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भाकृ अनुप ICAR

मत्स्य प्रौद्योगिकी समाचार
Fish Technology Newsletter

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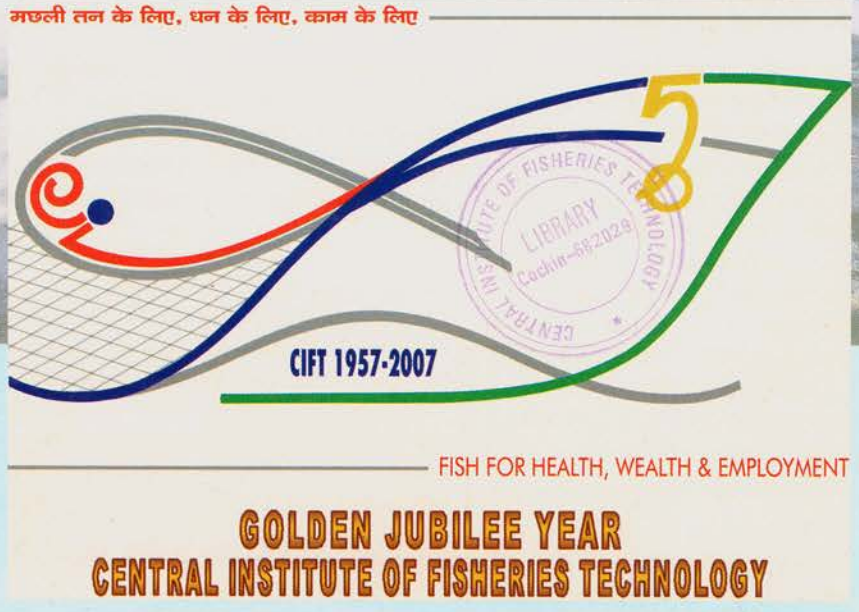
EDITORIAL COMMITTEE

CIFT Celebrates Golden Jubilee
सिफ्ट सुवर्ण जयंती मनाता है

CIFT is completing 50 years of its useful existence. The year 2007 is the Golden Jubilee Year of the Institute. As part of the celebrations a series of activities are planned. Monthly talks by eminent persons on subjects of interest to agricultural scientists will be organised. Industry-Institute interface meetings for better mutual help and cooperation are also planned. The new block under construction in the office premises is expected to be completed before this date ie. 25th April, 2007, which will be opened by the Chief Guest. The

सिफ्ट 50 वर्षों के सफल अस्तित्व की पूर्ती कर रही है। 2007 संस्थान के स्वर्ण जयन्ती वर्ष है। समारोह के भाग के रूप में कई क्रियाकलापों की योजना की गयी है। कृषि वैज्ञानिकों की अभिरुचि के विषयों पर मासिक भाषण प्रतिष्ठित व्यक्तियों द्वारा आयोजित किया जाएगा। उत्तम आपसी सहयोग और समन्वयन के लिए उद्योग-संस्थान मिलन-बिंदु बैठके भी नियोजित की गई है। नये ब्लॉक जो निर्माणाधीन है, की पूर्ति 25 अप्रैल 2007 के पहले हो जाने की प्रतीक्षा है जिसका उद्घाटन मुख्यातिथि करेंगे।



केन्द्रीय मात्स्यकी प्रौद्योगिकी संस्थान
मत्स्यपुरी पी.ओ., कोचिन - 682 029

Central Institute of Fisheries Technology
MATSYAPURI P.O., COCHIN - 682 029

Indian Postal Department will be releasing special stamps and first day cover, for which designs have already been furnished. A souvenir will also be brought out. Scientific seminars on different aspects of fishery technology will be organized and exhibitions and awareness programmes will be conducted in different parts of the country. A calendar for 2007 commemorating CIFT's Golden Jubilee will be brought out for distribution to all scientific institutions and fish processors. A number of publications on fishery technology is also proposed to be brought out during the period.

