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# Capture of flying fish : Findings of BOBP trials and studies

by G. Pajot

*What BOBP has learnt about flying fish on India's Coromandel Coast – through fishing trials with its beachcraft, fish marketing studies and resource analysis – is summarized on these pages.*

**They prefer warm temperatures**

Flying fish are ocean-living surface fish that leap out of the water and glide long distances using elongated pectoral fins and winged gliders. While swimming on the surface or close to it, the pectoral fins are held close to the body. They prefer warm temperatures and are therefore found mainly in tropical and sub-tropical areas.

Several species of flying fish (scientific term: Exocetidae) are caught in various parts of the world. The main ones are the small-sized four-winged flying fish *Hirundichthys affinis. Cypselurus* are less common. (See box).

The season for common flying fish species is usually short (less than two months), and varies from one country to another. Most of the fish are caught during the spawning period. Why are they not available during the other 10 months of the year? Perhaps they migrate out of the near-offshore area. Perhaps they can be caught only when they aggregate to spawn.

Spawning habits

The common flying fish spawn in the water surface around floating objects. Since flying fish eggs do not float (unlike the eggs of most surface-living fish), the eggs get deposited by the females on floating objects through the sticky filaments that surround the eggs. Male flying fish deposit their sperms over the eggs to induce fertilization. About 100 hours after fertilization the eggs hatch as larvae. The larvae float near the surface, rapidly becoming juvenile flying fish.

Flying fish feed mostly at night, and mainly on juvenile fish. They live for one to three years.

Fishing techniques used to catch flying fish vary by country, size of fish and spawning season. The most common small-sized species are caught mainly during the spawning season, by short small-mesh gilinets and scoop nets used in conjunction with various man-made floating objects that serve as• FADs (fish aggregating devices). To enhance the aggregating effect of the FAD, chopped fish and oil may be poured into the water. The larger flying fish are caught mainly during the non-spawning season, using specially designed gilinets and hook and line.

The fishing craft used in this type of fishery vary in type and size, and range in length from 4 m to 15 m. As flying fish are caught mainly in the near-offshore areas, the craft engaged in this fishery function as day-boats in most countries, leaving for the fishing ground early morning and returning to the operation base late afternoon.

Most of these craft do not have facilities to preserve catch, hence flying fish are landed mostly fresh; use of ice is still limited to the larger multi-day boats, or to circumstances where ice is economically viable.

The landed flying fish is rather low in quality; it does not reach the prime market, and is mostly sold in fresh or dried form for local consumption.

Flying fish in India

The national production of flying fish in India is about 4000 tons. Tamil Nadu and Pondicherry contribute 76% and 22% respectively of this total. As in other parts of the world, capture of flying fish is a traditional small-scale activity.

In Tamil Nadu, artisanal fishermen aiming at flying fish go up to 40 nautical miles offshore in locally built 7-log kattumarams known as kola kattumarams. According to one estimate, about *5%* of the total number of kattumarams in the area venture out for this fishery. During May-July, small-sized varieties of flying fish, mainly the Coromandel flying fish *(Hirundichthys coromandelensis)* come close to the continental shelf for spawning, mainly off Nagapattinam in Thanjavur district and Cuddalore in South Arcot district. Fishermen use traditional small-mesh surface gilinets and large scoop nets in conjunction with shrub lures, to capture the flying fish. These are landed and marketed fresh, or salted and dried.

The main factors that limit development of the flying fish- fishery are: the

*Catches of flying fish on the Tamil Nadu coast – from Besant Nagar, Madras fright), and Thirumullaivasal in Thanjavur district (left).*

traditional kattumarams lack mobility, the fishing area is too far, and the fishing season too short. Large species like Sutton flying fish and Indian spotted flying fish are occasionally caught between the months of March and July by small-scale kattumaram fishermen. Being non-spawners the species are caught with baited hook and line. But the production is negligible.

In 1988, BOBP examined the possibility of improving the exploitation of large species of flying fish, by using gillnets specifically aimed at the species during the non-spawning season. Past experiences with flying fish within and outside the Bay of Bengal indicated that the chances were good. Consequently, gilinetting trials for flying fish were carried out from Besant Nagar fishing village south of Madras from BOBP beachlanding craft (BLC). (The craft were going out anyway to test newly developed 'water-cooled engines). Gillnets used in the trials were adapted to local fishing conditions, and the trials commenced early March and ended early July.

The results from the trials were positive. Kattumarams equipped with

**Production data and cash How for tlying fish gilinetting in Thirumullaivasal April-July 1990**

| | APR 90 | MAY | JUN | JUL 90 | TOTAL |
|---|---|---|---|---|---|
| Fishing trips (no) | 10 | 19 | 24 | 10 | 63 |
| Fishing hours (no) | 67 | 111 | 154 | 36 | 368 |
| Total fish caught (kg) | 1322 | 1903 | 3212 | 239 | 6677 |
| and value (IRs)* | *9558* | 14734 | 24049 | 1735 | 50076 |
| Fish caught per trip (kg) | 132 | 100 | 134 | 24 | 106 |
| Value per trip (IRs) | 956 | 775 | 1002 | 173 | 795 |
| Total operational cost (IRs) | 1638 | 2207 | 2499 | *956* | 7300 |
| Net cash flow before payment to crew and boat owner (IRs) | 7919 | 12527 | 21550 | 779 | 42776 |
| Distribution to c'ew members *(50%)* | 3960 | 6263 | 10775 | 389 | 21388 |
| Crew(No) | 4 | 4 | 4 | 4 | 4 |
| Man-days (No) | 40 | 76 | 96 | 4 | 252 |
| Earnings (Rs/man-day) | 99 | 82 | 112 | 39 | 85 |
| Gross payment to boat owner (IRs) | 3960 | 6263 | 10775 | 389 | 21388 |
| Repair, Maintenance expenses (IRs) | 409 | 358 | 206 | 107 | 1080 |
| Net payment to boat owner (IRs) | 3551 | 5905 | 10569 | 282 | 20308 |

