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Low Value Fishes for Nuritional Security : The Case with Trawl Landings in Kerala

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ABSTRACT

Fisheries over the years have evolved from subsistence fishing towards a capital intensive enterprise. There has been structural transformation in the fishing fleet with motorization and mechanization. The current scenario of marine fisheries in terms of fishing fleets clearly indicates a situation "too many boats chasing too few fishes". Due to the tragedy of commons in operation, increasing fleet size and costs of fishing and the decreasing catch per unit efforts, the fishing operations have taken a toll. The mechanised sector is venturing into multi day fishing which negate the losses of fishing cost. Sizeable amount of low value fish's lands across the landing centres on account of the targeted fishing; Low value fishes include juveniles, by catch, trash fishes and discards and it is estimated that around 30 per cent of the mechanised landings constitute low value fishes which has a huge untapped economic value. Economic loss due to low value catch can cause serious environmental threats that could be reduced by implementing mesh-size regulations to avoid juvenile catch, prevent discards and utilizing by catch. Appropriate utilisation strategies are to be developed with respect to discards, regulating multi-day fishing operations or innovative measures may be adopted to land the catches on frequent intervals. There exists a huge consumer demand on account of the escalating domestic market prices of fish. The paper focuses on the targeted fishing and resultant huge amount of by catch / low value fishes / trash fishes which possess a huge economic value which are being surpassed. The paper estimates the quantum of low value fish across the different fishing sector and the present level of marketing. The paper suggests the possible policy intervention required for harnessing the market for the low value fishes.

FISHERIES sector is gaining importance on account of being the fastest growing food sector in the world. Even in the aftermath of global economic recession and downward trend in the agricultural productivity, the fisheries sector continue to provide livelihood and employment to millions of people and contributes to food security of the country. India's marine capture production increased from 0.5 million tonnes in 1950 to 2.9 million tonnes in 2008 and the export earnings crossed 2 billion dollars . The species composition of the marine landings include small and large pelagics, demersal finfishes, shrimps and cephalopods. Among the maritime states in India, Kerala occupies the foremost position in marine fish production, accounting for about 20 per cent of the total landings. Fish production in the marine sector of Kerala over the last 10 years presents more or less a stagnant trend with a decadal average of 5.88 lakh tonnes. The mechanised sector is venturing into multi day fishing, which negates the losses of fishing cost. Sizeable amount of low value fish's land across the landing centres on account of the targeted fishing (Sarah *et al*, 2007); Low value fishes include juveniles, by catch, trash fishes and discards and it is estimated that around 30 per cent of the mechanised landings constitute low value fishes which has a huge untapped economic value. In 2003, nearly 2.7 lakh tonnes of low value fishes, which constitute 10–20 per cent of trawl catch in India were landed (Zynudeen, *et.al*, 2004 and FAO, 2005).

Low value or 'trash fish' is a broadly used term that relates fish species, by virtue of their small size or low consumer preference have little or no commercial value (Dayton *et al*, 1996). The term is not really appropriate in many cases as these fish form the basis of human nutrition in many coastal areas in the country. The term low value/trash fish is often used in different ways throughout India and some confusion exists on what it actually means. It is often used interchangeably with the term bycatch. This incidental catch includes several species of fin and shellfish, which have varying values in the market. In some fisheries, a proportion of this low value/trash fish is discarded overboard (often to make space). Even within the landed catch there are some species whose

size, appearance and consumer preference constrain them from being readily accepted as human food. Once caught, fish are either (i) retained or (ii) discarded. Of those retained, they are either used for (i) human food (in a range of product forms and markets), (ii) livestock/fish food (either fed directly to livestock/ fish or used indirectly through processing into fish meal/oil that is used to make pellets) or (iii) other uses (such as fertilisers) (Kumar and Deepthi, 2006). In general, prices can be used as criteria for considering fish as low value/trash fish (e.g. fish fetching less than Rs.5 per kg).

