Fisheries Management for Sustainable Livelihoods (FIMSUL)

Work Package 5
Report - R20

Fisheries Management Options for Tamil Nadu & Puducherry

Government of Tamil Nadu

सत्यमेव जयते
Government of Puducherry

Food and Agriculture Organization of the United Nations

The World Bank

Cover photograph : Discussions on the beach. Photo by SIFFS/FIMSUL

FISHERIES MANAGEMENT FOR SUSTAINABLE LIVELIHOODS (FIMSUL) PROJECT IN TAMIL NADU AND PUDUCHERRY, INDIA (FAO/UTF/IND/180/IND)

Work-Package 5

Fisheries Management Systems

FISHERIES MANAGEMENT OPTIONS FOR TAMIL NADU & PUDUCHERRY

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PREFACE

Fisheries Management for Sustainable Livelihoods (FIMSUL),is a project implemented by the Food and Agriculture Organization of the United Nations (FAO) with the Government of Tamil Nadu and Puducherry in India under the World Bank Trust Fund.

The project aims at establishing frameworks, processes and building capacities of various stakeholders especially the Government, to facilitate the planning, design and implementation of appropriate fisheries development and management policies.

The project includes a series of stakeholder consultations and consensus building apart from detailed review and analysis in the areas of stakeholders, livelihoods, policy, legal and institutional frame work and fisheries management. Based on this, the project comes up with various options.

Work package 5 is on Fisheries management. Starting with an initial review of the fisheries management, an orientation workshop, detailed analysis of the fisheries data and other details, feedback from stakeholder consultations, case studies on Fisheries management units and final stake holder workshop were taken up. Based on these processes, this report is the final analysis and recommendation of options for marine fisheries management in Tamil Nadu and Puducherry. The authors Mr. V. Vivekanandan and Dr. Mohamad Kasim are thanked for this detailed work

The FIMSUL team thanks the successive Secretaries and Director/ Commissioners of Fisheries in Tamil Nadu and Puducherry during the project period for all the support provided. Many thanks are due to the Department of fisheries officers of Tamil Nadu and Puducherry, who had provided a lot of the information during the project. Special thanks to Dr. Ahana Lakshmi for editing the report.

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EXECUTIVE SUMMARY

The specific aim or output of the work package on fisheries management is to "define a new fisheries management system" for Tamil Nadu & Puducherry (TN & PC) since it is an essential tool for achieving the long term development goal of the project. The approach was a mixture of (i) expert consultations with fishery biologists, fishery statisticians, academics, fisheries NGOs, fisheries officials, (ii) review of fisheries management with available current information, (iii) a detailed analysis of catch data species wise, district wise and sector wise (mechanised, motorised and non-motorised) and (iv) an exercise to identify potential Fisheries Management Units (FMUs) and to develop a detailed characterization of them. Based on the above, fisheries management options for TN & PC have been worked out and presented in a state level multi-stakeholder workshop and subsequently refined. This report is the outcome of this process.

Chapter 1 orients the reader to the current status of marine fisheries in Tamil Nadu and Puducherry. Chapter 2 discusses the management issues facing the sector reflecting the diagnosis of problem made by FIMSUL. Chapter 3 looks at the management options with some specific recommendations. Chapter 4 provides a brief summary of the findings and recommendations.

Tamil Nadu coast has four distinct ecosystems- the Coromandel coast, Palk bay and Gulf of Mannar on the east coast and a small portion of the Arabian Sea on the west coast, with each having distinct communities and variations in fishing systems. The report found that there has been a continuous growth in fish landings with nearly five-fold increase over a 55 year period along with more than a three-fold increase in active fishermen along the Tamil Nadu coast. Technical interventions such as mechanisation, motorisation, improved gears and the continuous increase of efficiency and numbers of fishing units were responsible for this increase. This has been accompanied by a continuous expansion of fishing operations to deeper and distant waters and the continuous discovery of new grounds and resources. There has also been a polarisation of the sector into two categories called "mechanised" and "artisanal" with the differences going deeper than mere technical factors. At present the mechanised sector with 22% of the workforce is taking away two-thirds of the catch, while the artisanal sector with 78% of the workforce has to be satisfied with one-third of the catch. It is seen that in addition to fully covering the shelf area adjoining the TN coast, sections of the TN fleet depend heavily on fishing in neighbouring waters including that of Sri Lanka and Andhra Pradesh. Intense competition between units is leading to continuous increases in investment and operating costs.From a fisheries management point of view, the marine fisheries is an open access system. The term "open access" in TN & PC needs to qualified by the fact that there are many social barriers that restrict entry to particular social groups that are well entrenched in the fishery. The problem with this "socially limited entry" is that there is more than enough number of people to invest and make the fishery unsustainable. The overall increases in catches actually mask the resource degradation that is taking place with decline and depletion of some species being made up by increases in others, particularly small pelagics like the oil sardine. The oil sardine has emerged as the dominant species contributing over 20% of the overall landings. Thus over fishing—both biological and economical—is definitely taking place in TN & PC, but the extent of over fishing, the potential losses due to over-fishing and the long term consequences of this are not known. There is over capacity in different sub sectors, especially the trawler sector. .At the heart of the problem of trans-border fishing by Tamil Nadu boats in Sri Lankan waters lies the issue of over-capacity and weak fisheries management. The fishing communities' own systems of management are still very much in place, only there is weak coherence between the decisions taken by different villages and different groups reducing the efficacy of these systems. The important regulatory frameworks such as the Marine Fishing Regulation Act (MFRA) and the Wild Life Protection Act are top down. The enforcement of MFRA is weak and patchy. Wherever effective regulations exist, it is often based on the acceptance and support of the community. Threats to the coastal and marine eco-system from non-fishery activities are on the increase and these are threatening to overtake over-fishing as the major cause for fish depletion, especially in near shore waters.

With regard to choice of fisheries management frameworks, it is too early to expect the stakeholders make a choice between various frameworks including the Eco-system based approach, Wealth based fisheries management or the Human rights based fisheries management. At the moment, output based controls are not realistic and input controls are more suitable for TN & PC.

The TN& PC fisheries are in a transition from traditionally managed systems to modern state managed systems. As a result, both the community and Government have a certain amount of power to manage the fisheries, but there is no synergy in the use of these. This requires the development of a system of "co-management" that works on the basis of partnership between the fishing community and the Department of Fisheries (DoF) with the community institutions playing a major role in fisheries management. Such structures should not be set up top-down, but need to evolve. They need to be built up from village or local level using the traditional village institutions and the new boat associations as building blocks. Eventually, a four tiered system with village or landing centre-based institutions at the base could emerge.

Making a shift from 'open access' to 'limited access' is a major challenge. Various options for restricting entry are discussed in the report. Capacity controls also need to be put in place, which obviously need to start with the trawlers. It is recommended that this is undertaken in a phased manner starting with the Palk Bay where a trawl fleet retirement plan is required urgently.

While recognizing that welfare measures not conflicting with management objectives can add to overall welfare of the fishing community, it is important to recognise that *the best guarantee of fishermen welfare is to ensure sustainable fishing based on a healthy fish resource*. Though deep sea fishing has good potential for TN fishermen, some caution is required while developing it as resources like tuna are shared resources and the fact that many countries are already exploiting them and all coastal states in India have ambitious plans for promoting deep sea fishing. It also needs to be recognized that some sections of the TN & PC fleet are already into deep sea fishing.

Fisheries management plans blending scientific information with people's knowledge will be an useful instrument. The Marine Fishing Regulation Act needs to be revised with a view to making it a more flexible instrument and suitable for decentralized decision making. It also needs to be aligned with other laws affecting fisheries. The report also discusses specific management issues including gear controls, increasing the scope of the "closed season", resolving the problems of trans-border fishing and the system of enforcement. While recommending better information collection and knowledge management to support fisheries management, the report also recommends the setting up of a fisheries management advisory group to guide the Department of Fisheries.

There is also an urgent need to develop high level mechanism to protect fishing interests in the on-going competition for coastal and marine space and resources with other sectors.

CONTENTS

INTRODUCTION

Objective

The specific aim or output of the work package on fisheries management is to "define a new fisheries management system" for Tamil Nadu& Puducherry (TN & PC). This arose from the scoping study that clearly identified weaknesses in fisheries management as a key problem that had been aggravated by the liberal distribution of fishing boats and nets by Government and NGOs after the tsunami.

The significance of this work package is underscored by the fact that effective fisheries management is an essential tool for achieving the long term development goal of the project: *sustainable management of the fisheries in India and that this makes a positive net contribution to development and pro-poor growth.*

Approach and Methodology

The work package started with an expert consultation involving fishery biologists, fishery statisticians, academics, fisheries NGOs, fisheries officials and a few others to explore the current understanding of fish resources, fishing fleets, economics of fishing and approaches to fisheries management that might work in TN & PC. International fisheries experts also presented "success stories" from other countries like New Zealand, Mauritania and Ghana.

The expert consultation was followed by a "review of fisheries management", which looked at current information on fish resources, level of exploitation, the fishing fleet, the fishermen, socio-economic aspects, the legal & institutional framework, functions & processes, etc. An attempt was made to assess the performance of the fisheries sector from this information as well as discuss the various challenges ahead.

Finding the absence of disaggregated catch statistics a major hurdle for a better understanding of the current status of the fishery, the project acquired unpublished catch statistics for the period 2001-2010 from the Central Marine Fisheries Research Institute. This enabled a more detailed analysis of the catch data species wise, district wise and sector wise (mechanised, motorised and non-motorised) and provide valuable insights.

Subsequently, an exercise was carried out to identify potential Fisheries Management Units (FMUs) and to develop a detailed characterization of them. A variety of options emerged and to explore in depth, three case studies were undertaken:

1. Chennai fishing harbour as a landing centre based FMU
2. Palk Bay as an eco-system and geographical FMU
3. Lobster fishing in Kanyakumari district as a fish resource based FMU

In addition to the above activities specific to WP5, fisheries management related inputs were also taken from workshops conducted for other work packages, wherein there was considerable interaction with fishermen, fisherwomen and fisheries officials.

Based on the above, fisheries management options for TN & PC have been worked out and presented in a state level multi-stakeholder workshop and subsequently refined. This report is the outcome of this process.

Structure of this report

This report starts with an orientation of the reader to the current status of marine fisheries in Tamil Nadu and Puducherry in Chapter 1. While efforts have been made to make this chapter self-contained, it may require reference to other FIMSUL reports and papers to get a fuller understanding of the marine fisheries of TN & PC. Chapter 2 goes into the management issues facing the sector. This reflects the diagnosis of problem made by FIMSUL. Chapter 3 provides the solutions—or rather management options with some specific recommendations. Given the length of this report and the inevitable scattering of findings and recommendations all over the report, Chapter 4 provides a brief summary of the findings and recommendations. Readers, while being encouraged to use the summary, are advised to go deeper into topics of their interest using the Contents page that lists all the sub-topics.

Chapter 1 : Current Status of Marine Fisheries in Tamil Nadu & Puducherry

1.1 Background to the sector

Geographical aspects

Tamil Nadu is the southern-most state of India with a coastline of 1076 km. Essentially, an east coast state, it extends around 60 km into the south west coast of India, gaining a foot hold on the fisheries of the west coast as well. Embedded in the TN coast are two enclaves of the Union Territory of Puducherry—Puducherry, the capital city and Karaikal, a predominantly rural district—with a coast line of 45 km. The significance of the geographical location of TN is that the fishermen of northern TN have potential access to the entire east coast up to the Bangladesh border while the Kanyakumari fishermen in the south have access to the entire west coast, up to the Pakistan border[1]. Another geographical aspect of great significance is that while half the coast line faces the open sea with a 200 nautical mile EEZ, the other half is proximate to the Sri Lankan coast line with an international maritime boundary that restricts the area available for fishing. At the closest point, the international boundary line is just 16 km away from Dhanushkodi onRameswaram Island.

The four seas

Another geographical and ecological feature of the TN coast is that it can be divided into four distinct eco-systems from a fisheries point of view. It has four "seas", as follows (north to south):

i. Bay of Bengal, from Pulicat to Pt.Calimere (also called the "Coromandel Coast")

ii. Palk Bay, from Pt. Calimere to Rameswaram Island

iii. Gulf of Mannar, from Rameswaram Island to Cape Comorin (Kanyakumari)

iv. Arabian Sea, from Cape Comorin to Neerodi on the Kerala border (also called the Kanyakumari coast)

Each of the four seas/ecosystems has its own peculiarities leading to the evolution of distinctive artisanal fisheries and identities. Rameswaram Island and the "Adam's bridge" (a natural barrier just below the sea surface) that extends to the Sri Lankan coast, significantly limits movement of boats from the southern districts to the north and vice versa. However, with the exception of the 300 km Palk Bay coastline, the rest of the coast, in principle, has access to the "deep sea" and the "high seas".

The fishing communities, institutions and traditions

Tamil Nadu (along with Kerala, once part of ancient *Thamizhagam*), has the oldest marine fishing communities in India, with some of them having an unbroken tradition of over 2000 years. Interestingly, three of the four eco-systems are associated with particular communities (castes), which have a near total hold over that part of the coast. The Hindu *Pattinavar* community is associated with the Bay of Bengal or Coromandel Coast, the Christian *Parava* community with the Gulf of Mannar and the Christian *Mukkuva* Community with the Arabian Sea coast. Though there is a smattering of other communities that co-exist in these three coasts, the overall ethos is that of the pre-dominant community on that part of the coast. The three big communities have well developed traditions and institutions that transcend the village and embrace the entire zone they occupy. Strong self-governance is the hall mark of these three zones/communities.

1 At the moment, the Chennai fishermen make use of the opportunity on the east coast by fishing in Andhra waters with some of the multi-day trawlers going up Visakhapatnam. On the west coast, the footprint of the Kanyakumari fishermen is much more substantial. The Colachel trawlers fish mainly in Kerala, while a significant number of motorized units seasonally migrate and fish in Kerala, Karnataka and Southern Maharashtra. The Thoothoor "shark boats" fish all over the Indian EEZ on the west coast using up to the Pakistan border using long lines and gillnets.

The Palk Bay and the northern part of the Gulf of Mannar (Rameswaram to Vembar) are settled by an assorted group of communities, possibly much later in history. Some of these communities are considered marine fishing castes, while others are clearly small segments of agrarian castes that moved into fishing in the last century or so. This mosaic of communities make this zone more socially complex with a relative paucity of traditional institutions. Self-governing structures have emerged but are more fragmented than in the other three coasts.

All fishing hamlets (some may be just streets in a larger habitation) are generally single caste and **self-governed** (see section 1.4 for more details). This self-governing characteristic has not vanished despite 60 years of the Indian constitution and remains strong. This is not true just for TN, but for almost the entire Indian coastline.

1.2 Historical Overview of Fisheries Development in TN & PC

To understand the current status of marine fisheries in TN & PC it is important to take a historical view of the development of fisheries, especially since independence. This section represents an original analysis of CMFRI catch data by FIMSUL and correlating it with various changes in fisheries reported by fishermen and the observations of the authors themselves.

Post-independence era: a period of continuous expansion

In the early 1950s, fishing in TN & PC was entirely the preserve of small country craft, propelled by sails, paddles and oars. Starting from the early 1960s, the sector has undergone a rapid transformation. Today in 2011,almost the entire fishing is carried out by vessels using motors, though non-motorised vessels exist nominally. These changes have been caused by Government policies and investments in fishing as well as rapid changes in markets, both for fish and inputs.

Table 1 provides a timeline of the changes in the fisheries during the last 60 years

Table 1 : Characteristics of the fisheries of Tamil Nadu and Puducherry, 1950 - present day

Period	Characteristics/changes
1950s	A non-mechanized fishing fleet composed entirely of traditional craft and gear; continuing use of cotton and natural fibres; fishing close to the shore; some expansion due to fishing population increase and improvements in transport system
1960s	Start of dramatic changes. Introduction of nylon nets in the artisanal sector leads to increased productivity and expansion. Start of mechanization programme with introduction of mechanized gill netters in 1960, which had limited impact. Mechanised trawl boats introduced in the second half of decade and started becoming noticeable by end of 1960s. Start of export oriented fisheries that led to ice plants, cold storages, etc. Nevertheless, it was essentially a decade of artisanal sector expansion
1970s	Trawling takes off due to attractive international price for shrimp, starts contributing significantly to production. Competition and conflict develops between the artisanal sector (still without mechanical power) and the new mechanised boats (essentially trawlers); Conflicts reach a peak in 1978 across the coast and first set of Government actions to protect artisanal fishermen; 3 day-4 day rule in the Palk Bay devised. Mechanisedsector catches outstrip artisanal sector catches by end of decade. Indo-Sri Lankan maritime boundaries fixed in 1974 and 1976, but no immediate impact on fishing and fishermen

Table 1 : Characteristics of the fisheries of Tamil Nadu and Puducherry, 1950 - present day	
1980s	Competition and conflicts continue, leading to enactment of TNMarine Fisheries Regulation Act (TNMFRA) in 1983 and the creation of a 3-mile zone for artisanal fishing. Trawlers reach a plateau and start next round of expansion with adoption of High Open Bottom Trawl nets, diversification to finfish and cephalopods, etc. Start of civil war in Sri Lanka brings distress to Palk Bay districts due to proximity and the continuation of the historical fishing practices across the border. Despite risks, the mechanisedboat fleet of TN in the Palk Bay increases due to decline of fishing on Sri Lankan side of Palk Bay. Motorisation of artisanal sector starts, but limited progress on the east coast. However, Kanyakumari fishermen adopt imported 8 hpkerosene Out Board Motors (OBMs) with new marine plywood boats with specific focus on fishing in Kerala. 1987 also heralds the start of India's first indigenous deep sea fleet in Thoothoor (KanyakumariDist) that starts targeting sharks all over the west coast of India using mechanized gillnet boats.
1990s	Motorisation picks up on the east coast based on the use of 5 hp Lombardini diesel long-tails on *kattumarams* and new 'Maruti' FRP beach boats[2]. Still, non-mechanised vessels remain a significant presence by end of decade. Mechanised trawlers continue to scale up gradually. Motorisation on the west coast (Kanyakumari Dist) becomes a dominant factor. The Thoothoor shark fleet starts moving beyond the shelf to catch pelagic sharks. Chennai trawlers start multi-day fishing taking them increasingly into Andhra waters; some diversify from trawling to multi-day gillnetting in the mid-90s
2000s - Pre tsunami	Crisis in trawl sector with declining catch rates; leads to next level of expansion—multi-day fishing on the Coromandel coast and the shift to offshore gillnetting by a section of mechanised boats in Chennai. Use of banned pair trawls also increases due to competition. Motorisation and replacement of *kattumaram* with FRP boats gain momentum. The Thoothoor shark fleet starts yellow fin tuna fishing with support of export firms.
2000s Post tsunami	Rapid recovery after debilitating losses. Liberal and uncontrolled distribution of fishing equipment leads to near total motorization of artisanal sector. This in turn increased area of operation on the one hand and intensified the competition within the artisanal sector on the other. Emergence of banned ring seine as a means of diversification of artisanal sector and dramatic increases in oil sardine landings. Oil sardine, a relatively unimportant fish in TN, emerges as the No.1 species. Trawl fleet also expands capacity by upgrading to steel vessels and use of high horsepower Chinese engines. Chennai gillnetters start going beyond shelf for tuna and bill fishes

Source : Put together by the authors based on personal observations and interactions with stakeholders over 30 years

The above changes in the fisheries, characterised by continuous expansion of capacity, both in number of fishing units as well as in terms of increase in unit capacity, were made possible by the relatively low level of exploitation of the resources at the start of the development cycle and the possibility to find new resources and expand to new areas. Whether this is still the case is a moot point. Table 2 summarises the changes in fish landings, fleet and active fishermen during the sixty year period.

2 Though Government subsidies did help the spread of motorisation, the real credit goes to the technical break through made by the Greaves company in making available an affordable, rugged diesel long tail motor that could be easily fitted on a kattumaram. The "Maruti boat" is an innovation of a small private boat yard. The fishermen themselves were motivated to adopt motorisation in view of the declining catches in near shore waters. Motorisation of the artisanal fishery in TN was a gradual process spread out over two decades unlike the frenzied change-over that took place in Kerala in just 3-4 years.

Table 2 : Key indicators of expansion of fisheries 1950-2010			
Parameter	**1950s**	**1980s**	**2000s**
Fish landings	1.16 lakh tonnes (1962)	2.17 lakh tonnes (1980)	5.33 lakh tonnes (2009)
Non-motorised craft	29,661 (1961-62)	43,343 (1980)	23,494 (2005)
Motorised craft	Nil	Nil	18,643 (2005)
Mechanised craft	Nil	2,627 (1980)	7,711 (2005)
Active fishermen	56,586 (1961-62)	96,500	206,908 (2005)

Source : CMFRI, unless mentioned otherwise

Overall, there has been a 4.6 times increase in fish production accompanied by a 3.7 times increase in active fishermen over a 50 year period.

Emergence of two sectors with different interests

An important development that resulted from the above changes is the polarization of the sector into two broad interest groups: mechanized and artisanal/traditional. Even though the so-called traditional sector has changed beyond recognition and has considerable heterogeneity, it still remains a single interest group, seeing itself as different from the mechanized sector. Still, scale wise and gear wise, the emergence of a ring seine sub-sector (officially banned) within the artisanal sector is noteworthy. There is considerable tension in different areas between those who use ring seines and those who do not.

The terms "artisanal" (or less appropriately "traditional") and "mechanized" have particular connotations in India. Table 3 highlights the differences between the two sectors.

Table 3 : Characteristics that distinguish "artisanal" and "mechanised" sectors		
Parameter	**Artisanal**	**Mechanised**
Fishing base	Beach based fishing	Harbour based fishing
Scale of investment	Relatively low, especially when calculated on per-crew basis (true even for ring seine units)[3]	Much higher investments, especially, per crew[4]
Owner status	Active fishermen depending on both owner share and worker share[5]	More of an investor and manager than active fisherman; represents a new class within the fishing community
Labour	From same village where unit is based; based on kith & kin relationship	From far and wide; can include labour from non-fishing castes
Organisation and control	Part of traditional village organisation and subject to its control	Generally, outside the control of traditional village organisation[6]; part of new mechanised boat associations to protect their particular interests

The following figure captures the internal divisions within the sector on the basis of scale and fishing technology[7].

3 Investment per crew ranges currently from Rs.20,000 to Rs.30,000 in the non- motorised sector and from Rs.30,000 to Rs.50,000 in the motorised sector.

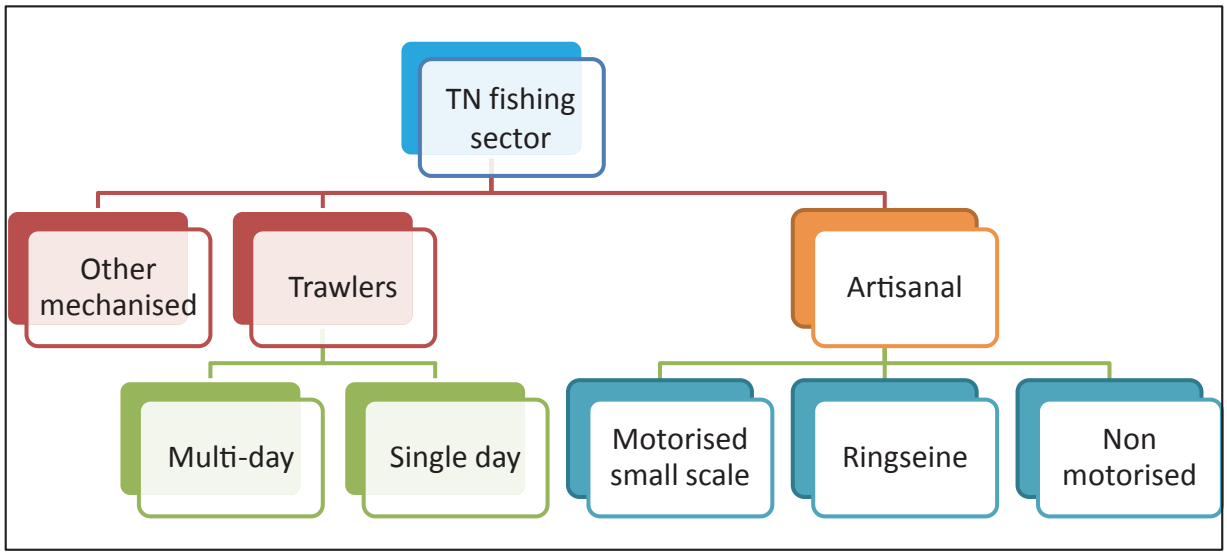
4 Investment per crew can vary from Rs.1 lakh in the case of small trawlers to Rs.3 lakhs in the multi-day trawlers.

