Journal of Fisheries International 7 (2): 46-50, 2012
ISSN: 1817-3381

Exploitation of Marine Perciformes Fishery Resources off Tuticorin, Gulf of Mannar

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Abstract: Tuticorin is an important marine fish landing centre in India. This study was carried out between the months of June, 2008 to May, 2010. The fishes which belong to perciformes order were taken up for this research. The average annual catch of teleosts during the period 2008-2010 was 33808.1 tonnes. Perciformes contribute major teloest catches 64.2% (23658.34 tonnes) and 63.06% (23341.02 tonnes) for the period of 2008-09 and 2009-10, respectively. The perciformes fishery distinguishes with 41 families that come under 9 orders. The important families Carangidae (13.98%), Lethrinidae (5.565%), Leiognathidae (8.29%), Nemipteridae (5.33%), Scombridae (6.56%) and Sphyraenidae (5.25%) were noted. *Selar crumenophthalmus*, *Lethrinus nebulosus*, *Leiognathus dussumieri*, *Nemipterus delagoae*, *Rastrelliger kanagurta* and *Sphyraena jello* were contributed in a peculiar level on perciformes fishery.

Key words: Perciformes, gulf of mannar, carangidae, leiognathidae, glass fishes, India

INTRODUCTION

Humans have been exploiting marine coastlines for millennia. At first, people may have been gathering invertebrates and harpooned or otherwise caught larger vertebrates such as fishes, turtles, marine mammals only as they swam inshore. Of these larger vertebrates, only those that had narrow coastal ranges were affected by such exploitation and incurred the risk of being overfished. The development of better fishing vessels with greater ranges subsequently enabled people to exploit resources further offshore. However for a very long time, distance offshore and storms (or the likelihood of storms) continued to prevent the exploitation and hence, the overexploitation of most marine species. This is the reason for the perception that fisheries were sustainable in the past and by extension that contemporary artisanal fisheries and fisheries conducted by aboriginal peoples are sustainable whatever gear they may deploy (Pauly *et al*., 2002). The growth and expansion of European fishing fleets in the 17 and 18th century did not affect this perception even when their exploitation, e.g., of cod in the North Atlantic, affected the stocks so much that localized depletions occurred (Rosenberg *et al*., 2005). Perciformes also called the Percomorphi or Acanthopteri is the largest order of vertebrates containing about 40% of all bony fish. Perciformes means perch-like. They belong to the class of ray-finned fish and comprise over 10,000 species found in almost all aquatic environments. It contains about 160 families which is the most of any order within the vertebrates. The average annual production of major perches in the country during 1990-98 period has been estimated as 23,732 tonnes forming 17% of the total perch catch and roughly 2% of the total fish production in the country. These are exploited mainly by trawl nets, hook and line, gill nets and the perch traps, though there is no targeted fishing for these resources except for the hook and line fisheries in vogue along Kerala and Tamil Nadu coasts and recently in Karnataka (Zacharia *et al*., 1997). A perusal of the annual production statistics of major perches in the country during 1990-98 shows that it is steadily on the increase with a minimum of 11,319 tonnes in 1990 to a maximum of 35,948 tonnes in 1998. There is an organised fishery for major perches in Tamil Nadu along the Gulf of Mannar and the Wadge Bank using both mechanised as well as non-mechanised traditional methods. The annual estimated catch of major perches here varying from 5114-17,863 tonnes during 1990-98 periods is contributed by pigface breams (63%), rock cods (23.8%) and snappers (12.3%) in the order of abundance (Mathew *et al*., 2000). Peak season of abundance for perch fishery along the Tamil Nadu coast is from December to April, although good catches are recorded throughout the year.

