yes/ no. why?
- b. Do you think seasonal trawl ban is a necessary measure? why?
- c. Suggestions and any other measures besides the trawl ban will ensure resource conservation and also improve the livelihood conditions?

17. Institutional involvement

- a. How and to what extent the boundaries are regulated in inter-fishing ground and intra-fishing ground?
- b. How fisheries activities are monitored in the area and by whom?
- c. Explain the role of co-operatives, Fisheries Department, NGOs, Sangams etc help in fisheries conflicts?
- d. Reason you depend on these institutions and involvement and its purpose?
- e. What were the institutional changes which took place in Kerala and the outcome of these changes to the fishermen community?