5 Since "returns to labour" is a crucial determinant of owner status, ownership is often linked to number of family members who go fishing rather than ability to invest.

6 Nagapattinam district is an exception to this rule. The mechanised boats are not organised separately and continue to be under the control of their respective village organisations. However, since mechanised boats are concentrated in a few villages, these villages tend to represent the interests of the mechanised sector.

7 A detailed description of the fishing units is available later in the chapter.

Figure 1 : A broad classification of the fishing units in Tamil Nadu and PC



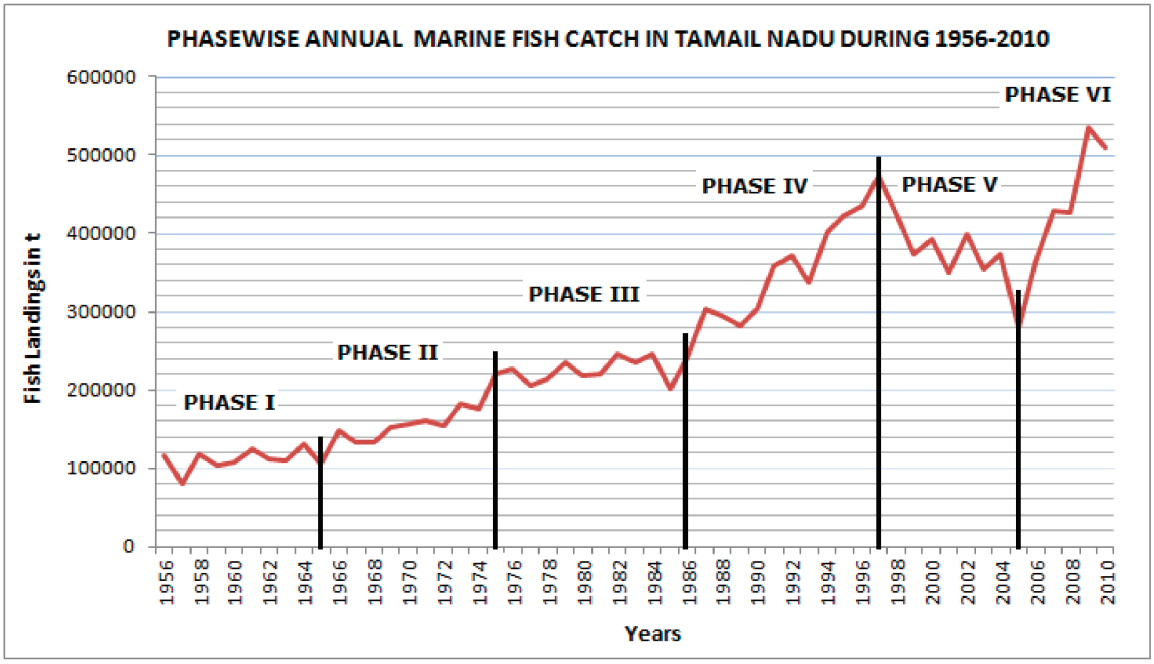
Note : Non-motorised includes shore seines that are still present in some districts

1.3 Fish production trends

Changes in fish production

The following graph shows the increase in fish production over a period of 55 years (1956 to 2010)[8].

Figure 2 : Marine Fish Production in TN from 1956 to 2010



Source : Prepared by authors based on published information and disaggregated data made available by CMFRI.

8 Detailed analysis of this data with species-wise trends is available in a separate FIMSUL report. District wise break down of information is available in that report for the period 2001-2010.

The following periodization, based on landings, has been arrived at by FIMSUL on a detailed study of the 55 year time series of data from CMFRI.

Table 4 : Interpretation of the different phases of growth

Phase	Period	Production trend	Comment
I	1956-65	Slow growth	Essentially a non-mechanised fishery with traditional craft. Introduction of nylon nets start impacting catches, but mechanization yet to make impact
II	1966-75	Continuing to grow	Introduction and growth of trawling
III	1976-86	Growth continues, but slows down	Some area expansion, perhaps
IV	1987-97	Rapid growth period	Expansion of both sectors; emergence of oil sardine as one of the top-10 species, but still unnoticed
V	1998-2004	Declining trend for first time	Catch decline despite capacity increases. Decline appears to be mainly due to decline of clupeids, especially, oil sardines
VI	2005-2010	Post tsunami dip in production followed by recovery and further growth	Dramatic increase in oil sardine catches, perhaps due to better targeting. Oil sardine is No.1 species contributing more than 20% of catches.

1.4 A brief snapshot of the marine fisheries system

While the previous section was aimed at explaining the evolution of the fisheries of TN & PC from a historical point of view, this section is aimed at giving a snap shot of the fisheries at the moment. We start by describing the artisanal and mechanised fishing units.

The artisanal fishing units

Though in terms of fish production, this sector comes a distant second to the mechanised sector, it has the largest number of fishermen involved. It is also the most ubiquitous due to its presence across the entire 1000km coastin about 500 villages and about 300 beach landing centres. The following is a description of the main fishing units in the artisanal sector.

Kattumaram : A traditional fisherman is still associated in public mind with the *Kattumaram*, the small craft made of lashing together logs specially shaped to get the desired result. It is present in the Coromandel coast, southern Gulf of Mannar and the Kanyakumari coast, but this champion of surf crossing is now a marginal fishing unit with very few used for serious fishing. It had been adapted to the motor (diesel long-tail) and enjoyed great popularity as a motorised unit in the 90s and early 2000s, but the tsunami accelerated its demise with the Fibre Reinforced Plastic Boat-Out Board Motor (FRP-OBM) combination replacing it in most areas.

The *kattumaram* is used in combination with a number of small gillnets and hand-lines. Mostly used within 1-2 km distance as a non-motorised vessel and with a crew of 1-3 persons. Tirunelveli district and the southern part of Kanyakumari district still have a preference for the motorised *kattumaram* in view of the extreme surf conditions. *Kattumaram* substitutes or "look-alikes" made of plywood or fibreglass are popular in Kanyakumari and they are often used with small imported OBMs (2-5 hp).

Small wooden canoes : Small non-motorised canoes called *vathai*or*vallam*are used for near-shore fishing with a variety of small gillnets in the Palk Bay and northern Gulf of Mannar. The crew size is 2-4 persons.

Large sailing *vallams* : In the Palk Bay, large wooden sailing boats or vallams have had a long innings. Using the unique balance-board mechanism, they can take a large sail and move at a fairly rapid clip when the winds are favourable. Now, they are also facing extinction like the *Kattumaram* with the post tsunami rush for FRP-OBM boats.

Shore seines : In Kanyakumari and some pockets of the Gulf of Mannar, shore seines are still in operation. With the conversion from natural fibre to synthetic fibre, it is still an important gear for a section of fishermen in Kanyakumari. Only the owner and a small number of the 30-40 fishermen needed to pull the net depend heavily on it. The rest of the fishermen just "pile on" when they see a shore seine operation and get a share of the income.

The reduced availability of shoals coming close to the shore and beach erosion have taken a heavy toll of this sub sector. In some areas like Rameswaram, the shore seine fishermen have shifted to ring seine fishing.

Large motorised vallams : The Palk Bay and the Gulf of Mannar have a fleet of large wooden vallams with in-board diesel engines (15-25 hp). They specialise in use of large drift nets and can be considered the aristocracy of the artisanal sector in the Palk Bay and Gulf of Mannar.

The FRP-OBM unit : This has become the most common fishing unit in TN & PC. 26'-30' flat bottomed FRP decked boats that can be comfortably beached are now found on all beaches. They are typically used with diesel long-tail motors (6-10 hp), an Indian version of petrol long tails found in South East Asia. A wide range of gillnets, hand lines, long lines, etc., are used for fishing on these vessels with crew size of 3-5. Though it is not easy to further categorise these fishing units, one can say that one group with small gillnets is involved in near shore fishing while those with large drift nets and long lines can go deep and far. Some of them do go for multi-day fishing (2-5 days).

The Ring-seine unit : This is a new unit that has gained sudden momentum after the tsunami. The ring seine (a small scale variant of the mechanised purse-seine) is an import from neighbouring Kerala where it has been in use for nearly 25 years (mostly as a banned gear!) to catch large shoals of oil sardine and mackerel. The increased abundance of oil sardines and the good market for it in Kerala (as fresh fish) and the TN poultry feed industry has triggered the adoption of the ring seines. A group of 7-8 FRP boats join hands in investing in a ring seine net for a few lakhs or rupees along with a larger boat to carry the net. The net-boat and the 7-8 FRP boats jointly participate in the fishing operations with a large contingent of labour (30-40 persons). While in some areas, this is a seasonal option for the FRP boat fishermen, they shift on a day-to-day basis from individual FRP boat fishing to ring seine fishing depending on the sighting of the big shoals.

The ring seine is the most controversial gear at the moment. As a "bulk-catching method", it can affect those using smaller nets to target the same species. As the net size is growing, it is alleged that the rings hit the sea bottom in shallow water harming the benthic area. Catch of juveniles is another major complaint. It is officially banned, but the efforts of the DoF to stamp it out have not been successful. The community itself has banned it and hence there are parts of the coast (e.g, the Chennai coast) where it is not in use. In other areas, there are ring-seine villages and non-ring seine villages with considerable amount of heart burn about the new technology. Cuddalore and Tirunelveli districts have emerged as the main centres of this technology. In Cuddalore, after a conflict for 4-5 seasons, the ring seine fishermen and the others have reached an agreement to use it for six months only.

Other specialised or niche fishing : There are other groups in certain locations which undertake some special or unusual types of "fishing". In the Gulf of Mannar and Kanyakumari, there is a long tradition of "skin diving" for picking up pearl oysters, *chanks* and sea-cucumbers. With pearl oysters beds having been silted over after independence and sea-cucumber catching been banned since 2000, the divers in the Gulf of Mannar mainly depend on *chank* fishing. This group is a few thousand strong.

The Kanyakumari divers are a much smaller group, but use the skills for not just picking up chanks, but also for fishing with traps. They set lobster traps over specific crevices in rocky patches by diving and then dive again when it time to pick up the traps and lobsters trapped in them. Unlike the Gulf of Mannar divers, the Kanyakumari divers also undertake "normal fishing" using *kattumaram*s or FRP-OBM units.

An interesting group in the Gulf of Mannar is that which undertakes seaweed harvesting. Seaweed harvesting is essentially a fisherwoman's job in some villages. Near the beach, they just bend down to pick up seaweed in waist deep water. Further beyond, they take small boats and undertake skin diving for harvesting seaweed. Seaweed is found in good quantities mainly in the northern Gulf of Mannar.

Another unusual group of specialists are the *ChunnaParavars*[9] who specialise in sea-shell picking near the shore in Tirunelveli and southern Kanyakumari districts.

The mechanised sector

The trawlers : The trawlers constitute the bulk of the mechanised sector with around 5500 units spread out across the coast in a dozen important fishing harbours and another 10-12 minor centres where they are anchored in small numbers. Though the shrimp trawl was originally the main gear, now-a-days, the trawlers have developed a wide range of trawl nets to target a variety of resources at different depths. The High Open Bottom Trawl (HOBT) is perhaps the most common and popular gear as it targets a wide range of fin fishes in the mid-water column. Specialised trawls for crabs, sea-cucumber, etc., are also used by some groups, which are banned gears, technically.

In recent years the use of pair trawls, also banned, has become a major source of conflict between mechanised and artisanal boats as well as between sections of the mechanised boats themselves. The pair trawls are getting larger and the boats larger, giving the users bumper catches to the dismay of the others. In Rameswaram, it is acknowledged that the use of this gear aggravates the already difficult relationship between Indian and Sri Lankan fishermen in the Palk Bay. Interestingly, the Rameswaram fishermen also use the pair trawl to target oil sardine for 2-3 months in a year[10].

The trawlers of Pazhayar (Nagapattinam district) have an unusual diversification. They make use of the ring seines seasonally to target mackerel and carangids. The Kanyakumari trawlers (the ChinnaMuttom boats operating locally and the Colachel boats operating in Kerala) seasonally shift to long lining for perches and other valuable reef fishes.

Gill net boats: Mechanised gillnetters are basically meant to target large pelagics (seer, tuna) in deeper waters using drift nets. They are found only in a few pockets as gillnetting is a traditional fishing method and many of the artisanal units from *Kattumaram*s onwards do gillnetting in deeper waters seasonally. A dedicated gillnet boat for fishing for large pelagicsmakes sense only in some pockets. Some of the so-called "mechanised" gillnetters are nothing but small boats with in-board diesel engines with a fishing capacity comparable to the motorised boats[11]. Taruvaikulam in the Gulf of Mannar is unusual for its gillnetters operated by a group of fishermen belonging to a non-fishing caste.

Chennai fishing harbour is the one place where mechanised gillnetting has come into its own. Targeting skip jack tuna in Andhra waters, this fleet of 150 boats represent an important move away from trawling for a section of the local mechanised boat fishermen. These boats undertake multi-day fishing upto 15 days. The larger among them (perhaps 100 out of the 150-strong fleet) go beyond the shelf for tuna fishing. This can be considered the first "deep sea" fleet on the TN east coast.

The Thoothoor "shark boats' : Though of gillnet boat design, the Thoothoor fleet of 500-600 boats have a distinct character of their own and need separate recognition and treatment. This fleet hails from a group of 5-6 villages on the Kanyakumari-Trivandrum border, but fishes all over the west coast of India up to the Pakistan border. Starting off as small 32' gillnet boats in the late 1980s, this fleet metamorphosed into long liners for shark all along the west coast of India. By mid-90s, they diversified from their bottom long-line (suitable only for fishing on the shelf) to surface long-lines to fish for oceanic sharks beyond the shelf. By 2000, they further diversified from shark fishing to tuna fishing, one group with long lines for yellow-fin and another with gillnets for skipjack. Today the fleet is much more diversified, with the following grouping: (i) mainly shark fishing, (ii) long lining and gillnetting for mainly tuna, (iii) gillnetting for seer, carangids, etc. This fleet is constantly innovating and changing strategy depending on changes in the fishing opportunities. It is India's only truly indigenous deep sea fleet. Developed purely with native intelligence and money from informal sources, it has achieved what Government of India's many schemes for deep

9 A separate caste group, whose name literally means "Lime Paravars"—indicating their original livelihood of converting seashells into lime. Today, sea-shells are mainly harvested for sale to those making ornaments or handicrafts using sea-shells.

10 Outside the Palk Bay, the mechanised boats do not go for sardines. It is almost as if the lion, the King of the Forest, is reduced to eating grass in some months for survival! The oil sardines caught with pair trawl are sold at Rs. 5 per kg for drying and for eventual sale to the poultry feed industry.

11 In this category can be included the gillnet boats based in the ChinnaMuttom harbour (Kanyakumari) and the Puducherry fishing harbour.

sea fishing have not achieved over the last four decades. The gradual evolution of this fleet has meant that some of the larger boats have hit the 20 m mark in terms of overall length. While the smaller boats go for week long voyages, the largest may go fishing up to four weeks.

It is worth noting that the Thoothoor fleet is mostly based outside the state with a third of them returning to Kanyakumari for a three-four month fishing season before the south-west monsoon. The rest are based in Cochin, Mangalore, Maharashtra and Gujarat with movement between the bases to a certain extent. Cochin has by far the largest concentration of the Thoothoor boats and for many this is their regular base. This means that the bulk of the landings of the Thoothoor boats take place in Kerala and other west coast states. The absence of a fishing harbour in the Thoothoor area has been a dampener for those who wish to fish from home. With a new fishing harbour coming up in Thengapattinam, a large section of the fleet is likely to relocate there. However, the fishing will still be all over the west coast with many boats having the capacity to fish up to Gujarat and return home with their holds full of fish to Thoothoor.

The numbers involved

The categories used here are not often the basis of official data collection. Hence it will be difficult to put numbers to the different categories described above in terms of number of units as well as number of fishermen in each category. Though the CMFRI, as well as the DoF,had conducted censuses of fishermen and fishing craft & gear in 2010, that information had not been processed and released before the completion of the FIMSUL project. The last authentic data available is from the CMFRI census of 2005 and this has severe limitations when used in 2011 as the numbers of motorised craft have changed dramatically after the tsunami[12]. The following is an approximate estimate of fishing units of different categories in TN in 2011, put together by the authors by discussion with fishermen and officials. The number of fishermen on each category of vessels is normally not captured in any official data base and is entirely an estimate made by FIMSUL[13].

Table 5 : Fishing units and number of fishermen working on them in TN

Category/ sector	No. of Units (approx.)	No. of fishermen employed (approx.)	% of total fishermen employed
Mechanised	7,500-8,000	40,000-45,000	22-23%
Motorised	30,000-32,000	125,000-130,000	65-67%
Non-motorised	10,000	20,000-25,000	10-12%
Total		185,000-200,000	

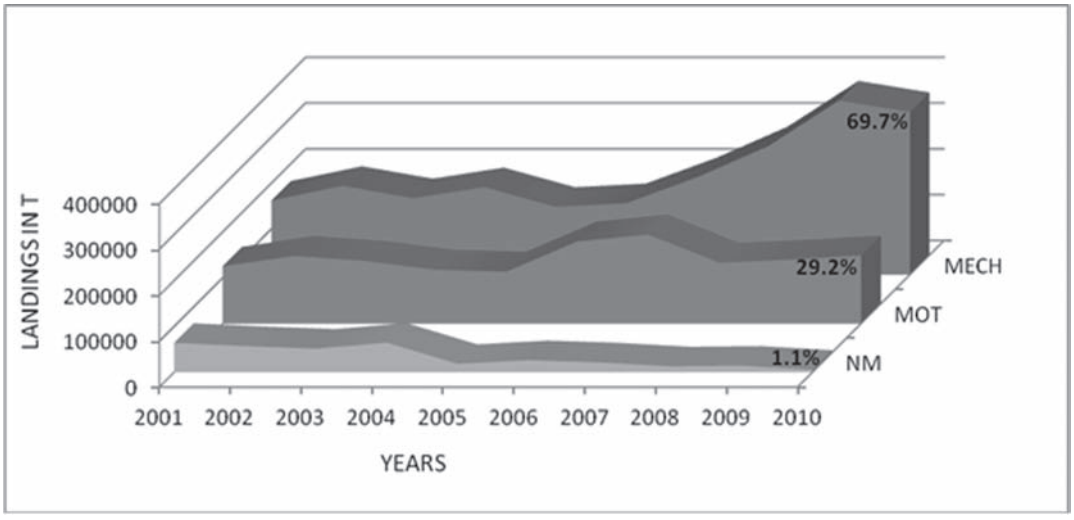
12 The CMFRI census of 2005 was held in October, 10 months after the tsunami, but the changes were still gathering momentum at that time.

13 Crew sizes have been assumed to be 5-6 per mechanised boat, 4 per motorised boat and 2 per non-motorised craft. If the in-migrants from Andhra Pradesh are around 5,000 an equal number of TN fishermen are possibly working as migrant fishermen in other states.

Catch share of the different sectors

The actual share in the catches of the different sectors for the period 2001-10 were calculated as indicated in the graph below.

Figure 3 : Share of different sectors in the fish landings of TN during 2000-10



The share of the mechanised sector has shot up from below 50% at the start of the decade to 70% at the end. Since CMFRI has included the ring seine catches in Cuddalore under "mechanised", we reckon that *the share of the mechanised sector in 2010 is around 67% rather than 70%* and the motorised sector is 32% rather than 29%. Overall, one can say that the mechanised sector with around22% of the workforce takes away two-thirds of the catch, while the "artisanal sector" with 78% of the workforce is able to land only one-third of the total catches[14].

Value of landings

Post-harvest and marketing

Fish landing and marketing are dispersed activities all along the coast. Fish is sold wherever it is landed. There are around 350 locations where fish is landed including 200-odd centres where mechanised boats land their catches.

Post-harvest and marketing are part of the informal sector, with the exception of the export end of the business. Even for export species the raw material for processing (mainly freezing) is procured from the same informal sector that handles the entire domestic chain. Even these export houses, though considered part of the "organised" or "formal" sector, are by and large nothing but family concerns rather than big corporate houses. Big business houses find it difficult to achieve a satisfactory scale of operation that will justify their entry. This reflects the dispersed and highly seasonal nature of the activity. Domestic retailing of fish has started as part of the new organised retail networks being set up in India. However, this business is still in its infancy and its market share is negligible.

Facilities in the landing centres are very rudimentary with even the fishing harbours suffering from poor facilities and lack of hygiene. However, for the domestic market, hygiene issues are not that sensitive as Indians cook fish (fish curry or fish fry) in a manner that completely kills all pathogens. There is a taker for every quality of fish, only the price and class of customer varies.

Fish is mainly sold as fresh or chilled for the domestic market. However, certain species are dried or cured[15] and sold to domestic consumers. Certain species are dried/cured if the quantity of landings exceeds what the fresh fish market

14 A detailed analysis of the species composition of the catches of TN & PC, changes in composition over the long term, composition of catches at district level and sectoral level (mechanised, motorised and non-motorised) have all been provided in the FIMSUL report "Marine Fish Production in Tamil Nadu and Puducherry" by H. Mohamad Kasimand V. Vivekanandan (FIMSUL Report WP5AR2).

15 Salt is used for curing. Salted and dried fish as well wet-salted fish is produced as per need.

chain can absorb on a given day. Trash fish landings by trawlers and oil sardine catches that cannot be sold fresh to Kerala, are also dried, mostly for supply to poultry feed manufacturers.

Tamil Nadu is a good market for marine fish, but Kerala is better for certain species like oil sardines, mackerel, shark, etc. Even seer fish from southern TN goes to southern Kerala. A small quantity of fish goes to Karnataka, mainly Bangalore. While there is no significant fish sale to Andhra, fish caught in Andhra comes in large quantities to the Chennai market. While Chennai is easily the biggest market in TN, wholesale fish markets in Tiruchirapalli, Madurai, Coimbatore and other towns all absorb fairly good quantity of the fish landed every day. Specialised dry fish markets like the one in Kovilpatti and the market on Wall Tax Road in Chennai play an important role in redistributing dry fish.

Fisherwomen play an important role in the domestic fish marketing chains. Their role has declined over the years due to the shift from dried/cured fish to fresh fish on account of ice availability and better transport. It has also declined in view of the increasing concentration of catches in the mechanised landing centres with the trawlers taking away the bulk of the fish catch. However, the bulk landing of oil sardines by the ring seines in recent years has given them more work in fish drying.

Government interventions in post-harvest and marketing have not been successful in the past. Even the management and maintenance of the fishing harbours under Government control are not very impressive. The official fishermen cooperatives have no role to play in post-harvest or marketing and remain mechanisms for doling out subsidies and implementing "welfare" measures. However, NGO intervention in organising artisanal fishermen to by-pass the middlemen on the beach and bargain for better prices with the rest of the chain has been very successful in many of the districts. Interestingly, the mechanised sector is more aggrieved about fish prices than artisanal fishermen. On the one hand this reflects on the continuing increases in domestic fish prices while prices of shrimp has gone down in real terms in the international market with the increase in farmed shrimp supply. On the other hand it also reflects on the structure of the export chain that allows for a few buyers to rig up prices.

Community governance

As mentioned earlier, the fishing communities are self-governed, especially the three major communities—*Pattinavars, Paravars* and *Mukkuvars*. This means that many aspects of village life including fishing are governed by the village councils/committees. Religious activities, social life, cultural activities and even civic affairs in the village are under their control. They have powers of taxation and collect revenues from a variety of sources including a percentage of the fish sale value. They can mete out punishment for violation of village decisions. Various kinds of sanction including the ultimate sanction of ostracization from the village community are applied, depending upon the severity of the violation.

The relationship with the outside world is often mediated through the village governance system. Even law enforcement authorities cannot easily impose their will in a fishing village without negotiating with the local village committee or parish priest (in the case of the Christian villages). All fishing villages are part of the modern Gram Panchayat System—the third and lowest tier of governance under the Indian constitution. Most Gram Panchayats have boundaries that go beyond the fishing village and include agrarian villages/hamlets. The fishing village relates to the Gram Panchayat as one single block on most matters. All this means that in most areas, the fisherman's first loyalty or accountability is to his village governance system and then only to other external authorities.

As far as fishing is concerned, all aspects of fishing come under the purview of the village self-governance system. Many kinds of rules and regulations govern fishing in each village. These include fishing technology, fishing time, market times, market rules, etc[16]. Conflict resolution is very much part of the mandate of the village committees.

