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Maintaining a Viable Trawler Fishery:

A Study of Regulatory Failures and Over Capitalization in the Palk Bay Fishery

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Abstract

Due to instances of severe over fishing and slow or dramatic collapse of fish stocks, there have been widespread calls for global reduction in fishing fleet sizes and fishing efforts. This requires significant reduction of the existing fishing capacity for levels to become commensurate with sustainable resource productivity. The primary reason identified for overcapitalisation and over fishing has been the failure of various regulatory measures. Therefore, the central challenge of fisheries is to strengthen the fisheries governance by creating incentives that lead to desired behaviours. Against this background the present study explores the regulatory failures leading to and in addressing over capitalisation in general and trawler sector in particular in the Palk Bay of India. The study has used both primary and secondary sources of data. Primary data comprised of both qualitative and quantitative data. Qualitative data has been collected from 10 mechanized boat landing centres along the Palk Bay during January-February 2007. A survey among selected 226 sample boat owners has been conducted during April-May 2007 for collecting quantitative data on various aspects related to trawler boat fishery. The landing centres selected for the study are: Malli patinam, Sethupava Chatiram, Kottai patinam, Jagada patinam, Lanjadi, Chozliakudi, Tondi, Mandapam, Pamban, and Rameswaram. This study observed that in the wake of widespread violations incentive adjusting measures which is a rights based system is desirable and there is a need for the fisheries regulation to move towards that direction. However, the current scenario is not conducive to rely only on that. Incentive blocking is already partly in place, but it is insufficiently/unsuccessfully enforced. In order to complement the enforcement issues, and at the same time to provide a better ground for enforcement, there is a need for fleet reduction by removing at least some of the boats from an oversized fishery. This in fact is the real challenge.

I

Introduction

Fishing regulation is a highly debated topic in fisheries management in the wake of signals of depletion and over exploitation of fish stock in several fisheries worldwide. Due to instances of intensive fishing and slow or dramatic collapse of fish stocks, there have been widespread calls for global reduction in fishing fleet sizes and fishing efforts (Mullon, et al 2005). Garcia and Newton (1997) has estimated that world fishing capacity would need to be reduced by 25 per cent for revenues to cover operating costs and by 53 per cent for revenues to cover total costs. In other words many world fisheries are biologically as well as economically unsustainable. In India too, mechanisation of vessels brought about drastic changes in the sector. More and more indigenous crafts were motorised and the use of different types of gears was taken up to meet growing demand. Since 1960, trawling gained importance as a method for exploiting demersal fisheries (especially prawns and shrimps) (Vivekanandan, 2003) and soon trawlers became the main stay of the fishing sector with almost 50 per cent of the total Indian catch coming from it (Devaraj, et al., 1997; 1999). Moreover, the Indian government encouraged mechanization via through various subsidy programmes (e.g., for diesel engines, use of innovative gears and vessels etc.) and loans to fishers and their co-operative organizations (Srivastava, et al., 1991). As per the Government of India (2004) estimates, there are 1896 traditional fish landing centres, 33 minor fish harbours and 6 major fishing harbours serving as a base for 208000 traditional non-motorized, 55000 small scale beach landing crafts with out-board motors; 51250 mechanized crafts (mainly bottom trawler and purse seine) and 180 deep sea vessels of which 80 are in operation. Today, Indian marine fisheries face a number of challenges and problems threatening its long term sustainability and very survival. As a result of the introduction of many new vessels over the last few decades, current catching capacity of the fishing fleets in Indian waters far exceeds required for biologically sustainable catches from most commercial stocks at a depth down to 100 m (Devaraj and Vivekanandan, 1999[1]). This has resulted in the reduction in the area per fisherman (Vivekananadan, *et al.,* 2003). Presently, there are too many fishing vessels, generating an excess fishing effort in various areas, especially where valuable species occur (Somvanshi, 2001).

In the context of the guidelines issued by the government of India to all the maritime states for formulating rules and regulations, most of them passed respective Marine Fisheries Regulation Acts. These Acts inter alia provide for registration of all fishing vessels, including non-mechanized crafts at their respective base ports, licensing fishing vessels for fishing in specified areas, regulation, restriction or prohibition of fishing using any specific gear *etc*. However, the enactments have not been carried out with conservation motive, but only with a view of avoiding confrontation between the mechanized and artisanal sectors rather than as suitable regulatory measures for ensuring sustainability of the resources. Above all there have been enforcement problems in terms of widespread violations of rules and regulations threatening the sustainability of fisheries. Having said this background, the present study focuses on the Palk Bay fisheries in the east coast of Tamil Nadu, India, and analyses the regulatory failures leading to and in addressing over capitalisation in general and trawler sector in particular. This paper uses both primary and secondary data that we collected as part of a research

[1] Here it is important to note that only the state of Orissa has determined the optimum number of mechanized vessels of various categories for different fishing ports (James, 1992).

project supported by United Nations Tsunami Recovery Support (UNTRS). Primary data collected consists of both qualitative and quantitative data. Qualitative data for this study has been collected from 10 mechanized boat landing centres of the three main districts along the Palk Bay area during January 4th to February 26th of 2007. The quantitative data for this study has been collected through a sample survey among boat owners during the period April-May 2007 for all the 10 landing centres of Palk-Bay area. A structured interview schedule was used to collect data from the boat owners selected for the survey.

II

Importance of Incentive Based Instruments in Fisheries Management

The existence of excess capacity is seen as a short-term phenomenon because of various reasons in which overcapitalization being the major one and is considered as a longer-term problem in fisheries where the existing fleet size is greater than that required to harvest a particular yield. It is well known that some of the important consequences of excess fleet capacity relate to poor economic performance, inefficiency and biological over-fishing. Excess fleet capacity not only wastes investment capital but also leads to high fishing costs. Similarly, overexploitation of stocks wastes fish resources (FAO, 1998). It can even lead to political strife in the management process. However, the primary reason identified for this kind of situation is the absence or lack of well defined property rights.