Due to the tragedy of commons in operation, increasing fleet size and costs of fishing and the decreasing catch per unit efforts, the fishing operations have taken a toll. The domestic prices of fish products continue to spiral up which leads to non-availability of fish products at affordable prices (Sharon *et al*, 2000 and Steve, 2007). But still fish is considered as poor man's protein which is being consumed, by large number of middle-income groups in addition to poor people (Kabahenda *et al*, 2009). Due this demand supply lag, low value fishes are landed and are used for fishmeal preparations or for consumption purposes in local and export markets. For example Puffer fish (*Lagocephalus inermis)* which was a menace to the trawl nets and discarded earlier fetches high price in in local and overseas markets (Rs 40 / kg). The price of low value / trash fish is likely to go up owing to the ever-widening gap between the demand and supply (Simon *et al*, 2005). So there is need to focus on the targeted fishing and resultant huge amount of by catch / low value fishes / trash fishes which possess a huge economic value. The main objectives of this paper is to analyze the quantum of low value fishes landed , to estimate the economic externalities due to the low value fish landings and to suggest policy options for tapping the low value fishes - for edible and non edible purposes.

Material and Methods

Cochin and Munambam harbours were selected in Ernakulam district of Kerala to estimate the quantum of low value fish catches across the different fishing sectors and for evaluating the externalities. These two harbours contribute to more than 75 per cent of the marine fish landings in Ernakulam district. A total of 90 trawlers conducting in multiday fishing trips of 3-4 and 5-6 days duration were drawn randomly from these harbours and the data on craft and gear, species composition of high value and low value fishes, prices and quantities of low value fishes were collected. Conventional analyses were employed to estimate the losses and to evaluate the economic externalities.

Results and Discussion

The general details of fishing regarding the length of craft (feet), engine capacity (HP), depth of fishing (meters), fish holding capacity (tonnes), number of hauls / trip and number of labourers employed are presented in Table I. The average engine capacity and average number of hauls per trip for both type of trawlers were 90-140 hp and 4, respectively. The depth of fishing for multiday trips of 3-4 and 5-6 days was 60 and 80 m, respectively. The fish holding capacity varied across the multiday trawlers.

The total catch per trip was found to be 1.1 and 2.1 tonnes for multiday trips of 3-4 and 5-6 days, respectively. A weighed average of low value fish

Table I

General details of fishing

Parameters	Multi day	
	3-4 days	5-6 days
Av. length of craft (feet)	40-60	>60
Av. engine capacity (HP)	90-140	90-140
Av. depth of fishing (Metres)	60	80
Av. fish holding capacity (tonnes)	6.00	10.00
Av. No of hauls / trip	4	4
Av. No of labourers employed	8	8*

* Normally 10 for Tamil Nadu trawlers operating from Colachel

(discards and bycatch) in Kerala is 25 per cent of the total marine catch. The discards were found to be more for multiday trips of 5-6 than 3-4 days. For the multiday trips of fishing of more than 5-6 days, the discards are thrown for the first three days and the rest will be landed to the shore, whereas, in multiday trips of 3-4 days, they will bring maximum catches to the shore. The limited fish hold capacity of the trawlers is the main reason for discards. The discards and bycatch were estimated at 275 and 600 kg per trip per trawl for multiday trips of 3-4 and 5-6 days, respectively. The bycatch, which includes trash, juveniles and damaged fish is 400 kg per trip per trawl for multiday trips of 5-6 days. The trash landings, which is used for fishmeal, is more for both types of fishing when compared to juveniles and damaged fish. (Table II).

TABLE II

Quantum of total catch and bycatch (kg / fishing trip)

Characters	Multi day	
	3-4 days	5-6 days
Total catch per craft per trip	1100	2100
Discards and bycatch (kg)	275	600
1) Discards (kg)	75	200
2) Bycatch (kg)	200	400
a) Trash (kg)	120	240
b) Juveniles (kg0	60	120

Species composition of total catch : The species composition includes shrimps, mackerels, threadfin breams, perches and scads. Total value of catch was Rs. 1.1 and 1.9 lakh for multiday trips of 3-4 and 5-6 days, respectively. Shrimp catches accounted for the maximum revenue in both types of trawlers with revenue of Rs 2.3 lakh / tonne when compared to other fish species. Details about the quantities and values of fishes are presented in Tables III and IV.