It is note-worthy that the village self-governance system tends to be all-male. However, a crack in the male bastion is visible with the women becoming members of parish committees of Kanyakumari district and some of them rising to the position of Vice Presidents of their parish.

12 More on this at the end of the Chapter.

1.5 Fisheries Management

The current system to manage fisheries is fragmented and composed of a number of actors with little coordination between them. There are also a number of laws relevant for fisheries management and some of them overlap creating difficulties.

Institutions and actors dealing with fisheries management

Though a large number of institutions have some role to play in fisheries management, six of them are the most important ones. Table 6 describes these institutions, their roles and their actual performance.

Table 6 : Key institutions in fisheries management[17]

Actor/ Institution	Role, instruments	Effectiveness/performance
State Fisheries Department	Is responsible, as per the constitution of India, for fisheries in the territorial waters up to 12 nautical miles. Is responsible to implement the MFRA that gives it power to register and licence fishing vessels and impose a wide range of restrictions on fishing	With the exception of the six week ban on mechanized fishing (common to the entire Indian coast), the implementation and enforcement of the MFRA is weak. While registration and licensing is being done, the provisions are not used to limit entry, retaining the open access character of the fishery. Gear bans/restrictions are effective only where the local community is supportive. 'Lack of political will' and lack of staff cited as reason by Department officers
Union Ministry for Agriculture (MoA)	Is responsible for management of the fisheries beyond 12 nautical miles up to 200 nautical miles. Maritime Zones of India (MZI)Act, 1981, gives power to regulate foreign vessels.An Act to regulate national vessels in the EEZ, still in draft stage.	Coast Guard implements MZI by catching 'poachers' at sea. Difficult to assess effectiveness with many vessels said to escape notice. MoA has used its powers vis-à-vis foreign vessels to license some deep sea vessels from abroad hired by Indian operators under 'Letter of Permit' scheme. Scheme unfavourable to interests of existing national fleet and resources
Union Ministry for Environment & Forests (MoEF)	Has powers under Wild Life Protection Act to ban fishing of endangered species and to declare national parks with restrictions on fishing. Has powers under Coastal Regulation Zone (CRZ) notification to control coastal degradation and pollution taking place through industrialization, urbanization, etc.	Has used its powers to ban a variety of shark species, gastropods, sea cucumber, etc., often without exhaustive study and without any consultation with fisheries departments, MoA, fisheries research institutes and fishermen. Has also imposed a "Marine National Park" along with many restrictions on fishing in the Gulf of Mannar (GoM) area without any effective consultation or participation of fishermen; its alternative employment schemes are ineffective. CRZ useful to protect fishing interests, but implementation weak
State Forest Department	Is responsible for implementing MoEF bans and running of national parks. Forest guards have powers to arrest and detain under Forest Act.	Is implementing MoEF bans on catching and trading of banned species. Is running the GoM national park with a narrow understanding of conservation, ignoring the larger fisheries management issues. Serious conflicts between fishing community and forest department with fisheries department as an onlooker.

12 An exhaustive list of institutions and actors connected to fisheries management is available in the "Review of Fisheries Management in TN & PC" prepared by the same authors for FIMSUL

Table 6 : Key institutions in fisheries management[17]		
Central Marine Fisheries Research Institute (CMFRI)	A premier institute under the Indian Council for Agricultural Research (ICAR), CMFRI is responsible for collecting fish catch statistics, make stock assessments and provide management advisories to state and central governments	It has very useful data over a long period of time and has provided "potential yield" estimates for fisheries at national and state levels. However, state Governments do not use CMFRI data or follow its advice. Disaggregated information necessary for field managers is not available. The Government of India policy of treating state government data rather than CMFRI data as official is also behind the current state of affairs[18].
Fishermen traditional institutions	Most fishing hamlets under traditional governance system that regulates many aspects of life including fishing itself. Variety of local rules and regulations to be found all over the coast	Village organisation very effective in controlling fishermen belonging to that village, but weak in establishing common rules across a significant stretch of coast involving many villages due to breakdown of higher tiers of traditional governance and divisions within community due to mechanization and ring seines[19]. Has low control over mechanized boats that are harbour based.
Mechanised boat associations	Most harbours have mechanized boat associations that manage their own members. Basic role is to protect interest of mechanized boats in conflict with artisanal boats, get Government subsidies for diesel and seek proper harbour and post-harvest infrastructure	In many areas, are successful in reducing conflicts with artisanal fishermen. In some harbours, they run the show taking care of cleanliness, etc. The Chennai harbour boat association has gone one step ahead and has put a freeze on fleet size and also unit capacity (horsepower).

In addition to the above, the Marine Products Development Authority (MPEDA) under the Ministry of Commerce and the National Fisheries Development Board (NFDB) are important organisations, but their current involvement in fisheries management is low.

Legal instruments

The Marine Fisheries Regulation Act (MFRA) is the most important legal instrument in fisheries management followed by the Wild Life Protection Act. The MFRA is fundamentally based on a top-down approach. Given that marine fisheries is a traditional occupation with a long history, the basic assumption that the State is responsible for managing the marine resources rather than the fishers, may be constitutionally correct, but lacks credibility at the field level where fisheries officials realise that the fishermen consider themselves the inheritors of certain historical rights that are recognized by the society at large (and the politicians, in particular), though not formalized in any law.

The MFRA has been implemented rather patchily, covering certain aspects and ignoring others. The implementation is also variable across the coast, depending on local context and fishermen sensitivities. Many of the actual arrangements at sea, often brokered by the Department of Fisheries, are not necessarily under the MFRA. *De facto* fisheries management in TN is decentralized, while the MFRA is an instrument that is based on centralization of decision making in Chennai.

18 As we go to press, we learn that the Government of India has finally agreed to treat CMFRI data as the official statistics. This will hopefully improve access to CMFRI data.

19 If mechanisation resulted in the creation of two sectors (mechanised and artisanal), the ring seines have created a division within the artisanal sector between villages that permit the use of that gear and those who do not.

Table 7 summarises the important regulations under the MFRA and the status of their implementation.

Table 7 : MFRA - Key regulations and their implementation status

Regulation in force	Implementation status
All vessels to be compulsorily registered	Was not seriously implemented till recently; post tsunami awareness of importance of registration has led to better implementation by officials and better compliance by fishermen. Possible that some of the non-motorised boats are not registered yet. Registration prior to building a boat in not necessary.
Fishing licenses are required for fishing within the territorial waters (up to 12 nautical miles)	Just treated as a paper that accompanies registration and is renewed periodically without any fuss. Has no connotation of limiting access. Fairly meaningless procedure
3 miles from the shore is for exclusive use of artisanal boats; mechanised cannot fish in this zone	Not enforced by Department as it has no real capacity to do so. However, better compliance by mechanised boats where artisanal fishermen are more vigilant and take direct action if there is violation. In other areas, mechanised boats fish close to shore with impunity
Night fishing by mechanised boats is banned	Is strictly enforced in the Gulf of Mannar where the artisanal fishermen insist on its enforcement. No one bothers about this rule elsewhere.
45-day ban on mechanised fishing in Apr-May	Strictly enforced and fully complied with. The regulation that is best complied with at the All India level.
Ban on purse seines, ring seines and pair trawls	Department unable to enforce despite many serious attempts to do so due to fishermen resistance and political interference; however complied with where local fishing community itself enforces the ban
Mesh size regulations for many nets	Rarely talked about, even less enforced or complied with

A particular weakness of the TNMFRA is that is has been interpreted in a manner that has made it inflexible. Instead of being interpreted as an enabling act that provides the Government with powers to make regulation within the scope of the Act, every new regulation or change in regulation has to be taken to the Legislative Assembly as an amendment.

The Wild Life Protection Act (WLPA) is an extremely centralized instrument and its application is done without adequate consultations or even the knowledge of fishermen. This leads to improper application and negative consequences for the fishermen, who should be the actual beneficiary of better resource health. WLPA, born out of the concept of keeping people out of forests and the Forest Department as the sole arbitrator of what constitutes conservation, is ill equipped to deal with marine fishing issues where conservation has to be part of a larger management plan and well integrated into it. The State Government has very little influence on WLPA, a central Act. However, the State Forest Department, which implements the Act, is under the control of the State Government and there are opportunities to create coordinating mechanisms that can take care of some of the issues arising from the application of WLPA.

The absence of a legal instrument covering the EEZ (beyond 12 nautical miles) needs specific comment. At the moment, this means that TN & PC can develop their fisheries beyond 12 nautical miles, without any hindrance. This is what is actually happening. The Chennai mechanized fleet and the Thoothoor shark boats are essentially thriving on the absence of any controls beyond the 12 nautical miles. TN is clearly a major beneficiary of the absence of a law. This also means that TN is vulnerable, if the new law, which is bound to come sooner or later, is not favourable to its expansionism.

Community "laws" and regulations

In addition to the legal framework of the state to manage fisheries, it is important to understand the rules and regulations that the fishing community makes to manage fisheries. Using the anthropological theory of "legal

pluralism", social scientists like Prof Maarten Bavinck consider that rules and regulations made by customary institutions as having the weight of law in their own societies[20]. Even values and norms in society have more power to govern behaviour than laws made by the state.

Even a casual visit to any fishing village indicates the presence of many rules and regulations that govern fishing activities. All aspects of fishing are under the influence to this. Table 8 gives some examples of community rules and regulations that work in different parts of the coast.

Table 8 : Examples of community rules governing fisheries in TN & PC[21]

Location	Regulation
Kanyakumari district, Gulf of Mannar	Rules governing order in which shore seines can be used given that all cannot be simultaneously operated
Most landing centres	Restrictions on fish landings by outsiders. This often applies even to fishing harbours officially under DoF control
Kanyakumari west coast	Colachel trawlers have to fish beyond 23 fathoms in contrast to MFRA that only specifies 3 nautical miles
Chennai and parts of other districts	Ban on ring seine fishing
Cuddalore district	Ban on ring seine fishing for six months
Enayam in Kanyakumari	Each family of traditional lobster fishermen has exclusive rights to specific lobster grounds and these rights are inherited by sons and lead to sub-division of "property" as on land

It may be surprising to note that the mechanised boat associations, in addition to their standard role of defending the interests of the mechanised boats, actually impose regulations and controls on their members in many areas. These are some examples.

1. The Chennai boat association has "frozen" the fleet size of mechanised boats in the Chennai harbour and will allow new entrants if they buy a boat from the existing pool of boats.
2. Ceiling on horse power that can be used by trawlers is in force in some fishing harbours.
3. The Colachel boat association used to have in the 1990s its own system of patrolling to ensure that its members do not violate the 23 fathom rule.
4. Pair trawling is banned in Chennai and some of the harbours and enforced strictly.
5. Chennai even has restrictions on the multi-day trawlers fishing in areas that the single-day trawlers regularly fish in.

Joint rule making

Most interestingly, Tamil Nadu has some examples of rules made jointly by the community and state authorities. These often represent negotiated settlement of disputes between artisanal fishermen and mechanised boats. Here are a couple of examples.

1. The 3 day - 4 day rule in the Palk Bay, by which trawlers can fish on three days a week and the artisanal boats the remaining four days, came into being as a result of an agreement brokered by the District administration in Pudukottai and was then adopted by the other districts. Since this was in 1978 when the MFRA was not in place, this regulation is in force through a local administrative order. It can be considered the most successful and the longest standing of marine fishing regulations by state authorities in TN. Around 30,000-40,000 fishermen of TN are governed by this. It even has influence on the fishing in Sri Lanka as local fishermen take evasive action on the days on which trawlers are permitted to operate in India.

20 Maarten Bavinck. 2001. Marine Resource Management. Conflict and Regulation in the Fisheries of the Coromandel Coast.Sage Publications.

21 For a more detailed discussion on community rules and regulations refer to FIMSUL paper entitled "Legal frameworks governing fisheries in TN & PC" by V. Vivekanandan and H. Mohamad Kasim (See FIMSUL Report WP5AR3)

2. Before the enforcement of the "uniform ban" on mechanised boats in 2000, a three-and-a-half-month ban was in place on the ChinnaMuttom trawlers in Kanyakumari as a result of negotiations between the mechanised boats and artisanal fishermen mediated by the District administration. This regulation was literally cast in stone with a stone slab erected in Kanyakumari proclaiming the ban period!

One could argue that Tamil Nadu has already experiences in co-management, in light of the above.

1.6 About Puducherry

The marine fisheries of Puducherry are mostly indistinguishable from the fisheries of the Coromandel Coast of TN. Fishing methods, fishing communities and the dynamics of fishing are all the same. Puducherry district is a continuum of Villupuram and Cuddalore districts of TN. Karaikal district is located in the heart of Nagapattinam district, dividing the latter into two nearly equal halves. In terms of community organisation, Karaikal is well integrated with Nagapattinam, as Karaikalmedu and Kilinjalmedu enjoy high respect in the notional 64-village federation of Nagapattinam fishing villages[22]. Fishermen of Puducherry district, in contrast, have their own independent village federation, which has good fraternal relationship with neighbouring villages in Cuddalore and Villupuram.

In this report, whatever is said about TN is also applicable to Puducherry[23]. One important difference is that Puducherry did not have a MFRA till very recently. Quite sensibly, given that there are no boundaries at sea (between TN & PC) as far as PC fishermen are concerned, the PC fisheries department has more or less followed all the rules set by TN for their fishermen. It has also largely left the enforcement of such rules to the fishermen themselves who seem to understand which rules need following. One has not heard of conflicts between Tamil Nadu and Puducherry fishermen. The PMFRA is mostly an ornament in the locker of the PC department of fisheries. Even rules have not been framed to back up the Act. Another difference worth noting is that the PC department of fisheries is even more "welfare" oriented than TN. Given the greater importance of fishermen in a small coastal territory, the PC fishermen enjoy more generous welfare and subsidy schemes that the TN fishermen. Table 9 provides some basic statistics about PC fisheries.

Table 9 : Basic details of Puducherry Fisheries

	Puducherry (including Karaikal)
Coastline	45
Coastal Districts	2
Continental Shelf	900 km^2
Number of fishing villages	25
Total fisherfolk population	36,905
Active fishermen	8,813
Production	30,502 tonnes
Trawlers	281
Other mechanised boats	289
Motorised boats	2247
Non motorised boats	1137

Source : Population and craft figures are from CMFRI, 2005

A perusal of the CMFRI catch data for PC indicates no striking trend that one can talk about, unlike that of the catch data for TN as a whole. The fish catches during the period 2001-10 (see Table 10) seems to have fluctuated between 10,819 tonnes (2005) and 19,459 tonnes (2002).

22 Nagai fishermen still talk of being part of 64 village federation covering the entire Cauvery delta that traces its history back to the period of Raja RajaChola (10th century AD). The actual number, including the villages of Karaikal, is just 54 at the moment. It appears that 10 villages in the Chidambaram subsequently became part of the Cuddalore grouping.

23 Another distinction to be made is that when we say Puducherry or PC, we are only talking about the two districts of Puducherry and Karaikal, unless otherwise specified. We also exclude Mahe and Yanam districts of the Union Territory.

Table 10 : Fish landings in Puducherry (Puducherry & Karaikal), 2001-10	
Year	**Landings in Tonnes**
2001	12013
2002	19459
2003	14968
2004	18416
2005	10819
2006	12478
2007	14706
2008	14921
2009	12637
2010	10864

Source : CMFRI

The post tsunami period has not shown the kind of big jump in catches as in TN. This seems contrary to the overall trend that is visible in TN, where the period 2008-10 shows a big jump in landings. We wondered whether this could just be due to the limitations of CMFRI data. However, a closer look at the fortunes of the mechanised sector in Puducherry and integrating the Puducherry data with that of TN gave a simple answer to this puzzle. Table 11 provides a comparative picture of the different districts of TN & PC when the relative shares of the mechanised, motorised and non-motorised sectors are analysed for 2010.

Table 11 : Share of each sector in fish landings in each district of TN & PC (2010)				
District	**Area of fishing for mechanised boats**	**Percentage share of total landings**		
		Mechanised	**Motorised**	**Non-motorised**
Chennai	Mostly Andhra	86.6	13.1	0.3
Cuddalore	Mostly local area[24]	77.2	22.8	0.0
Kancheepuram	No mechanised centre	1.2	98.3	0.5
Kanyakumari	Fishing in Wadge bank[25]	61.0	35.9	3.0
Karaikal	No mechanised centre	0.0	100.0	0.0
Nagapattinam	Local area + Sri Lanka	63.0	37.0	0.0
Puducherry	Only local area	48.5	51.4	0.1
Pudukottai	Local + Sri Lanka	82.6	17.4	0.0
Ramnad	Mostly Sri Lanka	93.2	4.8	2.0
Thanjavur	Local + Sri Lanka	60.2	39.8	0.0
Tirunelveli	No mechanised centre	0.0	100.0	0.0
Thiruvallur	No mechanised centre	0.0	100.0	0.0
Tuticorin	Only local area	51.1	48.8	0.1
Villupuram	No mechanised centre	0.0	99.9	0.1
Total		69.1	29.8	1.1

Source : FIMSUL calculations based on CMFRI data

24 Catches of mechanised boats in Cuddalore are exaggerated as CMFRI has included artisanal ring-seine catches in mechanised sector catches, as a result of a different approach to classification of mechanised boats.

25 Wadge bank is the shallow and rich fishing grounds south of Cape Comorin on the Indian Ocean side. ChinnaMuttom trawlers have access to this area. The Colachel trawlers mostly operate from Neendakara and Cochin in Kerala and also land their catch in Kerala. Hence they are not considered in this analysis.

It is obvious that the share of the different sectors (mechanised, motorised and non-motorised) varies from district to district depending upon the level of mechanisation. Further, the fortunes of mechanised boats depend on whether they have the possibility of fishing beyond the sea-area adjacent to the district. At 48% of the landings, the share of the Puducherry mechanised boats is the lowest when compared to other districts with mechanised landing centres in TN[26]. This can be explained when examines the area available for fishing for the Puducherry trawlers and compare them with that of other mechanised landing centres.

The mechanised boats of Chennai have access to Andhra waters accounting for more the 75% of their catches. Puducherry trawlers are farther away from Andhra waters and it makes no sense for them to invest in trawlers large enough to go to Andhra and compete with the Chennai trawlers. More importantly, they have competition from the Chennai boats whose southern boundary is Puducherry. The competition from Cuddalore boats must also be intensive as Cuddalore is just 20 km south of Puducherry. That the Puducherry trawlers do not use pair trawls may also be a factor contributing to the reduced share of the mechanised sector in the total landings[27].

It is worth noting that the mechanised boat owners of Puducherry, recognising the limits to their growth have made a small shift from trawling to oceanic fishing. A dozen boats of around 20 m length have been purchased from the Thoothoor fishermen and with the help of the Thoothoor fishermen as crew, have started long-lining for yellow fin tuna in the Bay of Bengal. In this, they are one step ahead of the Chennai fishermen[28].

As far as Karaikal is concerned, though it has a trawl fleet, this fleet tends to land its catches in neighbouring Nagapattinam harbour where both landing facilities and market opportunities are better. Interestingly, a part of the Karaikal trawl fleet also migrates seasonally to Jagadapatnam harbour in the Palk Bay and indulges in trans-border fishing in Sri Lankan waters!

All this indicates that the fortunes of Puducherry fishermen, especially those on mechanised boats, is closely inter-woven with that of the TN fishermen, not necessarily only those in the immediate vicinity. A separate analysis of Puducherry data may give misleading findings. This also underscores the importance of managing the fisheries of the TN & PC coastline in an integrated manner[29].

26 Even this does not reflect reality as the mechanised sector in Puducherry also includes the modest gillnetters who are comparable in scale to motorised units but get classified as "mechanised" on account of having in-board diesel engines and the hull design compels them to be anchored in the fishing harbour.

27 Neither do the Chennai boats. The non-use of pair trawls by Puducherry trawlers may be due to better social controls or just the lack of adequate space to operate such large gear.

28 A peculiar hurdle facing this fledgling fleet and the Puducherry DoF is that the PMFRA does not provide for registering boats of this length! Strictly speaking, this is also true for the TNMFRA, but the DoF officials in Kanyakumari take a more liberal view of the matter and register the Thoothoor boats without much hassle.

29 One must salute the wisdom of the two Governments—TN & PC—for deciding upon a joint project in FIMSUL, which also implies their willingness to move forward in the direction of a common management framework for both states.

Chapter 2 : Fisheries Management - A Discussion of Key Issues

2.1 The nature of access in TN & PC fisheries

The term "open access" conjures up various images. When not qualified, it can mean that anyone can enter the fisheries (as investor or labour) any time they want. In many poor countries, open access fisheries provide an opportunity for the poorest to eke out a living. In India (and most of South Asia), this is not the case. There are strong social barriers to entry as a result of the caste system. There are specific castes who have historically fished and this is acknowledged by the other castes and there is a certain unwritten code of conduct that regulates entry into traditional occupations in the rural areas. While such barriers have broken down in the case of many traditional occupations, marine fishing remains largely unaffected. This is significantly due to the skill and aptitude factors.

The skills inherent in marine fishing are passed on from generation to generation through an informal process in the fishing villages and outsiders do not have access to this. The sea, for all non-fishing castes, is an unsafe and threatening terrain unless their courage is bolstered by technology—larger harbour based vessels that offer greater protection from the elements. Fishing skills like spotting fish, understanding fish behaviour, etc., are also not easy to pick up for outsiders. Hence, labour entry into fishing takes place only on fishing fleets where the skill requirement is lower, *viz* trawlers. In TN, even this has happened only in the Palk Bay area where no dominant marine fishing caste exists and there are fewer social barriers to entry. The trawl sector in Rameswaram attracts labour from communities in the interior as far as Theni or Dindigul. The character of this labour force is that it is based on male migration with the families continuing to reside in their "native place". This labour force is therefore footloose and not integrated into the local fishing villages or communities.

The entry of fishermen from Andhra Pradesh as labour needs mention here. In the last few years, post tsunami, fishermen from Andhra Pradesh have been employed on Chennai based mechanised boats. These are skilled traditional fishermen and many also belong to the same Pattinavar caste. This is a different type of "outsider" entry and the result of two factors: (i) with enough motor boats at their disposal, post tsunami, the local Chennai fishermen are reluctant to work as labour on mechanized boats, causing a labour shortage for mechanisedboats, and (ii) distress of the small fishermen of Andhra Pradesh who struggle to co-exist with the mechanized trawl fleet of both Andhra and TN.

As far as investment in fishing is concerned, here also the only area where non-caste fishermen own mechanized boats is in the Palk Bay districts. However, the entry of this group was in the late 1960s and 1970s when trawling started and offered an attractive opportunity. This group has settled down on the coast forming their own hamlets (or at least streets), and have become integrated into the fisheries sector. No fresh entry is taking place or seems possible.

So, "open access", in reality, means that within the large fishing community anyone can invest in a boat, artisanal or mechanized, provided he is confident of making it a commercial success. On the artisanal boats and on mechanised boats where higher levels of skills are needed (like long lining), the owners are also likely to participate in the fishing operations. So, "open access" in TN & PC is not fully open access, but entry limited to particular social groups that are well entrenched in the fishery.

The problem with this "socially limited entry" is that there is more than enough number of people to invest and make the fishery unsustainable. Population increase within the fishing castes and the increasing scale of the fishing units make this socially limited entry ineffective in keeping investment to levels that are compatible with sustainable fishing. So, the system of "socially limited entry" in TN ends up with impacts similar to that of pure "open access" fisheries.

However, the legal side is worth looking at. As of now, the TN & PC fishery is *de jure* open access fishery! No restrictions are placed on who can own a boat and who can be involved in fishing. In law, any one from any caste

can enter fishing, both as investor and worker. Though the MFRA has the provision for limiting fleet size, this has not been done so far. This is true not only of TN but also the rest of India. A drive along the coast will reveal new boats under construction in many parts of the coast without having taken prior approval or consent.

Licensing is an important tool for restricting entry, but in TN, a fishing license is merely seen as a paper that one automatically acquires when one constructs and registers a vessel with an assurance of periodic renewals.

In this report, the term "open access" is used with the understanding that it is qualified by the special social conditions prevailing in TN & PC outlined above.

2.2 Over fishing in TN & PC

That there is over fishing in TN & PC fisheries is the strong view of all stakeholders we had interviewed as well as those who participated in the various FIMSUL workshops. This is in apparent contradiction with the continuing increases in overall fish landings at state level as reported by the CMFRI. However, a closer look at the data and a careful examination of fishermen experiences indicate that there is strong convergence between scientific information and fishermen perceptions.

