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CIFT Semi-pelagic Trawl System: An Eco-friendly Alternative to Bottom Trawling for Small-scale Mechanised Sector

Trawling industry in India tended to be shrimp-oriented, due to its economic importance and export value. The Indian trawler fishermen cannot depend on shrimp alone for viable commercial operations any more, due to proliferation of trawlers and overfishing of target resources. There are over 29000 trawlers operating in small-scale mechanised sector of India (CMFRI, 2006). Trawler fishermen require to adopt

appropriate fishing gear to expand their reach to harvest large demersal and semi-pelagic species which are beyond the reach of currently existing designs of shrimp/fish trawls. Responsible fishing regime, which is promoted in India and around the world, requires that selectivity of the gear has to be improved and its negative environmental impact has to be reduced, in order to protect the biodiversity and environment and to



Artist's perspective of CIFT SPTS



ensure long-term sustainability of the fishery resources. It is in this context, CIFT has developed a semi-pelagic trawl system, for the benefit of the mechanised trawling sector.

Resource specific trawls for semi-pelagic resources have comparatively low impact on the benthic biota (Brewer *et al.*, 1996; Mounsey and Prado 1997; He, 2007). In the semi-pelagic trawl system the otter boards remain in touch with the bottom, but the trawl floats at some distance above the bottom. Different aspects of semi-pelagic trawling and its advantages in the Indian context have been discussed by Vijayan *et al.* (1996), Vijayan *et al.* (1998), Remesan *et al.* (2003), Vijayan *et al.* (2003a), Vijayan *et al.* (2003b), Anon (2006), Vijayan and Baiju (2006), Devadasan and Boopendranath (2009), Boopendranath (2009) and Vijayan (2009). Semi-pelagic trawling of different designs are in use in Australian and North-Atlantic waters, targeted at snappers, blue whiting, silver smelt, Atlantic mackerel and other semi-pelagic resources, prevalent in these waters.

CIFT semi-pelagic trawl system

CIFT semi-pelagic trawl system, christened as CIFT SPTS was developed as an alternative to shrimp trawling in the small-scale mechanised trawler sector, after extensive field-testing. It is capable of attaining catch rates beyond 200 kg.h⁻¹ in moderately productive grounds and selectively harvest fast swimming demersal and semi-pelagic finfishes and cephalopods, which are generally beyond the reach of conventional bottom trawls, currently used in commercial trawl fisheries in India. The version of CIFT SPTS released recently by CIFT was developed by a team of researchers of Fishing Technology Division of CIFT, viz. Shri V. Vijayan, Dr. M.P. Remesan, Dr. P. Pravin, Dr. S.K. Panda, Shri V.R. Madhu, Shri M.V. Baiju, and Dr. M.R. Boopendranath, under an ICAR funded Institute Project, *Development Studies on Responsible Trawl Systems*, operated from Cochin (Kerala) and Veraval (Gujarat), based on earlier investigations on semi-pelagic trawls by Shri V. Vijayan, Dr. M.D. Varghese, Shri P. George Mathai, Dr. V.C. George, Shri P. Dawson, Shri R.S. Manoharadoss and Shri M.V. Baiju (Vijayan *et al.*, 1996; Vijayan *et al.*, 1998; Vijayan *et al.*, 2003a; Vijayan

et al., 2003b; Vijayan and Baiju, 2006). CIFT SPTS has been developed and perfected after extensive field trials and observations, using acoustic gear monitoring instrumentation and inference from statistical evaluation of catch, over an extended period.