It needs to be recognized that property rights are a subset of the institutions. Institutions are organizational constraints that structure incentives and shape human interactions (North, 1992). Property rights or regime which is a subset of institutions are bundles of entitlements that define owner's rights and duties, and the rules under which those rights and duties are exercised (Bromley, 1991). A key attribute of an institutional environment is the set of economic incentives that it embodies. These incentives, in turn, shape the behaviour of both individuals and groups. Thus, the central challenge of fisheries management lies in creating incentives that lead to desired behaviours (Hanna, 1998). That mean, when property rights are not well defined and enforced, individuals have no incentive to restrict their actions even though the combined effect of each individual's actions (increased fishing effort) result in reduced stock size along with future potential yields and profits.

Nevertheless, solution to the property rights problem is not a simple one due to a variety of reasons including technical, political and social. This means that there is a need to create an enabling institutional environment for fisheries management where not only the property rights are well defined and enforced but also appropriate incentives are created which will guide individual behaviours in the desirable direction. In short, it is necessary to recognize that reducing the capacity of fishing falls under the broader question of fisheries management and, therefore, cannot be addressed in isolation. This has to be addressed in relation to other aspects of fisheries management which include besides institutional arrangements, the way in which access to fish stock is regulated, how participants in fishery react to different types of regulations and how subsidies affect participation in fisheries.

Overcapacity is a major problem faced by many developing economies where fisheries is not very well regulated and property rights are not properly defined. Need for regulating fishing capacity essentially emerges from both biological and economic considerations. Capacity regulation in terms of restrictions on harvests takes into account the biological considerations of size of stock and its regeneration; however, the information related to it

is by and large limited and incomplete. Moreover, most fisheries, especially in developing countries are considered either as open access as the property rights are not very well defined; in such situations, individual fishers unable to control the activities of other fishers, have little incentive to moderate their own use. On the other hand, the fishers who want to either improve or at least maintain their fair share in the harvest, have incentives to add more and more labour and capital. The outcome of this excessive addition of labour and capital is biological overfishing and a decline in sustainable yields which manifests as overcapacity and a reduction in net benefits. Technological improvements and availability of subsidies help the fishers maintain their profits in the short run even when the stocks are declining and also provide further incentives for new entry into fishery (Ward et al 2004). This calls for a change in the incentives confronting fishers.

In literature, 'Incentive blocking' and 'incentive adjusting' are pointed out as two instruments fisheries management authorities can adopt for changing the incentives facing fishers and thereby reduce excess capacity. 'Incentive blocking' measures attempt to restrict the level of fishers' activities in some way, whereas incentive adjusting measures attempt to address the property rights issue where an environment can be created in which fishers benefit within harvesting constraints, and allow the market to assist in reducing overcapacity (Ward et al, 2004). Among the important incentive blocking instruments relate to limited entry, buyback programmes, gear and vessel restrictions, aggregate quotas, non transferable vessel catch limits, individual effort quota (IEQs), etc. Group/community fishing rights, Territorial use rights, individual transferable quotas and taxes and royalties constitute important incentive adjusting instruments.

Incentive blocking Measures

Regulating entry to fishing assumes utmost importance where fisheries are either open access or not regulated properly. Limited entry is generally aimed to prevent further increases in effort, increasing economic efficiency, or protecting local fishermen from outside competition and risk. However, a major problem with limited entry is capital stuffing. When the total catch of the fleet is limited, each individual tends to increase his/her share of the catch by fishing harder either by increasing the size of the vessels or by upgrading engines (Branch, et al, 2006). Therefore, for limited entry program to be successful it needs to be supplemented with other restrictions such as gear and vessel restrictions, area restrictions etc. Attempts to reduce fishing effort by putting restrictions on vessel and gear characteristics, directly reduces economic efficiency of the fishing fleet and lower profitability so that fishermen do not have further incentives to increase fishing capacity. However, a major problem is that fishermen tend to invest in unregulated input dimensions, for example, if there is a restriction on the engine power to be used, fishermen tend to increase vessel length.

In developed countries, vessel or licence buy back programs are used to reduce over capitalization in fisheries. This is aimed at decreasing the capacity of the fishing fleet or rationalizing the size of fishing fleets. Buyback programs are implemented in response to over fishing or a drastic reduction in the stock of fish available for harvest. One common assumption is that removing vessels with the highest catch history at the lowest cost will be optimal (Holland, et al, 1999); but the effectiveness of this approach may be undermined if vessel characteristics are not the most important determinant factor of catching power (Branch et al, 2006). A major drawback of this system, like most of the other incentive blocking mechanisms, is that it fails to address the underlying problems that create overcapitalization. Similarly, aggregate quota system are used to maintain the fish stocks by establishing a total allowable catch (TAC) which will be allocated between different fishing gears or user groups and internationally to allocate between

nations. On the other hand non transferable vessel catch limit, and individual effort quota systems are also practiced as a incentive blocking measure in many parts of the world. Individual effort quotas, limit the fishing effort that a fishing craft can apply to a fishery mostly by placing a restriction on trawl time, time away from port, or fishing days that the vessel can employ. The IEQs create incentives for self adjustment and where they are transferable, fishers can purchase them from existing fishers or sell to new entrants. It is pointed out that these can allow the consolidation of fishing activity and reduce the level of excess capacity and possibly the level of overcapacity.

A major criticism or drawback of incentive blocking measures in general has been that there is no guarantee that in the long term they reduce excess capacity. In fact many of the above mentioned measures tend to create incentives for increasing fishing capacity in the long run. Therefore, incentive adjusting measures are more preferable as a long term strategy.

Incentive adjusting measures

Incentive adjusting measures attempts to control fishing capacity by changing the regulatory environment through a market incentive that helps fishers adjust their fishing capacity. They address the underlying property rights issue more explicitly. For example, individual transferable quotas explicitly limit the fish catch that a fleet can harvest from a fishery and assign tradable shares of the total catch to the participants in the fishery. Each ITQ holder is allowed to harvest a portion of the TAC in a given year and can transfer this right to other entities by leasing or selling it. It has been noted that the key aspect of ITQs is the transferability which encourages less efficient owners sell their quota to more efficient owners and leave the fishery, reducing overcapacity (Wertheimer and Swanson, 2000). It is also argued that taxes on landings are also useful in reducing capacity although little empirical evidence is available in support of this. A major challenge is in determining the optimal tax rate. Moreover, as various other factors such as costs, prices, and abundance fluctuate, capacity levels need to be adjusted by an appropriate tax on a timely basis. Royalties are also used in many countries for recovering rents from natural resource extraction activities.

