

## **Marine resources degradation in the trawling: A study in the Thoothukudi Fishing Harbour, Tamil Nadu.**

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### **Abstract**

India is fourth place in fish production in the world; it has been exporting fishery items to many foreign countries. India's fish landing has been enhanced to 4.6 per cent after mechanization was introduced. Mechanisation in fishing includes the trawler, the purse seiner and the gill netter. Among them the trawler and purse seiner are the vessels that destroy the marine ecology in the form of exploiting the by-catch. The exploitation of by-catch in the trawling is unavoidable. Its market value is very less and some species do not possess any monetary value, but they are very much needed to maintain the balanced marine environment. This paper an attempt has been made to highlight amount of the by-catch exploitation in the trawling.

**Keywords:** by-catch, exploitation, main catch, mechanization, trawl, trawler

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### **INTRODUCTION**

Indian Fisheries is an important component of the global fisheries, which generates lot of income and employment at home. India with the long coastline of 8,118 million sq. kms., has an Exclusive Economic Zone (EEZ) extending to 2.02 million sq kms. The present fishery production of India is 6 million tons and occupies the fourth position in the world. The contribution of fishery sector to the GDP is 1.4 percent. The fishery sector in India has been directly providing employment to about 59.90 lakh fishermen. In addition, another 6 million people are engaged in fishery related ancillary activities (Kokate and Upara, 2005). This positive effect is due to the mechanization in the marine fishing. Mechanisation in fishing initially took place in the Western hemisphere, later it influenced the developing countries to adopt the same in the field of marine fishing. Therefore powered vessels, electronic fish sensing equipments, synthetic netting materials, fish specific nets, preservation and processing technology have been used in the fishing (Bhatocharya, 2002). In India during the Second Five Year Plan period mechanization was introduced. As a result, fish production and its export have been increased simultaneously. However, at the same time some of adverse effects such as pollution, resources degradation and loss of bio-diversity have been reported. The studies of Noble and Narayanankuttly (1978), Bharat Bhushan (1979), Sathiadhas and Panikkar (1989) and Sathiadhas (1996) dealt the economic effect of mechanized fishing in various fishing centres in India. These studies

revealed that due to mechanization in fishing the catch has been increased much, so that more and more valuable fish items are being exported to many foreign countries, consequently generating high foreign exchange. The same view was expressed by the Evaluating Organization, Planning Commission, Government of India (1971), which reported that the fishery output has increased to 4.6 per cent after mechanization was introduced in India. At the same time there is a strong evidence that due to mechanization, especially in the trawling more and more valuable marine living resources are degraded in the form of by-catch. Therefore an attempt has been made in this study to reveal resources degradation in terms of by-catch exploitation in the trawling.

### **Mechanisation in Fishing**

Mechanisation in fishing refers to the operation of fully mechanized and deep sea fishing vessels. The fishing vessels are designed to operate advanced gears and they are capable to fish in distant sea (Ganapathy 1987). The trawler, the gill netter and the purse seiner are the mechanized fishing vessels. The purse seiner is banned in most of the fishing centres in India. However the trawler and gill netter are the common mechanized fishing crafts operated all over India. The trawlers exploit both main-catch and by-catch. The by-catch does not appear in the gill netter. The by-catch is one of the components of the environmental resources in the sea. The trawlers scoop such resources from the sea bottom. Therefore, this paper deals the by-catch exploitation in the trawling of the Thoothukudi fishing harbour of Tamil Nadu, India.