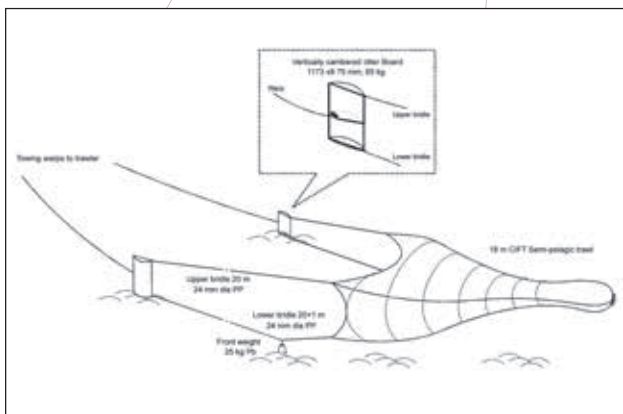
The system consists of an 18 m four panel semi-pelagic trawl with double bridles, front weights of 25 kg each and vertically cambered high aspect ratio otter boards (trawl doors) of 85 kg each.

Advantages of the CIFT-SPTS over the conventional shrimp/fish trawl systems practiced in Indian fishing industry

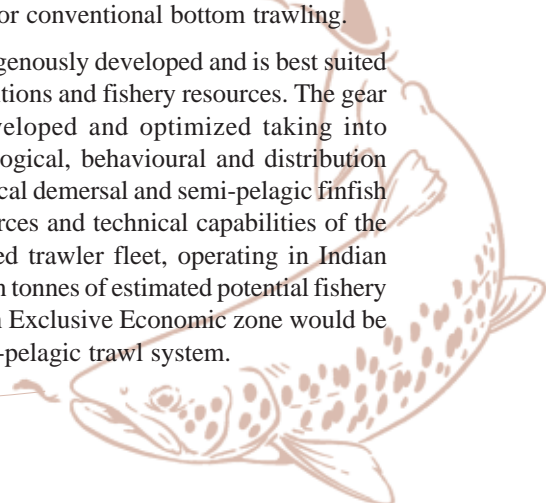
Major advantages of the CIFT SPTS over the conventional shrimp/fish demersal trawl systems in vogue in Indian fishing industry are enumerated below:

- Conventional bottom trawls are proven to cause high bottom impact on the benthos. As the semi-pelagic trawl is designed to operate at some distance above the bottom, the bottom impact of semi-pelagic trawl is significantly low, making it an ecologically friendly gear, compared to bottom trawls.
- Results of performance evaluation and biodiversity analysis have shown that CIFT SPTS has significantly high resource specificity for off-bottom (semi-pelagic) finfishes, which are generally large in size, fast swimming and exhibit shoaling characteristics. Conventional bottom trawls have poor resource specificity and size selectivity and have greater impact on biodiversity and sustainability.
- Conventional bottom shrimp and fish trawls have low vertical opening, mostly limited to 1-1.5 m and hence their catches are limited to species living close to the bottom. Due to higher vertical opening up to 4 m realized in CIFT SPTS, resources that are beyond the reach of conventional bottom trawls, could be efficiently harvested.
- Significantly high sheer-drag ratio of vertically cambered high aspect ratio otter boards, makes the system energy-efficient, compared to conventional flat rectangular and V-form otter boards. The vertically cambered high aspect ratio otter boards have dual-purpose capabilities and can also be deployed for conventional bottom trawling.

CIFT SPTS is indigenously developed and is best suited to Indian fishing conditions and fishery resources. The gear system has been developed and optimized taking into consideration the biological, behavioural and distribution characteristics of tropical demersal and semi-pelagic finfish and cephalopod resources and technical capabilities of the small-scale mechanised trawler fleet, operating in Indian waters. About 2 million tonnes of estimated potential fishery resources in the Indian Exclusive Economic zone would be accessible to the semi-pelagic trawl system.



Rigging of CIFT Semi-pelagic Trawl System





CIFT SPTS with exchangeable codends is prescribed for harvesting non-shrimp trawl resources (55 mm codend for small demersals like mackerel and horse mackerel and 166 mm codend for tall bodied fishes like pomfrets), based on codend selectivity studies.



