

The attraction behaviour of fishes to moonlight during the nights immediately preceding and following the full-moon period was known to fishers and night fishing during this period was a common practice. This behaviour of the fish was gainfully adopted by fishers and fishing using lights onboard large mechanized fishing vessels has become popular along coastal Karnataka. Low voltage electric bulbs and tube lights used earlier have now been replaced with high power CFL bulbs to aggregate fishes. A single vessel fitted with 15 such bulbs emitting a total light intensity of 1500 watts was operated in 2013 and aggregations of large sized fishes (scombroids, carangids, halfbeaks, barracudas, perches, mackerel, moonfish, etc.), ranging from 10-12 t were observed. The bumper catch encouraged more than 70% of the purse seiners operating in Karnataka to take up light fishing. Several improvisations and modifications were made in the light source and number of bulbs used, duration of fishing and the type of purse seines used. Presently, a vessel uses a combination of 8 metal halide lamps, 6 halogen bulbs and 30 tube lights, all powered by a 25 kW generator; uses large meshed purse seines and operates at depths ranging from 60-150 m. Such operations have resulted in increased fish catches but have led to selective removal of large sized fishes (2+ year old fishes). Large pelagics have longevity of 4 to 8 years and in effect, such type of fishing over a long period, will ultimately lead to recruitment as well as growth overfishing and result in depletion of stocks. Concerns on the unsystematic and unrestrained expansion of 'light fishing' by purse seines have been raised in various forum and regulatory measures in the memorandum issued by the DADF has been adopted *in toto* by the Government of Karnataka.

### **Ultra High Molecular Weight Polyethylene (UHMWPE): New generation netting material for energy and resource conservation in fisheries**

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Invention of synthetic fibre was a major development which revolutionized the fishing industry. By mid-20<sup>th</sup> century, synthetic fibres have replaced natural fibres in fish netting and ropes. Ultra-high Molecular Weight Polyethylene (UHMWPE) fibre available under the trade names Dyneema® / Spectra is a recent introduction in the fishing sector. Dyneema®, the strongest manmade fibre, was invented by DSM, Netherlands in 1974 and commercialized in 1990. Among many applications, due to its excellent strength, this fibre is best suited for ropes, trawls, purse seines and lines. UHMWPE fibre has a low weight/strength ratio, by which, a thinner material (1/3rd of nylon) can be used for fishing purpose thereby considerably reducing drag. Though manufacturers claim upto 40% savings on fuel, it was not tested in India. For the first time in India, ICAR-CIFT took up a study in collaboration with DSM India and Garware Wall Ropes Ltd., and proved that use of UHMWPE trawls reduced drag by 15% reduction and a 10% saving on fuel in comparison to PE trawls. Since the material has low elongation (<5%) and do not shrink in water, mesh size remain intact allowing better filtration and reduction in bycatch. In purse seining, UHMWPE fibre facilitates good water filtering, reduced drag and faster sinking of the net. Designs with substantial weight reduction and faster

sinking speed by substituting certain portions of nylon mini purse seine with UHMWPE were developed by ICAR-CIFT. Although empirical results show better performance, trials are to be carried out to get real time results. As the material is highly bite resistant, depredation problem by puffer fish and dolphin can also be prevented. UHMWPE ropes can be used in trawling to substitute wire ropes which helps in weight reduction, drag reduction, fuel saving and a clean catch devoid of oil and grease contamination. Fishing trials conducted by ICAR-CIFT using UHMWPE rope of 12 mm dia. for the past five years, proved it as a very good substitute to steel wire rope. UHMWPE webbing is a very good choice for cages by providing better water exchange and low resistance. Thus UHMWPE is a 'green fibre' for the fisheries industry of the Country for energy saving and resource conservation.

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### Enhancing energy efficiency through hull form optimization in deep sea fishing vessel design

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Fuel consumption is the most decisive operational parameter deciding the profitability of a commercial fishing vessel. An all India survey conducted by ICAR-CIFT on the commercial fishing vessel designs reinforced the need for fuel saving. This work attempts to reduce resistance and optimize a hull form for a fuel efficient combination fishing vessel. The effect of optimization of hull form of a deep sea fishing vessel to reduce resistance is discussed in this paper. Computational Fluid Dynamics is utilized to

simulate the vessel and arrive at the resistance at various operating speeds scientifically. Model testing to verify this resistance values and also to assess the maneuvering behaviour of deep sea hull form is described. It is very important to select an appropriate main engine and reduction gear box to arrive at fuel efficiency. The introduction of bulbous bow in the forward hull bottom reduces wave resistance. A kort nozzle around the propeller increases the thrust during fishing. A deep sea fishing vessel hull was developed and constructed and trials were carried out to prove the fuel efficiency by various steps.

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### Demonstration of off-bottom trawl systems (OBTS) in coastal waters of Goa, India as an ecofriendly trawl design

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Marine capture fisheries contributes significantly to the economy of Goa. Though bottom trawling is a widely practiced fishing method, it often affects the benthic ecosystem adversely. In this context, off-bottom trawl system (OBTS), an ecofriendly trawl design compared developed by CIFT was demonstrated in Goa. The operational efficiency of a 22 m high density polyethylene (HDPE) OBTS fitted with 65 kg suberkrub otter boards was tested on-board mechanized trawlers along the coastal waters off Chapora, Goa. Five hauls of one hour duration each were carried out at 10 to 12 m depth zone. A total of 43 different