भारतीय डाक विभाग विशेष मोहरों एवं फस्ट डे कवर निकला जाएगा, जिसका अभिकल्प पहले ही प्रस्तुत किया गया है। एक स्मारिका का भी तदवसर पर प्रकाशन होगा। मात्स्यकी प्रौद्योगिकियों के विभिन्न पहलुओं पर वैज्ञानिक संगोष्ठियाँ संचालित की जाएगी। देश के विभिन्न भागों में प्रदर्शनियों/जानकारी कार्यक्रमों का संचालन किया जाएगा। सभी वैज्ञानिक संस्थानों एवं मात्स्यकी और मत्स्य संसाधकों के बीच वितरण के लिए, सिफ्ट, स्वर्ण जयंत्री स्मारिका कलैंडर भी निकाला जाएगा। फायदेमन्द कई प्रकाशनों को भी तदवसर पर निकाला जाएगा।

News From The Research Front/अनुसंधान क्षेत्र से समाचार

Energy Conservation in Fishing Operations

Modern fishing is one of the most energy intensive methods of food production. Motorized and mechanized fishing is dependent on fossil fuels, which are non-renewable and limited. More over, spiraling oil prices may severely affect the economic viability of fishing. According to a recent estimate, in world capture fisheries, 50 billion litres of fuel is consumed annually, which forms 1.2% of the global fuel consumption. In India, energy security issues assume greater significance on account of increasing demand-supply gap and escalating dependence on imports. Annual consumption of fuel by the mechanized and motorized fishing fleet of India has been estimated at about 1220 million liters. It is obvious that fuel conservation initiatives should take centre-stage in developmental efforts, considering its non-renewable nature, limited availability and effects of its use on environment. Various approaches to energy conservation in fish harvesting, are discussed here.

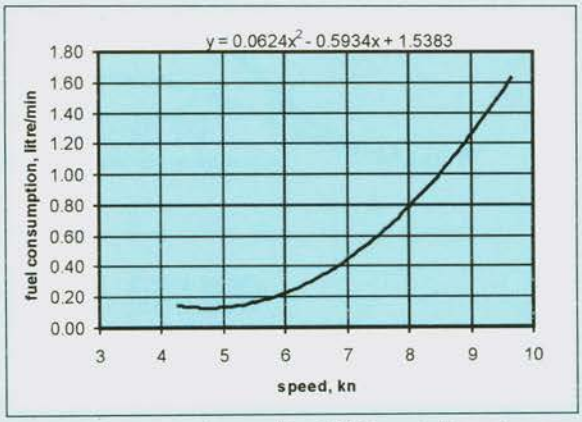
1. Fishing gear and methods

Selection and deployment of energy efficient mix of harvesting technologies appropriate for target resources is one of the main options available for fuel conservation. Large variations in energy use exist among different fishing gears. The introduction of man-made netting materials has increased the catching power and fuel efficiency of fishing gears. Some of the energy conserving fishing practices such as purse seining became possible only with the introduction of synthetic netting material.

Trawling is the most energy intensive fishing activity. It consumes nearly 5 times more fuel compared to passive fishing methods such as long-lining and gillnetting and over 11 times more fuel compared to purse seining for every kilogram of fish produced. Percentage of fuel cost in the operational expenditure of trawlers may vary between 45 to 75%, depending on installed engine power and duration of voyage. Hence, most potential for fuel conservation exist in trawling. In trawling, typically a substantial portion of the time is spent on towing the gear. During the tow, resistance of the vessel is insignificant compared to the resistance of the gear. The gear resistance therefore has a large effect on overall fuel economy. Several means of reducing drag in trawl system such as use of knotless netting, thinner twine and large meshes in trawl construction, use of cambered and slotted otter boards, optimizing angle of attack of otter boards, multi-rig system for shrimp trawling and pair trawling in lieu of otter trawling have been recommended by research workers. Many of these measures have been accepted in common fishing practice, in different areas, including India.

2. Vessel technology

Significant improvement in operational savings of fuel have been achieved by optimizing vessel and machinery design. The power required to propel a vessel is mainly a function of (i) speed, (ii) length of water line, and (iii) displacement.



Fuel consumption profile of 17.5 m steel trawler (277 hp @ 1000 rpm engine)

Economic vessel speed

Vessel speed is the single most important factor affecting fuel consumption of the vessel. The fuel consumption drastically increases as the vessel approaches maximum speed, due to great increase in wave breaking resistance. It has been shown that over 35% savings in fuel is often possible for a reduction of 10-20% of the speed. Economic vessel speed is the most

important practical measure among fuel saving practices. The choice of operating speed, particularly while cruising to the fishing ground and back, is generally under direct control of the skipper of the vessel. Installation of fuel flow monitors or vessel analysis computing systems onboard fishing vessels have been proven to lead to improved operational efficiency and energy optimization. Code of Conduct for Responsible Fisheries (FAO, 1995) recommends the promotion of the use of such devices onboard fishing vessels.

