

Identification and Characterisation of Fisheries Management Units



Government of Tamil Nadu



Government of Puducherry



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

Work-Package 5

Fisheries Management Systems

**IDENTIFICATION AND CHARACTERISATION OF
FISHERIES MANAGEMENT UNITS**

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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. As part of the work package a detailed review on the concept of Fisheries Management Unit approach suitable for Tamil Nadu and Puducherry was taken up. This is the discussion paper that had emerged out of the review. This is followed up by three case studies in Chennai Harbour, Palk Bay area and with Kanyakumari lobster fishers which will be available on the FIMSUL website. The authors, Mr. V. Vivekanandan and Dr. H.M. Kasim are thanked for this 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

This is a discussion paper on the identification of Fisheries Management Units (FMU) in Tamil Nadu and Puducherry. The choice of fisheries management units or FMUs depends on many factors like fisheries resource configuration, structure of the fisheries, availability of information, institutional aspects and the scale or level at which one can make a significant contribution to the management goals and objectives. Six possible FMU were identified based on various groupings such as fish resources, gear based, fleet based, geographical, harvesters and subsectors, and combinations of these as the seventh FMU. The prospects of each type of FMU in the TN & P context are discussed in detail in this paper.

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IDENTIFICATION OF FISHERIES MANAGEMENT UNITS IN TAMIL NADU & PUDUCHERRY

Introduction : Fisheries Management Units

From a practical point of view, fisheries management requires the choice of the unit or units of management. Choice of fisheries management units or FMUs depends on many factors like fisheries resource configuration, structure of the fisheries, availability of information, institutional aspects and the scale or level at which one can make a significant contribution to the management goals and objectives. In many of the developed countries, especially those in the temperate zone, important individual species or their stocks are often used as FMUs. In some of the South East Asian countries, with the small bays and localised coastal resources, compact geographical units (e.g. cluster of village surrounding a bay) is treated as a FMU. There are very many possibilities for choice of FMUs and here we discuss the options available for TN & P fisheries.

Following are possible fisheries management units in TN & P :

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
7. Combinations of the above

We discuss below the prospects of each type of FMU in the TN & P context.

1. FMU Based on Specific Fish Resources / Species

The following are the top 10 species of TN&P on the basis of average value for the five year period 2005-09. The difficulties to be faced if any of them are selected as FMU is also commented upon.

Rank	Resource/Species	Comment
1	Peneaid Prawns	Made up of a number of single species; lack of information at the level of stocks of individual species; will require management over long coast lines of multiple fleets if chosen as FMU
2	Oil Sardine	Single species; uncertainty about stocks; fishery exists over most of TN coast and is probably either All-India in character or at least common for the entire east coast of India (TN, AP & Orissa); Caught by a wide range of fleets: mechanised boats adopting ring seines or pair trawls, motorised artisanal boats teaming up to use ring seines and small boats using gillnets; species seems to be expanding its area all over the Indian coast due to increases in sea surface temperature; a resource more affected by environmental parameters than fishing effort
3	Silverbellies	More than one species; harvested all along TN coast, though more concentrated in Gulf of Mannar and Palk Bay (need district wise data to substantiate this); Mostly by-catch of shrimp trawling
4	Other sardines	Made up of many species; lack of information on individual species and their spread; targeted catch by gillnets on motorised and non-motorised artisanal fisheries, but also caught as by-catch of mechanised boats
5	Other carangids	Wide range of species included; caught all over TN; caught by both mechanised and motorised fleets
6	Pig faced breams (Vilameen)	Also not a single species; also caught by both mechanised and artisanal fleets with higher proportion in artisanal fleet.
7	<i>S. commersoni</i> (King Seer)	Single species; appears to be available all over the Indian coast; stock details of TN catches not known; mostly caught by drift gillnets and lines on both mechanised and motorised units
8	Indian Mackerel	Single species; All India availability; stock boundaries and other stock details not available
9	Crabs	Multiple species; swimming crabs and mud-crabs most important; separate species level data not available; caught in a wide variety of gears
10	Barracudas	Also multiple species; caught all over TN coast by both mechanised and artisanal boats; stock level information not available

These are some of the challenges in adopting the fisheries of specific resources/species in the Indian/TN context:

- As can be seen in the table above, catch data is often not available at individual species levels and where catches are available at individual species level, information on stocks is absent.
- Most species seem to be common to the entire coast and caught/landed in a dispersed manner that adopting individual species or specie-groups as FMUs may be impractical.
- Many of the species or specie-groups seem to be spread much beyond the administrative boundaries of TN & P that adopting them as FMUs may not be practical.
- Given the high diversity of species, with the exception of oil sardines, no individual species is above 5% of total value (though Peneaid prawns are nearly 17% of value, if individual species level information is collected, no

prawn species is likely to cross the 5% mark); almost all species are caught by a wide range of gears. This high level of species diversity combined with wide range of gears that are involved in catching each species will make species based management a complex affair.