In Tuticorin, during the year 1998 estimated total catch of major perches from this centre was 5055 tonnes exploited from the near shore rocky areas and islands or

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paars from depths extending to 50 m. Perches form about 10.9% of the total marine fish landings by traditional gear at Tuticorin (Sam and Arumugham, 1994). Except during November and December when turbulant conditions prevailed due to North East monsoon, fairly good catch of perches was recorded in all other months. Hooks and lines are the most important traditional gear, operated for fishing large sized perches which constitute 45-50% of the total fish catch from this gear. Hooks and lines are ideally suited for fishing the perches distributed over wide areas. Long line units popularly known as ayiramkal thoondil accounted for >45.8% of larger perches. Nearly, 75% of the perch catch landed here is from the mechanised trawlers. The gear wise fishery for perches at Tuticorin is described by Sam and Arumugam (1994). Studies on the perch fishery at Tuticorin were made by Mathew (1994) and Hamsa and Kasim (1992). Though, there is a clear cut seasonal preponderance of perches at Tuticorin, the months of peak abundance are from December to April (Sam and Arumugham, 1994). The pig face breams or *Lethrinus* sp., contribute 62% of the total perches from all the gears put together followed by rock cods 14.7% and snappers 9.12%. State wise, the highest share was from Tamil Nadu (49.5%), followed by Kerala (19.7%), Gujarat (11.3%), Maharashtra (7.5%), Karnataka 6.4%) and Andhra Pradesh (5.3%). Along the coasts of Orissa and West Bengal, the fishery for these resources is very negligible. In the Gulf of Mannar, perches contributed to 21% of the catches, snappers being the most dominant, followed by rock cods and pigface breams. The most productive areas for perches here were at depths up to 50 m and this resource was fairly abundant during the first half of the year at depth up to 50 m. Fairly dense populations of perches were available during April to September period in the 51-100 m depth zone. From the North Eastern region, 91% of the total perches caught were from the 51-100 m (Mathew, 1994).

Table 1: Different families of fishes contributing to the exploited marine perciformes fishery resources of Tuticorin during 2008-2010

Order	Sub-orders	Family	Percentage of landings (2008-2010)
Perciformes			
	Acanthuroidei	Acanthuridae	0.4000
	Labrodei	Siganidae	0.7950
	Mugilloidei	Scaridae	1.0550
	Percoidei	Mugilidae	0.1700
		Ambassidae	0.0005
		Apogonidae	0.0500
		Carangidae	13.9800
		Centropomidae	0.2250
		Chaetodontidae	0.0500
		Coryphaenidae	0.0750
		Drepanidae	0.2750
		Echeinidae	0.0250
		Emmelichthydae	0.2150
		Gerridae	0.2950
		Lactaridae	0.6100
		Lethrinidae	5.5600
		Leognathidae	8.2900
		Lobotidae	0.0150
		Lutjanidae	1.6350
		Menidae	0.1200
		Mullidae	3.2500
		Nemipteridae	5.3300
		Platacidae	0.0300
		Pomadasydae	0.5950
		Pomacanthidae	0.4000
		Priacanthidae	0.3800
		Rachycentridae	0.4850
		Scatophagidae	0.0650
		Sciaeneidae	1.8800
		Serranidae	2.2600
		Sillaginidae	1.2250
	Polynemoidei	Teraponidae	0.4500
	Scombroidei	Polynemidae	0.1850
		Gemphylidae	0.0850
		Scombridae	6.5850
	Sphyraenoidaei	Trichiuridae	0.7750
	Stromateoidei	Sphyraenidae	5.2500
		Ariommidae	0.1350
	Xiphioidei	Stromatidae	0.1500
		Istiophoridae	0.2700
		Xiphidae	0.0015

MATERIALS AND METHODS

Tuticorin is one of the important fish landing centres where major perches exploited from the Gulf of Mannar by both mechanised as well as traditional crafts. Fishing methods being practiced in the reef areas of the Gulf of Mannar for fin fishes are trawling, gill netting, fishing by hooks and lines and traps. Out of these, the most important device is trawling by which the most diverse and the highest quantity of fin fishes are being landed from coral reef areas in this region. This study carried out between the months of June, 2008 to May, 2010. The landed fishes were identified based on their morphological characters. The families which belong to perciformes order only considered for this study. The Perciformes constitutes major landings in marine teleost fishery along the Tuticorin coast. According to Mathew *et al.* (2000), the majority of perch catches in Gulf of Mannar were landed only in this fishing centre. The total weight of each family under perciformes was noted for every month during the study period. The annual catch was calculated and the percentages of each family were shown in Table 1.