In many countries, group fishing rights are also employed that grants access privileges or rights to particular groups or communities; and when granted to communities, these are known as community development quotas (CDQs). These embody the interest of fishing communities that go beyond just harvesters and processors involved in the fishery. Similarly, territorial use rights (TURFs) are a formal mechanism of assigning exclusive rights to fishery area to an individual or group. TURFs allow for the rational exploitation of resources and through ownership rights provide incentives to maintain a sustainable fishery and prevent poaching. This type of territorial rights provide long-term incentives for the resource owners to sustainably manage their resources and that they can be more effective if the owners have the ability to prevent outsiders from harvesting their resources (Branch, et al, 2006).

On the whole, incentive blocking measures are more of a command and control approach while the latter is more of a rights-based approach. Incentive adjusting measures (which create incentives for voluntary reduction of excess capacity) have limited applicability in small scale fisheries across developing countries mostly because of livelihood and equity considerations; for incentive adjusting mechanisms make an explicit reallocation of wealth in the fishery negatively affecting those who are left out in the initial allocation in contrast to incentive blocking measures which implicitly allocate wealth (Ward et al, 2004). The choice available in the initial period or short term, narrows down to incentive adjusting mechanisms, amongst which entry restrictions, gear and vessel restrictions and

buy back programs are all relevant. It can be seen that in several of the small scale fisheries in developing countries like India, some form of entry and gear and vessel restrictions, in fact, do exist though the effectiveness of such measures leaves much to be desired.

In fisheries management, the problem often faced is that if only a single aspect of the fishery is regulated, fishermen may increase effort using unregulated dimensions of the fishery which may result in unintended consequences (Branch, et al, 2006). Therefore, it is to be noted that for fisheries management to be successful and also for delivering the intended outcomes, a host of measures have to be crafted together in a judicious manner rather than relying on just one measure. From the previous paragraphs, it can be observed that incentive based regulatory instruments can be very powerful in fisheries management and capacity regulation; and the choice whether to use incentive blocking or adjusting measures or both, depends upon the problem for which we are seeking a solution.

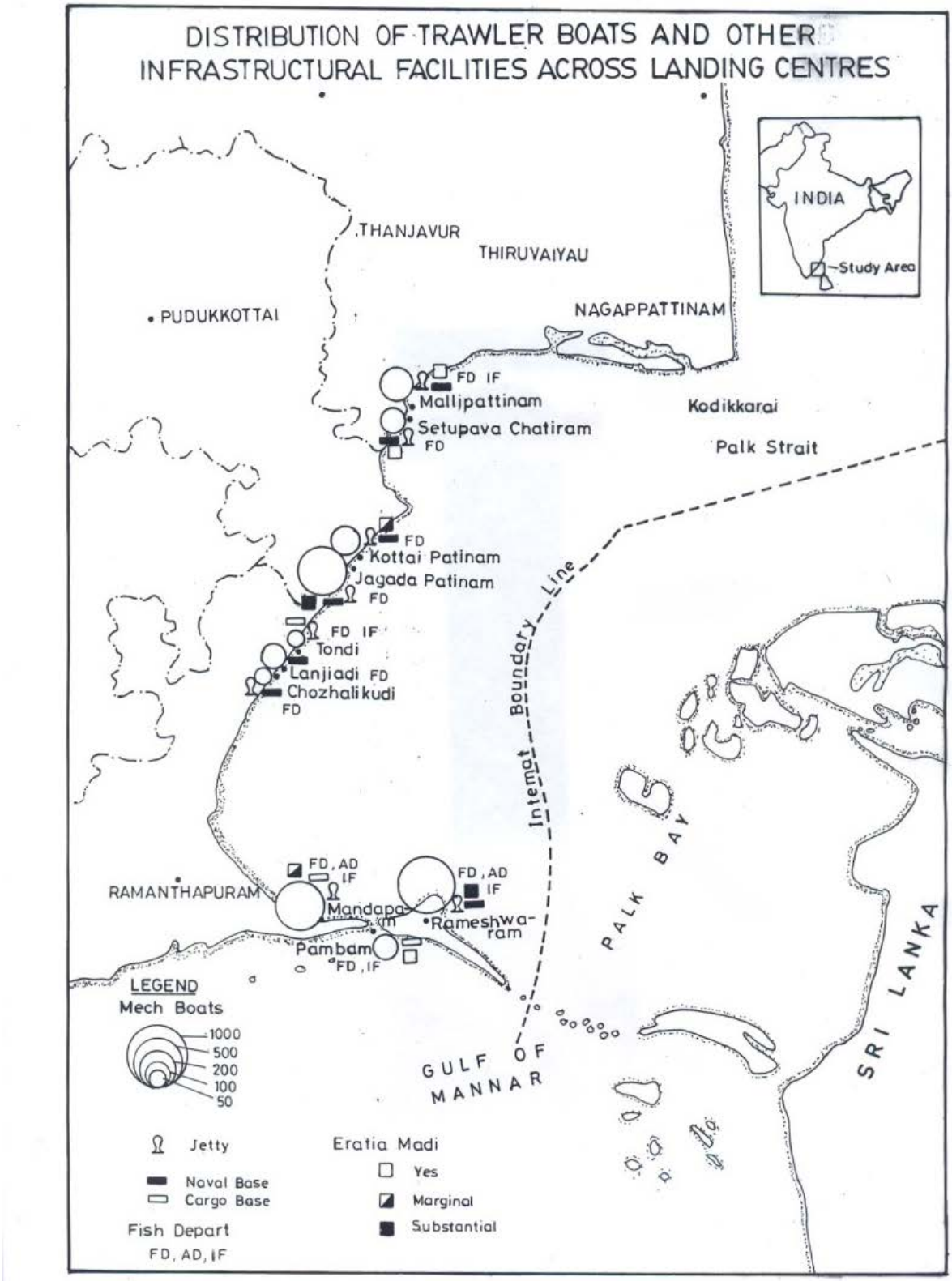
III

The Palk-Bay fishery

The Tamil Nadu marine fishery spreads over a coastal line of about 1000 kilometers with the Palk Bay being located in the east coast of the state. It spreads across four revenue districts of Tamil Nadu namely the Ramanadhapuram, Puthukkottai, Tanjore and Naga patina, having total coastal area of 270 kilometres, that is, approximately 27 per cent of the total coastal area of Tamil Nadu. But the present study covers only 107 kilometres of Ramanadhapuram, Puthukkottai, and Tanjore districts. The total number of fishing villages in Palk Bay stand at 169 with a total population of 140202 (Fisheries Census, 2000). Both traditional and non traditional communities are involved in fishing. The traditional communities include Ambalakarar, Paravar, Pattinavar, Kadaien, Paruvatha Rajakulam and Padiachy, while non-traditional communities include Muslims, Theevar, Nadar Konar etc. It has been reported that 54.15 per cent of the total fishers are literate.