However, this does not mean that using species as FMUs are totally ruled out. These are some of the possibilities:

- Species like lobsters that are sedentary and localised resources can be managed, especially where small scale, non-trawl gears are in use. For instance, lobster resources of Kanyakumari district are exploited by the artisanal fleet using traps and bottom set nets in a set of known fishing grounds. The fleet size involved is also somewhat limited and stable. One could perhaps set up a management system in such a case without even requiring CMFRI or the Dept of Fisheries to set up an elaborate system of data collection¹. One could run the system without getting into setting a TAC and by using simple indicators. However, even if such an effort proves successful, it a moot point as to whether it will be a model for replication for other species that are more widespread and mobile.
- CMFRI is said to have individual species data for many specie-groups on which it reports. If one can have access to that data base, one could cull out more species that have a relatively compact area or fleet for management purposes. For instance, *P.semisulcatus* is said to be available only in TN and that too only in the Palk Bay and the northern part of the Gulf of Mannar and is associated with sea-grass beds. It is conceivable that one could draw up a management plan for this resource. Three to four major trawl landing centres and six or seven small landing centres will need to cooperate. One may also have to work on the small fishermen using push-nets who also exploit this resource. It will be a complex and challenging task, but a lot more meaningful than trying to manage *P.indicus* or *P.monodon* whose resource boundaries are wider and which extend into neighbouring states².
- Species based management may also have relevance for certain endangered species like sea cucumber to avoid a total ban on fishing for these species.

In any case, even if one does not choose species as FMUs, there is no question that there is a need to assemble a lot more information about individual species: stock boundaries, stock abundances, seasonality, life cycle details, vulnerability to fishing effort, etc. Even if one uses input controls and fleets or certain geographical areas as FMUs, information on fish resources is essential to be able to set management goals and evaluate the effectiveness of the management system in place.

1 A local NGO in Kanyakumari District led by a retired CMFRI scientist had actually initiated a project in 3-4 villages of Kanyakumari involving payment of a small incentive for fishermen to return undersize lobsters to the sea. They reckoned that the fishermen would start benefiting after three years through better catches that the incentive can be discontinued. However, due to lack of funds, the project was discontinued after 1 year providing proof that fishermen were willing to play the game.

2 One needs to cross check as to whether *P.semisulcatus* is also available on the Sri Lankan side and whether it is caught there. If it is, *P.semisulcatus* will also pose a similar problem!

2. Gears or Gear Groups as FMU

The following are the major gears or gear groups in TN & P and their important characteristics.

S. No.	Gear Type	Characteristics/Divisions
1	Gillnets	Range from small gillnets used on kattumarams to large drift nets used on vallams and mech boats; include both bottom set and drift nets; include monofilament and multifilament nets; widest range of nets with differences in mesh size (target species), dimensions, materials, use in sea column (surface, mid-water and bottom) and method of use (set net, drift net)
2	Trawls	Around 10 different trawl nets used by mechanised boats including shrimp trawl, high open bottom trawl (HOBOT) for fish, chank trawl, sea cucumber net, roller trawl (to roll over rocky patches), pair trawl, etc.; mini-trawl on small motorised boats have made an appearance without anybody taking notice;
3	Ring seines	Two sizes—one for oil sardine and other for mackerel and other species; used mostly by artisanal sector by pooling together motorised boats; used for seasonal diversification of fishing by mech trawlers in a few locations like Pazhayar; it appears that the traditional Kerala canoe “thanguvallam” has also been introduced for ring-seining in some locations.
4	Hook & line	Used in many districts; range from small handlines on kattumarams to longlines on mechanised boats; line fishing is often a diversification from net fishing but can also be a specialised and dedicated activity for others
5	Shore seines	Significant presence only in the Gulf of Mannar and Arabian sea coast; a gear declining in importance
6	Miscellaneous	Traps for lobsters and fish are in use in Kanyakumari district; push nets are used in the northern Gulf of Mannar; boat seines or thattumadi, the once dominant gear from Kollam (Quilon) on the west coast to Tuticorin on the east coast has declined but is still present in Kanyakumari dist

It may not make much sense to look at individual gears or gear types as FMUs. Even trawl nets have a huge diversity and keep evolving. At the moment, there may be a case to look at the ring-seines as a possible FMU, if one is willing to ignore the fact that they are officially banned. In the case of gillnets one could look at those that target specific species like seer fishes or anchovy. Lobster traps and Lobster nets could be possible FMUs.

