

# Sri Lanka: Fishing without gas-guzzling

Towards fuel-efficient fishing for food and nutritional security

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**The present economic crisis, and the associated energy crisis, has mightily affected the fisheries sector, reducing the number of boats at sea, dwindling market supply, soaring fish prices, all affecting food and nutritional security of the people in Sri Lanka. Being a highly fuel-dependent sector, there is a pressing need for the sector to find means of economising on fuel and continue to provide the most important animal protein to the people-the Fish. Yet, the tale of woe of fishers is that they have neither the physical nor economic access to fuel. Time has come to reexamine ways and means of improving the fuel use efficiency of fishing vessels to meet the escalating food crisis which has already hit the people with a monstrous force.**

Fishing is among the most energy-intensive food production methods globally, and the world's fishing fleet consumes about 1.2% of the total global fuel consumption, which is equal to 0.67 liters of fuel for each Kg of live fish and shellfish landed. In dealing with the issue of fuel efficiency in fisheries, it is imperative to understand how energy is expended in a fishing vessel and what means are available to minimize energy use without any fall in the efficiency of productive operations and incomes. It may also be necessary to understand how energy use can be influenced by the operator, boat-builder or mechanic, etc. Apart from improving the fuel use efficiency, various parties have been trying out the potential for using alternative sources of energy such as solar energy and wind energy. Yet, information on various issues related to the use of solar energy, use of sail on motorised fishing boats, the diverse benefits and costs associated with such innovations, etc., are quite scanty.

Giving due consideration to the significance and urgency of the above issues, the SLFSSF (Sri Lanka Forum for Small Scale Fisheries) organized an Interactive Platform on "Improving the energy use efficiency in fisheries" on the 17<sup>th</sup> of June. This platform brought together representatives of the Department of Fisheries, Boat yards, companies producing solar power, marine engineers (consultants), civil society organisations, fishing leaders, academics and researchers of the SLFSSF, etc., who deliberated on their knowledge and experience on various aspects of energy use in fishing crafts and proposed certain recommendations by common consent. The aim of this article is to bring to the attention of the fisheries authorities, and other relevant parties, the results of these deliberations, which have very important implications for immediate, short term and medium-term measures that could be adopted to improve the fuel use efficiency in fishing vessels.

## Immediate measures

It was disclosed that only about a third of the energy generated in a fishing vessel is expended to turn the propeller, while the rest is used to overcome resistance offered by a diversity of factors: 27 percent to overcome wave resistance; 18 percent to overcome skin friction; 17 percent to overcome resistance from the wake and propeller wash against the hull; and three percent to overcome air resistance. This information has already been published by the FAO more than 20 years ago, although they have evaded the attention of fisheries authorities in this country. In overcoming

resistance offered by waves, hull fouling, wake and propeller wash, etc. ,a number of strategies were proposed to be adopted, which included, slowing down (reduced speeds), proper hull designs, regular engine and hull maintenance, capacity building of operators, etc.

Speed was one factor which was discussed in detail. Generally, fishers like high speeds and try to reach fishing grounds within the shortest time possible which will allow them to return with the catch early. Thus engines are often run to maximum speeds. It was revealed during deliberations that fuel requirement for increase in speed increases exponentially. To double the speed, one needs more than double the amount of fuel. Thus a reduction of the speed appears to be an effective means of increasing fuel use efficiency. It has been estimated that 10-20 reduction in the speed could result in 35-61 percent savings on fuel. The FAO has published optimum speed recommendations for fishing vessels by the size of the vessel, and they were accepted as applicable to fishing vessels used in the country at present. For example, for boats with a waterline length of 13 meters, the recommended speeds are 8.5 and 7.1, knots, respectively for long thin vessels and short fat vessels. The same for boats with a 15 m water line are 9.1 and 7.7 knots, respectively. Of course, reduced speeds will result in longer fishing trips, short periods of shore leave and/or lesser number of trips annually. The use of fish finding devices, information from NARA to locate fish resources and reach fishing grounds early, etc., are important strategies to surmount loss of fishing time and to reduce the amount of fuel required to travel one nautical mile. Fuel wastage could also be minimized by reducing the number of zero catch days which is quite common in fisheries, often emerging from resource and weather uncertainties. In this regard, too, information on fishing grounds and weather would be of great value. Such information show where and what opportunities exist to improve energy use efficiency.

Another short term measure would be to minimize energy expended to cope with hull fouling. There is accumulation of marine growth on the boat hull, resulting in reduced speed. It was revealed that about 18 - 20 percent of the energy is expended to counteract hull fouling. The most appropriate measure to reduce resistance offered by hull fouling is to clean the hull below the water line during servicing, at regular intervals. It was also noted that by using a good anti-foul paint, which could last three year or longer, would be beneficial, economically, even if the investment cost could be high.

A complain that is often heard is that there is too much of fishing pressure in Sri Lanka's waters, especially in inshore waters: too many crafts and too many fishers. In such a context, the higher the fishing pressure, the higher would be the fuel consumption and degradation of resources, and the lesser would be the income per fisher. Therefore, there is an urgent need to stop building small crafts such as fiber glass boats with outboard engine. One way to do this is to put an end to the process of registration of such crafts.

### **Short-term measures**

Recognising the fact that search for resource areas is a huge cost, needing the multiday boat crews to carry 12-14,000 liters of diesel on board, improvement of fish finding information, provided by the National Aquatic Resources Research and Development Agency, by strengthening the relevant process, would be of utmost importance in reducing search costs. Moreover, low-cost fish detection systems available in the world, could be tried out locally to find out their applicability and adoptability. If this is found to be successful, fuel savings from this measure would be colossal.