The important landing centres of trawler boats in the study area are Rameswaram, Pamban, Mandapam north, Chozliakudi, Lanjadi, Tondi, Jagada patinam, Kottai patinam, Sethupava Chatiram and Malli patinam. The first 6 landing centres come under the Ramanadhapuram revenue district while Jagada patinam and Kottai Patinam are in Puthukkottai district. The last two landing centres, Sethupava Chatiram and Malli patinam are located in Tanjore district. These landing centres are provided with jetties for berthing of boats except Mandapam and Pamban. The location of the major landing centres (with the distribution of trawlers and other infrastructure) is given in Figure 1.

Figure1. Location and other infrastructure of Palk Bay Landing Centres



These centres vane a substantial variation in terms of trawler characteristics, fishing activity, population, organisation, use of gears etc (Sathyapalan et al 2007). Most of the diversity can be explained in terms of geographical and population characteristics. Fishermen from places like Tondi and Tanjore clusters that located far from Sri Lanka do not cross the border. In villages, where mechanised boat owners are relatively better organised than the traditional fishermen, tend to violate regulations more easily (like using of prohibited of pair trawlers). Country crafts do not operate from big landing centres as they are located at small landing centres. In big landing centres like Rameswaram, boat owners associations are fragmented on the basis of religion or politics.

The Palk Bay fisheries are known for the heterogeneity and fragmentation among their fisher folk. The reason for this can be traced to the topography of the Palk Bay. Palk Bay is a geographically contained area situated between northwest Sri Lanka and southeast India, connects the Bay of Bengal to the northeast with the Gulf of Mannar to the south. Studies report that the Palk Bay is a very shallow flat basin with the depth never exceeds 15 meters. The average depth is 9 meters. The coast is covered by thick mangroves in Muthupet area and also patches of mangroves in the northern part of Ramanadhapuram coast. The area is also known for coral reefs (Mahadevan and Nair, 1969).

Table 1 Fish species became not common in the Palk Bay ecosystem as reported by fishers

Local name of the fish	Common Name	Scientific Name
• Kalandan *Eral*	• Jinga Prawn	• Metapenaeus affinis
• Komban Sorrah	• Round headed shark	• Sphyma blochii
• Poovali	• Elongata illisha	• Illisha elongata
• Ullam	• Chinese Herring	• H. toli
• Vella vaval	• Silver pomfret	• Pampus argenteus
• Seela choorai	• Sarda orientails	• Oriental bonito
• Perum Parai	• Thread-fin trevally	• Alectis ciliaris
• Ayilis	• Common dolphin fish	• Coryphaena hippurus
• Thirukkai meen	• Rays	• *Dasyatis microps*
• Kuthippu or Suthumbu	• White fish	• Lactarius lactarius
• Uluvai	• Skates	• ----------
• Karal	• Pony fish	• Silver bellies
• Vilaimeen	• Long-face emperor-bream	• Lethrinus miniatus

Based on Primary Data
Note (This table indicates only fishers opinion, this may be cross checked with scientific data prepared by scientific organisation like CMFRI)

It has also been reported that the area is known for seaweeds and sea grasses. Maximum number of marine algae (302 species) has been recorded in Tamil Nadu, and mostly from the Palk Bay. There are 11 sea grass species also reported from the coral reef area of Palk bay (Venkataraman, 2004 p 61). The study also reports that the Gulf of Mannar and Palk Bay region has the highest diversity of sponges, mollusca, crustaceans and fishes. However, in our discussion with fishermen, we have found that many species are on the decline. The declining trend indicates that the health of the Palk Bay ecosystem is under stress (Table1).

The fishing practices of Palk Bay can be broadly categorised into mechanised and non-mechanised. The mechanised crafts consist entirely of trawlers and are locally usually known as Launches or simply boats. The length of the trawlers varies between 28 and 50 feet. All boats have a portable ice box with a capacity of 200 to 500 kgs. In the mechanised sector, both single and pair trawlers operate and they both use bottom and surface nets. They use an inboard engine with a capacity ranging from 68 to 120 horse power. The non-mechanised boats can be broadly divided into two types, namely, motorised and non-motorised boats. The motorised boats are either equipped with an Outboard Motors (OBM), that include the wooden Vathais and the fiberglass crafts, or Inboard Motors (IBM) called vallam. The marine fisheries census (2005) categorised motorised vessels into Dugout, Catamarans, Plank-built, Ring Seiner, Fiber glass, Ferro cement, and others. The non-motorised crafts are mainly Dugout, Catamarans, Plank built. The gear used by the non-mechanised fishers varies across seasons. Some of the important gears used in this sector include Sudai-valai, Eral-valai, paaru valai, tallu valai and nandu valai. Destructive fishing practices prevailed in the non-mechanised sector is the use of Surukku madi (purse seining) and dynamite, though both are legally banned. Generally, the use of purse seining is quite common during the month of March as the chances of being caught for this illegal use are virtually nil. The study observed that shore seine fishing is also common in Palk Bay area.

The labour market in the Palk Bay consists of both hired and family labour. Among hired labour, there are many migrants. Some of these migrants have become settlers as they have been living in the respective villages for a considerable amount of time. Wage, and share contract both exist although they differ across landing centres. Some boat owners even opine that labourers (crew) are much better off as compared to owners. This is because most labourers working in the boats get a guaranteed minimum income as wages. They get credit for their consumption and other productive needs. Today labour shortage is a micro level problem in many landing locations in the Palk Bay. Fishers say that it is difficult to get people to work on boats, especially in Thanjore district during the agricultural harvest season.