Composition of low value fishes: Low value fishes include discards, bycatch, juveniles, trash fishes and damaged fishes. Discards which has no value comprised of Sea shells (Gastropods), Chilly (Squilla), Sciaenids, Red nund (*Charybdis smithii*) and Kurichi (Silver bellies). Juveniles include Threadfin breams, Shrimps, Anchovies, Crabs, Lizard fish (*Saurida tumbil*), Sardines and Mackerels. Bycatch includes Threadfin breams, Mackerels, Sardines and Lizard fish (*Saurida tumbil*). Trash fishes which are mainly used for fish meal include Puffer fish (*Lagocephalus inermis*), Uluvachi, Udathodu, Clathy (*Odonous niger*), Myctophids and Kora (O*tolithes* sp). Damaged fish fetches a low value on account of freshness and abrasion when compared to good quality fish.

TABLE III

Species composition of catch / trip / craft (MD 3-4 days)

Species	Qty. (t)	Value / tonne (Rs. Lakhs)	Total values (Rs. Lakhs)
Shrimps	0.35	2.38	0.83
Mackerels	0.20	0.313	0.06
Threadfin breams	0.20	0.23	0.04
Perches	0.20	0.30	0.06
Scads	0.10	0.25	0.02
Trash fish	0.20	0.07	0.01
Others	0.20	0.35	0.07
Total	1.10	–	1.10

TABLE IV

Species composition of catch / trip / craft (MD 5-6 days)

Species	Qty. (t)	Value / tonne (Rs. Lakhs)	Total values (Rs. Lakhs)
Shrimps	0.60	2.38	1.42
Mackerels	0.20	0.31	0.06
Threadfin breams	0.20	0.22	0.04
Perches	0.20	0.30	0.06
Scads	0.12	0.25	0.03
Trash fish	0.36	0.07	0.03
Others	0.44	0.60	0.26
Total	2.12	–	1.91

Externalities in trawl operations due to low value fishes : There exist positive and negative externalities in the trawl fishing operations with reference to low value fishes. Discards are thrown back due to non realization at the landing centres. Bycatch that includes trash fish, damaged fish and juveniles are brought back to the landing centers because of its economic utilities. Thus, the low value landing possesses considerable incentives (positive externalities) and disincentives (negative externalities) (Fig. 1). The positive and negative externalities have been calculated to find net economic losses due to low value fish catch. Damaged fishes are marketable but at very low price. Juveniles of many commercial fishes are being sold at less than Rs.10 / kg. If it is harvested at the table size or with superior quality or caught in proper gears, it may fetch a higher price. So the negative externality was calculated with regard to discards, damaged fish and juveniles. Trash fishes, which have been discarded earlier fetching good market price now and it is being used for fish meal which has generated an incentive. Based on the incentives and disincentives, the net economic loss/gain by trawl fishing and the landings of low value fishes are worked out.

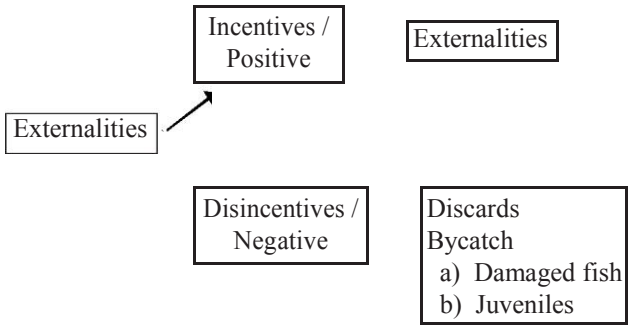

Fig. 1. Extenalities in trawl fishing due to low value fishing

Economic disincentives due to discards : The average catch per trawl per trip was 1.5 tonnes for which the discards accounted for more than 10 per cent . The discards per trip was 150 kg and valued at Rs.6/kg. Thus, the economic disincentives due to discards was Rs.900 / trip (Table V). The average intrinsic externality / year / trawl due to discards was Rs.90000 for around 80-100 fishing trips per annum.

