

MARINE BIODIVERSITY CONSERVATION AND MANAGEMENT

Edited by

N.G. Menon and C.S.G. Pillai



ICAR

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

TATAPURAM P.O., COCHIN-682 014

1996

IX. IMPACT OF BOTTOM TRAWLING ON EXPLOITED RESOURCES

N.G. MENON

Central Marine Fisheries Research Institute, Cochin - 682 014

Today's Indian marine fisheries face challenging problems in trying to achieve the kind of sustainability that will assure its own long-range survival.

INTRODUCTION

The fast technological developments have transformed a subsistence oriented traditional Indian marine fisheries into a market oriented, semi-industrial sector, with tremendous growth in fish production which in turn has increased the total revenue in terms of national and foreign currency. The modern harvesting technology along with the rising demand for Indian marine products abroad helped the fish producers to reap the vast expanse of coastal waters, sometimes even beyond the sustaining level. Despite the advances in the harvesting sector, the production swings around 2 million tonnes during the past two decades, with only marginal annual increases. Assessment of the stocks of major exploited resources from the coastal waters have also revealed optimum harvest or in some cases over harvest and therefore warrants immediate management measures. Thus today's Indian marine fisheries face challenging problems in trying to achieve the kind of sustainability that will assure its own long-range survival.

The introduction of mechanised trawlers in the early sixties to our coastal fisheries was received with enthusiasm because of the high returns. The mechanised bottom trawling became widespread all along the trawlable coastal grounds of Indian waters and established as one of the most dominant fishing techniques, especially to exploit target resources from the sea bottom. Their incessant operation in a climatically limited coastal habitat has slowly resulted in disproportionate destruction of non-target groups too along with juveniles/sub adults

of heterogenous species of commercially important shell fishes and finfishes and a wide spectrum of benthic organisms, most of which have low or currently no edible and economic value, but vital in the food web of all exploitable resources. In addition to the target resources (shrimps or cephalopods) the bottom trawling have been yielding shell fishes and finfishes of economic importance to the tune of 1 : 3.6 ratio (Average of 1985-90 in Karnataka, Kerala and Tamil Nadu) and in edible biota and juveniles of shell fishes and finfishes at a ratio of 1 : 0.15. Finfish component has accounted for the major share in the bottom trawl landings which is caught unintentionally, and being a less priority item it is generally thrown overboard invariably, especially so in cases of stay over fishing extending to 2 or more days. This post harvest loss to capture fisheries and habitat alteration and diversity degradation, as a consequence of excessive bottom trawling, is a matter of grave concern to most of the developed and developing nations and therefore a lot of effort has gone into recover and utilise the by-catch. But quite surprisingly, so far no serious attempt has been made in India to estimate the quality and quantity of this wanton post-harvest wastage of benthic animal diversity, which is essential to assess the effect of coastal bottom trawling on the habitat, its biota, and the interrelationships with fisheries. This seemingly unimportant catch of juveniles, bottom biota needs regular monitoring, estimation and periodic documentation, in order to impress upon the beneficiaries of coastal fish wealth, about the seriousness of biotic devastation. The data for this report was drawn from the National Marine Living Resources Data Centre of Central Marine Fisheries Research Institute and from scattered observations and samplings conducted from selected trawling centres along Karnataka, Kerala and Tamil Nadu during 1985-90. Reliable estimates of total discarded catch is difficult, however an attempt is made to estimate it from the last haul's unsorted catch brought ashore.

MECHANISED BOTTOM TRAWLING

In the coastal waters of Karnataka, Kerala and Tamil Nadu about 5800 small mechanised trawlers (7-14 m overall length) regularly fish mainly for target resources such as shrimps and cephalopods by using