However, a gear based FMU is likely to be difficult to consider as most fishing units consist of boats that use multiple gears with considerable flexibility in switching from one to the other. *A fundamental objection to a gear based FMU is that it may be difficult to set objectives and make management plans with the involvement of just the user of that gear when user of other gears or gear types are competing for the same set of resources.* It will work only if a gear based FMU is subordinate to a larger FMU involving the other competing groups to set objectives and agree to broad principles.

3. Fleet Based FMU

A serious option is the use of specific fishing fleets as FMUs. What constitutes a fleet? In the TN context, the following are distinct fleets that involve in distinctive type of fishing and represent considerable amount of homogeneity and common interest.

S. No.	Fleet or particular craft-gear combination	Characteristics
1	Trawlers	These boats represent the group that has the largest share of the fisheries pie; around 5000 fishing boats operating from 10 major landing centres and another 10 minor centres; has regional variations with multi-day fishing in the Coromandel coast, 18 hour fishing trips in the Palk Bay and just 12 hours in the Gulf of Mannar; use a variety of trawl nets; use other gears like ring seines and longlines in some centres for seasonal diversification; often fish in neighbouring waters (Andhra, Kerala and Sri Lanka); multi-day trawler and day trawlers could be considered as separate categories for management purposes
2	Mechanised Gillnetters	This is a relatively small fleet that operates from a handful of landing centres across the coast with considerable variation in boat design and size; mainly target seer and tuna
3	The Thoothoor “shark boats”	This is a specific fleet of 500 odd mechanised boats that hail from the Thoothoor area of Kanyakumari district that use both drift nets and longlines to catch shark and tuna all along the west coast of India; though there is some overlap in fishing for seer fish, carangids and perches in coastal waters with the driftnet fleet of all west coast fleets, this fleet is distinctive for fishing beyond the shelf in oceanic waters for yellowfin tuna and pelagic shark
4	The in-board vallam fleet	Large traditional wooden “vallams” with inboard diesel engines using gillnets fish in the northern Gulf of Mannar and the Palk Bay; they represent a reasonably similar and homogeneous fishing category
5	Motorised beach landing fleet	The typical 26-28 foot FRP beach landing boat with 10 hp diesel long tail that operates over most of the coast is the main constituent of this fleet; also includes the plywood/FRP boat (SIFFS design) with 8-10 hp kerosene OBMs found in deep south; Kattumarams of the deep south that use long tails or OBMs can also be considered part of this group; operate with wide range of gillnets and lines; though there is considerable variation in fishing operations, it is not easy to subdivide this group into homogeneous categories at state level; such subdivision can be done at more local levels on the basis of gear combinations, area of operation, etc.
6	Ring seine fleet	It is a moot point as to whether the ring seine units represent a distinctive fleet. In general, the ring seine units have one dedicated boat for carrying the ring seine while 6-8 motorised boats join it during a ring seine operation and share the catches. When there is no ring seine fishing, the motorised boats get back to gillnetting or line fishing. This fleet is an emerging fleet
7	Tiny motorised units	In Kanyakumari district we also find small kattumarams and kattumaram substitutes (FRP or plywood) that use 2 hp-5 hp motors and form an intermediate category between the motorised and non-motorised fleet; may have to be clubbed with motorised or non-motorised as the situation warrants
8	Sailing vallams of Palk Bay	Large traditional boats with a balance board and large sails have fished for centuries with gillnets in the Palk Bay; this is a dying fleet that is likely to be replaced by smaller but faster ‘Maruti’ boats with OBMs
9	Non motorised fleet	Basically the <i>kattumarams</i> and the small <i>vathais</i> that are not motorised. Have a very low share in fish catches, but represent a group that is important in some parts of the coast
10	Shore seines	This is once again not strictly a fleet, even though there is a large traditional shore seine boat
11	Others	There are a handful of large mechanised long liners of more than 20m OAL operating all along the east coast of India with Chennai as base for some of them; mainly target the yellow fin tuna; whether they fit into any framework for state level fisheries management is a question

Using specific fleets as FMUs may work within the framework of fisheries management through input controls and technical measures. Fixed numbers, specifications of craft/motor/gear, trip timings, number of trips per season, fishing holidays, areas of operation, etc., can all be done for each fleet category.

These are some of the issues to be taken into account while considering fleets as FMUs.