The fish market at many locations in Palk Bay is highly imperfect in that it functions like a monospony; for example, in the southern part of Palk bay, there are two main buyers called NILA and DSM. Fishers opined that there is no competition between buyers. The fish price is always kept artificially low. Middlemen also play an important role on keeping the price at a lower level. There are two levels of middlemen before reaching the fish from fishers to processor. So the present market condition affects the profitability of fishers. They do not have any right over deciding fish price. The market is characterised by low landing prices. The trends show that declining profitability of fishers has been getting worsened due to increasing diesel prices and to a lesser extent declining catches. The present scenario of fish production is presented in table 3.

Table 2 A summary of the characteristic features of Palk bay fishery

Geography and Marine Ecology	Biodiversity	Landing centres	Fishing Practice, Crafts and gears	Institutional Characteristics and functions	Fishing regulations	Core Issues
• Low island • Reef shoals • Shallow flat basin • Depth never exceeds 15 meters (Venkataraman Wafar 2005)	• Rich in seagrasses, seaweeds, crustaceans and fishes (Venkataram an Wafar 2005)	• Total 10 landing centres for Trawler boats • Landing centres distributed in three revenue districts • Landing centres are *Rameswaram, Pamban, Mandapam-north, Soloaikudi, Lanjadi Tondi, Jagada Patinam, Kottai Patinam, Sethupava Chatiram and Malli patinam*	• Mechanised and Non mechanised fishing • Shore seine fishing and gathering • Crafts (Trawlers, Vallam, *Vathai*, Fiber boats) • Gears (Gill nets, trawl nets etc) • Pair trawling, Substantial number of pair trawlers are located in *Rameswaram* and *Jagada Patinam.* • Vallam, *Vathai* and FRP are mostly located in small landing centres	• Department of fishery • Coast guard and Indian Navy play an indirect role in monitoring fishing activities • Recently, the Coast Guard has launched a 'community interaction program', with the aim of improving relations with fishers. • Alliance for Release of Innocent Fishermen (ARIF). Works for the co existence of fishermen in both India and Sri Lanka (Vivekanandan 2004) • South Indian Federation of Fishermen Societies (SIFFS) • Boat owners association • Both cash and share contracting practice	• Licensing of fishing boats • Token system • Monsoon ban • Limited movement of boats between landing centres (boats need Anchor permit) • 3 to 4 days agreement between country craft owners and trawler fishers through a government order • 3 nautical mile rule of the Tamilnadu marine fisheries regulation Act 1983 (Violation are observed in many landing centres of Palk Bay)	• Troubled location due to civil war in Sri Lanka since 1983. • The civil war has had a deep impact on Palk Bay fishery (Vivekanandan 2004) • Existing Capacity of the number of boats exceeds planned capacity in Landing centres. • Practice of destructive fishing gears e.g rathmadi, *Chank madi*, attaimadi, suruku valai *etc* • Over fishing and resource degradation • Stock of many marine species are under stress • Less co-ordination between different institutions • Poor human resource of fisheries department • Boat owners associations are fragmented on caste and political lines • Declining profitability of fishing • Imperfect product and factor market • Aspiration to become a trawler owner is common among artisanal fishers • Labours are in migrats • Low landing price for fish

Based on primary data

Table 3 Average Value of catch realized by Palk Bay boat owners by landing centre and boat size

	Boat length less than 32 Value realised per trip in Rupees				Boat length between 32 and 41 Value realised per trip in Rupees				Boat length above 41 Value realised per trip in Rupees			
Landing centres	Average in a month	Maximum in a month	Minimum in a month	Estimated (135 days in a year)	Average in a month	Maximum in a month	Minimum in a month	Estimated (135 days in a year)	Average in a month	Maximum in a month	Minimum in a month	Estimated (135 days in a year)
Rameswaram	6615	22633	6000	1586175	8649	31556	637	1837880	13071	39095	5538	2596681
Pamban					6833	24950	700	1461713	10242	50092	4958	2938125
Mandapam	3568	19870	3000	1189725	6172	21980	2643	1385787	7775	22400	5000	1582875
Tondi					6586	18023	1077	1155856	9950	26400	4589	1842255
Jagada patinam					7200	10932	203	825089.5	4960	18250	3456	1199970
Kottai patinam					6569	18922	625	1175245	4800	24500	4567	1524015
Sethupava Chatiram					7713	12260	1145	950287.5				
Malli patinam	6910	15300	4000	1179450	7057	12595	525	907968.8				
For all landing centres	5698	19193	3167	1262563	7214	20921	1068	1314134	11075	38307	4240	2412995

Source Primary survey
Estimated 135 effective fishing days in a year on the basis of 3 to 4 day rule

A Troubled Location

It is also documented that Palk Bay is a troubled location since the start of civil war in Sri Lanka in 1983. The civil war has had a deep impact on the fishing operations of this area. Till 1983, the fishers of both sides, who share a common language, and a long history of contact, carried on fishing activities harmoniously in Palk Bay with only occasional problems (Vivekanandan, 2004 p 3). On the Sri Lankan side, they had introduced severe restrictions on fishing due to security reasons. On the Indian side, fishers faced hardship as the Sri Lankan navy shot at and imprisoned a large number of fishers who crossed over to Sri Lankan waters during the two decades of the civil war. Although fishing operations were restored in Sri Lankan waters in 2002 altering the situation in Palk Bay, the operations of Indian fleets in Sri Lankan waters pose a grave threat to the livelihood of Sri Lankan Fishers. In some instances, there have been clashes reported at sea between fishers of two sides (Vivekanandan 2004 p 4). Nevertheless, there have been organised efforts from both the sides to engage fishers from Tamil Nadu and Sri Lanka in a dialogue on the issue of coexistence in and also to work out solutions for the conflict between the two groups in terms of sharing of peace and resources. Keeping this in view, the idea of a good will mission came in to force since 2003 (Vivekanandan, 2004 p 5). Today overcrowding of trawler boats in this area have implications on controlling the situation, therefore, it is also important to maintain a viable trawler fishery in this troubled location. The physically contained and troubled geography of Palk Bay has some implications for the fishing ground used by fishers. First of all, as a result of the maximum duration of a fishing trip of 24 hours, virtually no fisherman is able to visit any area outside the Palk Bay. Secondly, it has become clear that the large number of trawlers in the area competing for limited resources have 'forced' many fishermen head to Sri Lankan waters to for a sufficient catch; and this is done despite being aware of the fact that crossing the international boundary line can result in confrontations with the Indian or Sri Lankan navies, or with local fishermen (Bavinck et. al. 2007). Besides Sri Lankan waters, Tondi and the northern part of Palk Bay are also considered as fishing grounds. These considerations explain the difference of fishing grounds between the different landing centres. Especially the Rameswaram trawlers head enormous in eastern direction where fishing grounds are rich in marine resource (behind the Sri Lankan boarder which is just one hour away from their berthing place). In terms of excess capacity, it is more telling that the average fishing ground available per trawler is a mere 2 to 3 square km.