Increasing fish catches mask actual resource situation

CMFRI has assessed the "potential yield" of TN as 4.25 lakh tonnes per annum. So, how does one explain the current landings of over 5 lakh tonnes as well as the view that there is over-fishing? This is best explained by a combination of three factors:

i. The phenomenon of "sequential fishing" wherein the fishermen are constantly upgrading the fleet to reach new resources (species/stocks) and new areas after over-fishing the stocks in the earlier fishing grounds. The catches from the new areas and new resources mask the decline of many near shore resources.

ii. The overall catch increases in recent years also come significantly from small pelagics, particularly the oil sardine, whose increase could be attributed to a combination of over-fishing of apex predators and increase in sea surface temperature.

iii. The TN fleet is bringing in a large quantity of fish from Sri Lankan and Andhra Pradesh waters. If this quantity (roughly estimated at 1.0-1.25 lakh tonnes per annum) is deducted from the TN catch, then the overall catch figures are far less impressive.

Considering the above factors, one can safely say that there is considerable amount of over-fishing in the TN coastal waters. Overfishing can be of various kinds: biological and economic, to name two. There is evidence for all kinds of overfishing in TN.

The case for biological over fishing

A problem with the available CMFRI data is that most catch data is for groups of species rather than individual species with exceptions like the Oil Sardine and Mackerel. Even then, there is no information on individual stocks[30]. Hence one cannot easily say which species or stocks are over exploited in a biological sense. Still, one can make a number of inferences from the catch data, experiences of fishermen and some scientific studies of specific species or centres.

i. Even though the full picture is not available from the CMFRI data on account of the masking effect of fishing expanding to new areas/resources, it is still obvious from the available data that the following species have declined after reaching a peak:(i) elasmobranchs, (ii) anchovy, (iii) penaeid prawns, (iv) lobsters, (v) pomfrets and (vi) seer fishes.

ii. Fishermen as part of structured exercise conducted by FIMSUL have made the following observations (Table 10) about decline of certain species in the coastal waters of the three zones of TN & PC coast:

30 We are mostly commenting on data in public domain and the disaggregated data that FIMSUL was able to access from CMFRI. It appears that CMFRI actually has data for around 800-900 individual species even if the reporting is for 85 groups/individual species.

Table 12 : Fishermen observations on decline and depletion of fish resources

Zone	Species—depleted*	Species—declined or reduced availability*
Coromandel coast	Sharks, skates, sawfish Lobsters Eels *Lactarius* Catfish Red snapper	Pomfrets Carangids Seer fish Flying fish
Palk Bay	Some shark varieties, skates Catfish *Lactarius* White sardine *Coilia* Sea turtles	Silver bellies Sharks Rays Anchovy Seer Lobster Ribbon fish Lobsters Perches Parrot fish
Gulf of Mannar and Kanyakumari[31]	Sharks, saw fish, skates Black rays Rainbow sardine Tiger prawns Sea bass Catfish Lobster	Silver bellies Tunnies *Chirocentrus* Eel Parrot fish Red mullet Perches

** Means that species are depleted or declining in the original fishing grounds/areas*

iii. CMFRI research papers have also, at different times, analysed catches of specific centres like Chennai, Rameswaram and Tuticorin fishing harbours and indicated that many species show strong indications of over-fishing. Fishermen have also indicated a number of species whose sizes have declined in the catch[32].

iv. **Recruitment over fishing** is another factor that needs to be considered. The large number of juveniles of a wide range of species that is landing by the trawls is also well acknowledged in scientific reports and by fishermen. The quantification of the losses due to this is yet to be systematically done.

v. **Habitat over fishing** is also present in TN. The impact of trawling on the bottom habitat in TN is acknowledged by a number of studies. In particular, the impacts are severe in areas like the northern Gulf of Mannar where there are a large number of coral patches. Sea grass beds are a unique feature of the Palk Bay ecosystem and the large quantity of sea grass that is part of each trawl landing is obvious to all observers. In addition to shrimp trawls and fish trawls, the trawlers have devised a variety of trawl nets (mostly banned) to catch crabs, sea cucumber and chanks. The trawls for chank fishing are nothing but dredges that scrape the sea bottom and cause harm to the benthic system. The actual impact of such activity has not been quantified but that the impact is severe is something that most fishermen, including a growing number of trawl fishermen, acknowledge.

31 Ideally Kanyakumari and the Gulf of Mannar should be treated separately; however this could not be done due to practical reasons in the workshop.

32 CMFRI also has length frequency data for many species for specific centres and fleets. This is not available in the public domain.

Biological over fishing in a multi-species tropical eco-system

Quite often, the absence of dramatic stock collapses and the continuing increases in overall catches are seen as indicators of good health of the fishery by administrators and policy makers. That there have been no dramatic collapses like that of the North Atlantic Cod is seen as an indication that our fisheries are "safe" and that our fishing effort is below the "danger mark". The reality is that the multi-species character of the Indian tropical fishery reacts to over fishing in a less obvious and dramatic fashion. We have actually had our own stock collapses. The collapse of the catfish on the west coast in the late 1970s is well known. However, such collapses are not dramatic in that they leave a big hole in the landings or result in the virtual paralysis of certain fleets and loss of jobs (both in harvest and post-harvest) for a large number of people.

Generally, the decline or collapse of one stock leads to increased availability of other species that are hardier and those that emerge to fill up the void left by the depleted/declining species. Often, species that contribute to the bulk of the catches in India are low value species like the Oil Sardine (in the south) and Bombay Duck (in the northern latitudes), whose abundance fluctuate violently due to changes in oceanic parameters like temperature, salinity and currents. So far, such species seem to be "indestructible" and able to take any amount of fishing pressure. Whether such laxity on the part of nature to punish over-fishing in the tropics can be taken for granted is not clear. Whether there exists a "tipping point" at which the whole system will unravel is not really known. It is much better to be safe than sorry.

The case for economic over fishing

Even more than biological over fishing, it is economic over fishing that is most obvious in the TN fisheries. However, the statistics for this is somewhat weaker as economic information on fisheries is given low priority by all institutions connected with the fishery. Fisheries economics is a neglected field in India. Of course there is information on Catch per Unit Effort (CPUE)[33], prices of fish, some input costs, etc., but there are very few genuine costs and earning studies in India. Use of bio-economic models is virtually unheard of.

However, talking to fishermen and documenting the changes in fisheries has given us the clear picture that fishing units in TN are scrambling to stay in the race to fish. Each season sees increased investment to catch more or less the same fish. While there are many profitable units, there are also many unprofitable units. The latter have to come up with new strategies to continue the race or drop out of the race itself. This sector dynamics is itself a strong indicator of over fishing with additional investment in fishing being determined by competition (in an open access situation) rather than additional availability of fish. We shall deal with this in more detail while discussing over-capacity.

Over fishing is certain, but extent unknown

Thus one can safely say that over fishing—both biological and economic—is definite in TN & PC, but the extent of over fishing, the potential losses due to over-fishing and the long term consequences of this are not known.

2.3 Over-capacity

Over capacity in TN & PC fisheries is clearly present in many segments of the fisheries, especially the trawl fisheries. This is reflected in the dynamics described below.

A vicious cycle: over capacity—unhealthy competition—over capacity

Both scale and technology are currently unstable due to the intense competition created by over-capacity. With over capacity in each sub-sector, each group is trying to expand and diversify into new niches. Often, the "new" niche is not really new and is already occupied by another sub-group. Some examples of these are: (i) the trawl fleet of Chinna Muttom in Kanyakumari, having built capacity to undertake rapid trips to the Wadge Bank, is now increasingly straying into the 3 nautical mile zone protected for small fishermen, (ii) the FRP-OBM boats of

33 We received CPUE figures for TN from CMFRI for the period 2001-10, but they were difficult to interpret and use. We found that CPUE is not standardized for any craft and gear combination (or fishing unit) and with constant changes in scale (size of boat and net, changes in horse power) it is difficult to make meaningful comparison over a time period. That we were not able to obtain gear wise CPUEs was another reason we could not make useful calculations.

Chennai have developed a larger FRP craft to use two 10 hp motors that will help them reach the tuna resources in deeper waters, a niche already occupied by multi-day mechanized gillnet boats and (iii) many of the mechanized boats are increasing horsepower to reach the same grounds faster than their competitors and to return earlier to shore to get a better price.

Thus investments are being made not because there are new resources to be tapped, but to beat the competition targeting the same resource. When one group invests to increase its capacity, it creates a chain reaction that pushes all others in the sector to also increase investment, in a desperate attempt to maintain their current level of access to fish resources. Thus the failure to curb unhealthy competition is forcing unnecessary investment in fishing with capital and maintenance costs eating into owner profits and labour incomes.

We are facing, in many segments of the fishing fleet, the vicious cycle of overcapacity leading to unhealthy competition and in turn fuelling fresh investment that lead to further over capacity. It is unclear as to how long this cycle can go on. Faulty policies promoting further investments in fish harvesting capacity are aggravating the policies.

Which sections of the fleet have over-capacity?

The trawler fleet is clearly the most over capitalized with significant over capacity. Many observers would put the over capacity at 100%. In other words, just half the current fleet is enough to maintain the current trawl catches. This is leading to trawlers preying on the fishing grounds reserved for artisanal fishing within the 3 nautical mile zone. This is also leading to trawlers fishing in waters of neighbouring states—Kerala, Andhra and Sri Lanka. This has many serious social and political consequences.

The artisanal fleet also has excess capacity if one considers the matter in isolation. Generous distribution of free motorized craft after the tsunami has resulted in excess capacity and increased competition within the artisanal sector itself. The adoption and spread of ring seines can be in part attributed to this competition. However, the excess capacity in the artisanal sector cannot be viewed in isolation of the capacity in the mechanized sector. One can argue that there is excess capacity in the artisanal sector only if one assumes that the current share of resources that the artisanal sector enjoys (33-35%) is what it ought to enjoy. Alternatively, if one recognizes that the artisanal sector, which is a labour intensive sector, should get the priority in resource allocation, then one could argue that the artisanal sector may not have over-capacity. In this case, the solution to the current over capacity in the artisanal sector is to reduce the capacity of the mechanized (trawl) sector. Even if this were to happen, one needs to serious consider the risks of allowing further capacity increases in the artisanal sector.

There are certain niche fisheries like the mechanized gillnetting and long lining. These are limited to certain pockets and appear to be restricted to certain groups of fishermen with specific skills. Even if they do not appear to suffer from over-capacity, these fleets also need monitoring and controls to ensure that they do not get out of control.

2.4 Inequitable access to resources

The current “open access” policy with no mechanism to directly or indirectly allocate resources between the different groups of fishermen has led to serious inequity in the access to resources. The mechanized sector with just 22% of the workforce has grabbed around 66% of the catches using its higher fishing power (higher horse power, active gears, etc.). The motorized fishing fleet with 66% of the workforce has around 33% of the catch while the non-motorised fleet with 10% of the workforce has just around 1% of the catches. This clearly indicates that from a social point of view, the *open access policies are not benefitting the vast majority of the fishermen.* Of course, it could be argued that the high proportion of catches by the mechanized sector is the result of its ability to target resources out of the reach of the artisanal sector. This is only partly true. A good part of the mechanised boat catches are within the capacity of the motorised units to catch as these boats also go to the edge of the shelf and beyond in many areas and have gears suitable for exploiting resources on the bottom as well. At present they lose their share of catches to the mechanized boats which have higher fishing power. Increasingly, the trawl fleet is not dependent on prawns any more but targets all kinds of fin fishes using “high open bottom trawls”. The Rameswaram trawlers use pair trawling to catch oil sardines, the pelagic fish that is the target of artisanal fishermen in the rest of Tamil Nadu. All this further aggravates the problem of trawlers snatching fish from the artisanal sector.

Given that the artisanal fishing represents labour intensive fishing, mainly for livelihood, it is an irony that limited entry and capacity controls are often resisted in the name of employment protection.

2.5 Limitations of gear control and fishing holidays in the absence of capacity controls

In all our interactions with fishermen, especially in the visioning workshops, the near universal prescription coming from them, and supported by fisheries officials, is the following:

- Enforce ban on ring seines and pair trawls
- To conserve fish resource, increase fishing holiday from six weeks to 12, spreading it over two spells
- Strictly enforce the protection given by law to the three mile "artisanal" zone
- Enforce mesh size regulations for all gears
- Enforce all gear related regulations by controlling the manufacture of these items

Only a few lone voices talked about controlling competition and fleet size. The above mentioned measures, however laudable they may be, ignore the fact that lack of control on investment is compelling all fishermen to adopt unsound practices. Increasing the burden on them with increases in duration of fishing holidays will only force them to adopt more aggressive fishing methods to compensate for the loss during normal fishing days. Without assuring adequate returns to fishing for owner and adequate income for workers if rules are followed, there is very little chance of compliance. This is unlikely to happen in the current "open access" regime that does not control investment and fishing capacity.

2.6 Understanding issues related to labour, capital and employment

Limiting entry : Threat to employment?

One of the phobias associated with introducing limited entry, putting limits to numbers of boats, or (more radically) to retire part of the fleet is the fear that lots of people will lose their livelihoods. The actual situation in fishing is that **labour shortages** are affecting parts of the fleet. The increase in the number of motorised vessels has ensured that many erstwhile crew of mechanised boats are happy to stay back in their own villages and fish as co-owners or just crew of FRP-OBM boats. This has necessitated the recruitment of Andhra fishermen by Chennai mechanised boat owners. In Kanyakumari district, the Thoothoor deep sea fleet is stagnating due to lack of skilled fishermen willing to go on long 2-3 week voyages. This in turn means that owners trying to introduce long lining for Tuna on the Coromandel Coast are unable to get labour from Kanyakumari, an absolute must if the venture has to succeed.

Even if one ignores the current shortages as aberrations, shortage of labour from the traditional fishing community is just round the corner. In many districts (notably, Kanyakumari), all children are going to school (with the aim of landing white collared jobs) and it is only a matter of 10-20 years that TN will see an acute shortage of skilled fishermen and there is likely to be a trend to substitute skilled labour with more technology.

It is also important to recognize that over-capacity in the trawl sector needs urgent reduction as it affects both the resource base as well as the rest of the fishing units. A reduction of the trawl fleet can actually give a boost to the more labour intensive artisanal sector and provide better incomes to a larger number of persons than at present.

As far as the post-harvest sector is concerned, employment opportunities are related to the total landings and a well-managed fishery will continue to provide sustainable livelihoods in post-harvest as well. Unsustainable fishing will eventually lead to decline in the post-harvest sector as well.

Investment, sources of money, sharing systems

A paradox that many have noted in the Indian fishery is that the fishing community is said to be poor (or at least, not rich) and yet seems to have no problem in finding finances to invest in fishing. This is not just true for the

trawler owner, but also true for the *kattumaram* owner. Adding to the puzzlement is that formal financial institutions rarely finance fishermen, who depend almost entirely on informal sources. This paradox can be explained only if one recognizes that even the smallest of fishing units is fully integrated into the market economy and trade. Also, even the unit with the lowest investment runs on the basis of an income sharing system that sets apart a certain proportion of the catch income to service the capital costs (interest and depreciation) and maintenance costs.

Typically, the owner's share is not called as such, but referred to as "boat share", "net share" or just "fishing equipment share". Thus, even an illiterate fisherman knows that a certain proportion of earnings has to be kept apart for perpetuating the fishing unit. And that money will come from the trade and local money lender if you have the skill and management capacity to run a successful fishing unit. It is a different issue as to who benefits more from such arrangements, the fisherman or the financier/trader.

Investing for returns vs. investing for generating labour opportunity for one self

It is also worth noting that most owners of artisanal fishing units double up as crew and take home the crew share, ensuring that the share to the fishing equipment is actually kept apart for servicing capital costs and for reinvestment. In most cases, the decision to become owner depends on the number of male members available in the family and the proportion of catch income that can be taken home.

It is important to recognize that an owner who invests mainly to generate employment (labour opportunity) for himself and his sons is different from the owner who invests with the intention of living on the net returns from the owner's share (or return to investment). This is one reason why the artisanal sector is not driven by the logic of return on investment, but more on employment opportunity generated through viable investments. It is important to realise that even these employment-oriented investments have to produce adequate returns to capital to ensure proper maintenance and timely replacement. The economic/commercial logic is ever present in the fishery, both artisanal and mechanised.

It is important to note that the mechanization process has created a significant number of families in the fishing community that look at fishing as an investment oriented activity rather than as a labour generating activity for oneself and one's family. If returns are good, they are ready to invest in more boats, often one for each son to manage. So, there is no dearth of investors from the fishing community.

2.7 Weak understanding of fisheries management

In general, the stakeholders in the TN & PC fisheries have a weak understanding of fisheries management. We discuss here some of the deficiencies in understanding that lie behind the inability of most stakeholders to thin holistically about fisheries management.

Social objectives as important as biological objectives

Fisheries management, perhaps due to the unfortunate fact that it translates into "fish resource management" in Tamil, is only associated with species conservation, which is only one of the many possible objectives of fisheries management. Both the officials and fishermen start discussing instruments to conserve species or stocks whenever fisheries management is mentioned. The MFRA, in addition to the objective of fish resource conservation, clearly mentions two more specific objectives, which are social in character (protection of small scale fishermen and preserving law and order).

Not many realise that the annual six-week fishing holiday for mechanized boats originated in Kerala not merely a resource conservation measure, but also as an instrument of redistributing resources between the mechanized and artisanal sectors. The six-week trawl ban during the south west monsoon in Kerala ensures that the artisanal sector gets its share of prawns that it lost to the trawlers prior to the imposition of the ban. That fisheries management should also answer questions on who should benefit from the fisheries is completely ignored in the discourse. The current distribution of benefits is skewed. Due to the "open access" regime, the more powerful fishing units (larger boats, higher horsepower, active fishing gears, etc.) get a disproportionate share of the fish resources. Is it not a matter of concern that more than two-thirds of the TN catch is from the mechanized sector?

Economic dimensions

Just as social dimensions are ignored when discussing management measures, economic dimensions are completely ignored. When gear bans and additional fishing holidays are proposed, the economic implications are rarely talked about, both at sector level and at the level of individual fishing units. Attempts to regulate gears and effort without limiting entry and capacity come from this mindset that ignores that there are strong economic reasons for the current overfishing and overcapacity.

Post-harvest and gender

Another area that is completely ignored in discussions on fisheries management is that they have significant bearing on the post-harvest sector and those employed in it. Here the involvement of fisherwomen needs to be specifically factored in. The increased catch by the mechanized sector automatically leads to concentration of catches in the fishing harbours. This leads to changes in the employment opportunities in the post-harvest sector. Fisherwomen depending on marketing fish catches in their villages lose out to those (mostly male traders) who are mobile and can operate from harbours. The larger catches in the harbours provides the economies of scale that favour larger merchants and traders. The large trawl by-catch also leads to a new dry fish business with its own set of actors. Any changes in the fish landing pattern between mechanized and artisanal landing centres will produce a new set of winners and losers. All these are never talked about while discussing management measures.

Poor understanding of Common Pool Resources

Fisheries are rarely understood by administrators and policy makers as common pool resources (CPR). This is often the reason behind the typical subsidy schemes that continue to promote new fishing units and aim at increased production. That, in a CPR regime under high level of exploitation, each unit imposes negative externality on the others is never taken into consideration. Every new scheme is justified with reference to itself with no study of the implications it has for the rest of the fishery. Every new fishing harbour is justified on the basis of the number of boats it will hold and the anticipated catch by each boat. That these boats may snatch fish from some other category of fishing vessels and may not necessarily add to total production is never given consideration.

This weak understanding of CPR is behind many of the poor plans and weak governance of the fishery.

2.8 The problem of trans-border fishing

The most sensitive and politically charged problem in the fisheries of TN is that of Tamil Nadu fishermen facing arrests, detention, physical harassment, and at times, shooting by the Sri Lankan Navy for fishing in Sri Lankan waters. This problem affects fishermen from Nagapattinam to Ramnad districts. Usually, this problem is seen in Tamil Nadu as emanating from the Indo-Sri Lanka agreement in 1974 that demarcated the maritime border in the Palk Bay. This agreement led to the Katchathivu Island in the centre of the Bay being handed over the Sri Lanka and resulted in the maritime boundary being drawn closer to the Indian shore than it might have been otherwise.

However, from a fisheries point of view, more than the island and the maritime boundary, it is the fishing rights in each other's waters that have greater significance. Interestingly, Article 6 of the agreement clearly states "The vessels of Sri Lanka and India will enjoy in each other's waters such rights as they have traditionally enjoyed therein". Since this can be interpreted to include fishing rights, it was unfortunate that the Government of India, through a subsequent "exchange of letters" in 1976 formally agreed that Indian vessels shall not fish in Sri Lankan waters. In practice, this did not matter as neither country was interested in regulating fishing till the start of the civil war in Sri Lanka in 1983. Completely oblivious to the agreement between the two nations,both fishermen (who have strong ties of religion, caste and kinship) happily fished in each other's waters till the start of the civil war with only the occasional clash over fishing methods.

The civil war created a new situation that led to severe curbs on fishing by the Sri Lankan fishermen and their coming on more than one occasion as refugees to Tamil Nadu. With the Sri Lankan waters under-fished, the Tamil Nadu fleet in the Palk Bay found it attractive in increase its fishing effort in Sri Lankan waters. Tamil Nadu had already embraced mechanised trawlers in the 70s and this fleet started expanding to fill the void left by Sri Lankan

fishermen in the Palk Bay. Sri Lanka did have a small fledgling trawl fleet at the start of the civil war, but in general, Sri Lanka is one of the few countries in the tropics that did not promote shrimp trawlers due to clear awareness of the negative effects of trawling on both its marine eco-system and small scale fishermen. The Indian trawl fleet in the Palk Bay more than doubled during the war time (1983 to 2009) with the individual units also becoming more powerful (higher horsepower, larger boats, improved gear, etc.). With limited area available for fishing on the Indian side aggravated by over-fishing, this fleet has become more or less dependent on fishing in Sri Lankan waters. Even a section of the artisanal fleet (the vallams and other motorised craft) fishes deep in Sri Lankan waters.

This expansion of fishing in Sri Lankan waters by the TN fleet during the quarter century civil war was achieved at great human cost. Though the Sri Lankan Navy rarely tried to control fishing by Indian vessels in Sri Lankan waters, the Indian fishermen were often victims of the war with a few hundred losing lives in incidents of shooting by the Sri Lankan Navy. Many more were arrested and detained for varying periods.

The end of the civil war has created new problems as well as opportunities. The new problem is that the Sri Lankan fishermen are back to fishing with most fishing restrictions having been withdrawn. This means that they are unable to accept the large number of fishing operations by Indian boats in their waters. The Indian trawlers, in addition to catching large quantities of fish in Sri Lankan waters, do considerable damage to the nets and other fixed gear that the Sri Lankan fishermen use close to their coast. There is considerable anger among the Sri Lankan fishermen about this indiscriminate trawling activity by Tamil Nadu trawlers when they are trying to re-establish their livelihood after a gap of more than a generation. Clashes have taken place at sea between fishermen and, on a few occasions, Tamil Nadu trawlers have been captured by irate Sri Lankan fishermen. Though Sri Lanka is still not formally enforcing fishing restrictions, informally, the Sri Lankan Navy is making life difficult to Indian fishermen in many ways. Occasionally, such methods get out of hand and result in loss of life or injury to Indian fishermen, causing a major political upheaval in TN.

However, the end of the war has also brought with it the opportunity to find a permanent solution to this vexed problem. Fishermen leaders have already met to find a solution under the aegis of civil society organisations. The two Governments have also embraced this idea of a fishermen-to-fishermen dialogue and have started promoting this officially. However, it is clear that the negotiated solution to this problem lies on how TN tackles the trawler issue. With Sri Lankan fishermen strongly objecting to trawling rather than territorial incursions, the solution lies in TN's ability to manage its 2500 strong trawler fleet. Some trawl fishermen associations in TN have already proposed a trawl fleet reduction through a "buy-back" scheme. It is clear that any re-negotiation of fishing rights between India and Sri Lanka can only be on the basis of equitable access to resources and the trawlers on the Indian side represent a large imbalance in the system. There are also some issues with artisanal fishermen who cross borders. Not border crossing *per se*, but the fact that they use mono-filament nets which are banned in Sri Lanka.

Despite geo-political and other factors, it can be argued that the solution for the problem of trans-border fishing lies in better fisheries management and the measures required are equally applicable to other parts of TN and other fleets that are not involved in trans-border fishing.