RESULTS AND DISCUSSION

The order Perciformes include pelagic and demersal fishes with distribution ranging from coastal to oceanic waters. The average annual total catch of bony fishes during study period was 36828 tonnes. Among them the order Perciformes constitutes 64.2% (23658.34 tonnes) and 63.06% (23341.02 tonnes) for the period of 2008-09 and 2009-10, respectively. Other notable catches belongs to

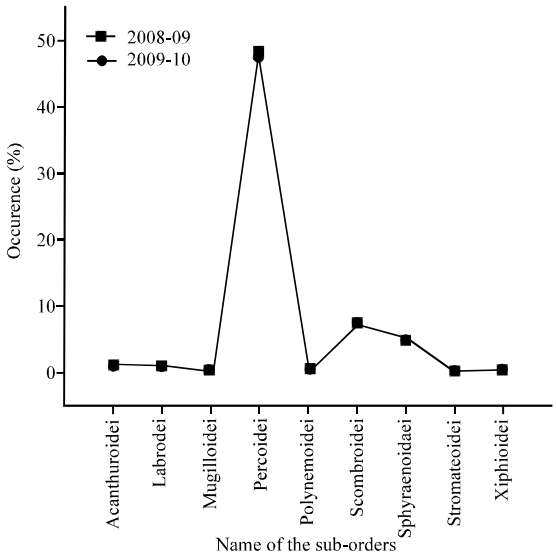

Fig. 1: Percentage of occurrence of sub-orders under the order perciformes

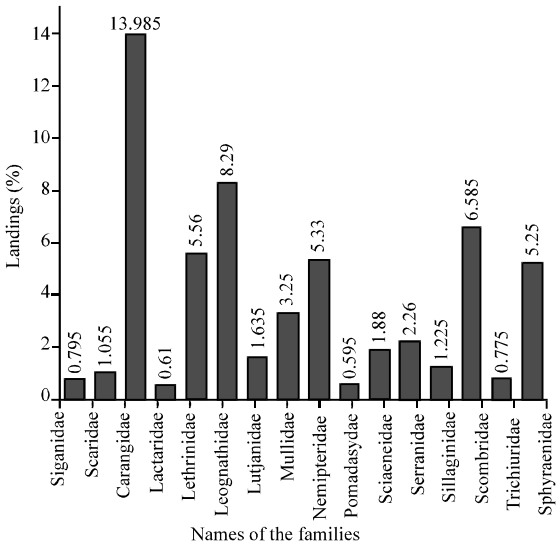

Fig. 2: Perciformes families landed with the value of >0.5%

the following orders such as Beloniformes, Clupeiformes, Myctophiformes and Tetradontiformes. The landed perciformes fishes include 9 orders (Fig. 1) which hold 41 families (Table 1). The major representatives were Carangidae, Lethrinidae, Leiognathidae, Nemipteridae, Scombridae and Sphyraenidae (Abdussamad *et al*., 2006).

Carangidae: Carangidae forms 13.98% of the total perciformes production with an annual average catch of about 3285.26 tonnes. Carangidae fishery was notified by catches belongs to 47 species and 19 genera. Most dominant species in the fishery are *Atule mate*, *Caranx carangus*, *Caranx ignobilis*, *Decapterus russelli*, *Gnathanodon speciosus*, *Selaroides leptolepis*, *Selar crumenophthalmus*, *Scomberoides commersonianus* and *Megalapsis cordyla*.

Leognathidae: Silver bellies constitute 8.29% of the total perciformes production with an average annual production of 1948.12 tonnes. Fishery was supported by 12 species of the genera, Leiognathus, Gaza and Secutor. Most dominant species in the catch were *Leiognathus dussumieri*, *L. barbis*, *L. bindus* and *Gaza minuta*.

Lethrinidae: Pigface breams constitute 5.56% of the total catch with an average annual production of 1306.58 tonnes. Fishery was supported by 6 species and dominated by *Lethrinus nebulosus*. Others in the fishery are *Lethrinus miniatus*, *L. harak*, *L. ornatus*, *L. lentjan* and *L. kallopterus*.

Lutjanidae: Snappers constitute 1.64% (385.39 tonnes) of the total catch. Fishery was supported by species of the genera Lutjanus, Macolo and Pristipomoides. Common species in the fishery are *Lutjanus rivulatus*, *L. fulviflammus*, *L. argentimaculatus*, *L. johni*, *L. russelli*, *L. lineolatus* and *L. vaigiensis*.