- Unless one specified a location or an area (district, zone), treating each fleet type across the entire state as an FMU is unlikely to lead to practical management.
- Since with the exception of the Thoothoor shark fleet, all other fleets are in competition for space and fish resources, treating each as a separate FMU will make it difficult to set objectives and decide on inter-fleet allocation of resources/access.

The following are some possible candidates for fleet based FMUs:

- Trawlers of Chennai, Tuticorin and Chinnamuttom, all of which operate in a distinct area with single home base and have strong organisations of their own. The downside is that they will be in competition for resources and space with other fleets in their respective areas of operation and treating these fleets as FMUs may mean that relative resource allocation/access between the different fleets is not addressed.
- The Thoothoor shark fleet is a distinctive and itinerant fleet that is difficult to fit into any locality or area based fishing regime. It may have to be managed as a separate fleet with its own characteristics; it will however involve negotiations with other groups across the coast to determine their rights and limits.

4. Particular Groups of Resource Harvesters as FMU

In certain situations, one may need to consider a specific group of harvesters (or fishers) as a FMU.

For instance, seaweed harvesters of the Gulf of Mannar are facing the common problem that the bulk of the seaweed grounds are within the Gulf of Mannar National Park where any harvesting activity around the 21 coral islands is banned. One could look at this group of families (it is a family based enterprise involving men, women and children) as a separate FMU to work out their rights to resources, the rules that have to be set to minimise the damage to corals and the supplementary/alternative livelihoods that need to be organised to improve their wellbeing.

The skin-divers of the Gulf of Mannar are yet another group that has common problems associated with declining resources and ban on some of their fishing activities. Many of the species (chanks, sea cucumber, etc.) on which they depend for their historical livelihood are facing decline or on banned lists. Treating the skin divers as a group will provide the opportunity to review the ban on the species, consider options for management without total ban, work on supplementary/alternative livelihoods, etc.

Groups involved in “destructive” fishing activities like using explosives for fishing or undertaking coral mining are also categories that require similar attention. Though TN does not have this category, the shrimp seed collectors form a similar category in Orissa and West Bengal and one learns that focussed attention to these groups has helped them come out of an ecologically harmful activity and get gainful alternative employment. Of course such interventions did not use the term FMU but nevertheless demonstrate the concept.

5. Sub-Sectors as FMU

The fisheries sector of TN is internally divided into some broad categories or sub-sectors that do not strictly fit into scientific categories based on craft and gear. Though these are not precise categories, they seem to make sense to the fishermen themselves, to the politicians and administrators. These could also be seen as political categories. Since resource allocation is an intensely political activity, consideration of these categories may not be inappropriate. These are the categories or sub-sectors with their own internal divisions. We give below two attempts to capture the way the fisheries sector is divided into sub-sectors in TN & P.