2.9 Governance : Key Issues

State vs community governance

Historically, marine fishing has been a self-governed system based on traditional values and village governance systems. This system, despite the inevitable decline due to competition with modern constitutional bodies and the internal changes in the fishing community brought about by technological change, is still going strong, at least at the village level. Higher tiers of the traditional governance system are much weaker or have disappeared. The newly created mechanised boat sector is generally not amenable to traditional controls, but it has also developed its own institutional arrangements for internal discipline and to represent it in the outside world.This division between the traditional/artisanal and the mechanised sectors has made it very difficult for the self-governing systems to address the current problems of over fishing, over capacity and inequitable distribution of access and benefits.

The state as a governor in marine fisheries is a recent phenomenon, if one ignores state controls over certain niche fisheries in the past[34]. Till the enactment of the MFRA, the fisheries department was essentially a "development" department, which meant promotion of fish production through various investments in infrastructure and subsidies for new technologies. Now-a-days it sees itself more as a "welfare department" handing out various doles to fishermen and fisher women. Regulation and management sit very uneasily in the department's portfolio of activities. Fishermen normally like to resolve issues internally rather than go to the department. However, when they are unable to resolve the matters internally and approach the department, the department is often stymied in its efforts due to "political interference", often at the behest of one of the parties to the conflict/dispute. Quite often it finds itself unable to enforce the regulations it has made.

Very clearly, the *fishing community institutions have been a lot more successful in getting fishermen to comply with rules than the Government*. Whenever the Government rules have been successfully implemented, they are so because of community backing. Very clearly, given the complexity of today's situation, neither the Department nor the community can manage the fisheries without each other's support.

Given that traditional or community governance is unable to manage fisheries in its entirety, the importance of state intervention cannot be ignored. However, the top-down conception of fisheries management implicit in the function of the state and its laws is not the best way to resolve the current governance deficit. Finding a new approach to governance and developing new sets of institutions to govern will be the key to the success of fisheries management.

Multiplicity of state actors, often working at cross purposes

Even if the Fisheries Department has the most obvious role in the governance of fisheries, there are other Government departments and agencies which have overlapping jurisdictions and can queer the pitch. At the moment the Ministry of Environment and Forests (MoEF) in the Union Government and the local Forest Department in TN have a fair amount of power to regulate fisheries making use of the provisions of the Wild Life Protection Act that empower them to declare national parks and sanctuaries on the one hand and ban the exploitation of endangered species on the other. That such interventions should be in sync with larger fisheries policies and management systems is rarely appreciated by the MoEF and State Forest Department leading to considerable dissonance and conflict at grass-roots level. The Gulf of Mannar Marine National Park is the best example of this. The ban on various marine species including the sea-cucumber was done by MoEF without any consultation with key stakeholders including the potentially affected fishermen, Ministry of Agriculture, state fisheries departments and fisheries research institutions. Inherently, an authoritarian act that is proving very difficult to undo on account of the formalities involved in reversing a decision.

A number of other Government agencies also have jurisdiction on various aspects of the fishery and the coordination mechanisms to ensure coherence is very weak or absent. These include the Mercantile Marine Department (MMD) which has power to register all vessels including fishing vessels and tends to regularly exempt vessels below 20m from this provision.

The jurisdiction of the state government over 12 nautical miles while its fleet fishes a long way beyond that is potentially a major threat to the TN fisheries. How the Government of India—through the Ministry of Agriculture—eventually decides to manage the EEZ will have a lot of implications for the TN fishing fleet which is one of the biggest users of the resources in the EEZ when compared to other coastal states of India.

"Welfare", "development" and "management"

The terms "welfare" and "development" dominate the discourse with fisheries officers who feel that the DoF has moved away from its original "development" orientation to that of a "welfare" department. This movement is seen with mixed feelings with a strong preference at officer level to re-establishment of the primacy of "development".

34 The Pandya kings of Madurai had exercised many controls over the pearl fisheries of Tuticorin as the export of pearls was a major source of revenue for them. However, they dealt with the community as a corporate entity and negotiated with its Chiefs. The successor kingdoms continued this policy. During the colonial period, the Portuguese, Dutch and the British controlled pearl and chank fishing off Tuticorin through a rigorous system of individual licensing and market controls. The post-colonial state (through the aegis of the GoTN) continues to have certain controls over chank fishing while the pearl fishery has ceased entirely.

The Puducherry Fisheries Department has formally renamed itself "Department of Fisheries and Fishermen Welfare" indicating the importance given to fishermen welfare. "Management" itself rarely figures in the reports and internal discourse and has virtually no budgetary allocation.

The term "welfare" is largely used to cover the following:

- Subsidies given to fishermen for acquiring boats and motors
- Fuel subsidies
- Subsidies for housing, link roads, etc.
- Lean season support through "savings cum relief" scheme
- The various schemes of the new Fishermen Welfare Board that includes educational scholarships, insurance, etc.
- All other payments to fishermen and women

The term "development" seems to imply the following:

- Infrastructure like fishing harbours, fish landing centres
- Cold storages and post-harvest facilities
- Technological upgrading of fishing
- Extension activities to improve fishing and post-harvest
- Resource enhancement measures

The term "management" is mainly understood and limited to:

- Conservation of fish resources through proper enforcement of the gear regulations and the three mile artisanal fishing zone.

The following is an assessment of the department's schemes from a fisheries management perspective

i. Many of the welfare and development schemes actually promote over capacity and over fishing and hence undermine fisheries management objectives

ii. In addition to over fishing and excess capacity, some measures also create greater inequity in the system further aggravating the problem of the weaker groups in fishing. For instance fuel subsidies to trawlers can lead to decrease in the catches of the small scale fishermen, unless one has the enforcement capacity to ensure that the trawlers fish well beyond the areas fished by small scale fishermen and also target resources not targeted by small scale fishermen.

iii. Such welfare and development schemes actually reduce fishermen welfare by making fishing less rewarding or sustainable

iv. The eligibility conditions for the welfare measures also create a number of distortions. Many of the welfare measures are only for members of cooperatives and eligibility for coop membership is that one is either an active fisherman or a fish vending woman. This leads to false reporting as many who do not actually fish are registered as fishermen. If the actual fleet size can only support a workforce of 1.5-1.75 lakhs, the number of persons registered as fishermen through coops is 2.6 lakhs at the moment, giving a completely exaggerated picture of the actual numbers involved in fishing.

Hence resolving the conflict between "welfare", "development" and "management" and ensuring their harmonious integration is extremely vital for the proper development of the fishery and the welfare of the fishermen.

Huge gaps in information required for fisheries management

There is no evidence that any of the fisheries development schemes including infrastructure, subsidies for fishing units, etc., are made on the basis a proper assessment of the benefits and costs. That there is no separate fisheries resource assessment for Tamil Nadu and Puducherry tells its own story. All plans are clearly based on optimistic

projections than hard data. The fish catch data is another important area where there is no real analysis of the landings information. The fisheries department also unnecessarily duplicates the data collection done by CMFRI without allocating adequate human resources for enumeration or having proper scientific personnel to collate and analyse the data. This unfortunate state of affairs has arisen out of a Government of India decision in the mid-1980s to make State Governments responsible for fish production data with CMFRI data being used for research purposes[35].

While catch data figures are provided by two sources, there is very little economic and social information that is collected by any agency. A dynamic and fast changing fisheries requires continuous monitoring for changes in technology, scale, returns, ownership, labour, etc. No such information is put together, even though the fisheries department has a large field presence through its numerous personnel.

Though large outlays are done for infrastructure projects, who actually benefits is questionable as no investment is made in developing a proper information base for decision making.

No fund allocation for management

Fisheries management only gets lip service but no funds are actually allocated. This means that the local fisheries official responsible for enforcing the TNMFRA is often left wondering how he will pay for the expenses associated with enforcement (hiring vessels for patrolling, paying for protecting confiscated boats, etc.). Such "nuts and bolts" funding gets no attention while "big ticket" expenditure for expensive (but often ineffective) patrol vessels, etc., gets lot of interest.

2.10 Law : weaknesses in the MFRA and its enforcement

Limitations of the TNMFRA

The TNMFRA has for all practical purposes become a rigid and inflexible tool. It is based on the top-down model of regulation. It also visualises a centralised system of rule-making with all powers with the Government in Chennai while Tamil Nadu is actually known for various local regulations brokered by the District administration. A much bigger problem with the TNMFRA is that it has been interpreted in a manner that makes changes in rules and regulations very difficult. In principle, it is an "enabling" act made by the legislature providing the executive with powers to make rules and regulations. Unfortunately, it has been interpreted that every change of rule or new rule needs an amendment in the legislature. This makes it virtually impossible to make the necessary changes in a reasonable period of time. The MFRA clearly needs to be modernised, making it a meaningful and flexible tool for fisheries management.

Enforcement, or its lack

Both fisheries officials and fishermen blame lack of enforcement as the main problem behind the weak implementation of the TNMFRA. The officials further see this lack of enforcement as being related to lack of adequate personnel and facilities like patrol vessels. Ultimately, the entire problem is considered as arising from lack of "political will". We shall discuss in greater detail in Chapter 3 when management options are proposed.

2.11 Misplaced optimism about alternatives

It is common to prescribe the following measures to combat the crisis of overfishing:

- Promotion of deep sea fishing to reduce fishing pressure in coastal waters
- Redeploy fishermen in mariculture to reduce pressure on fish resources
- Provide training and support for fishermen to learn new trades and businesses and move out of fishing

35 As we go to press there is the interesting news that the GoI has reconsidered its 25 year old decision and has agreed that CMFRI production statistics will be recognized as official Government statistics. This will hopefully improve matters. TN could stop the half-hearted attempt at catch data collection and focus on demanding greater detail and quality from CMFRI and use its resources to collect other useful information.

Even if one accepts at face value the viability of deep sea fishing on a scale significant enough to redeploy fishermen from coastal waters, or the possibility to generate alternative jobs attractive enough for fishermen to leave the fishery, or to create adequate opportunities to move to mariculture, or the efficacy of a combination of all three measures, the question rarely asked is "will not some else come to occupy the niche vacated by these fishermen?" Without entry barriers, this is precisely what will happen. There are enough persons to invest and work in the niche vacated by persons who are provided with alternatives. Unfortunately, all prescriptions of alternative employment, deep sea fishing and mariculture, come without any corresponding proposal to limit entry.

It is one thing to say that one should not limit entry without providing alternatives and another to assume that merely providing alternatives will solve the problem of over-fishing. Such proposals are naïve and irresponsible. Developing sound fisheries management may be tough, but there is no substitute for it. Unless one faces squarely the difficulties of putting in place a sound fisheries management system, none of the alternatives are likely to resolve the issue of overfishing and resource depletion.

Similar is the case with artificial reefs and sea ranching. Both can bring some benefits, if managed properly, but cannot be a solution to over fishing and over capacity without putting in place a good management system based on limiting investment/entry.

2.12 Marketing and post-harvest

While fisheries management may appear to be more related to fishing activities at sea, fish marketing and post-harvest play a crucial role in the fortunes of fishing units. While fisheries management measures may have impact on marketing and post-harvest, the reverse is also true. A high price for a particular species can lead to its over-exploitation in the absence of effort controls or catch restrictions. Improved processing and market for under-exploited resource may ensure its proper exploitation while the same may sound the death knell for an over-exploited species under open access conditions. Sound marketing systems can also provide useful information for fisheries management. It is worth noting that market controls (where one can sell, and to whom) are often used in many of the developed country fisheries to regulate fish catches and to monitor them.

The key issue that emerged in TN fisheries *vis-à-vis* marketing[36] was the exploitation by middlemen, traders and exporters and the general view was that the fishermen did not get a fair price for their catch. Interestingly, this view was strongly articulated by the better off mechanised boat fishermen whose export oriented catches depend on a limited number of exporters whose agents can easily form cartels and depress landing centre prices. There is also a strong feeling that most of the mechanised landing centres suffer from poor infrastructure and this also depresses the prices.

The strong demand that came up was for state intervention in the form of support prices or state run marketing systems backed by state investment in marketing infrastructure (cold storage facilities). The voices in favour of fishermen run cooperatives to solve the problem were heard only in a few centres. However, the state's direct interventions in marketing is not really advisable given that the coast is littered with marketing infrastructure created by the fisheries department in poor condition and disuse. Even many of the NGO created marketing facilities after the tsunami are not being used. The current marketing interventions of the Tamil Nadu Fisheries Development Corporation like the fish food stall near the Directorate of Fisheries appear to be more in the nature of show pieces rather than attempts to solve the marketing problems of fishermen.

That the marketing system needs significant improvement is to be accepted, but the ways and means of doing this in a sustainable manner without creating further distortions in the fishery needs careful thought. Marketing support to the struggling trawl fleet may be counter-productive in the absence of limited entry and capacity controls.

36 This came out in the various FIMSUL consultations on fisheries management and for developing a common vision

2.13 Backwater and estuarine fisheries

There are backwater and estuarine fisheries in some pockets of the state. The Pulicat Lake on the Tamil Nadu-Andhra border is by far the most important of these. A large number of fishing villages by the periphery of the brackish water lake undertake fishing with a wide range of fishing methods. The lake appears to be dying with freshwater inflow being below the required environmental flow. The mouth to the sea is also getting clogged by sand bar formation with the water lacking force to push its way into the sea. The Pulicat Lake also has the celebrated "*paadu*" system that governs fishing operations. This entirely community based fisheries management system is now unable to revive the fortunes of the fisheries in the absence of major interventions in the hydrology of the lake that only the state can do. A section of the Pulicat fishermen go to the sea as part of their history as well as understanding with the larger lake community.

Thiruvarur is a coastal district that is dominated by backwater/estuarine fishermen who also venture short distances into the sea. There are also estuarine fishermen in the Killai area of Cuddalore. With regard to many fishermen in these eco-systems, it is difficult to say whether they are just inland fishermen or should be considered marine fishermen. In terms of traditional governance, most of these backwater fishermen are part and parcel of the system governing the marine fishermen. In Pulicat the dominant fishermen are from the *Pattinavar* caste that also populates the marine fishing villages. In Thiruvarur, many of the fishermen belong to the *Vanniar* caste that treats the marine fishing village Arcottuthurai in Nagapattinam as its guide in many matters.

As it stands, the backwater/estuarine fisheries are considered as "inland fisheries" and administered the inland fisheries division of the DoF along with fresh water lakes, riverine fisheries and reservoir fisheries in the interior. This does not seem appropriate given the significant links between backwater fisheries and marine fisheries as well as treating communities in these fisheries as an entirely different lot, which they are not. The issue of whether the backwater and estuarine fisheries should be better integrated to the management of marine fisheries is worth serious consideration.

Interestingly, the CMFRI also considers backwater fisheries as outside its mandate while the Central Institute for Brackishwater Aquaculture (CIBA) in Chennai cannot deal with capture fisheries even in brackishwater areas. Technically, the West Bengal based CIFRI (Central Institute for Inland Fisheries Research) is the agency that deals with backwater capture fisheries. However, historically, it does not seem to be much active in the backwater areas of TN. The fish catch data for the back water fisheries is much weaker than in marine fisheries. The net result is that there is no authentic catch data for the backwaters.

2.14 Coastal issues

Increasingly, the fisheries sector is facing threats from the development of other sectors along the coast—industries, urbanization, thermal & nuclear power plants, desalination plants, tourism, port development, mining for sand and rare minerals, etc. The impact of coastal development on fisheries is not new as it is now acknowledged that the Tuticorin port and thermal power plants played their role in the destruction of the pearl fishery[37] of Tuticorin even as early as the 1960s. However, what was mostly a localized phenomenon has now become a coast wide phenomenon associated with India's rapid economic growth.

Many fishermen have started to say that coastal pollution is a bigger cause for fish depletion than over fishing. While this is unlikely to be true for the state as a whole, the rapid development on the coast, if unchecked, could make this contention true in the near future.

With unleashing of private investment in many sectors, the coast has become the most attractive destination for many investors. These are the major sectors and their impacts on the coast (Table 11).

37 Pearl from Tuticorin was one of ancient India's famous exports along with spices. The kings of Madurai had control over this trade and extracted revenue for their treasury. During the colonial period, the Portuguese, Dutch and the British continued this tradition of controlling this trade and extracting revenue from it. One of the triggers for the formation of the Madras Fisheries Department (or Bureau as it was called then) was the need to manage the pearl fishery better.

Table 13 : Sectors/activities that affect the coastal eco-system and fishing interests

Sector/ Activity	Trend	Impacts (actual/potential)
Ports	Opening up of investment in private ports has meant a big increase in industries and private companies keen on setting up ports including captive ports and jetties. Plans afoot to put up a port every 20 km of Indian coast	Displacement of fishing villages in port location; coastal erosion; increased ship transport disrupting fishing activities; marine pollution due to shipping, coal transport, etc; ports open the door for further developments on the coast
Power plants	Need for additional power to meet India's growth needs. With the hydro-electric potential for large dams more or less exhausted, thermal power is an important source. Current thermal plant investments are made with import of coal from Indonesia and Australia in mind. This makes setting up of power plants along coast very attractive. Availability of "unlimited" sea water for cooling is also attractive for setting up mega plants. TN's acute power shortage is an additional trigger for power plants.	Pumping sea water in large quantities for cooling purposes destroy plankton and fish in coastal waters; letting out hot water into the sea also affects marine life in the area; fly ash and coal dust pollution, if not strictly monitored
Urban-isation	Growth of urban centres along the coast as a result of TN's ongoing urbanization. TN is one of the states with the highest level of urbanisation	City sewage and effluents still being dumped in the sea without adequate treatment; polluting the sea and affecting marine life; greater demand for coastal lands
Industries	Industries are coming up on the coast to make use of the infrastructure created as well as to make use of sea for water requirements	Pollution of marine ecosystem
Desalination plants	For drinking water purposes as well as for industrial use	Pumping in large quantities of water can destroy marine life in the vicinity; pumping back salt water leading to localized higher salt concentration can also affect marine life in vicinity
Mining sand and minerals	Mining of some rare minerals taking place in southern districts are on the increase	Coastal erosion, pollution caused by sending chemicals used for mineral extraction; silting of nearshore grounds of lobster, etc.
Tourism	Beach tourism is on the increase with demand for more resorts	Purchase of coastal lands, displacement of fishermen, competition for beach space
Shrimp farms	Is concentrated in some areas, especially Thanjavur; growth slowed down due to regulations, limited area suitable for expansion	Destruction of mangroves, other vegetation, negative impacts on ground water and pollution due to effluents

It is important to note that the negative impacts of the above activities arise from three factors:

i. Problems inherent to that activity

ii. Weaknesses in sanctioning process that does not make proper assessment of impacts on coast, marine life and fishing communities

iii. Weaknesses in enforcement of conditions and monitoring of impacts

Which factor dominates depends on the activity and context.

Very clearly, the answer to the problem lies in (i) minimise investments on the coast to absolutely essential activities, (ii) strengthen pre-sanction systems for evaluating projects and (iii) strong monitoring and enforcement.

The various FIMSUL workshops and discussions have identified some of the hot spots on the TN coast. Some of them are given below (not an exhaustive list) in Table 12.

Table 14 : "Hot spots" along the TN coast

Location	Activity	Impacts
North Chennai and Tiruvallur	Port, thermal power, desalination plants, industries	Erosion, marine pollution
Puducherry	Port; bigger port under consideration	Erosion
Cuddalore	Chemical industries	Pollution of estuary and sea; health issues
Nagapattinam	7-9 thermal power plants planned; one or two already in operation	Local impact on marine life due to intake of water for cooling and hot water discharge
Thanjavur	Shrimp farms	Mangrove destruction, pollution from shrimp farm effluents
Tuticorin	Port, thermal plant, industries	Loss of fishing grounds due to siltation and fly ash; marine pollution
Tirunelveli	Sand mining for minerals	Erosion, effluents with chemicals used for extraction; negative impact on near shore resources including silting of lobster grounds
Kanyakumari	Sand mining for radioactive minerals	Erosion

It is worth noting that this report is being written when fishing villages are involved in a major agitation against a new nuclear power plant nearing completion at Kudankulam in Tirunelveli district. A number of smaller agitations are also taking place on and off in different points of the coast against power plants (particularly in Nagapattinam) and industrial pollution (Cuddalore).

Another factor that affects marine fishing, but rarely recognized, is the decline of nutrient flow to the sea due the impact of dams on rivers. CMFRI has estimated that there is a 30% drop in nutrient flow to the sea in India in the last 50 years[38].

38 Dr. E. Vivekanandan, CMFRI, in his power point presentation to fishermen leaders at Vizhinjam, 2004

Chapter 3 : Management Options and Recommendations

3.1 Choice of frameworks

The first discussion that often takes place before working on fisheries management options is the choice of frameworks to be used. Many frameworks have been developed, mostly in developed countries, often for temperate water fisheries. Each framework has its own pros and cons and passionate advocates and trenchant critics. There is a lot of overlap between the frameworks and the differences at time are just in emphasis. We shall take a quick look at three competing frameworks currently.

Eco-system approach

The most talked about framework in recent years is the "Eco-system approach to fisheries" or EAF, promoted by the FAO. It is compatible with both input and output control systems and involves a very rigorous protocol to design a management system. It has its moorings in approaches developed by conservation groups that talk about "precautionary approach" and "reference points". By taking the position that human being are part of the environment or eco-system, the FAO has converted what could be a conservation dominant framework into a more balanced one. FAO has also integrated the principle of stakeholder participation and is leaving the setting of objectives to them. It is an attractive framework, but there seems no evidence of any country actually adopting it *in toto*. It is to be noted that there are subtle variations of EAF called Ecosystem Based Fisheries Management (EBFM), etc., that are promoted by other agencies.

Wealth Based Fisheries Management

The World Bank, on the other hand, seems to be in favour of the lesser known "Wealth Based Fisheries Management", a framework with very little documentation, unlike FAO's EAF. It is predominantly output based in its approach, but goes much beyond mere quota setting. Its fundamental underpinning is the importance given to maximizing "resource rent" from fisheries. In other words, to catch fish in the most economic manner that leaves a surplus for the individual and society to utilize according to local needs/objectives. Since the MEY (Maximum Economic Yield) comes before MSY (Maximum SustainableYield), it automatically ensures that over exploitation of fish resources is avoided. Rather than maximizing (or optimizing) sustainable fish catch, WBFM believes in maximizing sustainable (net) income from fisheries. Its strength is that it provides fishermen with strong incentives for better management.

The attraction of WBFM, for the few who are its strong proponents, comes from the fact that it has actually been adopted by two or three countries where it is considered a roaring success, at least in terms of fish stock health and the profitability of fishing. The New Zealand story of the Maoris applying "resource rent" for the betterment of their entire community is a striking example of how wealth from fisheries can be utilized for collective good. However, the fact remains that the "successful" examples of WBFM comes from fisheries that involve very few people compared to Tamil Nadu. The critics of WBFM have strongly argued that WBFM is inappropriate as it will have disastrous consequences for the poor where the overall political system cannot guarantee the proper use or application of the "resource rent" from fishing.

Whatever be the pros and cons of WBFM, the officers of the TN & PC fisheries departments who visited New Zealand as part of FIMSUL, found it alien in conception and seemed to be even put off by the fact that the "Maoris are filthy rich". Resource rent as a concept is still confusing to them and they cannot see, at the moment, any way to apply it.

Human Rights Based Fisheries Management

Another framework that is being talked about at the moment is "Human rights based fisheries management", particularly in the context of small scale fisheries. It is critical of the way the term "rights" has been used in fisheries management discourse. It only means some form of property right and ignores the other dimensions of the term.

Many fisheries management systems, based on conferring "rights" to fishermen, appear to be quite comfortable with excluding many, especially the poor, from the fishery. The community dimension is often ignored and can have disastrous consequences in countries with sizeable small scale fisheries. Moreover, the small scale fishing communities are often victims of denial of various kinds of rights as citizens to a decent life and suffer from many deprivations—health, education, basic needs, etc. In such conditions, it is more important for the Government to ensure that the human rights of the fishing community are incorporated in any intervention or management system that is in place. The HRBFM is inspired by similar ideas in other natural resource based systems where privatization of resources is depriving large numbers of their rights. However, beyond stating some general principles, it is yet to be developed as a full-fledged framework. Whether it will be, is a matter of conjecture, but it certainly offers some important ideas for other frameworks to incorporate.

Choosing between the frameworks

The above is not an exhaustive discussion on all frameworks. EAF and WBFM have been discussed because they are promoted by the FIMSUL implementing agency (FAO) and donor (World Bank), respectively. HRBFM is championed by the Chennai based ICSF, to which some of those in the project have close association. It also provides a useful counterpoint to the EAF and WBFM.