Thoothukudi fishing harbour is also one of the major fishing harbours in Tamil Nadu in the East coast of India (Fig. 1). It is a mechanized fishing centre, the In

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**Figure 1.** Marine fishing villages in South Tamil Nadu

1958, Tuticorin type of 'Vallam' was motorized then 28 feet trawler with 31.5 HP engine was introduced in this harbour. At that time cotton gears were used. There was no winch in the trawler, so the trawl was operated by human power. Soon after 32 feet trawler with 47 HP, 57HP and 88 HP engines were used. At this stage nylon fishing nets came into force. In the next stage 98 HP and 108 HP trawlers with the length of 37 feet to 47 feet were added for fishing. Then 160 HP engine with 47 feet trawler introduced was for fishing. At present 20 meters long length trawlers with 193 HP engine are used for fishing. The Thoothukudi fishing harbour was taken over by the Public Works Department on 31<sup>st</sup> December 1976. The facilities in the fishing harbour have been fulfilled as per the requirements of a major fishing harbour recommended by the Carl. G Bjuke the well known Swedish harbour consultant.

The Thoothukudi fishing harbour is capable of accommodating 400 mechanised boats. But at present only 220 trawlers are fishing from this fishing harbour. The fishing days in this port is usually 6 days in a week, that is Monday to Saturday. The daily fishing time for the trawler in a trip is early morning 5 O'clock to night 9 O'clock, which is as per the directions of the Department of Fisheries, Government of Tamil Nadu. From April 15<sup>th</sup> to May 31<sup>st</sup> for about 45 days trawlers' fishing is prohibited. However no such restriction is applicable to traditional fishing. The fishermen in this area prefer to fish in the South side, because of the smooth sea bed and rich shrimp resources in this area; but they are allowed to fish in the South side during the peak season. However they can fish in the North and the East sides at any seasons. However they do not fish in the East segment, because of the unexpected raids carried out by the Sri Lanka Army.

#### Statement of the Problem

As already mentioned in the earlier part of this paper, the trawling is one of the mechanized fishing methods,

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#### PLATE NO : 1 MAIN - CATCH IN THE STUDY AREA



(trawler is the fishing craft and trawl is the fishing gear) which exploits large quantity of fishery resources. They are classified into main-catch and by-catch. The former are well grown fish and shrimp items. They are edible, highly valuable and export oriented items (Plate.1). The market price for main-catch in the peak-season is Rs.70 per kg and in the off-season is Rs.25 per kg, at the same time the price of shrimp items is Rs.350 per kg in the study area. Exploitation of main-catch does not create any ecological problem in the sea. Some times this leads to increase the food supply for existing fish stock in the sea and makes more space for other species in the sea. The by-catch is not edible, which contains very small, juvenile or trash fish items and other marine living resources. The by-catch is further divided into by-catch marketable items and by-catch discarded items. The by-catch marketable items (Plate.2) are juvenile or trash fish. They have been used for the raw material of fish feed, fish oil and poultry industries. The market value of by-catch is very less. In the study area it is Rs.2.25 per kg in the peak-season and Rs.2.00 per kg in the off-season. If by-catch marketable items are allowed to grow full span of time in the sea they might have been sold at the higher price or equal to the price of main-



PLATE NO : 2

## BY - CATCH MARKETABLE ITEMS IN THE STUDY AREA



PLATE NO : 3

## BY-CATCH DISCARDED ITEMS IN THE STUDY AREA



catch. The by-catch discarded items are jelly fish, marine plants and other living organisms (Plate.3). They are simply thrown out on the sea shore. There is no consumer or producer market for such species. (In China and Japan jelly fish is being used for certain uses but in India there is no market for jelly fish). However they have the indirect use value (environmental value). They are needed for the balanced ecology in the sea. But the trawler is scooping both by-catch marketable and discarded items from the sea bottom. This is dangerous for the marine environment, fishing community and the fisheries economy. Many studies such as Wassenberg and Hill (1989), Harold F.Upton (1992), David Brewer *et al* (1996), Evans and Wahju (1996), Anders Skonhoft (1997), Sathiadhas (2002) and Aaron Savio Lobo (2007) dealt with the resources degradation due to the trawling. These studies are given a framework for the research. Moreover no such research, especially, exploitation of by-catch discarded items was done in the Thoothukudi fishing harbour. Therefore, an attempt has been made to highlight the exploitation of by-catch including discarded items due to the operation of trawlers in the Thoothukudi fishing harbour of Tamil Nadu, India.