Chart 1 : Standard Model

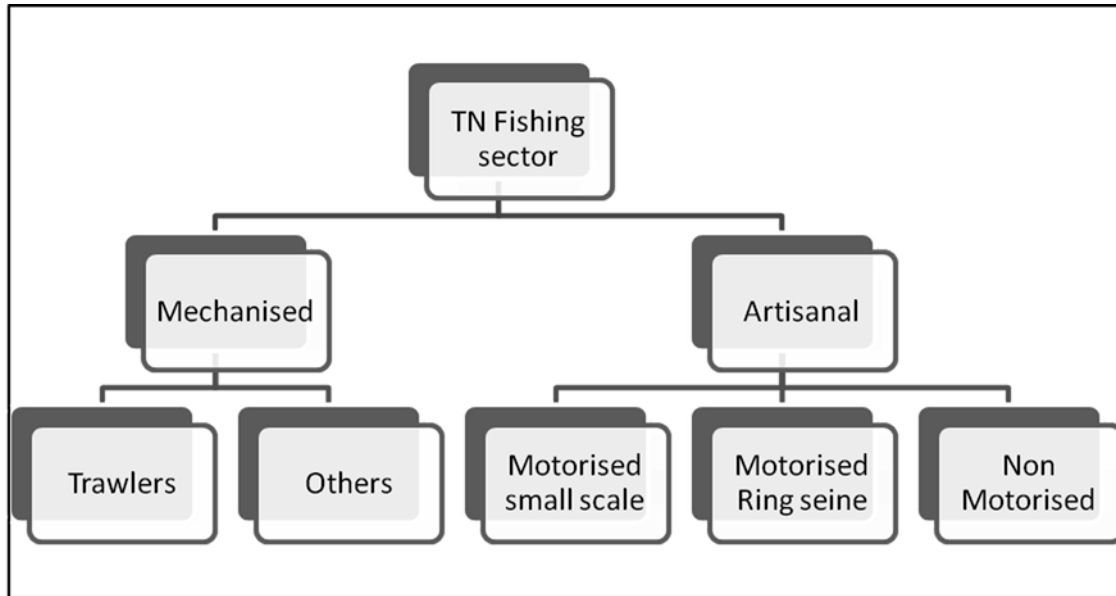
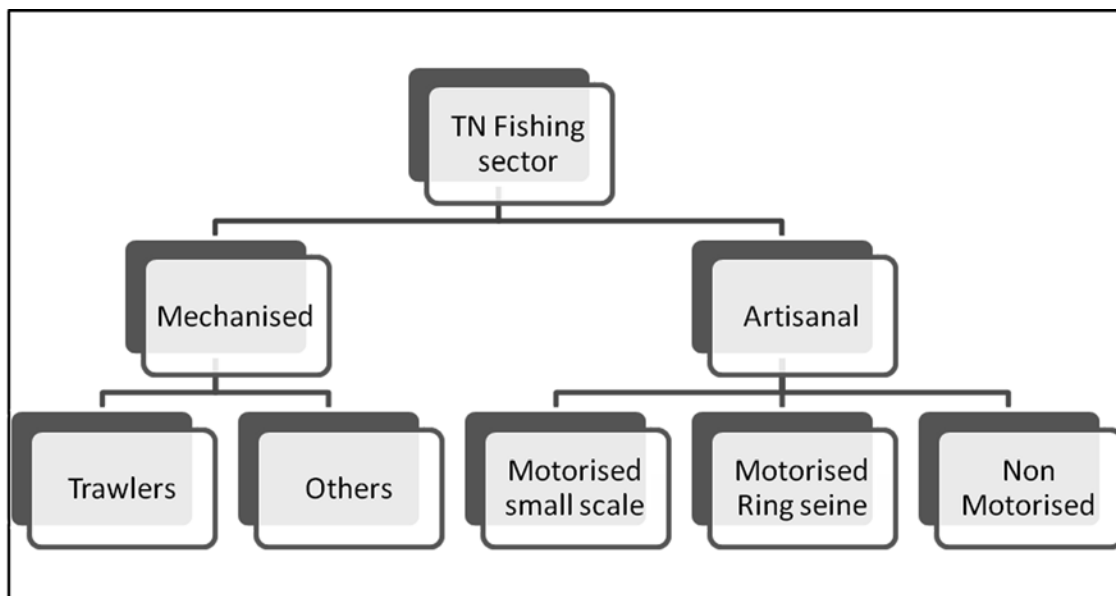


Chart 2 : An alternative but more realistic model



It is important to understand the basis of the above models of the fishing sector. The term “mechanised” and “artisanal” are loaded with many meanings. In fact we are using the term “artisanal” even though the term “traditional” is more commonly used. We compare mechanised and artisanal sectors under a number of parameters

Parameter	Artisanal	Mechanised
Fishing base	Beach based fishing	Harbour based fishing
Scale of investment	Relatively low, especially when calculated on per-crew basis ³	Much higher investments, especially per crew
Owner status	Active fishermen depending as much on both owner share and worker share	More of an investor and manager than active fisherman; represents a new class within the fishing community ⁴
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	Part of new boat associations and subject to their control ⁵

Thus the terms “mechanised” and “artisanal” do not just reflect technology and are code words to describe two groups that represents different scales and social classes. In the case of the trawlers, the difference is aggravated by the fact that there is a severe competition for resources and space at sea. The reason why “other mechanised” units are categorised separately in Chart 2 is that both trawlers and the artisanal groups have very little conflict with them and they are largely on their own. They are outliers as far as the main competition for resources is concerned.

Thus the ring seine issue is mainly an issue with the ‘artisanal’ sector except in places like Pazhayar where mechanised boats also use it.

It is important to recognise that these divisions are a reality at all levels—village, district, zone and state. What are the implications while choosing FMUs? It is conceivable that one could think of these subsectors (mechanised trawlers, other mechanised and artisanal) or the further subdivisions as FMUs, perhaps within geographical limits. The manner in which each of these subsectors needs to be governed or managed will also be different.

³ Even the ring seines do not violate this norm as the investment per worker is quite low

⁴ In TN mechanized owners are from fishing castes in most centres with the exception of Palk Bay centres where non-fishing castes have entered fishing 30-40 years back. However, it is not a continuing phenomenon and only those families who entered fishing at that time are still in fishing as owners.

⁵ Mechanised boats of Nagapattinam and Karaikal are an exception to this rule. They are also under the control of the traditional village organizations. However, since they are concentrated in certain villages, they have control over these village organizations.