Each of the frameworks teaches us something valuable. The EAF tells us that fisheries cannot be managed by looking at each species separately without taking into account the inter-relationship between species as well as the relationship between all species and the habitat/environment. The WBFM tells us that fish resources have enormous economic value and that fisheries management needs to go beyond biological conservation and help the nation and its people reap the best economic returns from fishing. HRBFM tells us that in many developing countries, one has to go beyond fisheries management to resolve the problems facing the fishery. This requires addressing various entitlements, many of which are enshrined in the Millennium Development Goals[39].

Whatever be the merits of the frameworks that TN & PC could choose for developing a fisheries management system, all appear to be distant and of just academic interest, given the stage/status of fisheries management in India/TN. TN & PC fisheries are in a difficult transition from a traditional community based system of management (under conditions of resource plenitude and limited harvesting capacity) to that of a "modern" system of management that implies formal state mandated systems for management under conditions of resource scarcity and over capacity. At the moment, neither the state nor fishermen are in full control of the fisheries. Both have their sources of power but they do not normally work together. It is the alignment of community power with that of state power that should be the priority today. Asking the Department of Fisheries, which has very little control on who fishes and where, to choose between different theoretical frameworks is not very meaningful at the moment.

It is recommended that the choice of framework is something that will be made by the key stakeholders as they start moving towards establishing a more effective system of governance. However, as will be seen from the discussions in this chapter, the *stakeholders have to evolve some sort of a "rights based" system that restricts further entry and fixes capacity limits*. What emerges from TN & PC could very well be a model suitable for other Indian states that face more or less similar problems in fisheries management.

3.2 Input controls vs. Output controls

Associated with the choice of frameworks is the debate over the use of input controls and output controls. It may also be useful to take a look at this debate as well.

Input controls involve controls on fishing effort, which may involve the use of a number of instruments that include regulating fishing capacity (fleet size, size and hp of vessel, size and type of net, etc.), gear controls, fishing holidays, etc. TN already has some of the input controls, though not the crucial ones of regulating fleet size and capacity.

39 It can be argued that India has already some form of HRBFM as both the GoI and the state Governments run a number of "welfare" schemes for fishing communities that are not linked directly to fisheries as such. Village development, educational scholarships, special schools for children of fishermen, insurance, health programmes, women's empowerment through Self Help Groups, savings-cum-relief schemes, etc., are all in place to varying degrees in most coastal states of India. What is lacking actually is fisheries management!

Output controls involve a radically different approach, that of fixing how much fish can be caught and then allocating the quantity in the form of quotas to individuals, groups or even nations (as in the case of the EU). Output control regimes are also wide ranging with the Individual Transferable Quota (ITQ) being an instrument that creates a purely market mechanism to decide on who fishes and who invests in fishing and the "right" or "quota' holders in the fishery can sell their quota for a consideration.

There are a number of arguments against either system, mostly practical. Some of the practical objections to output controls include the difficult of applying them in tropical fisheries where, due to high diversity of species, setting quotas for individual fish resources is impractical in most instances. Also the information required and the conditions necessary for the quota system to be successful are largely absent in most developing countries. The output control system is also strongly objected to by many on grounds of principle. The quota system, which is at the heart of the output control system, is considered to be a part of neo-liberal economics and implies the privatization of a common pool resource and the consequent concentration of wealth. The proponents of the quota system counter this by arguing that community quotas are possible and creation of ownership at community level can address the objections to privatization of resources.

The arguments against input controls is that it only indirectly leads to the desired outcome of ensuring a healthy stock and the users often have a strong incentive to catch more than what is desirable. In addition, "effort-creep" or "capital stuffing" can take place with vessels increasing their capacity or technical efficiency, unless there is a strong mechanism in place to check such practices

In TN &PC, it is unrealistic at this moment to talk about output controls or quotas for the simple reason that the kind of information system and governance required for such systems are not even visible on the horizon. Further, output control systems are best suited to fisheries with centralized or concentrated landings coupled with higher levels of value addition that also goes with a limited number of buyers from the 'organised sector'. The decentralized system of landing, large numbers of craft and the completely informal system of marketing that in turn involves a very large number of small buyers, makes it virtually impossible to implement an output based management system in TN & PC.

So, it is much better to talk in terms of input controls than output controls. It is of course quite possible that a generation from now, depending how the sector develops, one may shift to an output based management system, for some segments of the fleet.

3.3 Towards co-management

As explained above, what TN & PC require at the moment is not that much in terms of management frameworks or recommendations on specific management measures. What is most critical at the moment is to establish a governance system that will ensure effective control over the fishing units and can be expected to deliver in terms of compliance and enforcement. In other words we are not seeking the establishment of a system that will throw up the best solutions, but a system that will come up solutions, even if they are less than ideal, which will be effectively implemented.

As has been discussed elsewhere, TN fisheries are in a transition from traditionally managed systems to modern state managed systems. As a result, both the community and Government have a certain amount of power to manage the fisheries, but there is no synergy in the use of these. A logical conclusion is that Government and fishing communities need to work together for fisheries management instead of pulling in different directions. Sections within the fishing community are also pulling in different directions. Fisheries management in TN & PC can succeed if only there is alignment between the different forces and they all pull in the same direction. This implies some form of **co-management**.

Some questions that arise when talking about co-management are:

- Can the different fishermen groups with conflicting interests work together?
- Can the fisheries officials and fishermen work together in a horizontal relationship?

- What sort of structure?
- What will be the units of fisheries management and how will this relate to the co-management structure?
- Who will create it?
- Structure or function: which comes first?
- Law or practice: which comes first?
- Should there be first some pilot projects or should it be launched state wide straight away?

These are some attempts to answer these questions.

Uniting warring groups

There are many common interests that bind all fishermen together. Today, no group is strictly in a comfortable position that it can spurn offers of dialogue. The State has enough sticks and carrots with it to bring together warring groups. The various "peace committees" to resolve conflicts and the "3 day - 4 day rule" are testimonies to this.

Fishermen—officials relationship

The fisheries officials and fishermen are today locked into an unhealthy relationship based on a relationship that sees the Government as provider and fishermen as recipients. This does not however, lead to a situation of fishermen as supplicants, but as group that is aware of its "rights" and makes forceful demands. This relationship requires that they play "games" rather than sit down and participate in an honest discussion or feel comfortable enough to do a joint brainstorming exercise.

Need for external facilitation

The possibility for warring groups in the fishery working together exists. So does the possibility of fishery officials working together with diverse fishermen groups. However, as shown by FIMSUL, this will be much more effective if there is proper external facilitation, at least until a system is in place and the parties involved are comfortable with working in a new mode of decision making and talking about fisheries management—rather than welfare or development—both of which depend heavily on state finances and involve no responsibility on the part of the fishermen. The officials will also need orientation and skill building to ensure that they are comfortable with working in a new role that co-management implies.

Capacity building and orientation

At this stage, there is also a weakness in the imagination of both the fishermen and the officials, in that they are limited in their choice of instruments for management. Nor is there enough capacity to work out the implications of the various management measures or to look at problems from new angles. Capacity building is therefore essential for all the stakeholders. This is true for other actors including NGOs, academics and research institutions, who all need orientation/capacity building to be able to play a supporting role in co-management.

Capacity building needs to reach the ordinary fisherman and not just the leaders who represent them. The FAO/ UNTRS supported co-management experiment in TN and Kerala by SIFFS indicated that a broad based education and capacity building is needed for co-management to become successful. This has also been borne out by the FAO co-management initiative in Aceh, which attempted such a process[40]. FIMSUL found the awareness level on fisheries management issues very weak among the women leaders in the community, who also have a role to play in management as their livelihoods are also fishery dependent and the life in the community itself is fishery dependent.

Evolution of structures rather than blue-print based approach

The above points indicate that co-management has to evolve rather than be "set up" quickly. It is therefore not advisable to finalise the structure straight away but to start a process of working together by creating platforms

40 John Kurien, personal communication.

rather than institutions/organizations. As observed in the FAO/UNTRS pilot project[41], the building blocks for a co-management structure already exists at the village or landing centre level with a variety of traditional and new organizations exercising some degree of control over fishermen and fishing operations all over the coast.

Choice of fisheries management units (FMUs)

Another factor that needs consideration is the unit of management. It is not practical to look at the fisheries of TN & PC as one single monolithic system that has to be managed as a whole. From a practical point of view, it has to be broken into convenient units for ease of management. In most developed countries (often situated in the temperate zone), the preferred unit of management is an individual fish species, often at the level of individual stocks. This approach has many advantages including that of directly acting on the problem of overfishing of particular species. However, in the multi-species tropical eco-system of TN & PC, an individual fish species as an FMU will be more the exception than the norm. For instance, a FIMSUL case study indicates that the small scale lobster fisheries of Kanyakumari had the potential to be managed as a separate FMU. FIMSUL took a look the various options available for FMUs in TN & PC:

1. Fisheries of specific resources/species
2. Gear based groupings
3. Specific fleet based groupings
4. Particular groups of resource harvesters
5. Sub-sectors
6. Geographical area based units
    a. Eco-system based
    b. Landing centre based
    c. Fishing area/ground based
    d. Fisheries administrative boundaries
    e. Social organisation boundaries

A detailed discussion of the options led to the conclusion that all of the above have scope to be FMUs in particular situations along the coast[42]. It is the geographical area-based FMUs that have the biggest scope taking into multiple factors including social and administrative issues. However, no single system can adequately address the needs of fisheries management in TN & PC. So, some sort of combination of different types of FMUs is called for. Given that the greatest scope lies with geographical area-based FMUs, the overall system of multiple FMUs would be woven around a structure that will essentially be a geographical area-based one. This structure will also have significant advantages for co-management. The following section will explain the proposed architecture for co-management.

Architecture of a Co-management structure for TN & PC

A multi-tiered geographical area-based structure is visualised for the proposed co-management system that can cover the entire coastline of TN & PC. It starts at the grass-roots level with village or landing centre level organisations as the lowest unit of management. Given the enormous social capital already present in the traditional village governance systems and the mechanised boat associations, these existing organisations will be the natural foundation on which the remaining the tiers of the system can be built.

The next tier is the district, which is more of a political/administrative unit, but has the advantage of being the level at which many fisheries decisions have been taken in the last four decades. The next level will be that of the four

41 Between 2006 and 2008, South Indian Federation of Fishermen Societies (SIFFS) experimented with Co-management structures in Nagapattinam (TN) and Quilon (Kerala) districts, supported by the FAO as part of the United Nations Tsunami Recovery Support (UNTRS).

42 For a detailed discussion on FMUs refer to the authors' paper "Identification of FMUs in TN & PC" submitted to FIMSUL.

major eco-systems—Coromandel coast, Palk Bay, Gulf of Mannar and the Arabian Sea. Ultimately, there has to be a state level platform that sets the overall framework in which the lower levels will manage their affairs.

The lowest tier, by virtue of what it already is, will only contain fishermen. Other stakeholders—fisherwomen, post-harvest workers, merchants, officials, scientists, etc.—may not be represented. It is from the next tier upwards that these stakeholders can be integrated. Rules of representation, rules governing meetings and decision making need to be evolved through negotiations.

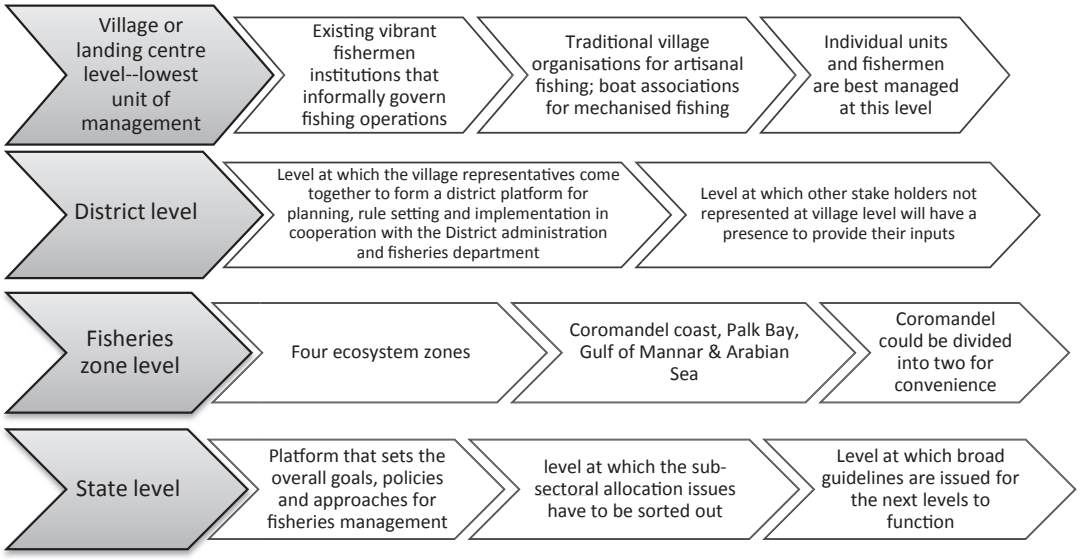
In reality, the four-tier structure proposed may not be neat and straightforward. There are boundary problems that need resolution. Ramnad district straddles both the Palk Bay and the Gulf of Mannar eco-systems with large stretches of coast on both sides. Perhaps, there will be two separate district units, one for the Palk Bay part and the other for the Gulf of Mannar part. Perhaps, they may occasionally come together to resolve some common problems. The Coromandel Coast is too long for convenience and may need to be broken into two (Pulicat to Puducherry and Cuddalore to Point Calimere?). The two units may have to occasionally meet to sort out boundary issues. Kanyakumari district has an 8-10 km stretch on the east coast (Gulf of Mannar). Is this stretch better off in Kanyakumari or should it be part of the Gulf of Mannar set-up? Perhaps, better off as part of Kanyakumari set up as all fishermen come under the same diocese and may find decision making easier. However, they may also need to maintain relationship with the Gulf of Mannar set-up. In some cases, some groups may need representation in two eco-systems in view of their anomalous position.

What about Puducherry and Karaikal? The integration of Puducherry with Karaikal will also require some creativity and flexibility. Both are part of the Coromandel Coast and it may be best if they are part of the grouping that involves the neighbouring districts of TN. In the SIFFS pilot project, the Karaikal fishermen integrated very neatly with the Nagapattinam fishermen as traditionally they are part of the higher level organisation that exists from Chola times. However, a parallel platform for Puducherry fishermen to meet as a part of a separate state (rather, Union Territory) may be useful to sort out issues that specifically relate to the policies and laws of Puducherry.

Another set of arrangements are needed to deal with FMUs that may not be geographical area based or whose area may not coincide with that of the units in the proposed structure. Special groups can be created within this four tier structure to deal with specific fleets (Thoothoor shark boats), gear groups (ring seines), or harvest groups (chank divers) or specific resource groups (small scale lobster fishermen), etc. Some groups may be permanent; others may be time-bound to manage certain parts of the fishery. Task forces that cut across boundaries in the four-tier structure can be set up to resolve specific issues.

Figure 4 gives a tentative view of how the multi-tiered co-management structure may look like. This should be seen as just a direction to start working in rather than as a blue-print.

Figure 4 : Scheme for a multi-tiered co-management system in TN & PC[43]



Phased development of co-management

It will be not be advisable to start co-management state wide, but develop it in phases. It may be easier to start in a few areas first and then expand the programme based on the learning from these areas. The three FMUs studied by FIMSUL could be possible starting points for the co-management programme: Chennai fishing harbour, Palk Bay and small scale lobster fisheries of Kanyakumari. These provide three distinct situations and will provide rich experience so that the next phases can be planned and executed better.

A state level platform is required early on in Phase-I itself as many broad issues need to be thrashed out at state level with all relevant stakeholders for the local initiatives to succeed. It will also ensure that the larger political dimensions of the local work are better handled.

Co-evolution of structure and function

The approach recommended is to start off co-management processes by handling live issues and to start the process of initial rule setting, especially the discussion on limiting entry and capacity. Both the structure and function need to co-evolve.

Law and co-management

As far as the legal issues are concerned, amendments to the MFRA to provide for the possibility of decentralized management through the delegation of certain powers and responsibilities will help. However, there is nothing to prevent the start of a co-management system as long as the DoF is committed to the process and willing to use the powers vested with it to back the decisions coming out of the evolving/emerging co-management structures. The MFRA does need some amendments and this is dealt with later.

To sum up, these are the *recommendations for co-management*

- Co-management is the best way to manage TN & PC fisheries given that the fishing community has its own management traditions and institutions
- Co-management needs to be seen as a process rather than as something to be set up by fiat
- Both the rules and organizational set-up need to evolve through actual practice

43 A more detailed discussion on the co-management structure is available in the FIMSUL report on Fisheries Management Units by the same authors.

- A multi-tiered system has to be developed given the length of the coastline, differences in eco-systems and the different administrative jurisdictions involved. This structure needs flexibility to handle boundary issues and other types of fisheries management units
- Existing traditional and self-organized structures at grass roots level need to be used as "building blocks" for the new structure
- External facilitation will be necessary to start the process and to support it till the system takes root; *setting up of a team of resource persons capable of guiding and supporting the co-management process is a pre-requisite*
- Capacity building and orientation is required at different levels and for different sets of stakeholders
- Co-management should be developed in a phased manner. A start could be made by initiating co-management processes in select areas/fisheries (e.g, FMU case study areas). Simultaneously a state level platform could be initiated.

It must be mentioned that management options discussed below in this report are based on the idea that they will be taken up in a manner that will not violate the spirit of co-management.

3.4 Limiting Entry—the first breakthrough required

This is easily the biggest challenge, as the DoF has no previous experience in this matter and has no role model to emulate in India. Of course, some of the other maritime states have announced "freeze in fleet size" from time to time, but have never exhibited the political will to implement the idea and set up suitable mechanisms. TN has not even made such an announcement so far.

What exactly should be the meaning of "limited entry" in TN & PC? What will it involve?

i. Limited entry could mean that new boats cannot be added to the fleet at will by anyone without a proper scrutiny; it may involve prior permission to build or buy a boat

ii. Similarly, permission will be required to upgrade any vessel or increase its horsepower, change fishing gears or methods

iii. Criteria for ownership of fishing vessels is fixed

iv. Vessel ownership is not automatically guaranteed to anyone matching the eligibility criteria; it will depend on fleet strength for each category that is approved by appropriate authority

It is important to note that setting criteria for vessel ownership is also linked to the issue of "capacity management" that is discussed in the next section on "limiting capacity". These are some of the options for fixing criteria for vessel ownership.

i. Link ownership to families with fishing tradition or history: For instance, all families from the traditional fishing communities (castes) could be eligible to own a fishing vessel. There could also be a ceiling on the number of vessels that a family can own. This could be related to be just one or related to the number of active fishermen in the family. Taking into account that a set of non-traditional communities moved into fishing in the last 30-40 years due to state sponsored mechanization, the same right could be given to families that have been in fishing for at least one generation (25 years). This option will ensure that all those who are currently vessel owners are legitimate, but will ensure that a totally new set of people who are rank outsiders as far as fishing is concerned, cannot enter fishing, which is possible in principle now.

ii. Link ownership to "active fisherman" status: In some countries with limited entry, notably Norway, fishing within territorial waters is limited to "owner-operators" or only active fishermen (those who also participate in fishing activity on board). This tends to put the brake on fleet expansion as successful owners tend to invest in more than one boat. This rule can be modified to accommodate the following categories: (a) fishermen who are over 50 years old having at least 20 years of active fishing and are now unable to retain active fishermen status, provided fishing is the main source of livelihood, and (b) widows of boat owning fishermen who do not have alternative sources of income

These are two options regarding the implementation of the chosen criteria for ownership: (i) Apply it for new investments (new boats) only, or (ii) start applying it to the existing fleet as well.

These are just initial thoughts formulated on the basis of discussions with stakeholders in the FIMSUL workshops on fisheries management. There is need for further debate and discussion. The rules for ownership can be further improved to suit the conditions prevailing.

Should the rules apply to all three categories of vessels: mechanized, motorised and non-motorised? In principle, it should apply to all those who use mechanical means of propulsion and this would include both "mechanised" and "motorised" vessels. The emergence of the ring seine and over capacity in the motorised sector means that it cannot be left to an open access regime. However, the rules and the levels of decision making could be different for both categories, given that motorised vessels are part of the local village community and subject to their control. Also the priority for closing or limiting access should first start at the top: mechanized sector and gradually include the motorised sector. Even within the motorised sector, it is the ring seine sector that warrants special attention.

3.5 Limiting/regulating Capacity and allocating resource

Limiting capacity or regulating capacity is closely linked to the "limited entry" concept and needs to be discussed in tandem, especially when the resource position is already unfavourable. It is also connected to the third idea of "allocating resources", which deals with who should be allowed to catch how much of the overall resource available.

Capacity, or rather Fishing Capacity, is a combination of fleet size (number of boats or fishing units) and unit capacity. When we are talking of overall capacity, deciding on just the number of boats is inadequate without spelling out the size or capacity of each individual boat to catch fish. In addition to the overall capacity of the fleet at TN & PC level, we can talk of capacity at the level of sub-sectors (mechanised, motorised, non-motorised) or craft-gears combinations (trawlers, gill netters, liners, ring seines, etc.) or regions (Palk Bay, etc.).

Measuring and fixing capacity

As discussed earlier in the report, excess capacity is driving the sector into many unhealthy practices and making it difficult to manage. However, measuring fishing capacity and proposing the appropriate capacity is a tricky task. Scientific institutions have provided some numbers in this regard, but without any indication on the assumptions behind them. If one includes the interactions between different fleets, it is obvious that one cannot say how many trawlers should be there without deciding on *allocation of resources* between the trawlers and other fishing fleets, especially where the resources can be caught by other methods. So, one has multiple options when it comes to deciding on the capacity appropriate to any particular fleet. This is a difficult job but may have to be done with help from scientific institutions.

Allocation needs setting objectives

Talking about allocation of resources, one needs some principles on which this has to be done. It is very much dependent on the objectives set for the management regime. Here, it is important to recognize that there are trade-offs between different objectives: employment, profitability and incomes, economic efficiency, equitable distribution of resources, etc. Of course, maintaining resource health or preventing over-fishing is a given objective or a constraint within which all planning and allocation has to take place.

Given the large population dependent on fisheries and the lack of immediate alternatives, *maintaining employment without jeopardizing the resource base could be a possible objective* or criterion for fixing capacity limits, at least in the early stages. As alternatives emerge through improved education levels and other developments in the larger economy, the capacity issue could be reconsidered with a view to improve the incomes of those engaged in fishing. However, at each stage, economic considerations cannot be ignored. Profitability of the fishing enterprise is an essential requirement for any owner to stay in business. If this is not ensured, he will not reinvest and employment will be lost. Or he will start breaking rules to the detriment of the resource and other fishermen.

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44 OECD has worked out principles and guidelines for de-commissioning of vessels. See box item in section on trawl fleet reduction.

45 Under-exploited resources are often a myth and a lot of care is required while identifying them.

Profitability of fishing and incomes of fishermen

Resource rent and overall economic efficiency of the fishery needs careful consideration. In a fishery with a large number of participants like in TN, it could be argued that allowing resource rent dissipation may be justified to maintain employment. While this may work up to a point, it could turn counterproductive after that from the point of view of employment and incomes of those involved.If higher fishing capacity translates into higher operating costs (not including payment to crew), higher maintenance costs and higher fixed costs (interest, depreciation), then the real beneficiaries will be the financiers, fuel companies and input suppliers. So, maintaining a larger than necessary fleet need not benefit fishermen but may actually represent outflow from the sector to others. The treatment of labour costs while assessing economic efficiency is crucial. While share of income to labour represents a cost to owners, this need not be a cost from the societal perspective, especially when maintaining employment levels is important. So, if the resource rent is actually applied to maintain a decent level of income for owners and workers, rather than getting dissipated in fuel costs, it may not be a problem. So, economic efficiency of each sub sector needs to be looked at from point of view of non-labour costs. Unfortunately, such information is scant. This has to be remedied if one has to look at fisheries as an important sector of the economy providing employment and incomes to a large number of people.

Scale subsidiarity and resource allocation

At the moment, there is considerable inequity in the system with capital intensive fishing boats—mainly trawlers—cornering the bulk of the resources, often at the cost of the labour intensive artisanal sector. Given the high priority of maintaining employment levels in fishing as well as ensuring greater equity in the sector, a reduction of the trawl fleet need not lead to loss of employment. Instead, it may actually improve the income levels of a majority who depend on artisanal boats.