Hull design, displacement and maintenance

Reduction in power requirements can be achieved by (i) increasing length of water line (L_{WL}), (ii) reducing displacement wherever possible at the design stage, and (iii) by taking measures for control of hull fouling.

For normal economic speed, the ratio between the vessel speed (kn) and the vessel length (ft), $V/\sqrt{L_{WL}}$ is close to unity. By increasing the length of waterline while keeping the other dimensions same, it is possible to reduce the hull resistance and increase the speed. Although the weight of the vessel is increased in the process, the overall effect on hull resistance is often beneficial. However increase in construction cost has to be balanced against fuel saving advantages. Trials in Norway, Denmark and India have indicated 15 to 20% reduction in hull resistance by modifications with sharper or bulbous bow and long waterline in existing vessels. Multi-hull vessels such as "Kattamaran" fishing vessel have been reported to have a high speed to power ratio, fuel saving potential and more spacious working deck, bridge and accommodation area than an equivalent mono-hull fishing vessel. However, the advantages of these innovative designs have to be balanced against the increase in construction and machinery cost.

Reduction in displacement also contributes to lower fuel consumption. Hull built of aluminium, FRP and plywood will be lighter than that of steel, ferro-cement and conventional wood construction. Fuel saving advantages in such cases has to be balanced against a possible reduction in stability, sea kindliness and cost of the vessel.

In tropics, surface friction due to fouling is estimated to increase at the rate of 0.6 to 1.5 %, resulting in increased rate of fuel consumption. Periodic hull cleaning and application of antifouling paints is a simple easily adoptable method which can lead to considerable savings in fuel.

3. Engines

Specific fuel consumption of the diesel engines has decreased in the last few decades, with the introduction of major technical improvements such as turbo-charging (introduced in 1965) and new material development, advanced production and quality control systems and computer aided design techniques.

Choice of engines

Two types of engines are predominantly used in small fishing boats (i) outboard petrol/and or kerosene engines, and (ii) inboard diesel engines. Typical fuel consumption (l hp^{-1}) is 0.55 for two-stroke petrol engine, 0.50 for kerosene outboard engine, 0.33 for four-stroke petrol engine, 0.25 for diesel inboard engine, and 0.21 for turbo-charged diesel engine. Two-stroke outboard engine have high fuel consumption, compared to diesel inboards. Another disadvantage of outboard is high propeller speed and consequent low propeller efficiency. Advantages are low cost and portability. Turbo-charged diesel engines are about 15% more fuel efficient than normally aspirated engines. Petrol four-stroke outboard engines, which have a much better fuel economy and emission standards, are also being introduced in small-scale fisheries. Direct fuel injection petrol outboard engines which is reported to have still better fuel efficiency, are expected to be introduced in small-scale fisheries.

Optimising the installed engine power

Overpowering the vessel is wasteful in terms of energy as the maximum attainable speed of the vessel is dependent on length of the waterline. Smaller engines have multiple benefits of lower investment cost, lesser maintenance and high potential for reduction in the fuel consumption.

Engine maintenance

The loss of efficiency of a badly maintained engine can be as high as 30%. Preventive maintenance including regular cleaning or replacement of injectors and oil changes as recommended by the engine manufacturer are very important practical steps in conserving fuel and controlling pollution.

4. Reduction gear, propeller and nozzle

Considerable fuel saving is possible if larger propeller with lower RPM (larger gear reduction ratio) matched to absorb the engine power at the lowest specific fuel consumption of RPM. Incorporation of propeller nozzle and improved design of propeller would also cut down fuel consumption rate. Studies have indicated that 20-30 percent better thrust is possible at speeds less than 6 knots with the use of propeller nozzles, while its effectiveness is reduced at higher speeds. It is reported that for trawlers that operate fishing gear at speeds lower than 6 knots, overall fuel savings could be to the tune of 10-14%. However, presence of debris and flotsam in coastal fishing grounds may interfere with the use of propeller nozzles.