6. Geographical Area based FMU

a. Based on the four major eco-system boundaries

The coastline of TN has been historically understood to be associated with four different seas: Bay of Bengal, Palk Bay, Gulf of Mannar and Arabian Sea. While the Bay of Bengal coast is called the Coromandel Coast, the other coasts are named after the seas. The Arabian sea coast can alternatively be called the Kanyakumari coast as it belongs entirely to Kanyakumari District⁶. Historically each of the four coasts has developed independently with distinct differences in fish resource configuration, fishing technologies and fishing communities. It is worth noting that the TN Fisheries Department statistics does provide aggregation of fish catches at the level of the four coasts. Thus the four coasts can be considered as four major eco-systems.

Thus the four major eco-system boundaries could be used for one level of management of the TN fisheries. With the exception of the Arabian Sea coast, the other three coasts are quite longish ranging from 300-400 km. Treating them as FMUs will pose a huge challenge to manageability, unless one is able to break up the eco-system based FMUs into smaller manageable units.

However, one can quibble about the eco-system boundaries. In particular, the northern part of the Gulf of Mannar coast is distinctly different from the southern part on account of differences in sea bottom and the presence of coral islands. Historically, the fisheries development of this area has more in common with the Palk Bay than the southern Gulf of Mannar. Even the three day-four day rule applies to this area and not the southern Gulf of Mannar area.

b. Landing centre based FMUs

The other extreme end of the spectrum, in terms of distances and area involved, is to treat each landing centre as a FMU. This has plenty of advantages. Each fishing village or fishing harbour is generally a landing centre, representing a small microcosm of TN fisheries. The fishing units in each landing centre are clearly under the control of traditional organisations or modern associations. This provides a great opportunity to implement any management plan with the cooperation of all the fishing units. By and large each landing centre represents a situation of equilibrium between different interests that are part of it.

However, given that fisheries are non-local, landing centre based FMUs will represent a sub-optimal unit of management unless there are higher levels of management that set the boundaries within which the local FMU works.

c. Fishing area based FMUs

While dividing up the coastline on various basis has its advantage, one could also divide the fishing units on the basis of where in the sea they fish. Near shore, coastal fisheries, offshore, deep sea, etc., could also be a basis of grouping the fishing units. The following could be one of the ways to do such a grouping.

Fishing area	Fishing units
Adjacent to shore (0-2 km)	Shore seines, small non-motorised vessels
Near Coastal fisheries (2-5 km)	Non-motorised and motorised fishing vessels. Trawls prohibited up to 5 km, but may transgress in some areas
Coastal fisheries beyond the reserved zone (5-20 km or 20m to 100 m depth)	Motorised vessels, mechanised gillnetters and mechanised trawlers

⁶ However, 8 km of the 68 km Kanyakumari coast is part of the Gulf of Mannar.

Fishing area	Fishing units
Offshore fisheries (beyond 100 m depth or beyond 20 km) till edge of shelf	Some motorised vessels, some day trawlers, all multiday trawlers and mechanised gillnetters
Deep sea (beyond shelf)	Thoothoor shark boats, “deep sea” vessels

The problem with using this classification to manage the fisheries is that there is considerable overlap as same category of vessels tends to operate in more than one zone. It is often difficult to obtain reliable data on the area of fishing, making it difficult to work out management systems.

d. Fisheries administrative boundaries

Fisheries administrative boundaries are quite important from the Government point of view. Generally, the district is an important unit of administration with an Assistant Director of Fisheries in charge of the administration. He reports to his departmental hierarchy ending with the Director of Fisheries at Chennai as well as to the District Collector who coordinates all departments in the district. From a law and order point of view also the District Collector is the key person and historically many of the fisheries conflicts have been resolved at the District level. Thus from the point of view of an area based FMU, the district is a good choice. It is much more compact than the four eco-systems we discussed earlier.

However, as exemplified by the three day-four day rule, certain management measures have to be at a larger area level than that of a district to be meaningful and bring results.

Another administrative boundary that needs to be taken into account is the 12 nautical mile limit or territorial sea limit. This line limits the jurisdiction of the state administration. Beyond 12 nautical miles, the power to make rules and regulations falls within the jurisdiction of the Central Govt. Till now the centre has not made specific laws governing the EEZ area except for laws that prohibit unauthorised fishing by foreign vessels. However, the Govt. of India is currently in the process of enacting a new law to regulate fishing in the EEZ. The initial draft bill required all fishing boats that operated beyond 12 nautical miles to register separately with the Govt. of India and to obtain separate fishing permits. This has been objected to by fishermen associations and some state Governments. The final version of the Bill is yet to be put up in the public domain.

e. Social boundaries or community institution based FMUs

It is an open secret that the fishing community institutions are much more effective in managing fishermen and their operations than the Govt. However, it is the internal divisions between the “mechanised” and “artisanal” on the one hand and the differences between villages on the other hand that has reduced the effectiveness of community institutions in ensuring effective management of the fisheries. The Govt. - fishermen cooperation in management is also weak. For effective management, it is essential for the Govt. and fishermen organisations to work together. Whatever may be the Govt. role in the management, managing the individual boat or fishermen is best left to the local fishermen organisations.