IV

Institutional Arrangements

The primary responsibility of fishery management rests with Tamil Nadu Fisheries Department. The institutional duty of the Fisheries Department is both enormous and complicated. First of all, it has to implement a number of welfare schemes meant for the fishermen community. The main scheme under concern here is the provision of 1500 litre of sale tax free diesel per month per mechanised boat. Secondly, they are to maintain the records of the fishing operations. Thirdly, they have to implement a wide range of fisheries regulations, including those falling under the Tamil Nadu Marine Fisheries Regulation Act of 1983. Add to this, if conflicts arise, fishermen can appeal to the Inspector of Fisheries to solve. Finally, the Fisheries Department has to provide fishermen with identity cards and daily fishing tokens with which they can identify themselves as genuine fishermen. This

extensive and complex procedure implies that the officials must simultaneously act as welfare providers, registration officers and policemen. Along the concerned districts, the Fisheries Department has six offices, three of them located in the southern cluster and the other three in the remaining clusters. These offices are headed by an Inspector of Fisheries with staff strength of about 2 to 8. while the big landing places of Rameswaram and Mandapam are headed by an Assistant Director. The offices are generally, poorly equipped and often face the problem of open vacancies.

Given the sensitivity of the area, the Coast Guard as well as the Indian Navy have a substantial presence in the Palk Bay. Across the districts under concern, there are four naval bases, one in each cluster. The navy personnel make use of nine hired blue painted fishing boats (40 ft) on which they patrol daily or twice-daily along the coastal areas. The Coast Guard is located on the southern shore of Mandapam and has thus – strictly taken – no base in the Palk Bay. However, the modern hovercrafts operate from Mandapam, make regular checks in the southern areas of the Palk Bay. Additionally, the Coast Guard patrols with several ships permanently along the international boarder line. As far as the fisheries in the Palk Bay are concerned, the responsibilities of the Coast Guard and the Navy do not differ significantly. More importantly, their principal duty is to safeguard the sovereignty of the national waters, and prevent smuggling activities, and this falls under the authority of the Central Government. This implies that they are not legally committed to the enforcement concerns of the fishing regulations designed by the Tamil Nadu government and makes their cooperation with the fisheries department principally limited to issues dealing with security, such as checking the fishing tokens and preventing fishermen from crossing over the Sri Lankan border. Although fishermen have nothing to fear from these security forces as long as they possess appropriate documents and stay within the Indian side of the border, they are generally afraid of them. Reasons include a general dislike of 'uniformed North Indians' and the fact that the Navy sometimes takes possession of some high value prawns. For landing centres where fishermen often 'have to' head to the Sri Lankan waters – like Rameswaram and Jagada Patinam – their fear is obvious as they need to circumvent their boats and ships in order to succeed. Recently, the Coast Guard has launched a 'community interaction program', with a view to improving relations with the fishermen. At local meetings they express their ability and willingness to speak Tamil and also assist fishermen in emergency situations. By doing so, they hope to establish a mutually beneficial relationship with these prime actors on the sea.

Another important but unofficial player in the institutional field are the boat owner associations. In each landing centre, one or more of these associations are present depending on the heterogeneity of the owners' backgrounds. For example, in Jagada Patinam, where virtually all owners belong to the Pattinavar caste, there is one association with all owners as members. Rameswaram, on the contrary, has thirteen associations, divided along the lines of religion, caste and political affiliation. In total, there are about thirty associations spread across ten landing centres. The operational scope of the boat owners associations has basically two dimensions: dealing with internal and external matters. To start with the latter one, lobbying for the collective interest of the boat owners at the district and state level is of vital importance. In the young history of the mechanised boat sector, this kind of lobbying has proved successful in many instances, with the allotment of sale tax free diesel as the most recent example. Their second commitment relates to internal affairs, with a focus on the settlement of disputes between the trawler owners and the traditional boat owners.. Boat associations are generally acknowledged by

the Fisheries Department as vital bodies in representing the interests of the fishermen; and the interaction between them is substantial. In those landing centres where boat owners are well organised (like Jagada Patinam, Malli patinam and Rameswaram), they even have the power to negotiate the scope of regulations with the Fisheries Department. Boat owner associations usually have a board headed by a president and a secretary and tend to raise a small tax on sea going boats (in the form of prawns or money) in order to secure their financial needs. The capacity of these associations tends to be a function of their fragmentation. In this respect, in landing centres with a high number of associations, competition for prestige tends to impede effective cooperation in collective lobbies against outside world. As a result, their institutional strength differs significantly from one landing place to another.

IV

Rules and Regulation in Palk Bay fisheries

In this section, we have tried to set out the important rules and regulations of Palk Bay fishery. These rules can be classified based on its temporal and spatial characteristics. While the rules pertaining to the spatial restriction is three nautical miles, 3 to 4 day trip has a temporal dimension. In addition to these rules, they observe a fishing 'holiday' generally known as 45 days ban (and also locally referred to as Government Strike). Important fisheries regulations are provided in table 4.