bottom trawl net of 30 m horizontal, 3-4 m vertical mouth opening, a cod end mesh of 18-35 mm and a heavy tickler chain in the foot rope. The estimated bottom area scraped by one trawl unit per day is around 0.3 - 0.5 km². In the total trawl landings of the region the target groups like shrimps (16%) and cephalopods (4%) together constituted only 20% and finfishes 65% and the benthic organisms 15%. Roughly about 1.5% (by weight) of the total landing is composed of juveniles of commercially important food fishes and shell fishes. The quality and quantity of the juvenile/subadult and benthic by-catch depend on the type of trawl net used - shrimp trawl or fish trawl; the target resource - shrimp, cephalopod or fish; the time of fishing - day or night; the nature of the trawling ground - muddy, sandy or rocky; the season - pre- and post-monsoon or monsoon; the prevailing sea condition - calm or turbulent. The bottom fauna caught is generally rich and varied in species composition and more abundant from muddy/sandy grounds than from rocky areas; their catch is invariably more in night operated shrimp trawl than in fish trawl. Based on 1980-84 data the estimated annual average quantity of discarded juvenile/young fish/prawn is around 6200 t. If allowed to grow and attain marketable size, this would have provided 1.55 lakh tonnes of fishes, which is roughly about 10% of the annual average national total catch valued at about Rs. 77.5 crore at the prevailing market rate. Observation made from selected trawling centres showed that the devastation of young fishes/prawns were very serious at Calicut (430 t/year - 1986-88), Bombay (600 t/year), Kakinada (280 t/year), Veraval (530 t/year), Mandapam (610 t/year) and Sakthikulangara (705 t/year). The species composition of young fishes caught at different centres vary : *Parastromateus niger*, *Pampus argenteus*, *Trichiurus lepturus* etc at Veraval; *Cynoglossus* spp, *Nemipterus* spp. etc at Calicut; sciaenids, *Nemipterus* spp Saurids, *Decapterus* spp, perches, silverbellies etc at Cochin and Sakthikulangara.

During 1985-90 period an estimated quantity of about 43,000 t of bottom organisms have been landed annually by the trawlers in the southern region of Karnataka, Kerala and Tamil Nadu, out of which about 81% has accounted for by stomatopods. The actual quantity caught would be higher than what is landed. A very modest estimate

of 1.3 lakh tonnes of unmarketable benthic organisms would have caught annually from the region by trawling. In order to save fishhold space for high-priced items, most of the by-catch is thrown overboard. The discarded by-catch includes many low-valued ground fishes (20 genera), crustaceans (26 genera), gastropods (23 genera), bivalves (15 genera), polychaetes, anemones; sponges, echinoderms (10 genera), gorgonids, ascidians, echiurids, jelly fishes etc, besides the unmarketable juveniles of fishes, prawns, crabs and cephalopods. As the target resources are embedded within a complex web of interrelated species from different taxa coexisting in an environment it would not be possible to isolate any desired animal for exploitation. Therefore by-catch is an inevitable component in trawl fishing, the ratio of which to target resources could only be narrowed by mesh regulations, closure of trawling in shallow coastal grounds and during peak breeding seasons etc. (Bensam *et. al.* 1994).