### Objectives

- To quantify the marine resources exploitation due to the operation of trawling in the Thoothukudi fishing harbour.
- To identify the species of by-catch in the trawling and to estimate the catch and by-catch ratio.

### Data and Methodology

This study is based on the primary data. The data was collected from the Thoothukudi (Tuticorin) fishing harbour, which is one of the major fishing harbours in Tamil Nadu. At present 220 different trawlers are fishing from this harbour. All the trawlers are registered in the Regional Fisheries Department, Thoothukudi. In the present study the trawlers have been classified in to three categories *VIZ.*, Low horse power (LHP) trawler, Medium horse power (MHP) trawler and High horse power (HHP) trawler. The sample size was 50 percent from each category by simple random sampling method. The sample size has been decided by the field experience in the one year of 2006-2007 both peak and off seasons. Since the population is less, initially it was decided to go for census method by different phases. In the first

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**Table 1.** Species of By-catch Marketable items and their Share

Name of the Species (By-catch marketable)	Average Length (cms)	Possibility to Grow (cms)	Share in the Total (%)
Silver Bellies	7.10	14	27.12
Sardines	11.30	20	2.36
Half Beak	17.20	35	0.47
Goat Fishes	8.70	40	4.23
Whiting	12.50	44	2.74
Rabit Fishes / Spine foat	8.90	45	0.57
Snapper	7.20	21	2.13
Float Heads	15.05	70	3.55
Emperor / Pigface Bream	6.20	35	1.18
Plotos / Eelcat Bream	7.25	30	3.54
Buffer fish	7.90	32	0.51
Shrimps / Prawns	5.35	32	1.76
Indian Oil Sardine	12.50	20	2.47
Anchovies	8.50	15.5	5.90
Tiger perch	15.00	25	1.17
Crab	7.50	22	4.23
Indian Mackerel	6.00	25	1.17
Thryssa	12.50	21	8.25
Ilsha / Pellona	9.00	16	9.43
Sand Lobster	12.00	25	1.17
Miscellaneous	13.50	22	16.05
Average / Percent age	10.04	29.02	100

phase 25 per cent of the trawlers have been contacted, and in the second phase another 25 per cent of the trawlers have been contacted. The trawlers' workers were asked to give information, because they know about the catch details and area of fishing. The information collected from the respondents in the two phases have been almost same, the variation of the data collected from one particular HP trawler in the two phases were very less and the variation was negligible. Therefore, the sample size was restricted to 50 per cent (110 trawlers) of the total trawlers. The collected information has been analysed by percentage, ratio and then presented in the tables.

**Table 2.** Craft-wise Annual Main-catch and By-catch Ratio and Overall Ratio

Trawlers	Main-catch (kgs)	By-catch (kgs)	Ratio
LHP Trawler	1,80,890	3,24,130	1:1.79
MHP Trawler	2,08,430	3,90,478	1:1.87
HHP Trawler	2,22,340	4,80,057	1: 2.16
Total / Ratio	6,11,660	11,94,665	1:1.95
Average / Ratio	2,03,887	3,98,222	1:1.95

## LIMITATIONS OF THE STUDY

The study was based on the cross section data of one year. From that alone the inferences have been drawn. Therefore it is not dynamic analysis. The present study is equating 'by-catch' for environment, the other ills caused by the trawling such as pollution (oil and noise) and loss of bio-diversity are excluded in the study.