A principle worth considering for resource allocation is that of "scale subsidiarity", which means that priority is given to a smaller unit (lower capital) when the same resource can be potentially harvested by either the small unit or a bigger unit (higher capital). So, what the small boats can catch is better left to them to catch. The operations of the larger units are restricted to resources the small units cannot catch. *We reckon that there is scope for restructuring the TN fleet without overall loss of employment.*

Similarly, from an ecological point of view, it may be better to give priority in allocation to passive fishing methods over active fishing methods.

Who sets objectives and principles of allocation?

With all the talk about co-management, it is obvious that objective setting and principles of allocation need to have a broad base of participation. However, given the contentious nature of the exercise, consensus may be difficult to achieve. It is here that the Government has an important role. It has a role to ensure that a vocal minority does not hijack the process or that a brute majority runs rough shod over a minority. After due consideration of the various views, the Government needs to clearly state its position in a clear and transparent manner and put its weight behind the objectives/principles that ensure the benefit to the largest number of people and in consonance with the constitution of India and principles of good governance. It also has the role to find alternatives or provide compensation for those who may lose out in the allocation processes.

Implementing capacity limits

It is one thing to fix capacity limits and make resource allocations, but another thing to implement them. Given that there is rampant over capacity in TN& PC, how is this to be addressed?

The methodology to implement capacity limits, especially those involving actual reduction in fleet size, would depend on time horizons involved—short term, medium term and long term. In turn, the time horizon would depend on how critical the problem is and the risks involved in not acting in time.

i. Short term (1-3 years?) reductions

There are some of options for short term reductions:

- Confiscate boats that do not have proper registration/license; also those operating banned or illegal fishing methods; also those that are in default to banks. Do not allow re-entry of these vessels
- De-commission excess vessels through "buy-back" policies that provide for adequate provision to take care of all those affected, including crew; criteria and process for decommissioning to be carefully worked out[44].
- Redeployment: divert excess capacity into other niches in the fishery where the scope for increasing capacity exists and if such diversion is technically feasible[45]
- Provide alternative employment for those likely to be displaced but cannot get back to fishing
- Live with excess capacity in the short run through effort reduction mechanisms like rotation fishing

It is important to recognize that owner interests and worker interests are largely congruent when fishing, but can be quite divergent when it comes to displacement from existing livelihood and changeover to another. For instance, in some instances, the owner of a trawler is at a disadvantage as he needs to find an alternative investment giving similar return while a skilled trawler-worker[46] can easily shift to the small scale sector as owner or worker, perhaps with some loss of income (not necessarily so) making use of the improved prospects for small scale fishing created by the reduction in trawling. Alternatively, if a trawler owner moves to deep sea fishing, his labour requirements may change and he may have to replace the original work force with more skilled fishermen from (say) Kanyakumari. For migrant labour that comes to fish on trawl vessels from distant places, shift to other unskilled or semi-skilled work elsewhere may be a possibility given the overall labour scarcity situation prevailing in TN for unskilled or semi-skilled work. Alternatively, they may struggle to do so. Thus both *de-commissioning* and *redeployment* of boats require careful planning.

Even within short term options, there are two options to be considered: (i) one shot, and (ii) staggered. The one-shot option is suited where staggering will lead to difficulties in implementation with those remaining in the fishery at each stage of implementation will get improved results and will be reluctant to quit and make further implementation difficult.

ii. Medium term (3-10 years)[47]

This may involve the following types of action:

Stop new boats or gears (as the case may be) entering the fishery and disallow replacements

Stop/withdraw incentives that prop up capacity or even lead to increases in capacity (investment subsidies, operating subsidies like fuel subsidies); allow for natural decline or death of particular fleet

iii. Long term (10-20 years)[48]

This may be relevant only when changes are planned over a generation. Thus increasing education levels in the fishing community is likely to bring down the number of youngsters entering the fishery over the next 10-20 years. For instance, the following measure is likely to bring down fleet levels gradually in the first 10 years and then rapidly after that:

Limit ownership rights to only those from families currently in fishing and ensure that new boats can be introduced only by active fishermen who go on board; fleet size will start declining as more youth get educated and move into

46 This is applicable to trawl centres where fishermen from the traditional caste work on trawlers and may not apply to centres (especially in the Palk Bay) where non-traditional castes work on board.

47 It means that a measure taken today may take 3-10 years to bring desired result.

48 Similarly, a long term measure means a measure taken today will bring desired result in 10-20 years

other occupations.

It is possible that some of the long term measures may also be to gradually improve the incomes from fishing which cannot be done in the short run without having negative effects on employment in fishing and equity within the fishing community. For instance, unit capacity (boat size, hp, gear size, etc.) could be fixed lower at the start of the process of fleet reduction and can be increased when fleet size falls to levels where the resource is no more under threat.

3.6 Trawl fleet reduction

While fishing capacity controls have to evolve, the problem of trawl fisheries cannot wait for a long term solution. It is somewhat urgent and its resolution will provide opportunities to resolve the other problems.

It is acknowledged by all fisheries stakeholders, including many trawl owners themselves, that TN has just too many trawlers that are causing the following problems:

i. Negative impact on resources due to over-fishing and habitat destruction

ii. Negative impact on all other fishing fleets, especially the small scale/artisanal fishermen

iii. Expansion into neighbouring state waters (including Sri Lanka) causing friction with those states and their fishermen

It is important to develop a trawl fleet reduction programme as even a freeze of trawl fleet at the current strength is inadequate to address the problem. These are some of the suggestions in this regard:

i. Formally close new entry into the trawl fishery and stop any fleet expansion and moves to increase unit capacity (size, horsepower, etc.)

ii. With the help of experts, administrators and fishermen representatives, fix appropriate numbers of trawlers that can operate in different parts of the coast

iii. Develop a package to retire the excess trawl fleet with a combination of the following measures:

   a. Redeployment of vessels for other types of fishing including deep sea fishing

   b. Retirement of vessels and substitution by other vessels suitable for fishing in new niches like deep sea fishing

   c. A buy back or boat retirement scheme[49] to retire the rest of the excess fleet that cannot be re-deployed or substituted with suitable package for compensating both owners and workers and need-based support for alternative livelihoods. OECD has developed a useful set of principles and guidelines for de-commissioning based on the experiences worldwide (see box next page)[50].

iv. Since this can be a politically sensitive matter, it requires political will and dialogue with all concerned stakeholders.

49 Svein Jentoft, the well-known Norwegian fisheries social scientist has proposed an alternative to "buy-back" with state funds. He has suggested the exploration of possibilities that may involve purchase of fishing rights by trawlers who remain in the fishery and this money is used to retire other trawlers—some sort of a self-financing scheme. Personal conversation.

50 OECD (2009) Reducing Fishing Capacity: Best Practices for Decommissioning Schemes. ISBN 9789264049116. Paris : OECD

Principles and Guidelines for Decommissioning Schemes

Principles

- Decommissioning schemes provide a useful mechanism for reducing capacity in situations where there is overcapacity. They can be used when urgent action is required to bring fishing capacity in line with available fisheries resources.
- Taking preventative measures to avoid overcapacity from occurring is preferable to using decommissioning schemes to adjust capacity. Fisheries management systems should be appropriately designed to prevent overcapacity and overfishing from occurring, and to ensure that there are appropriate incentives for fishers to automatically adjust fishing capacity and effort.
- The search for a perfect measure or a perfect assessment of capacity should not delay action to address overcapacity, although it is necessary to have an agreed measure of capacity to implement and enforce a cap on or reduction in capacity.
- Decommissioning schemes should be designed to achieve the "best value for money", representing a cost-effective investment of public funds to achieve given capacity reduction objectives. They should be well-targeted and time-limited.
- Decommissioning schemes will not, on their own, address the fundamental problems of overcapacity and overfishing. Decommissioning schemes should be designed as part of a package of adjustment measures towards sustainable and responsible fisheries. Social measures to assist retraining of fishers and community adjustment should be considered as part of fisheries adjustment packages.

Guidelines

Design

- Decommissioning schemes should have well-defined objectives that are clearly articulated and measurable in order to ensure that the reduction targets are achievable and will have a positive impact on resource sustainability and economic profitability.
- It is essential that the full range of management policies in place for the fishery, including the decommissioning scheme, are coherent and mutually supportive.
- Governments should ensure that the management regime in place following the completion of the decommissioning scheme effectively prevents capacity from re-entering the target fishery or other fisheries, otherwise the beneficial effects of decommissioning will be negated over the medium to longer term.
- Governments should ensure that the incentives of fishers are appropriately aligned in order to facilitate autonomous adjustment in the fishery in the future. This can be done by improving the specification and enforcement of access rights (based on either output or input dimensions) which will help to address the market failures that lead to the overcapacity problem.
- Decommissioning schemes should be designed as part of one-off structural adjustment programs in order to avoid becoming incorporated into the expectations of the sector and distorting current and future investment incentives and plans.

3.7 Gear restrictions and other operational controls

The current management system and thought in TN, both among fishermen and officials, tends to give considerable weight to gear controls: especially, ban on "bad" or "destructive" gears. Unfortunately, the success in implementing these regulations has been quite poor and depends on the extent of community support for these measures or rather the strength and determination of that section of the community that is in favour of the ban/regulation. It also depends on the logic of adoption of the gear by the particular user group.

One of the problems with the ban on gears is that the exact reasons of the ban and the objectives of the ban are rarely thought through and recorded, making it difficult to evaluate its utility and success. The standard response or logic tends to overstate the issue of "negative impact on resource". Gear bans often have two major criteria:

i. Negative impact on resources

ii. Negative impact on other fishermen/fleets

It is important to recognize that the negative impact on resources depends not just on the nature of the gear, but also on the actual numbers, specifications (dimensions, mesh size, etc.), where it is used (near shore, off shore, etc.), when it is used and for what species.

The negative impact on other fishermen or fleets (both local and far away) depends on many factors, including the same factors mentioned above: dimensions, where and when it is used and for what species. In addition, it also depends on who is using it. In some instances, the gear in question is being used by the 'big' guys and the negative impact is on the 'small' guys. In other instances, it is being used by one section of the 'small guys' and negatively impacts other 'small guys'. In some instances, it is even possible that the gear is adopted by small guys and negatively impacts the big guys.

All this argues actually for a nuanced control of gears depending on where, when and by who they are used. Unfortunately, such a nuanced use is not possible as long as the governance system cannot actually exercise control over gears once they are in use. It is this inability to control gears that leads to the typical across-the-board ban. Thus gear bans, however inevitable they may be, actually reveal some of the weaknesses in the management system rather than its strengths. In TN, the gear bans have actually not worked. It is the community itself that has worked out various arrangements vis-à-vis banned gears in different parts of the state. The use has been stopped totally in some areas while in others there are seasonal, locational or species restrictions mutually agreed by the conflicting groups. This is not to say that the resolution of the conflicts is satisfactory or even happens in all areas. It shows that many of the nuanced use of gears are more likely to succeed in a co-management regime where the overall policies on gear use are decided at higher levels and specific restrictions are left to local groups.

The oil sardine's emergence as TN's No.1 species by volume is closely linked to the growth of pair trawl and ring seine. It is clear that some kind of clear management plan for harvesting this emerging resource is needed that goes into who should catch this resource and with what gear in each part of TN coast.

3.8 Coherence between "welfare", "development" and "management"

While recognizing that welfare measures not conflicting with management objectives can add to overall welfare of the fishing community, it is important to recognise that *the best guarantee of fishermen welfare is to ensure sustainable fishing based on a healthy fish resource*. To look at welfare, development and management as completely independent processes or lines of action is a dangerous trend that will only lead to unsustainable fishing and contribute to reduce fishermen welfare. It is crucial to integrate welfare and development into a larger framework based on sound fisheries management. Both welfare and development need to be derived from fisheries management objectives.

While some welfare measures that conflict with fisheries management objectives may have to be reduced/eliminated, others may have to be increased and some new ones introduced. *Investing significantly larger funds in the education of children in the fishing community is one of the best measures in the long term to reduce dependency on fishing and to improve the overall well-being of the fishing community.*

3.9 Management Plans as instruments

Though management plans have gained great importance in many countries, India is yet to make use of this instrument. The proposed co-management set up could use management plans as a tool to develop the critical thinking on management and to help take the following decisions on a regular basis: (i) various input controls, (ii) enforcement, (ii) new resources to tap, (iii) new licenses to be issued, (iv) infrastructure creation, etc. Management plans, ideally should be made at all 4 levels of the Co-management structure, but it may not be realistic to expect them to be made at the lowest level—the village or landing centre. Even here, some of the major landing centres like the Chennai fishing harbour will require development of management plans. Management plans, in addition to being done on geographical/spatial basis may also be developed for major species. All this will evolve over time as the participants become more familiar with the process.

"Scientific plans" or "peoples' plans"?

Capacity controls, resource allocation, management plans all seem to indicate the need for a lot of data and scientific inputs. At the moment, it is doubtful whether such detailed and disaggregated data or information is available for proper scientific plans to be developed at local levels. No institutional mechanism exists for such information and inputs to be provided for taking management decisions at different levels. This does not mean that all the above cannot be done. To start with, management decision making will have to be based on the high level (aggregated) statistics available, along with fishermen knowledge and a large dose of common sense.

Management plans to mediate with other laws

Since the management plans are made through a multi-stakeholder process, it provides an opportunity to integrate the Forest Department into it, especially in areas where there are marine protected areas enforced by the Forest Department. The planning process can then provide an appropriate platform for discussing various rules and regulations that the Forest Department proposes or has already in force. This will ensure a democratic process and also ensure that what is agreed upon is enforced by all concerned and not just remain the burden of the Forest Department.

3.10 Enforcement

What is the system of enforcement most suited for TN & PC? At present, all enforcement is shore based, with no enforcement at sea. In many FIMSUL meetings, the issue of developing a sea based system with patrol vessels kept coming up as a demand from fisheries officials and some fishermen. This needs careful thought. Sea based enforcement does not exist in any of the maritime states of India with the exception of Kerala. Even Kerala's track record is not very impressive. Patrol vessels are notoriously difficult to maintain and operate. More often than not, they are under repair and the staff unsuitable for the kind of work that is required. In any case, the only "enforcement" that the Kerala fisheries Department does at sea is the enforcement of the "artisanal fishing zone" that is determined on the basis of depth unlike TN's distance based regime. None of the other regulations like gear restrictions have been enforced at sea.

Kerala banned ring seines, pair trawls and many other gears, way back in 1980. However, if today 70% of the fishermen in the state depend on the ring seine, it raises questions on the efficacy of enforcement. It is worth mentioning that Kerala, whose ring seine fishery started way back in 1987 has not even attempted enforcement of the ring seine ban to the extent that TN has done in fits and bursts in the last five years. Even worse, Matsyafed, the Kerala fishermen coop federation, openly provided loans and subsidies for ring seines, using the excuse that the federation only provided webbing and the fishermen added the rings without permission! Fishermen in north Kerala, including Mahe, a small territory of Puducherry trapped within the Kerala coastline objected to the very first ring seine that came in 1989 with Matsyafed finance. Some villages including Mahe got organised and burnt the first ring seine unit. Subsequently, the fishermen involved were hounded by the state through long drawn out criminal cases. This incident broke the back of the famous traditional fisheries management system of north Kerala called "sea court" or "court of the sea". Very clearly, enforcement is not really about having patrol vessels but about political will. How "political will" in fisheries management is created is one of the mysteries of our time. It appears to depend on complex and messy interactions between politicians, officials and various sections of fishermen. As discussed earlier in the report, fishing regulations mainly work when there is significant community support and what position some of the dominant sections of the community takes.

An interesting exception to the rule of lack of enforcement without pressure/support from below, is the adoption and implementing the 45 - day fishing holiday (for mechanized fishing) every year. This idea did not originate from the state itself and has a chequered history from the time the artisanal fishermen of Kerala made this their demand in 1979-80. It reached Tamil Nadu as the result of a consensus built by the Government of India among the coastal states to implement a fishing ban, with all east coast states having the fishing ban at the same time. While the implementation of this ban was a bit tardy in some of the states and required the Supreme Court's intervention in 2005, TN has been willingly enforcing this ban since 2000.

The high level administrative-political consensus that emerged to implement this "uniform ban" across the entire Indian coast line is a rare instance of "political will" being created at national level and then seeping down to the states in stages and getting implemented as a successful "top-down" policy. "Peer pressure" between states also played a significant role in this entire process. So, the Department of Fisheries worked with the fishermen cajoling and convincing them of the need for a fishing ban. It was helped by the fact that the ban only affected the mechanized fishermen and was welcomed with great enthusiasm by the artisanal fishermen, who are in numerical majority but find to their chagrin that the mechanized sector has often more political clout. So, even in this rare instance of a successful implementation of a top-down regulation, the majority of fishermen were allies.

Thus it is important to recognize that all successful regulations, including those that are partially successful, in that they have been adopted in only parts of the coast, all involve shore-based enforcement (involving an acceptance of the regulation by the fishermen). It is to be noted that with the exception of the LOP vessels[51], all vessels operating off the TN coast are based in TN landing centres. Therefore sea-based enforcement, especially within the territorial waters, has a very limited role, given the current realities. Nevertheless, sea based enforcement can come in handy when it is used as *a back-up to a shore based enforcement* regime at times when a small minority is breaking the rules and the shore based controls do not work. Such a situation demands the use of the coercive power of the state to strengthen the hands of the shore based authority and to avoid a "law and order" problem arising from physical conflict between the fishermen who break rules and fishermen trying to uphold the rules.

Given the high cost of sea-based enforcement, and it's very limited utility, serious consideration needs to be given to the costs and benefits before taking the plunge. An equally serious consideration is to link the issue of enforcement with co-management, if that is agreed to as the future direction that TN & PC fisheries intends to take. Jumping in to set up a sea based enforcement system should not lead to strengthening of the top-down model of management that is an acknowledged failure, not only in India, but in most of the world.

Even under co-management, some form of sea based enforcement may be needed at times to back up the shore-based enforcement system, only after exhaustion of all the shore-based options. Whether this requires the setting up of an elaborate infrastructure (dedicated patrol vessels with full complement of staff on board) is another issue. Simpler options like hiring of vessels and getting help from fishermen associations may be more cost effective. For classes of vessels that require monitoring beyond the scope of any shore-based enforcement system, technological options like "black boxes" or satellite based monitoring could be considered.

There is evidence that even in the current shore based and top-down enforcement model some simple things like lack of adequate budgets are hampering enforcement. One grouse of the officials is that if they seize an offending vessel, they do not even have the small resources needed for protecting the seized vessel.

Perhaps, there is a case for increasing the manpower needed, even in the current shore based enforcement model. However, this needs to done with care as the temptation will be to slip back into the mind-set that believes in top-down management and neglect the development of co-management.

Another problem with the current system of enforcement is the weak punishments in the current MFRA. Based on consultations with fishermen, what sort of punitive action will be fair and also act as a deterrent needs to decided and legislated.

51 These are deep sea vessels (above 20 m length) licensed to fish beyond 50 nautical miles or 100 m depth (whichever it farther from the shore) under a controversial "Letter of Permit" (LoP) scheme. They are large industrial vessels from Taiwan or Thailand fishing under the Indian flag as a local company has an agreement to buy majority share in this vessel over a five year period. 79 LoPs have been issued so far.

3.11 Legal framework: Revisiting the MFRA, aligning with other laws

The MFRA needs an overhaul, but not necessarily in the direction currently proposed by the department[52]. The department's proposals are still based on the top-down and centralised model of management. While it may plug some of the current loopholes and strengthen the hands of the officials to enforce rules and regulations, these proposals are unlikely to address the fundamental problems that plague fisheries management that have been discussed in the report.

Amendments to the MFRA (or, if needed, a totally new version of the MFRA) should contain some of the following:

i. It should be clearly drafted as an "enabling act" that gives the Government the power to make rules and regulations without going back to the Assembly

ii. It should have a preamble or a section that clearly sets the objectives and principles so that the executive has a clear guide for the actions taken under the Act.

iii. It provides for delegation of authority to lower levels so that all regulations do not have to be applicable across the state. While certain regulations have to be common across the state, TN fisheries in reality works on considerable decentralized arrangements based on local compromises that it is better to provide for this under law. Currently, many of the successful arrangements including the famous 3 day-4 day rule in the Palk Bay are all made outside the framework of the MFRA.

iv. All management measures, whether they are gear regulations, timing regulations, etc., should not be part of the Act, but be part of the regulations that are made by the Executive from time to time based on the evolution of the fisheries and its changing needs.

v. A clear provision is there for co-management and the option of delegating powers to various levels of co-management authorities. The co-management provisions should not be very prescriptive or restrictive and provide adequate scope for evolution. A set of criteria could be drawn up to help the Director of Fisheries to decide on when a co-management system is ready to take up formal responsibilities and powers could be given to it.

vi. The idea of "management plans" could also be introduced so that the various authorities and levels of management do so based on a clear and transparent plan of action.

vii. Punishment meted out under MFRA for violations need to be reviewed and strengthened in a manner that it is fair and also acts as a deterrent.

viii. Find mechanisms in the MFRA that address the issue of multiple laws and authorities that have power to regulate fishing at the moment.

The last point is an important one but a tricky one. The MFRA, at the moment is superseded by other central laws like the Wild Life Protection Act, The Forest Conservation Act, the MPEDA Act, Merchant Shipping Act, etc., all of which can be used in a manner that can be inimical to state policies on fisheries and fishing livelihoods. While the state may have no constitutional powers to change any of the central acts, there is a need to find some legal instrument to protect the interests of the State and its fishermen. Good legal opinion is needed on how this can be done. These are some ideas to work on:

i. Can there be a provision that the application of all other laws on fisheries require a prior consultation with the fisheries departments of TN (or Puducherry, as the case may be)?

ii. Can there be an insistence that all regulations arising from other laws should be incorporated in the fisheries "management plans" of the state?

52 The Department has proposed a number of amendments to the MFRA and these are pending for the last few years due to tedious process of putting up a Bill for amending the law and the lack of continuity at the top (frequent changes of Director/Commissioner).

iii. A provision that says that all regulations (including those brought under the MFRA) on fishing require that there is a public hearing and fishermen likely to be affected are fully aware of the proposal and are given an opportunity to give their views.

The last idea could also be incorporated in a new law that the state could bring to "protect fishing community interests", somewhat on the lines of the "forest dwellers rights" that the Central Government has brought in.

3.12 Resolving the trans-border fishing issue

The problems resulting from trans-border fishing by TN fishermen in the Palk Bay and Nagapattinam coast need a fisheries management approach in addition to the on-going diplomatic and political dialogues. These are some of the principles that could be the basis of a long term solution

i. To recognise that trans-border fishing, is inevitable given the space limitations for fishermen on both sides of the Palk Bay

ii. However, such trans-border fishing cannot go on in an unregulated manner that is harmful to the resource base or fishermen or sections of fishermen on either coasts

iii. Trans-border fishing needs to be regulated in a manner that sustainable fishing opportunities are equitable to both Indian and Sri Lankan fishermen

These are some broad strategies to resolve the issue on the above principles

i. For resolving the fisheries issue, focus on the issue of fishing rights originally indicated in the 1974 agreement rather than on the border itself as the alignment of the border is of marginal relevance to the fishing issue today[53]

ii. Restructure the TN fleet (involving a reduction of trawlers) in the Palk Bay and Nagapattinam to reduce the pressure on Sri Lankan resources and promote harmonious co-existence of Indian and Sri Lankan fleets in the Palk Bay

iii. Cooperation between India and Sri Lanka to help faster rehabilitation of war affected Sri Lankan fishermen in the Palk Bay and help them reclaim the fish resources they had been using before start of the war; provide the SL fishermen with the opportunity to fish in Indian waters to the extent that involves reciprocity and within the limits of sustainability

iv. To eventually reach an agreement with Sri Lanka on an equitable and sustainably use of the Palk Bay fish resources and to set up appropriate mechanisms for cooperation in management

These are some specific management measures to ensure harmonious fishing by fishermen from both countries

i. To strengthen the on-going dialogue between fishermen associations on both sides that was initiated by civil society and now is being carried forward by both national Governments

ii. Stop trawling by TN vessels on the Sri Lankan side of the Palk Bay recognizing that it is trawling in its various manifestations that actually affect the Sri Lankan fishermen the most and trawling is a banned fishing method in Sri Lanka

iii. To start the trawl fleet reduction programme first in the Palk Bay area using the methodology discussed earlier

iv. To negotiate a time-bound interim regime of regulated trawl fishing till the trawl fleet reduction package can be developed and implemented.

v. To stop use of monofilament nets banned by SL; consider the feasibility of stopping or phasing these out on the Indian side as well

53 The actual border issue and the status of Katchativu Island are geo-political issues beyond the scope of this report. This recommendation is purely from a fisheries point of view.

vi. To participate in the rehabilitation of Sri Lankan fishery that was destroyed by the long war; support the Sri Lankan Government for the evolution of deep sea fishing in the northern province, as it has virtually no deep sea fleet when compared with the rest of Sri Lanka.

vii. Work with GoI on the possibility of providing licenses for deep sea fishing to Sri Lankan multi-day boats as well as joint ventures between TN and SL fishermen in deep sea fishing, giving such vessels the opportunity to fish in the EEZ's of both countries.