All fishing villages have village organisations that manage fisheries affairs along with other social matters. For artisanal fisheries, the traditional village organisation is the best bet in most parts of the coast (in at least three of the four major eco-systems⁷) to manage local fishing units. For mechanised boats, all harbours and landing centres have boat associations which are the best bet to take responsibility to govern their members. So, village or landing centre based institutions exist all over TN & P that have the potential to be FMUs. However, as mentioned earlier, such FMUs will be sub-optimal unless they are linked up horizontally and vertically for higher order decisions.

Interestingly, the fishing community institutions do not stop at village level. Though not as strong as village institutions, the higher level community institutions continue to play a role in providing a common platform and

⁷ Coromandel coast, Gulf of Mannar and Arabian Sea where there is a much longer tradition of self governance

Identification and Characterisation of Fisheries Management units

act as representative bodies for negotiating with the Govt. The higher levels start from a cluster of villages to areas that often coincide with District boundaries. Above the district level, no well established traditional institution exists in most parts of the coast, but there exist certain linkages and networks of solidarity over long stretches of coast that can be leveraged for formation of higher level FMUs. These are the four solidarity zones.

Zone	Boundaries	Districts	Basis of solidarity
Coromandel coast	Pulicat lake to Pt.Calimere	Thiruvallur, Madras, Kanchipuram, Villupuram, Pondichery, Cuddalore and Nagapattinam	Practically occupied by single community—Pattinavars; have district level platforms with strong links to each other
Palk Bay and Northern Gulf of Mannar	Pt.Calimere to Vembar	Thanjavur, Thiruvarur, Pudukottai & Ramnad	Multiple communities without a single dominant community; solidarity based on common interest mobilisations and 3 day-4 day rule
Gulf of Mannar	Vembar to Idinthakarai	Tuticorin and Tirunelveli	Mostly occupied by Parava community; single diocese covering these districts
Kanyakumari coast (includes 8 km of Gulf of Mannar)	Arokiyapuram to Neerodi	Kanyakumari district	Christian fishermen (Mukkuva and Parava) organised into single church structure.

It is interesting to note that the social zonation of the TN coast coincides closely with the major eco-system boundaries. This is no coincidence. It is the eco-system that has moulded the communities and their structures.

7. FMU based on combining many of the Parameters discussed above

Ideally, FMUs should be large enough to make a meaningful contribution to achieving the goals and objectives of fisheries management and small enough to be compact and manageable. Given that the TN & P fisheries is characterised by (i) large number of species that are widespread and non-localised, and (ii) a large number of boats with multiple gears that are dispersed over the entire coast, FMU selection becomes tricky. Selecting a FMU that is large enough to make a difference can often lead it to being unwieldy and unmanageable. On the other hand, selecting a unit small enough to be compact and manageable can lead to sub-optimal results in achieving management objectives.

A multi-tiered system that is based on geographical area as FMU and integrating other parameters like gear divisions, different types of fleets, species level interventions, etc., is proposed to tackle the complex requirements of fisheries management in TN & P.

The proposed system will have four fixed levels of management.

- i. Village level or landing centre level will be the lowest unit of management
- ii. District level
- iii. Fisheries zone level
- iv. State level

The following is a discussion on the arrangements at each level:

Village/landing centre

At this level, there are vibrant fishermen institutions that govern fishing operations and they should be the basic building blocks for any fisheries management system in the state.

District level

This is the level at which the village representatives come together to form a district platform for planning, rule setting and implementation in cooperation with the District administration and fisheries department. This is also the level at which other stake holders not represented at village level will have a presence to provide their inputs. These could include women fish-vendor groups, exporters, NGOs, etc. Other Government departments like environment, forests, etc., could also be included as per local importance.

Fishery Zone level

The next higher level of aggregation for decision making will be the fisheries zone, which could coincide with the four eco-systems we had talked about earlier. These are some of the options for zonation:

Option 1 : Four zones with each representing one eco-system. This may mean a large area to be covered in the Coromandel coast and only one district to be covered by the Arabian sea eco-system.