Quite often, due to the high cost of cleaning boat hulls below water line, boat owners ignore anti-fouling measures. Facilities for treating hull fouling, such as cranes and hoists, could be installed at harbours and they can be offered to fishers at concessionary rates.

Another short term measure could be the training and capacity building of boat crew on fuel

efficient fishing and maintenance of engine and hull. The Department of Fisheries could organise awareness building workshops for boat owners and crews, with the participation of other experts, on the subject of energy use efficiency in boats. It was also stated that potential fuel savings gained from running at recommended speeds (reduced speeds) could be worked out and shown to the fishers.

Use of wind energy to charge batteries was also discussed. It was shown that this technology is already in use in some multiday boats, revealing the potential of adopting this technology with suitable modifications. Thus, installation of devices that use wind energy was recommended, which was also shown to be a good safety measure against the risk of engine failure which will make the GPS non-functional.

### **Medium and long term measures**

An array of medium term measures were proposed, which included, solar panels for boats, sail assisted propulsion, engine and hull maintenance and two-day fishing trips for fiber glass boats with outboard motor.

The potential for using solar panels on fishing boats was discussed in detail. Experts, on the production and installation of solar panel systems, showed that the area required to provide a fishing boat with the requisite energy was too large, compared to the surface available for solar panel installation on boats. This was true for both small and large fishing boats in use. Moreover, the decks of multiday boats are tightly packed with extra fuel barrels, fishing gear, various sticks and poles and space is hardly available to accommodate installation of solar panels. However, there might exist some possibility of using a hybrid system (solar + fuel) in boats, but this needs to be researched.

Sail- assisted propulsion could also be a possibility. Of course, the use of sail as auxiliary propulsion, could result in very large fuel savings (up to 80 percent with small vessels on longer journeys) but the applicability of sail to motorized fishing is, however by no means universally popular. Sri Lanka too does not possess much experience in using sail-assisted propulsion in motor boats, although there is some scanty evidence of using such hybrid systems. Undoubtedly, sails fixed on motorised crafts, with inboard or outboard motor, are likely to tamper with fishing operations on the deck, while requiring additional ballast for balancing of the crafts. This warrants further research on this technology. Very specific circumstances are required for this to be a viable technology, for motorised fishing crafts in the country, in terms of weather conditions, the design of the fishing vessel as well as crew attitude and knowledge. Sailing puts additional requirements on the vessel, with respect to stability and deck layout, and sails are usually only a viable technology for use on vessels that have been specifically designed for sailing. Smaller fishing vessels may require the addition of further ballast or an external ballast keel (a weighted horizontal keel under the hull) to improve both stability and sailing performance across or towards the wind. What possibility exists in fixing sails on small FRP boats or offshore crafts is not known.

The deliberations further focused on the possibility of expanding the size and operating distance of the fleet of small fiberglass boats with outboard motors, which account for 40 percent of the fishing fleet or 24,000 crafts, operating up to a maximum distance of 24 nautical miles (up to the edge of the contiguous zone), engaged in one-day fishing trips. Following requests often made by small scale fishers and the need to improve the fuel use efficiency of fishing crafts, the possibility of modifying this craft by introducing a fish hold for icing of the catch and providing moderate accommodation facilities for crew, to allow for a two-day fishing trip was also discussed. The boat yards recognized the existence of this possibility but were of the view that further research on boat designs, and applicability and adoptability of this technology was required with the participation of technical and

fisheries experts and fishing communities.

At a previous meeting on a similar subject, fuel inefficiencies arising from having about 5,000 multiday crafts with individual ownership was also noted. It was disclosed that such an organizational structure could change over to a cluster-based fleet, each cluster having its 'mother ship' to fish while the remaining boats could transfer the catch to the shore, minimising fuel costs to a great extent.

### **Expert panels and research**

One of the momentous turns at deliberations was the emphasis laid on the need for an assemblage of technical experts, including engineers from boat yards, scientists (academics, researchers, consultants) fisher leaders, etc., to guide technological change. This was especially important to design small boats with facilities to engage in two-day fishing trips, use of solar panels to assist using hybrid type of energy systems, sail assisted propulsion, use of wind power to charge batteries, etc. It was recognised that, endowed with a large array of educated and qualified experts, technicians, etc., what is required is for the Department of Fisheries to take the initiative in organizing such platforms and use them gainfully towards achieving the above goals.

### **Paradigm shift towards change**

It is a pity that, endowed with a large conglomerate of intelligentsia and an array of experts in a large diversity of technical disciplines, the fisheries authorities still appear to work, confining themselves to their own little shells. Even with hesitation, it needs to be reminded that, by joining hand with others you will know what you know and what you don't know, which is considered the true knowledge. It is said that, knowledge is power and knowledge shared is power squared. Therefore, it is strongly advised that the Department of Fisheries forms a Technical Expert Team, consisting of experts on marine engineering, boat design (architecture) and construction, solar power producing and system installation, sail assisted propulsion, and also of fishing leaders and boat owners, all of whom could guide them in boat designs and construction, fuel usage, minimizing energy requirements, search for alternative energy sources, etc.

As the theoretical physicist, David Bohm stated, it is the ability to perceive and think differently that will take us a long way rather than the knowledge gained.

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