5. Sail-assisted propulsion

If sail is used as the main propulsion, wherever it suits the fishing method adopted, it is possible to reduce the size of the engine. In low energy fishing methods such as coastal gill netting, trap fishing, hand lining and long lining, it is definitely a practical alternative energy source. In many countries like India, Sri Lanka and Indonesia there is a long tradition of using sail in small fishing vessels and 'kattamarans'.

6. Advanced technology and fleet management

Recent advances in technology have provided fishermen with equipment to reach the potential fishing ground accurately (Global Positioning Systems); detect the presence of fish and monitor the success of capture process acoustically (echo sounder, sonar, acoustic gear monitoring systems etc.), thus saving the search and fishing time and hence saving energy. Progress in the satellite-based remote sensing techniques which use sea surface temperature and ocean colour to identify areas of potential fish abundance also greatly reduces the search time as near-real time information is communicated to the fishermen. Development of fishery-based Geographical Information Systems (GIS) could provide accurate decision making support for choice of fishing grounds for specific target resources based on spatial relationship of fish stocks in relation to hydrographic and bathymetric parameters. Fish aggregating devices have shown potential for saving fuel, in purse seining, hand lining and gillnetting in different parts of the world.

Energy is also conserved by optimizing fleet management. Multi-day fishing rather than daily fishing and mother ship and catcher boat operations wherever practical are fuel saving practices in fleet operation.

7. Conservation and enhancement of fishery resources

Most of the fish stocks have been subjected to relentless fishing pressure leading to various stages of growth and economic over-fishing. This has resulted in diminishing returns from the traditional stocks, reduction in average size and catch per unit effort of fish caught. The effort in searching and catching is obviously a function of the abundance of the target resource. One of the most important long-term solutions for the issue of fuel conservation in fish harvesting is therefore, restoration and enhancement of coastal fishery resources by promotion of responsible fishing practices, removal of excess capacity from the fishing fleet and implementation of resource conservation and enhancement strategies.

- Dr. M.R. Boopendranath & Dr. P. Pravin
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Foldable Traps for Reservoir Fishing

जलाशय मत्स्यन केलिए मुडवाँ फन्दे

Wide ranges in size and shape of bamboo traps are in vogue at different inland waters like rivers, canals and reservoirs in Andhra Pradesh. Conical shaped and box type traps made of bamboo splinters are used for fishing in canals and large water bodies like reservoirs and rivers. Even though its manufacturing cost is low, it has inherent disadvantageous due to its large size, shorter life and large occupancy of space for its storage. So as to overcome these problems, Visakhapatnam Research Centre has designed and fabricated a new foldable prawn trap for fishing in reservoirs.

Design details of the trap

Traps of several designs were fabricated to exploit reservoir fishery. Mainly two types of traps, foldable and collapsible were designed and fabricated.

The foldable trap is made with four angled square shaped iron frames of 4 mm diameter rods. All the four frames are held and tied together at one side and the

Foldable trap for reservoir fishing

आन्ध्र प्रदेश के नदियों, नहरों एवं जलाशयों जैसे विभिन्न देशी जलों में विभिन्न आकार एवं आकृति के बाँस फँदे प्रचलित है। बाँस खपचियों से बनाए गए कोणाकृति एवं बक्स आकार के फँदों को नहरों और बडे जलाशयों पर क्रमशः जलाशय एवं नदियों पर प्रयुक्त किया जाता है। यद्यपि उनका निर्माण खर्च सस्त होने पर भी उसके बडे आकार, निम्न जीवन काल एवं संग्रहण केलिए अधिक जगह की आवश्यकता आदि के कारण वह सहजरूप में अप्रयुक्त है। इन्ही समस्याओं को सामना करने केलिए विशाखपटनम अनुसंधान केन्द्र एक नए मुडवाँ झींगे फँदे की अभिकल्पना एवं संरचना की।

फँदों का अभिकल्प विवरण

जलाशय मात्स्यकी के शोषण केलिए विभिन्न फँदा अभिकल्पों की रचना की गयी। मुख्यतः मुडवाँ एवं नाशवान, दो किस्म के फँदों की अभिकल्पना की गयी एवं बनाया गया।

4 एम एम डायमीटर दण्ड के 4 स्क्वयर आकार के लोहे ढाँचों से मुडवाँ फंदों को बनाया जाता है। सभी चार ढाँचों को एक साथ, एक भाग में बाँधकर बाकी तीन भागों को स्वतंत्र रखा जाता