Option 2 : Four zones, with the Coromandel coast split into two (Thiruvallur to Puducherry and Cuddalore + Nagapattinam + Karaikal) and Kanyakumari as part of a common south zone (Tuticorin, Tirunelveli and Kanyakumari). This may help equalise the areas involved and reduce the jurisdiction to manageable distances. In any case, Kanyakumari's different eco-system is taken care of by the district level platform.

The zone will be an important unit of management as it is best placed to ensure coherence between the different district plans and rules. Many common rules will be framed at zonal level. At this level, some more stakeholders can be included including fisheries research institutions, etc.

State level

The state level will have a platform that sets the overall goals, policies and approaches for fisheries management. It is the level at which the sub-sectoral allocation issues have to be sorted out and broad guidelines issued for the next levels to function. A state level management plan also needs to be prepared at this level. Inter-state and national issues will also be taken up at this level.

Integrating Puducherry

Integrating Puducherry into the management system needs some thought. While it is an autonomous Union Territory and not subordinate to TN state, the two fishing areas of Puducherry and Karaikal are sub-optimal for independent fisheries management. It is proposed that some kind of dual system will have to be operated. While Puducherry district could perhaps have a separate district platform that could then be integrated into a common platform at zonal level, Karaikal is better off being part of the Nagapattinam district platform as it is bang in the middle of the Nagapattinam coast.

At state level, one wonders whether it is better to have a common body for TN & P or whether each state will have separate bodies with Puducherry formally endorsing the decisions taken through a coordination mechanism.

Flexible levels and need based groupings

In addition to the four fixed levels of fisheries management proposed, following flexible arrangements may be needed to handle the complexities of managing different resources, gears groups, etc.

- i. Village Clusters : Within districts, specific clusters may have to work together to manage certain resources or gear groups. While such clusters need not be fixed a-priori, need based formation of groups representing clusters of villages can be done from time to time⁸.
- ii. District clusters : Within zones, for certain decision making processes or for monitoring certain ongoing processes, two or more districts could be clustered and responsibilities delegated to that group. For instance, if Tuticorin, Tirunelveli and Kanyakumari form a single zone, it is inevitable that many matters require decision making and implementation that is common to Tuticorin and Tirunelveli. Hence a cluster of the two districts could meet more often. It is likely that this cluster organisation may emerge stronger than the district organisations.
- iii. Subsector groupings : At both district level and zonal level, certain discussions need to take place at sub-sector levels (mechanised, motorised, etc.) before appropriate proposals can be put up to the district platform. Consensus building for certain major decisions will also have to take place at sub-sector group meetings. If the decisions taken require regular meetings of subsector groups, in such districts, these groupings may have a more permanent status.
- iv. Gear groups : Decisions affecting gear groups may require separate meetings and consultations of gear groups, either at cluster levels or at district level
- v. Specific resource user groups : These could include seaweed collectors, skin divers, shell collectors, etc.
- vi. Task forces : At district, zone and state levels, specific species management plans could be drawn up from time to time and platforms or groupings created that cut across the jurisdictions of the district and zonal level may have to be formed. These could be addressed through task forces that involve more than one district or more than one zone. Decisions taken at such task forces will have to be ratified and integrated into the work of the district and zonal platforms. Thus species as FMUs are to be integrated into a larger system based on geographical area as FMUs.

National and Inter-state issues

It is obvious that the State Govt. does not have constitutional powers to manage the fisheries beyond 12 nautical miles and hence requires negotiations with Central Govt. and neighbouring states to achieve its objectives. However, TN can set an example and show the way for the other states and Central Govt. None of the states or the Central Govt. has so far cracked the fisheries management puzzle.

8 In Nagapattinam, since the district fisheries management council formed by SIFFS as part of a FAO pilot project was unwieldy, four clusters were identified and separate meetings conducted for each before taking important decisions at district level. In some instances like the ring seine problem, it was found limited to certain areas and meetings were held only in those clusters to discuss such issues.

8. Case Studies On Possible Fisheries Management Unit Models

In the above background, FIMSUL took up three case studies :

1. Chennai Fishing harbour-As model of fish landing centre based approach
2. Palk bay- an ecosystem based approach
3. Lobster fisheries of Kanyakumari - as species based approach

The three case studies were done through stakeholder consultations and detailed reviews. The case studies are uploaded in the FIMSUL website.

In conclusion

It is a moot point as to whether the above proposal is strictly about FMUs. In a sense, it proposes the architecture to manage the fisheries of TN & P at different levels. Even if the entire edifice is built up in stages, it may be better to have the larger picture in mind before working on the individual parts.

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