Operation of CIFT SPTS, off Cochin

Trawler fishermen in India cannot depend on shrimp and associated species alone for viable commercial operations any more, and there is need to adopt responsible alternate trawl systems for harvesting large demersal and semi-pelagic species. CIFT SPTS has been developed and perfected after extensive field trials and observations onboard, over an extended period. Its adoption and responsible use will be a boon to the Indian small-scale trawling industry, to enhance fish production and profits and minimize environmental impacts of trawling. Shrimp trawls when operated should be equipped with Bycatch Reduction Devices (BRDs) and should target shrimp alone, in order to conserve fishery resources and minimise biodiversity loss due to trawling. CIFT SPTS with exchangeable codends (55 mm codend for small demersals like mackerel and horse mackerel and 166 mm codend for tall bodied fishes like pomfrets) is prescribed for harvesting non-shrimp trawl resources.

Release of Technology Advisory by DDG (Fisheries), ICAR, New Delhi

The technology was released for the benefit of the fishing industry by Dr. B. Meenakumari, Deputy Director General (Fisheries), ICAR, New Delhi at a function organized at CIFT, well-attended by representatives from State Fisheries Departments, fisheries development agencies, NGOs and fishing industry. The occasion was graced by the presence of Dr. K. Gopakumar, former DDG (Fisheries), ICAR; Dr. K. Ravindran and Dr. K. Devadasan, former Directors of CIFT, Dr. V.C. George, former HOD (Fishing Technology) and former Scientists and Technical Officers of Fishing Technology Division. The first copy CIFT Technology Advisory Series publication titled *CIFT Semi-pelagic Trawl System: An Ecofriendly Alternative to Bottom Trawling for Small-scale Mechanised Sector* was received by Smt. Saira Banu, Joint Director of Fisheries (Central Zone), Kerala,

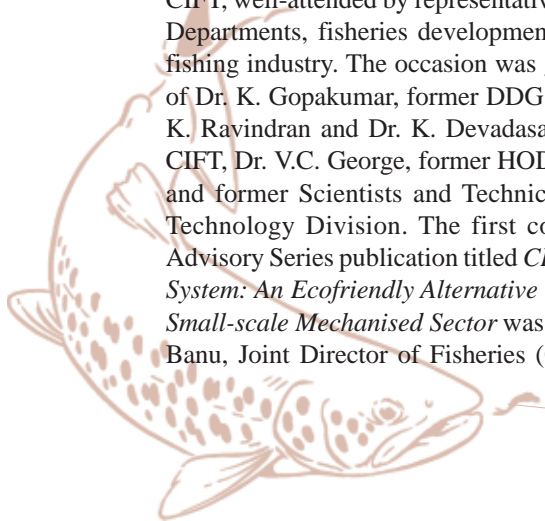
who also offered felicitations on the occasion. Dr. Leela Edwin, Head, Fishing Technology Division, CIFT welcomed the gathering; Dr. T.K. Srinivasa Gopal, Director, CIFT presided over the function; Dr. M.R. Boopendranath, Principal Scientist gave a brief introduction to the new technology and Dr. P. Pravin, Senior Scientist offered Vote of Thanks.



Dr. B. Meenakumari, Deputy Director General (Fisheries), ICAR releases Technology Advisory on CIFT SPTS, on 7 March 2011, at CIFT, (from Left: Dr. Leela Edwin, Dr. M.R. Boopendranath, Dr. B. Meenakumari, Dr. T.K. Srinivasa Gopal, Smt. Saira Banu and Dr. P. Pravin)

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*Copies of the CIFT Technology Advisory Series Publication titled *CIFT Semi-pelagic Trawl System: An Eco-friendly Alternative to Bottom Trawling for Small-scale Mechanised Sector* can be ordered from the Director, Central Institute of Fisheries Technology, CIFT Junction, P.O. Matsyapuri, Cochin – 682 029, Kerala, India, specifying the number of copies and enclosing the DD for the total face value of the book (Rs. 50/- per copy), drawn in favour of the Director, Central Institute of Fisheries Technology, payable at Cochin.