MINI TRAWLING BY TRADITIONAL OUTBOARD MOTOR BOATS

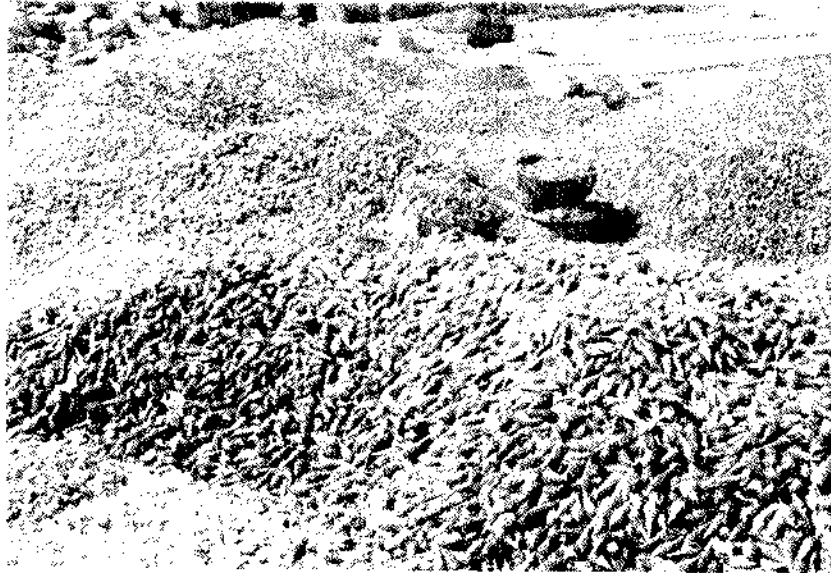
This innovative gear was first introduced by the fishermen of Alleppey district and gradually it spreads to Trichur, Malappuram and Calicut. Used and partially worn out traditional cannoes (Cut into two halves) and old and less efficient outboard motors, which are unsafe for distant fishing, are converted for coastal mini trawling. With the increase in demand for this type of crafts, of late, new units are also being fabricated for this type of fishing. At present about 1600 mini trawls operate along kerala coast. The gear is a mini trawl net of 6 m long with two small (15 kg) otter boards and the cod end mesh varied from 10-20 mm. In 1985-90 period the annual average landing by the gear was 5038 t at a catch rate of 169 kg/unit effort from fishing grounds of less than 15 m depth along Kerala. The catch consisted chiefly of finfishes (57%) and prawn (29%). In the total catch about 10% was constituted by non-marketable bottom organism such as stomatopods, gastropods, crabs, echinoderms, bivalves, polychaetes etc. Mini trawling is restricted to post-monsoon and pre-monsoon months, when the near shore sea is comparatively calm. Generally a large proportion of the catch composed of juvenile/subadults of the finfish (*Cynoglossus*



Trawl bycatch at Neendakara Fisheries Harbour, Quilon



A portion of discarded trawl bycatch of benthic biota



Discarded molluscan shells from trawl bycatch heaped in the Neendakata harbour area



Trawl landing of young silverbellies at Neendakara, Quilon

macrostomus) and prawn (*Parapenaeopsis stylifera*), causing damage to recruitment. The post harvest loss of by-catch including juveniles of commercially important species and many taxa of benthic organisms might also seriously affect the coast-ward feeding migrations and predator-prey relationships of component species in the affected habitats.

REGULATORY MEASURES

The rapid expansion of mechanised trawl net fishing and its increased fishing pressure, preferably in the coastal fishing grounds for target resources, has led to competition between mechanised and artisanal sectors for the same resource. The sharing of the common resource from almost the same grounds has resulted in frequent conflicts of interest leading to violence, carnage and burning of boats. Thus it has become a serious social, law and order problem in many coastal fishing areas. The magnitude and nature of the problem varied from region to region or state to state. Therefore, the State Governments enacted marine Fishing Regulations Acts with the objective to protect the interest of all engaged in fishing, preferably the traditional sector, to regulate fishing pressure for the protection and conservation of fish and to maintain law and order on shore and in sea. Under these Acts trawling is prohibited in coastal waters upto 20 m by small mechanised vessels and upto the limit of territorial waters by large vessels, the minimum size of cod end mesh should be at 35 mm and night trawling is totally banned in Kerala. But often these regulations could not be implemented due to shortage of surveillance facilities and manpower available with the implementing agency. Often the rules are violated by all sectors for economic gains which has resulted in law and order problem and judicial interventions and redressals. Different states have followed different approaches of the problem and there has been no overall strategy for regulating the resource exploitation and sharing of the resources by various sectors. As the problem has several political, social, economic and biological ramifications, the Kerala Government has constituted committees to study the problem and to suggest suitable regulatory measures. The Kerala State Government has banned monsoon trawling in the territorial waters as per the recommendations

of the committee; which itself is an issue of controversy and conflict of opinion between mechanised and traditional sectors.

Since the per capita income of those involved in fishing is registering a continued growth, any amount of appeal to restrict the bottom trawler operations in coastal areas may not yield desired results. Therefore, an awareness should be created among the coastal beneficiaries to rationally exploit the resources for a sustainable income from this sector with due biological considerations over economic considerations. It is also essential to implement some restrictive measures like total ban on mechanised trawling up to a depth of 30 m and motorised trawling upto 20 m; minimum cod end mesh size to 35 mm and discourage the use of tickler chain in the foot rope of trawl net for controlling the habitat alteration, benthic faunastic diversity degradation and recruitment overfishing of commercially important resources.