Economic disincentives due to bycatch : The average bycatch landed per trip per trawl was 0.2 tonnes consisting of 90 kg of juveniles per trip per trawl valued at Rs.10 / kg. Thus the price realization to juveniles was Rs.900 per trip per trawl. The price which can be realized at attaining a table size be Rs.25 / kg and the economic incentive will add to Rs.2250. Thus the economic disincentive due to juveniles was Rs.1350 / trip/ trawl. The damaged fish landed per trip per trawl was 30 kg valued at Rs.20/kg. The price realization if harvested at the table size or with superior quality or caught in proper gears would have been Rs.50 / kg and economic benefit would be Rs.1500 per trip per trawl. So the economic loss due to damaged fish was Rs.900 / trip / trawl. (Table V).

Economic incentives due to use of trash fish : In the past, trash fish has been discarded into the sea due to non realization of value at the landing centres. trash fish is used for fishmeal and it is being sold at Rs.5 / kg. Trash fish per trip per trawl was 180 kg. Thus the economic benefits is worked out at Rs.900 / trip / trawl

Net economic loss due to low value fishes : The economic disincentive due to trawl fishing was found

TABLE V

Total economic disincentives due to bycatch and discards

Low value fish	Economic loss per trp per trawl (Rs.)
A. Discards	900.00
B. Bycatch	2250.00
a) Juveniles	1350.00
b) Damaged fish	900.00
C. Total	3150.00

to be low value fish was Rs.3150 / trip / trawl. (Table V). The economic incentives due to low value fishing were Rs.900 / trip / trawl. Thus the net economic disincentive due to low value fish per trip per craft was Rs.2250.

Price comparisons of juveniles and adults of commercial fishes : The landing centre prices of juveniles and adults of commercially important fishes are worked out and presented in Table VI. The difference in prices indicate the vast scope of enacting regulatory mechanism thereby preventing the juvenile catch.

The low value fish has been discarded totally due to its low consumer preference, size and its appearance. But now trend has been changed. Low value fish is being used for fishmeal, export purpose and for meeting the domestic consumption needs. Externalities of low value fishes created multiplier effect in terms of employment generation and revenue realization in the secondary and tertiary sector. But still economic disincentive is more than incentives due to its low usage. The diminishing catches of high value fishes and increased consumer demand offer vast scope for reaping the economic benefits from low value fishes.

TABLE VI

Average landing centre price comparisons of juveniles and adults (Rs. / kg)

Fish species	Juveniles	Adults	Difference
Thread fin breams	25	37	12
Shrimps	66	237	182
Anchovies	28	65	37
Crabs	19	35	16
Lizard fish (*Saurida tumbil*)	15	40	25
Sardines	11	20	9
Mackerals	20	31	11

The problems in low value fish utilization includes low marketable surplus, lack of reaping economies of scale, low price realization, limited number of marketing functionaries, lack of domestic consumer demand, lack of knowledge in processing and geographical limitation. There is need for policy interventions to alleviate these problems and to properly harness economically optimum usage of low value fishes.

The main cause of low value catch in fisheries is the non-selectiveness of the fishing gear and very small size of mesh. So there is need to regulate the mesh size to avoid juvenile catch and develop adequate utilisation strategies for the usage of the discards. Multi-day fishing operations should be regulated and innovative measures may be adopted to land the catches on frequent intervals. Traditionally functioning boats can be engaged as carrier boats to land the fish which would otherwise turn as discards. There is a need to create awareness among fisher folk regarding the consequences of juvenile catches and corrective measures may be adopted to discourage such catches by mechanised boats.

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