Mullidae: Goatfishes form 3.25% of the marine perciformes fish catch with average annual production of 763.74 tonnes. Fishery was supported by species of the genera Parupeneus, Upeneus and Mulloides. Fishery was supported mainly by *Parupeneus indicus* and *Upeneus bensasi*.

Nemipteridae: Threadfin breams (*Nemipterus* sp.) and monocle bream (*Scolopsis* and *Parascolopsis* sp.) together form 5.33% of the total marine perciformes fish production with an average annual catch of 1252.53 tonnes. About 61% of the catch was supported by threadfin breams and the fishery was represented by *Nemipterus delagoae*, *N. japonicus* and *N. mesoprion*. Fishery of monocle bream was supported mainly by *Scolopsis bimaculatus* and *S. bilineatus*.

Sciaenidae: Croakers form 1.88% (441.79 tonnes) of the fish catch. Fishery was bear up mainly by *Otolithes ruber*, *Nibea maculata*, *Protonibea diacanthus*, *Johnius dussumieri*, *Johnius sina* and *Pseudosciaena coiber*.

Scombridae: Mackerel tuna and seerfish supported the fishery with an average annual production of 1541.58 tonnes. They form 6.56% (Fig. 2) of the total perciformes catch. Mackerel fishery was supported by *Rastrelliger*

kanagurta. Tuna fishery was supported by 7 species, *Euthynnus affinis*, *Thunnus albacares*, *Auxis thazard*, *Auxis rochei*, *Katsuwonus pelamis*, *Sarda orientalis* and *Thunnus tonggol*. Seerfishes fishery was supported by *Scomberomorus commerson*, *S. lineolatus*, *S. guttatus* and *Acanthocybium solandri* (Abdussamad *et al*., 2006).

Serranidae: Groupers represent 2.26% (531.09 tonnes) of the perciformes fish production. The majority of catch was supported by *Epinephelus tauvina*, *E. undulosus*, *Cephalopholis sonneratti* and *Epinephelus malabaricus*. Other species supporting the fishery are *Epinephelus longispinis*, *E. areolatus*, E. *chlorostigma* and *E. bleekeri*.

Sphyraenidae: They form 5.25% of the total catch with an average annual production of 1233.73 tonnes. Fishery was supported by *Sphyraena jello*, *S. barracuda*, *S. picuda*, and *S. obtusata*.

Significant catches from other important families of Perciformes: Surgeon fish (family Acanthuridae-0.4%) fishery was supported mainly by *Acanthurus* sp. Catch of rabbitfishes (family Siganidae 0.79%) was dominated by *Siganus canaliculatus* and *Siganus javus*. Parrotfish (family Scaridae 1.06%) fishery was supported by several species. Mullets (family Mugilidae 0.17%) fishery was supported by *Liza tade*, *Mugil cephalus* and *Valamugil speigleri*. Fishery of barramundis and seaperches (family Centropomidae 0.23%) was supported by *Lates calcarifer* and *Psammoperca waigiensis*. Dolphin fish (family Coryphaenidae 0.075%) (Fig. 3) fishery was supported by *Coryphaena hippurus* and *Coryphaena equiselis*. Silver biddies (family Gerreidae-0.295%) in the fishery were represented by *Gerres oyena*, *G. filamentosus*, *G. abbreviatus* and *Pentaprion longimanus*. The bulls eyes (family Priacanthidae 0.38%) represented by *Priacanthus hamrur* and black kingfishes (family Rachycentridae 0.49%) noted by *Rachycentron canadum*. Other groups with fishery supported by single species are false trevallies (family Lacataridae 0.61%) by *Lactarius lactarius* (Abdussamad *et al*., 2006). Sand whitings (family Sillaginidae) form 1.22% of total catch and was established by a single species, *Sillago sihama*.

