Assessment of low value bycatch and its application for management of trawl fisheries

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In recent years, large quantities of low value bycatch (LVB) are landed by trawlers for use as fish meal and in fertilizer. Several fish meal plants have been established and high demand for the raw material is acting as an incentive for catching and landing large quantities of LVB. In Karnataka (a coastal state along west coast of India) alone, the annual turnover of fish meal and fertilizer plants is estimated to be around 270 million rupees (= 4.6 million US$).The landed LVB is turning out to be a sizeable income to the trawl operators. There are several concerns related to increasing bycatch of the trawlers. The bycatch is comprised of a high percentage of juveniles of commercially important species, resulting in recruitment overfishing. With the introduction of high speed semi-pelagic trawls, the adults of low-valued, small-sized adult fishes are also removed in large quantities, impacting the coastal marine resources. The current situation demands a robust management plan addressing the issues of the bycatch and in this regard information on quantities, value and composition of lVB landed and/or discarded, and seasonality of the catch are essential.

To collect data on low value bycatch and discards, Mangalore Fisheries Harbour (in the southern coast of Karnataka) was selected. Monthly data on fishing effort, landings and catch composition were collected for four years (2008-2011) from commercial trawlers. The price of catch and bycatch were also collected. The data on landings were segregated as those landed for human consumption and the rest for uses other than direct human consumption, designated as low value bycatch (LVB). Data was also collected from a few trawl operators, who provided information on date, depth, location and time of each haul, net type, mesh size, total catch and discard. Along with this information, an unsorted portion of catch that would have been discarded at sea was collected as sample, which was representative of each haul. The data collected were used for the spatial mapping of juvenile abundance of a few dominant species.

It is estimated that the low value bycatch has substantially increased from 3,100 t in the year 2008 to 30,000 t by 2011. Over the years the discard from the trawl fisheries reduced considerably from 88% to 15%, resulting in landing of the bycatch (Fig.1). Established market linkages for the LVB has helped its efficient utilization and reduction of discards. With increasing number of fish meal plants, the demand for raw material has increased; and catching and landing of LVB is a source of enhanced income to the trawlers. The annual raw material requirement for the fishmeal and fish oil factories in Karnataka in 2012 has been estimated as 60,000 t. With only half of the demand is supplied now, capture and landing of LVB is likely to increase in future.

In the ecosystem and sustainability perspective, incidence of large quantity of juveniles in the trawl bycatch demands intervention of specific bycatch management measures. Analysis of samples showed rich biodiversity of trawl bycatch, constituted by 204 species/groups, of which 95 species were finfishes, 20 belongs to molluscs and 27 were crustaceans. The threadfin bream *Nemipterus randalli* was the major species caught and the period of high incidence of juveniles of the species was during post monsoon months of September and October. Finfishes

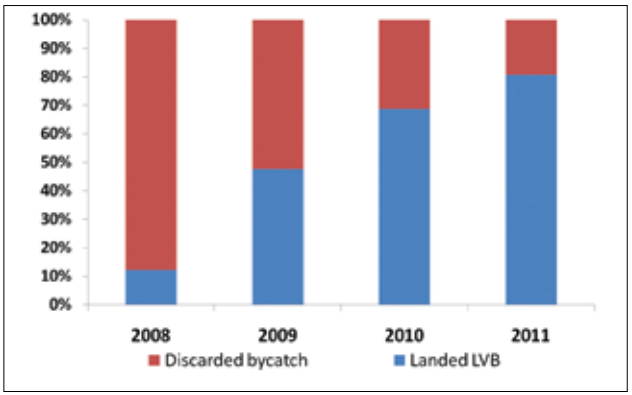

Fig.1. Contribution (%) of landed and discarded LVB by the trawlers of Mangalore Fisheries Harbour during 2008-2011

have more demand from fish meal plants as they form better raw material for fishmeal and fish oil production. During 2008-2009, about 34% of the bycatch by weight and 44% by number were formed by juveniles of commercially important species. These results stress the need for reduction of juveniles of commercial species in bycatch to sustain the stocks.

Information on seasonal availability of juveniles will be helpful in taking management decisions on the months of restriction of trawl operation to reduce the juveniles in trawl bycatch. Closure of nursery/spawning grounds or areas of special biological significance are effective options for reducing juveniles in the bycatch. With the GIS based resource mapping, seasonal and

spatial abundance of juveniles of four key species forming commercial fishery were identified (Fig. 2). This will facilitate establishing spatial restrictions to reduce juvenile capture. Similar maps of juvenile abundance of other key species will be helpful to arrive at conclusions on spatial and seasonal fishing restrictions

Reduced juvenile exploitation not only promotes sustainability of fish stocks, but also increases the profitability of the sector as larger fishes fetch better price. These measures are helpful for ecosystem-based management approaches and more fisheries can be managed through multispecies, multi-objective models with spatial component. To reduce the incidence of juveniles in bycatch, resource maps should be used as an excellent tool for the policy makers. It allows assessment of valuation of fishing grounds in terms of abundance of juveniles and adults. Illustrated maps with seasonal fishing grounds for juvenile exploitation would be a useful tool to educate the fishermen on the importance of protecting the areas of spawning and juvenile abundance if fish stocks.

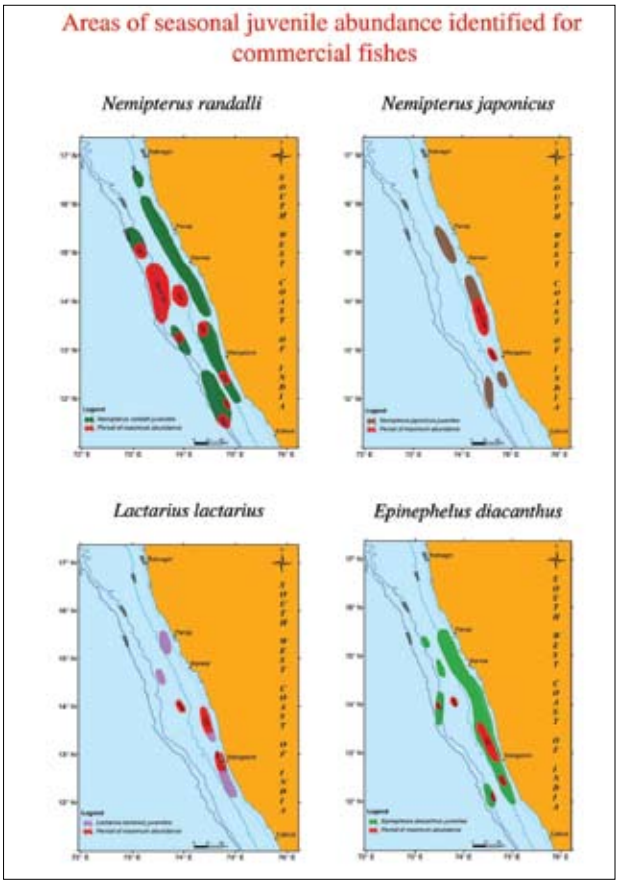

Fig.2. Spatio-temporal distribution of juveniles of important commercial finfishes in the trawling grounds off Mangalore.

Fishing in the Sundarbans, West Bengal

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