Table 4 Fishery regulations and its rationale in Palk bay

Regulations	Rationale
• Three nautical mile rule: • Three to four day rule • Banned nets • 45 days Ban	• Regulations stemming from the conflict with the artisanal fishermen (mainly the conflict between drift net and trawlers) • Regulations stemming from the resource degradation
• Fishermen are not allowed to cross the International Boundary Line • Fishermen have to possess an identity card, issued by the FD • If a trawler heads to the sea it requires a fishing token, issued and signed by the FD • A maximum of five crewmembers are allowed to man each trawler • One can only receive sale tax free diesel provided one possesses a fishing token	• These are regulations exclusively for Palk bay area arising out of the proximity to Sri Lanka.

Source: Discussion with fishery officials

One of the important clauses of the Tamil Nadu Marine Fisheries Regulation Act of 1983 relates to the three nautical mile rule that aims to demarcate fishing ground for the operation of country crafts (vallam, Vathai, FRP crafts) from trawlers. The rule restricts the operation of mechanised vessels only beyond 3 nautical miles which is to be used exclusively by the country crafts. Violation of this rule has been observed in many places throughout the area (Bavinck 2003, Scholtens 2006).

In order to solve the resource use conflicts between artisanal (non-mechanised) and trawler fishery in targeting same species within the same fishing territory, alternative night schedules were introduced for both the groups in 1993 (Bavinck 2003). This regulation aims to guarantee exclusive right to trawlers on alternative days. Generally, all trawler fishermen

obey this rule. Based on the tokens issued by the Fisheries Department in 2006, it is calculated that the on an average a mechanised trawler goes to the sea for 100 days a year (out of the 135 legally allowed nautical days). The limited number of days that fishermen venture into the sea (on average about 1/3 of the allowed nautical days are not used throughout the area) is an indicator of over capitalization as well. Many artisanal fishers however, head to the sea for 6 days per week although on trawler days they will keep near the shore. Even many artisanal fishers believe that the rule is actually meant to restrict trawlers and not to limit their operational scope. In 2001 the Government of Tamil Nadu introduced an annual ban on mechanised boat fishing, lasting from April 15th till May 29th, which became generally known as the 45-day ban. During this period, the mechanised boats are strictly forbidden to enter the sea. This restrictive measure was aimed at the conservation and regeneration of fish stocks and is well obeyed all throughout Tamil Nadu.

We found many trawler boat fishers practice pair trawling in Palk Bay region although the net (Erattai madi) is banned since 2000 by a government order (GO). The qualitative data collected during the first phase of this study shows that fishers have reasons in favour and against the use of pair trawl net (Table 5). We have already mentioned the different locations where this net is practiced at a larger scale. This study also observed use of other destructive gears in trawler boats which include Chunk madi and Attai madi etc. It is already mentioned that other destructive fishing practices like use of Surukku madi (purse seining) and occasional use of dynamite also exist in Palk Bay. Both are legally banned techniques. The use of purse seining is quite common during March.

Table 5 Reasons provided by fishers for opposing and favouring Pair trawling in the Palk bay fishery

Opposing pair trawling	Favouring pair trawling
- is an ecologically destructive fishing method, - reduces the catch available for other trawlers and small scale fishermen - reduces the fish prices thereby affecting other fishermen - It does a great appeal on the limited labour available. - Pair trawling used to be operated from January to March, but now it is operated throughout the year.	- The net is not destructive as it is used for catching migratory pelagic fishes. - It targets only fish and not prawns which are targeted by the 'ordinary fishermen. Hence it has no impact on the catch of others or on the price - All the protest is just a matter of jealously of smaller owners, as we have strong boats and big amounts of money are involved. - In *Pamban*, pair trawling is also allowed for three months per year. In *Rameswaram*, we need the same. If this is allowed, we can promise not to go anywhere throughout the rest of the year. - Small scale fishermen are no longer opposing pair trawling - With regard to the criminal act: how can you punish innocent crewmembers. This is ridiculous. - "If pair trawling is become banned (in practice) we shall fight against it. Otherwise, possible to increase the horsepower of the motor and operate the net with one boat. That is already being done by boats in Tuticorin".

Based on Primary Interviews and focus group discussions

Soft Disobedience and Hard misuse

First, there is the possibility of getting subsidised diesel without really going to the sea As the diesel can either be sold to outsiders or fellow boat owners or – in the case an owner having more than one boat – can be used for one of his boats that ventures into the sea. Secondly, if one sells ones boat (for example to a boat breaker) but keep his RC book, there is a possibility of fishing tokens and subsidised diesel being issued on continues basis. This diesel can be sold for a little margin to either fellow boat owners or outsiders. However, according to the Fisheries Department, this problem got solved in September 2006 when an extensive physical identification of boats was carried out. All RC books that were not connected to an existing boat were cancelled. In Rameswaram for example, 40 RC books were cancelled. Evidently large sums of money were reportedly offered to the FD by some powerful owners to continue their illegal activities, but accepting this allegation appears difficult as inspectors from different districts carried out the physical identification. However, these misuses appears to occur especially in the larger landing centres like Rameswaram, Mandapam, Kottai Patinam and Jagada Patinam where it is almost impossible for the Fisheries Department to monitor whether boats with fishing token really venture into the sea. Evidently, these activities have to be carried out in secrecy because without substantial influence or facing local 'enemies', it is very difficult for boat owners to abuse this scheme, as their local 'enemies' would be eager to lodge a complaint to the FD.

VI

Conclusion

The above discussion on the characteristic features of Palk Bay fishery reveals various issues related to fishery management. These issues can be classified in to three broad categories. (a) Location specific issues, (b) Issues related to fishing practice (c) institutional and market related issues. As far as the location is concerned, it is a troubled place due to Sri Lankan civil war and conflict over sharing fishery resources with Sri Lankan fishers. Secondly, issues like the use of destructive gears, and depletion of fishery stock come under the category of fishing practice. Other important issues that need most urgent attention are related to market condition and institutional set up. Finally, declining profitability, imperfect market condition in product and factor markets, and low landing price of fish do work against the interest of fishers. In this context, it is very important to reduce the fishing capacity. The need for regulating fishing capacity is also evident from other subjective and qualitative assessments of the Palk Bay fisheries. It is important to note that majority of the boat owners are of the opinion that the overall catch per trip is considerably less; as also the catch of certain species that we had pointed out in the previous sections. Some of the boat owners attribute this to the destructive harvest practices and the uncontrolled increase in the number of trawler boats (and the resultant decrease in the fishing ground per boat). Moreover, as noted earlier, the fishing area per boat is considerably low indicating increased competition for fishing space. All these point towards the long term problems in the fisheries such as overcapacity and overcapitalisation. Having realised the need to reduce the capacity, it is now worthwhile to revisit the existing measures to regulate fishing capacity and what additional measures need to be adopted for capacity reduction. Here, by capacity reduction, we mean the trawler boat capacity. Since we have already discussed fishing regulation on the basis of incentive blocking and incentive adjusting measures, it would be appropriate to classify the rules and regulations in the Palk Bay from this perspective.