Fishery of threadfins (family Polynemidae-0.19 %) was supported by *Eleutheronema* and *Polynemus* sp. Snake mackerels (family Gempylidae) form 0.085% of the total catch. *Neoepinula orientalis*, *Lepidocybium flavobrunneum*, *Ruvettus pretiosus cocco*, *Thyrsitoides marleyi*, *Thyrsites atun* and *Gempylus serpens* form up the fishery. Hairtails (family Trichiuridae) represent 0.78%

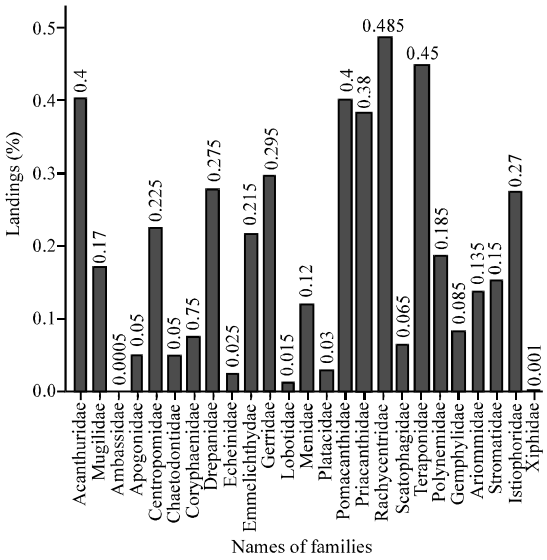

Fig. 3: Perciformes families landed with the value of <0.5%

of the total fish production. Fishery was supported by *Trichiurus lepturus* and *Lepturacanthus savala*. Fishery of Ariommas (family Ariommidae 0.14%) was supported by *Psenes indicus*. Silver pomfret (family Stromateidae 0.15%) fishery was supported by *Pampus argentius* and *Pampus chinensis*. Billfishes and marlins (family Istiophoridae 0.27%) in the fishery are represented by *Istiophorus platypterus* and *Makyra indica*. Sword fishes (family Xiphidae 0.002%) in the fishery were represented mainly by *Xiphias gladius* and occasionally by *Tetrapturus brevirostris*. The other perciformes families and their percentage of occurrence in this study were Ambassidae (0.0005%) Apogonidae (0.05%), Chaetodontidae (0.05%), Drepanidae (0.275%), Echeneidae (0.025%), Emmelichthyidae (red baits) (0.215%), Lobotidae (0.015%), Menidae (0.12%), Platacidae (0.031%), Pomadasydae (0.595%), Pomacanthidae (0.47%), Scatophagidae (0.0651%) and Teraponidae (0.45%).

A survey conducted by Somavanshi and Bhar (1984) in the Gulf of Mannar reported that major perches contributed 21% of the catches here, snappers being the most dominant, followed by rock cods and pig face breams. The most productive areas for perches here were in the depths up to 50 m. From the studies made on board FORV Sugar Sampada, on the South Eastern parts of the Indian EEZ, this resource was fairly abundant during the first half of the year at depths up to 50 m. Fairly dense populations of perches were available during April to September period in the 51-100 m depth zone (Mathew *et al*., 1996). Good perch grounds were located in the shallow coastal waters up to 50 m depth

off Cuddalore, Pondicherry and catch rates up to 350-400 kg h^{-1} were obtained in 51-100 m depths off point callmer and off madras (Mathew *et al*., 1996). Production of perches could be enhanced further by introducing traps and intensifying fishing with hooks and line in the 75-100 m depth zone off the South West coast at depths of 35-65 m in the Gulf of Mannar and Northeast region of the wadge bank, also at depths 91-125 m along the North West coast which are abundant in perches (Mathew *et al*., 2000). Nearly, 75% of the perch catch landed here is from the mechanised trawlers. Though, there is a clear cut seasonal preponderance of perches at Tuticorin, the peak abundance is from December to April. Pigface breams or *Lethrinus* sp., contribute 62% of the total perches from all the gears put together followed by rockcods 14.7% and snappers 9%. A seasonal hooks and line fishery for perches at Pamban has also been reported. During December to March, the Tuticorin fishermen migrate to Pamban and operate hooks and lines in areas of coral reefs off Dhanushkodi at depths 18-25 m. *Lethrinus* sp. (34%), *Lutjanus* sp. (23%), *Epinephelus* sp. (6.9%), *Pristipomoides* sp. (4.7%), *Plectorhynchus* sp. (4.7%) were the important perches landed along with sharks (9.6%) and rays (8.4%) (Mathew, 1996).

ACKNOWLEDGEMENTS

The researchers highly grateful to the Director, CMFRI and Scientist in Charge of Tuticorin Research Centre of CMFRI for their encouragement and support throughout the study period.

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