## RESULTS AND DISCUSSION

Trawler is the fishing vessel that exploits both main-catch and the by-catch. It is unavoidable in the trawling. The by-catch includes both by-catch marketable items and by-catch discarded items. In the total by-catch (Table - 2) the discarded items are only 0.5 percent and rest of the items are marketable items. Among the marketable by-catch the Silver Bellies were in large quantity (27.12 per cent) followed by the Ilsha/ Pellona (9.43 per cent), Thryssa (8.25 per cent) and Sardines, Indian Oil Sardine, Anchovies, Goat fish and Rabbit fishes/Spine foat. The miscellaneous items are 16.05 per cent in the total marketable items (Table.1). The average length of such items was 10.04 cms, however, the maximum possible length was 29.02 cms (the maximum length of these species taken from standard books). It means that the by-catch marketable items can grow two fold if they are in the sea. Unfortunately these species are scooped from the sea by the trawling. It is higher in the prawn trawl. In the study area during the peak-season from 1st June to 15<sup>th</sup> September they use both prawn trawl and fish trawl for fishing. The rest of the months are off-season for fishing. During this period they use only fish trawl for fishing. In the peak-season the main-catch and by-catch exploitation ratio in the prawn trawling is 1: 3.15 and fish trawling is 1:1.45. It shows that the prawn trawling is more responsible for marine environment degradation; In order to catch 1kg of shrimp items, the trawler is exploiting 3.15 kgs of other marine living resources (by-catch). On the other hand, to catch 1kg of fish items the trawler scoops 1.45 kgs of by-catch. In the off-season only fish trawls are used for fishing in the area, so main-catch and by-catch exploitation ratio is only 1:1.4. The overall main-catch and by-catch exploitation ratio is 1:1.95 (Table.2). In the total landing the by-catch discarded items are also one of the parts, even though their quantity in the total by-catch is very less, it should not be ignored, because they have indirect use value; they are destroyed by the trawling. The major discarded items are jelly fish, marine plants and many other unknown and unnamed marine living organisms. When compared to the other fishing centers in India, the by-catch exploitation in the Thoothukudi fishing harbour is less. This is because of the restricted fishing times for the trawlers operation. Fishing time for trawlers is 5AM to PM and staying more than one day in the sea has been restricted by the Regional Fisheries Department, Thoothukudi, because in this district there

are totally 21 fishing villages along the coast. Except this fishing harbour other 20 villages are fishing by traditional methods and mechanized gill netters. To protect the traditional fishermen and fishing methods in this district, the fishing time is restricted for trawling; there is no such time restrictions for traditional fishing in this district. If the trawlers are allowed to fish at their own they might scoop more trash fish and discarded items than the present. From this study it is understood that the time restriction is also one of the ways to reduce the exploitation of by-catch.

## CONCLUSION

Innovation and modernisation in fishing is paramount important for the development of the fisheries sector. In the Thoothukudi fishing harbour, still there is a excess capacity fishing facilities, hence there is a possibility to increase more fish units. Maximum utilization of the facilities in the fishing centre will enhance the income of the fishing community and fishery sector of the state. At the same time, sea is a "Open Access Resource", fishing is a right. But over fishing and destroying by-catch are not a so, measures have to be taken to catch the maximum amount of fully grown fishery items (main-catch) with minimum exploitation of by-catch. It is the optimum way of the operation of trawlers. So the eco-friendly fishing gear and By-catch Reduction Devices (BRD) should be invented and the fishermen should be encouraged to use the same.

## NOTE

1. The trawler is a modern and fully mechanized fishing vessel, which operates with the trawl net. It contains all the facilities such as engine room, fish hold, storage facility and a suitable size winch.
2. Gear is the net used in the mechanized fishing vessels. The trawl is the net used in the trawler. It is wide mouthed and dragged along the sea bed. The fish trawl is used to catch the fish items, which is operated just above the sea bed. The prawn net is used to catch the shrimp items, which is dragged in the sea bed.
3. The LHP trawlers are the fishing crafts where the engine capacity is less than 100 HP or the length of the boat is 32 feet or less. The MHP trawlers are the boat with engines of 100 HP to 150 HP or the length of the craft is between 32 feet and below 50 feet. The HHP trawlers are the boats with engines of 150 HP to 200 HP or the length of the trawler is 62 feet and above. In the present study the crafts are classified on the basis of the horse power of the engines used in the crafts.

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