As far as the incentive adjusting measures are concerned, the access to fishery is limited to those fishery participants who hold the rights over a share of a total allowable catch. It is premised on the ground that this system tends create incentives for voluntary reduction of excess capacity by fishers as attention is taken away from increasing catches to focusing more on reducing the cost of catching fish (Ward et al , 2004). This right-based management of fisheries is not yet well developed in the case of the Palk Bay fisheries although it is desirable to move in this direction, and is also not an altogether unachievable task for there exists some sort of demarcation of rights based on an altogether different logic or criteria. An example of this is the three nautical miles rule which indicates that trawler boats are not allowed to fish within the first 3 nautical miles from the shore; this is to resolve the conflicts between trawler boats and other traditional crafts (Bavinck, 2006) Similarly, along the Palk Bay, there are many landing centres, and boats are allowed to berth in a particular landing centre after obtaining a berthing permission from the Fisheries Department.

Boats from each landing centre have particular destinations, as fishing grounds along the Bay although no formal mechanisms for such demarcation exist. In fact, the boats are legally free to move on the sea as long as they stay within the Sri Lankan border and outside the 3 nm line and return to their allocated harbour within 24 hours. In practice however this freedom is more limited, because of the high diesel cost and the potential of conflicts when one enters fishing ground that are close to another landing centre. At this stage it is important to point out the role of Coast Guard and Navy who operate in this area. They keep a check on this though it is more for security reasons. However, to some extent they deter the free movements of trawler boats at least across the international borders although it is a widely known fact that border violations frequently occurs. This can be further strengthened.

It is to be remembered that there is an underlying equity issue involved in the adoption of incentive blocking and incentive adjusting measures. As noted earlier, this is especially true for incentive adjusting regulations because they make an explicit reallocation of wealth in contrast to incentive blocking measures which implicitly allocate wealth (Ward et al , 2004). In the Palk Bay, or developing countries at large, issues of employment and livelihood, social justice, resource allocation between mechanized and traditional sectors are very important. Therefore, measures which allocate fishery wealth more explicitly are likely to lead or aggravate social tensions and conflicts and need to be employed carefully. The option then boils down to incentive blocking mechanism more as a transitory measure, while moving towards incentive adjusting measures.

Three types of incentive blocking measures are known to exist in the Palk Bay: a) limited entry through registration, b) time restrictions and c) gear restrictions. First let us take measures to limit entry. In Palk Bay, both registration of boats and a separate licence are required to access fishery. In addition to these certain other methods are also there to limit entry, which virtually support licence system. First is obtaining permission for the vessel. Here a registration for the boat is a must. However, now no new registrations of boats are permitted thereby closing entry of new boats to the fishery. This has led to the creation of a second hand market for registration numbers as several boat owners simply transfer the registration number of a boat that has been broken down to a newly acquired one. Once a boat owner obtains a register number and licence he can set out for fishing after obtaining a token from the Fisheries Department. Tokens for trawler boats as noted in an earlier chapter are issued only 3 times a week on alternative days mainly because of the

competition for fishing space. This token is subsequently necessary for obtaining diesel subsidy. Fishermen are also required to have identity cards before going to the sea; these cards are still being issued to newcomers.

This type of registration system limiting entry to fishing is flawed. While it can be argued that stoppage of new registrations have stopped entry of new boats, it is not useful in reducing the already existing ones. The major reason is that even if the boats are not usable or broken down replacement is made with the already existing registration numbers. Additionally this has generated a clandestine market for registration numbers, which obviously is not a healthy sign. This calls for revamping of registration or entry limiting measures.

Gear and vessel restrictions attempt to control capacity by controlling the use of inputs in the production of fishing effort. This includes prescribing the minimum mesh size, restrictions on the length of certain gears or total ban of certain destructive gears etc. In the Palk Bay in fact some of these restrictions do exist. However they are seldom strictly enforced. As such, it is crucial to ensure that existing gear and vessel restrictions are strictly enforced. Our field observations reveals that fishers are not following mesh size regulations and are still widely adopting destructive fishing practices like pair trawling. These regulations have to be strictly monitored and enforced. Unless actions are taken to prevent destructive fishing practices, even fleet reduction may not result in desirable outcomes. However, one must be very careful in designing the monitoring and enforcement programs, otherwise, there cause chances of encouraging corruption in the sector. In some fisheries in India, penalties or fines for violations is very low as compared to the income they can generate by illegal operations or violation of rules. In many instances the probability of being caught is also low because of weak monitoring. In case of being caught for violations, fishermen tend to bribe the officials who are generally from the lower cadre and get rid of the problem; otherwise, fishermen have to spend time and money to get confiscated gears and vessels back resulting in high subjective costs, which can be over and above the fine that they have to pay (Srinivasan, 2005). Other important incentive blocking instruments such as aggregate quotas, non-transferable vessel catch limits, and individual quota limits have not been experimented in the case of the Palk Bay fisheries or in India. This is a very difficult task because of the existing high fleet size and various other reasons including incomplete or unscientific information regarding the resource stock, regeneration, allowable catch etc. More detailed scientific studies need to be carried out in this direction before adopting such measures. To sum up, incentive adjusting measures which is a rights based system is desirable and there is a need for the fisheries regulation to move towards that direction. However, the current scenario is not conducive to rely only on that. Incentive blocking is already partly in place, but it is insufficiently/unsuccessfully enforced. In order to complement the enforcement issues, and at the same time to provide a better ground for enforcement, there is a need for capacity reduction. Throughout the world there is an emerging consensus about the successes of using rights based fisheries management (Ward et al , 2004). Therefore, the first step would be to create an enabling environment by removing at least some of the boats from an oversized fishery. This in fact is the real challenge.

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