3.13 The timing and scope of the "closed season"

The following issues came up in FIMSUL consultations with respect to the 45-day ban on mechanized fishing boats from 15 April to 30th May.

i. The appropriateness of the ban period as most fishermen felt that it should be shifted to the north east monsoon period in Oct-Nov.

ii. The peculiar problem of the ChinnaMuttom harbour in Kanyakumari, which is subject to the west coast ban and is able to use its location close to the southern tip of the TN coast, to fish on the east coast during the east coast ban.

iii. The mechanized boat fishermen and some of the artisanal fishermen felt that the ban should include artisanal fishing (especially motorised boats) if it should really help in resource conservation

iv. Sections of the mechanized fishermen suggest an increase in the ban period to 90 days with a second 45-day ban during Oct-Nov in addition to the existing ban in Apr-May.

It is important to note that the fishing ban, despite its high level of acceptance, is only a limited instrument whose effectiveness is blunted by the lack of entry and capacity controls. The mechanized boats get back to fishing with a vengeance after the ban period and make up for lost time. Even in terms of resource conservation, it is useful mainly for the short lived species like shrimp and cannot help regeneration of many of the finfish species that are longer lived. A closed season needs to be part of a larger package of management measures rather than over-used as virtually the sole management measure. These are some suggestions with regard to the issues raised.

As far as the ban period is concerned, it has been mainly derived from the lay-off period for mechanized boats in Visakhapatnam that Andhra Pradesh converted into a closed season and then subsequently became the dates for the east coast ban that included TN. Most experts and stakeholders believe that the ban period is not the best suited for TN and there is considerable logic for the alternative dates of Oct-Nov. However, it may not be possible for TN to take a unilateral decision in this regard. It has the potential to upset the arrangements in Andhra fisheries. An expert committee of the GoI has already gone into the issues related to the ban period but is yet to submit its report.

The issue of including all artisanal craft (especially motorised boats) in the ban is a tricky one and may cause hardships even if some compensation is provided. It must not be forgotten that the closed season concept emerged not just to conserve resource but also to as a "re-distributive" measure bring some equity in the system and provide the artisanal sector with an opportunity to fish freely without the unfair competition from mechanized boats. However, some of the developments in the artisanal sector like the large ring seines needs addressing.

These are some recommendations with regard to the closed season:

i. To wait for the expert committee report on the ban and take up a call on the issue of deciding the most appropriate ban period

ii. To consider the option of bringing the Gulf of Mannar in the ambit of the west coast ban rather than the east coast ban as the GoM is more closely linked to west coast fisheries than east coast fisheries; the administrative aspects are also more convenient

iii. To talk to mechanized boat associations and consider the option of the second ban at a fishery zone (or eco-system) level. Thus if the Palk Bay or Gulf of Mannar or Coromandel Coast fishermen agree to a second ban, this could be a local management measure supplementing the existing state level ban

iv. Not to take any decision on the issue of including artisanal fishermen in the ban but to wait for the co-management system to evolve a comprehensive management package that could include some controls on artisanal fishing (some areas, some gears, some species, etc.) rather than a total ban.

3.14 Information systems for fisheries management

These are some of the gaps in information required for fisheries management:

- Weak information on the economics of fisheries—profitability, returns to owners, labour
- Weak information on value of catch, prices and price spreads
- Lack of "standardized" effort data. Current effort data cannot be used to compare figures over a time period in view of changes in scale of fishing for each fleet
- Identification of individual stocks, location specific estimates of potential yield of specific species/stocks (perhaps this information is available to some extent in research institutes but not available in the public domain)
- The catch collection data is difficult to interpret without additional information on where the catch actually comes from
- Timely information on the changes in fisheries taking place across the coast that upset all previous assumptions
- Very little documentation and monitoring of social aspects: changes in community, institutions, etc.

These gaps are compounded by the difficulties with existing data collection systems:

- Duplication of catch data collection by CMFRI and State Fisheries Department
- While State Fisheries Data is accessible, it is plagued by serious defects in data collection and analysis
- Lack of expertise and human resources for managing fisheries information system in the DoF
- CMFRI data is available at levels of aggregation that provide an useful idea at state level, but is not accessible as disaggregated information that can be used to understand what is happening at lower levels (districts, major landing centres, etc.) or at the level of different gears or fleets (though such information is available with CMFRI) or stocks
- Weak analysis and interpretation of currently available data
- Lack of budgetary allocation for information collection and monitoring
- Lack of dialogue between scientists, administrators and fishermen on state of fisheries.

These are FIMSUL suggestions with regard to fisheries information systems:

- Strengthen fisheries information collection in the Fisheries Department by creating autonomous unit that has enough expertise to grapple with the job on hand.
- In addition to regular staff for the information division in the DoF, external expertise could be tapped through a combination of following mechanisms:
  - ✧ employment of part time consultants chosen from retired fisheries scientists, statisticians, economists and sociologists,
  - ✧ tie-ups with research and academic institutions including the Tuticorin fisheries college, marine biology department of Annamalai University, leading social science departments from universities, etc.
- Recognise the comparative advantage that CMFRI has in collecting catch data. Get into an agreement with CMFRI to increase its sample size for catch estimation and commission it to collect and provide the information to TN in a timely manner.
- DoF acquires and strengthens its capacity to use and interpret data.

- Provide information to fishermen and other stakeholders, make sure that all relevant information is available in Tamil; organize regular meetings and workshops to discuss the information collected and to help stakeholders understand the implications of these.
- Strengthen the link between scientists, administrators and fishermen.
- Provide adequate budget to do all of the above.

3.15 Management advisory group

The kind of data, information and knowledge (from both natural science and social science) that is needed for sound management may have to be come from research and academic institutions that are already working on these subjects and those who may have to be motivated to take up these. However, in-house capacity is required in the DoF for mediating with these institutions, making independent analysis and to provide continuing support to the co-management system. A team of resource persons/experts with good understanding of the natural system, economics and social system need to be roped in for this purpose.

3.16 Deep sea fishing

A lot of hopes are pinned on the promotion of deep sea fishing, both from the point of view of enhancing the fish catches of the state and from the point of resolving the problem of overcapacity in coastal waters. These are some important considerations to be kept in mind while planning and implementing this laudable scheme:

i. The resources in the deep sea, though under-exploited, are not that large that the entire over-capacity in coastal water can be transferred to the deep sea.

ii. Deep sea fishing, or at least fishing beyond the shelf for oceanic resources like sharks, tunas and bill fishes, have already started in TN at the fishermen's own initiative. The Kanyakumari fishermen of the Thoothoor region already have 500 vessels that fish all over the west coast of India. Chennai has already a 100-150 strong fleet of gillnetters that fish regularly for oceanic tunas. Puducherry has a dozen long liners owned by local fishermen but bought from Thoothoor and employing Thoothoor fishermen.

iii. Though exploitation by local fleets of the oceanic resources is low, it is important to recognise that these resources are common to the Indian Ocean as a whole and are being exploited by 30 countries and the Indian Ocean Tuna Commission believes that the scope for increased expansion is low or non-extant.

iv. Other states in India are also planning the promotion of deep sea fishing and competition for deep sea resources between fleets of different state is likely to emerge shortly

v. Even though fishing beyond 12 nautical miles by Indian vessels is not regulated by the GoI at the moment, as and when that happens, the plans of for development of a large deep sea fleet could hit a ceiling.

vi. A matter of concern is the experience of the Thoothoor fleet on the west coast. Having gone after yellow fin tuna consistently for 3-4 years in the middle of the last decade, it starting reporting declining catches of Yellow fish tuna. Seafood exporters like Moon Exports who set up specialised operations to handle yellow fin processing in Cochin, have shut shop.

vii. So, planning for deep sea fishing needs to be cautious with a gradual build-up of fleet to avoid over-capitalisation that is affecting every sub-sector of the fishery. Effective control of numbers is necessary right from the beginning to avoid the fate of the coastal fishery.

viii. Choice of technology is crucial. The experiences of the Thoothoor fishermen in India, the multi-day boat fishermen of Sri Lanka and the small tuna boats in the Philippines indicate that large industrial scale fishing vessels are not needed for fishing in oceanic waters. Relatively simple technology, when combined with good fishing skills, can provide results. This will also ensure that more fishermen benefit from deep sea fishing and outside investors are not required to be wooed as has been the policy of the GoI.

ix. The Government of India's current scheme of providing Letters of Permit (LOP) to large industrial scale vessels brought from abroad by Indian companies is also detrimental to the local fleet that is already in the deep sea. It is high time this scheme is withdrawn and the larger industrial vessels stopped. The TN Government should take up this issue with the Ministry of Agriculture in Delhi.

x. Deep sea fishing has many challenges including the need to fish far and wide beyond the seas off the TN coast, perhaps even beyond the EEZ.

xi. Deep sea fishing needs specific skills and aptitudes and it cannot be expected as a natural option for those fishermen who are part of an over-capitalised fleet. It is worth mentioning that wherever deep sea fishing has started in TN & PC, there is a heavy demand for fishermen from Kanyakumari to work on board as they are still, for all practical purposes, the only deep sea fishing group in India. There could actually be a skilled labour constraint for deep sea fishing.

xii. More than deep sea fishing skills, lack of post-harvest handling and marketing arrangements may actually be a bigger constraint on development of deep sea fishing.

To conclude, policy makers need to recognise that deep sea fishing offers only a limited option for reducing the over-capacity in coastal waters. Equally important to recognise is that coastal over capacity cannot be tackled by merely providing options for deep sea fishing but will require steps to ensure that the coastal fishery, operating currently under open access policies, is properly managed.

3.17 Resource enhancement, Mariculture

Along with deep sea fishing, resource enhancement through artificial reefs and sea ranching, and mariculture are prescribed as important measures to reduce the pressure on coastal fisheries and to move fishermen from hunting to culture. Both these ideas have a number of merits. However, it is important to recognise that they cannot be considered a panacea for all our problems and have to be applied after taking into account, technical, ecological, economic and social parameters. It is in the absence of such holistic understanding that some of the problems we are facing have emerged in the past. Introduction of trawling, various fishing technologies and shrimp aquaculture without putting in a framework to handle the potential negative impacts, are some examples of this.

Equally important to recognise is that mere utilization of resource enhancement measures and adoption of mariculture will not resolve the problem of over-capacity in coastal fisheries. It is worth re-emphasising the need for effective controls on fleet size and capacity along with providing alternatives. Even with adequate alternatives, if not implemented along with closing the door for further entry or capacity enhancement, there is no guarantee that the problem of over-capacity in coastal waters will reduce. There are enough actors to invest and enough labour available to re-occupy the niche vacated by those who have moved on to alternatives offered.

3.18 A high level mechanism to protect fish resources and fishing communities from the negative externalities of other sectors

There is a growing realisation that problems related to fish resource decline or depletion are not merely caused by over fishing but also by the negative externalities imposed on the coast and sea by other sectors. The post liberalization era has seen rapid economic growth and this has in turn led to major investments on the coast by various sectors, notably industries, thermal power, nuclear energy, tourism, real estate, etc. The problems from other sectors come from the following limitations in the existing set up:

i. inadequate consideration of fishing interests in project design and sanction

ii. poor monitoring and enforcement mechanisms

An important reason for the above limitations is that fishing interests are not well represented in the decision making processes when sanctions are given. Neither are fishing interests well represented in the governance of bodies responsible for monitoring and enforcement, like the State Pollution Control Board.

The CRZ 2011, despite many flaws, is one of the crucial instruments for protecting fishing interests on the coast and at sea (within 12 nautical miles). A proper implementation of the CRZ in both letter and spirit by the State Government can go a long way in protecting fishing interests on the coast and sea.

These are some specific recommendations in this regard:

i. Set up a high level mechanism under the Chief Secretary to bring together all relevant departments (Fisheries, Environment, Industries, Tourism, PWD, Power, etc.) to regularly review inter-sectoral or inter-departmental issues that have a bearing on fisheries and fishing communities

ii. To specifically mandate the fisheries department to play a role in protecting fishing interests from the negative externalities on the coast. This will enable the fisheries department officials to play a much more proactive role in collecting information and monitoring the activities that can negatively impact fisheries. This will also provide the high level mechanism mentioned above with clear information and feedback

iii. Ensure that all authorities responsible for sanctioning projects on the coast have adequate representation of fisheries scientists, fisheries administrators and fishing communities

iv. In particular, to ensure that the State Coastal Zone Management Authority (SCZMA) is represented by at least 3 persons representing fishing interests including fishing community representation. Even though it is the MoEF that officially constitutes the SCZMA, the state has enough influence on the composition of the Authority. The actual representatives should be nominated on the basis of merit and ensure sound representation of fishing interests

v. To urgently implement the 2011 provision that district committees under the CRZ notification are established with at least three representatives from traditional coastal communities, especially fishermen

vi. The State should also play a proactive role in influencing Government of India policies that can potentially have a negative impact on the coast. The high level mechanism can be useful in identifying such policies and develop suitable strategies to deal with them.

3.19 Marketing and Credit

A major grouse that fishermen, both mechanized and artisanal, across the coast have is that they do not get the "correct" price as the trade is completely under the control of middlemen and fishermen have very little say in the market place. The complaint is even more vocal in the mechanized sector where prawn prices have gone down in the last decade while input costs have been constantly increasing. They allege that the limited number of export companies that come to buy prawns and other exportable species form a cartel and purchase prices are deliberately kept low. The lack of proper infrastructure and maintenance in fishing harbours also contributes to the lack of bargaining strength of the fishermen.

There is often a strong demand for state intervention in fish marketing. The suggestions, influenced by Government role in agricultural commodities, include Government takeover of trade, fixing of "floor price", setting up of a cold chain, etc.

It is interesting to note that there is already a significant intervention in fish marketing in the State. There are 120 fish marketing societies under the SIFFS umbrella in the State that have been successfully marketing fish of around 8500 artisanal boats to the tune of Rs.90 crores in 2010-11. 30,000-35,000 artisanal fishermen and their families are beneficiaries of this system. These societies have a strong presence in the three southern districts and Nagapattinam and limited presence in Villupuram, Cuddalore, Thiruvallur, Puducherry and Karaikal districts. There are also another 10-20 societies operating on the same model with the support of other NGOs, notably the TMSSS. The importance of this intervention is that it also integrates credit and other financial services like savings and insurance through tie ups with banks and insurance companies. It is also worth mentioning that these societies are entirely self-governed and run on the revenues generated from fish marketing commissions and even pay the members an annual bonus from profits.

Though the local fisheries officials are aware of the impact of this network, it has not caught the attention of those at the helm and the policy makers. Interestingly, the IFAD post tsunami project (still under operation), implemented by the Department of Rural Development, Government of TN, is funding SIFFS to expand the network to new areas and to set up supporting marketing infrastructure.

The lesson from this is that there is ample scope for fishermen to organize themselves into strong autonomous co-op organizations and manage their own marketing and credit. Government support will certainly help if it is provided without compromising the autonomy and self sufficiency of these co-ops. The fate of fishermen cooperative societies organized by the Fisheries Department is testimony to the fact that paternalistic interventions by Government can smother all local initiative and create hollow shells with no real content or spirit.

3.20 Greater integration between marine and backwater fisheries

In view of the strong inter-connections between the marine and backwater/estuarine fisheries, it may be advisable to bring the two sectors closer in administrative and management terms. It may be useful to carve out the backwater/estuarine fisheries separately from the larger salad bowl of inland fisheries. Recognising that it has much more in common with the marine sector than the fresh water fisheries (riverine, tank, reservoir, etc.), it should have closer administrative links with the marine fisheries division of the DoF. This should however be done without undermining the autonomy that backwater/estuarine fisheries requires in view of its unique characteristics. For the Pulicat Lake, a distinctive administrative mechanism on the lines of the successful Chilika Development Authority in Orissa needs to be given serious consideration.

Chapter 4 : A Summary of Findings and Recommendations

4.1 Findings

- A long term analysis of TN fisheries indicates that there has been a continuous growth in fish landings with a five-fold increase over a 55 year period along with a three-fold increase in active fishermen.
- This is the result of continuous expansion of the fishing operations to deeper and distant waters and the continuous discovery of new grounds and resources. The entire shelf area off the TN coast is now covered by the TN fishing fleet, both mechanised and motorised. It is unlikely that there is any scope for additional catches in the shelf area.
- In addition to fully exploiting its shelf area, sections of the TN fleet depend heavily on fishing in neighbouring waters. Over 20% of the catch comes from Andhra and Sri Lankan waters.
- TN is already a pioneer in deep sea fishing when it is strictly defined as fishing beyond the shelf. The Thoothoor fishermen with a fleet of 500 liners cum gillnetters have a monopoly all over the west coast of India but most landings (guesstimate of 20,000-30,000 tonnes) are in Cochin. Chennai gillnetters and a tiny fleet of long liners in Puducherry have already started fishing beyond the shelf on the east coast.
- Thus TN fisheries has developed well beyond the confines of its own geographical area and is dependent on fishing in the coastal waters of neighbouring states as well as fishing in the deep beyond state jurisdictions. This explains the paradox of TN fish landings touching a new peak of 5.33 lakh tonnes in 2009 when the CMFRI resource estimates of TN are only in the range of 4.0-4.25 lakh tonnes.
- A long term analysis of fish landings of TN show that landings grew continuously till 1997, fell sharply in the period 1998-2004 and then saw a sharp increase during the period 2005-09 hitting the new peak of 5.33 lakh tonnes. However this increase is not as welcome as it sounds. There are major structural changes in TN fisheries with the emergence of the low value oil sardine as the No.1 species contributing over 20% of the catches.
- Oil sardine catches in the coastal waters and new catches from deeper waters mask the decline of many coastal fish resources and this has led to the near-total elimination of the non-motorised fishing with the artisanal fishermen compelled to motorise in order to go deeper for fish.
- There is every reason to believe that fish catch levels are being maintained only by continuous increases in investment and operating costs leading to over capitalization of the fishery.
- Lack of entry barriers and capacity controls has meant that intense competition between sub sectors and between units in each sub-sector is leading to continuous investments to increase scale and shift towards more efficient gears.
- This has also led to unfavourable distribution of the fish catch between sub-sectors. The mechanized sector with just 22% of the workforce has increased its share from less than 50% a decade back to over 67% in 2010. Inter-sectoral conflicts and adoption of banned gears by both mechanized and motorised boats are considerable.
- The system for management is fragmented with the Department of Fisheries having only a limited control over what happens at sea. The MFRA implementation is only partial and varied and depends mostly on the cooperation of the fishing community. The MFRA is based on the typical top-down system of management that ignores that the marine fishing communities are self-governing in nature and their self-governing systems are still in place.
- The fishing communities' own systems of management are still very much in place, only there is weak coherence between the decisions taken by different villages and different groups reducing the efficacy of these systems. With both DoF and fishermen associations having their own sources of power and often both pulling in different directions, neither has adequate control on fishing.

- All sections of the fishermen are feeling the heat of over-capacity and cut-throat competition and are showing interest in finding radical solutions to the fishery problems. The restriction on fleet size and unit capacity put by the Chennai mechanized boat owners associations is just one indication of this. The demand for a "buy-back" programme by trawl owners in the Palk Bay is another. However, the administration is unable to use this opportunity as it is locked into an unhealthy relationship with the fishing community based on a number of "welfare schemes" that make the relationship one of patron-client rather than partners in management.
- Threats to the coastal and marine eco-system from non-fishery activities are on the increase and these are threatening to overtake over-fishing as the major cause for fish depletion, especially in near shore waters. The fisheries sector is weak in protecting its interests *vis-à-vis* other sectors and this is leading to considerable distress and unrest in many parts of the coast.

4.2 Recommendations

- TN needs to recognise that its approach of unregulated growth of fishing capacity and weak management cannot continue any further. This requires a fundamental shift in approach and this can come only with the support of the fishing community itself. This also requires the development of a system of "co-management" that works on the basis of partnership between the fishing community and DoF with the community institutions playing a major role in fisheries management.
- To use the village level traditional institutions as well as the self-organized boat associations as building blocks for a new multi-tiered system to manage fisheries in the state. Eventually, a four tiered system with village or landing centre-based institutions at the base could emerge. Starting with some of the FIMSUL initiated platforms in the Chennai fishing harbour, Palk Bay and Lobster fishermen of Kanyakumari, co-management can be developed in phases. A state level platform could also be set up in the initial phase.
- The structure has to evolve rather than be "set up" and the transfer of power take place in a gradual and orderly manner on the basis of demonstrated abilities to manage fisheries. The successful development of co-management also requires a large awareness and capacity building programme for the fishing community and a proper orientation for the DoF staff.
- An early shift from "open access" to "limited access" is recommended. The key to this would be to restrict the right to own fishing vessels. One option would be to restrict ownership to families who have been in fishing for at least one generation (25 years). Another option is to restrict ownership to owner-operators or active fishermen.
- Capacity controls have to be urgently introduced for the mechanised fleet while capacity controls for the artisanal fleet can evolve on need basis over a period of time. Freezing trawl fleet capacity and a strategy to reduce it is extremely important for the health of the resources and for the equitable distribution of fishing opportunities among the members of large fishing community. Such capacity reduction programmes can be designed in a manner that is not labour displacing. Recognising the pitfalls in such capacity reduction programmes, various safeguards are recommended.
- Trawl fleet reduction could be first started on a war footing in the Palk Bay, where the resolution of trans-border fishing will be difficult with a large trawl fleet on the TN side. A combination of fleet retirement and redeployment needs to be worked out urgently. Given that redeployment may be feasible only for a section of the fleet, a "buy-back" scheme aiming at fleet retirement or decommissioning needs urgent consideration. A full-fledged package for the Palk Bay that covers owners and workers needs to be developed through a combination of expert inputs and community dialogue.
- Some of the important gear controls like the ban on pair trawls and ring seines need to be implemented by building community support for them and to show firmness in enforcement.
- To develop the concept of "management plans"—both at geographical/spatial levels and resource levels—as instruments under the co-management system to ensure detailed planning at different levels of the fishery. Management plans can also be used to ensure that the current lack of coherence between fisheries and other departments like Environment and Forests can be addressed systematically.

- With deep sea fishing on the entire west coast of India a monopoly of Kanyakumari fishermen, deep sea fishing in the Bay of Bengal offers a good opportunity for the north coastal districts. Here with the TN & P fishermen already having ventured beyond the shelf, it is likely that in the next few years TN fishermen will also dominate the deep sea fishing on the east coast.
- While deep sea fishing has good potential for TN fishermen, some caution is required while developing it. Since the deep sea resources like sharks, tunas and bill fishes are international resources in the Indian Ocean targeted by 30 countries and the IOTC having already declared the Tuna resources optimally fished, there are obvious limits to the size of fleet that can be sustained. All Indian states also have ambitious plans for developing their own deep sea fleet. Poaching by foreign vessels and the operation of industrial scale vessels under the LOP scheme also limit what is available for a new fleet. Skill, aptitude and willingness to stay at sea for weeks together make deep sea fishing suitable only for those fishermen who possess all these attributes. Given that the Thoothoor fleet of 500 boats, which has the entire west coast of India for its arena, seems to have hit a ceiling, it may be not be safe to assume that a larger fleet can be sustained on the east coast of India. Deep sea fishing needs careful development and should not be seen as an easy solution to the problems of over-capacity in coastal waters. TN also needs to lobby in Delhi for the scrapping of the LoP scheme to protect local interests.
- To develop various mechanisms to protect fishing interests in the ongoing competition for coastal and marine space and resources with other sectors. These could include a high level mechanism under the Chief Secretary that monitors and reviews all activities and projects that affect fishing. Ensuring a proper representation for the fishing community and other fisheries stakeholders in various decision making bodies, notably the SCZMA, State Pollution Control Board, etc., will go a long way in protecting fishing and fishing communities.

FIMSUL : FISHERIES MANAGEMENT FOR SUSTAINABLE LIVELIHOODS

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