* Not including Rs. 4000 resulting from trolling operations from and to the fishing ground.

hook and line caught a few flying fish, but the BLC gilinets landed the same species by the hundred, thanks both to the efficiency of the fishing gear and the mobility and endurance at sea of the BLCs, which facilitated access to offshore resources of large flying fish.

Though limited in nature, the Besant Nagar fishing trials were an eye-opener. Local kattumaram fishermen saw for themselves how gillnets operated from motorized craft could tap the flying fish resource. The trials also showed that BLCs could diversify their operations and increase earnings by going for flying fish with gillnets. But more extensive fishing trials were needed to substantiate the findings, particularly because large-sized non-spawning flying fish — accessible to small craft such as the BLC — were believed to exist in commercial quantities along the Coromandel coast.

**Follow-up to the Besant Nagar trials**

**It was decided to** conduct these trials in Thirumullaivasal, Thanjavur district. This village was selected after a survey of 20 to 25 coastal villages of Thanjavur — of factors such as fish resources, shore infrastructure, beach configuration, fish marketing, fishing gear and community behaviour.

The trials were carried out in co-operation with the local kattumaram fishermen. BOBP provided a beach-landing craft IND-20, besides mono-filament gillnets of proven design — proven during earlier trials. Fishermen under the supervision of a technologist constructed a fleet (wall) of 26 nets floating from the surface down to a depth of two metres. Catches were preserved in ice on board and auctioned to local buyers at current market prices. All the proceeds went to the project. The crew were paid on the basis of the traditional sharing system. Data on fishing, proceeds of sale and operational expenditure were collected and recorded by a field officer of the fisheries department.

The IND-20 fishing craft used for the trial had a length of 8.5 m, a beam of 1.9 m and draft of 0.30 m. It also had a net hold and an insulated fish box. It was powered by a water-cooled 9 hp diesel engine fitted into a box type retractable propulsion system. The craft fished every day, beginning operations early morning. No trip lasted more than 18 hours. The trials started on April 17, and ended on 16 July, 1990.

Results of gilinetting trials

The table (page 2) provides data (both catches, and costs and earnings) resulting from the trials. Since the net payment to the boat-owner for three months (mid-April to mid-July) was Rs. 20,307 and fixed costs (beachcraft and fishing gear) were Rs. 7,500, the boat-owner's monthly net earning was Rs. 4,266. This gives an idea of how viable small-scale gillnetting from mototized craft is for at least three months a year, when it is aimed at

## Flying fish in the Bay of Bengal — Big and small

At least 10 species of flying fish have been recorded in the Bay of Bengal region. Of these, a small variety, a coastal species known as Coromandel flying fish *(Hirundichthys coromandelensis)*, has been landed on the east coasts of India and Sri Lanka for half a century or more. Fishermen aggregate the fish with lures and catch it with scoopnets.

Almost all other species are larger in size and oceanic in habitat. These include the two varieties that predominate in the gillnet catches off Besant Nagar and Thirumullaivasal — Sutton's flying fish *(Cypselurus suttoni)* and Indian spotted flying fish *(C poecilopterus)*. They exhibit a size range of 23 cm - 35 cm. (Those caught in Besant Nagar were 23 to 30 cm; those caught in Thirumullaivasal were 29 to 35 cm in length). By comparison, Coromandel flying fish usually belongs to the length group 18 - 24 cm.

Thus beachlanding craft have been capturing a bigger variety of flying fish than traditional boats do, and one which is relatively under-utilized too. Says BOBP's Senior Fishery Biologist, Dr K Sivasubramaniam, "Thanks to these catches, we now know that Sutton's flying fish and Indian spotted flying fish are present in commercially exploitable quantities. We have some idea of their size, of possible catch rates and the prices they will fetch."

It is known that the larger varieties of flying fish are generally scattered along the pelagic zone close to and beyond the continental shelf, along the southwestern part of the Bay of Bengal. They are more visible along the east coasts of India and Sri Lanka, than along the west coasts.

The "traditional" Coromandel flying fish is caught between May and July, which is when it spawns. The species lay 5,000 to 12,000 eggs, depending on the size of the fish. The eggs are laid on any floating material that's around: fishing nets, fishing lines, weeds, flotsam and jetsam. Many eggs are lost when fishermen discard egg-laden lures after removing the fish from them. Can this destruction of eggs be stopped? An international market does exist for flying fish eggs. Japan, for instance, imports flying fish eggs from Indonesia. However, in the absence of resource knowledge, commercial utilization of flying fish eggs should not be encouraged, experts believe.

The BOBP beachlanding craft in Thirumullaivasal caught Sutton's flying fish and Indian spotted flying fish between May and August. They did not show evidence of spawning then.

How rich is the flying fish resource? What does available evidence indicate? Dr Sivasubramaniam cites three facts (a) The resource in both India and Sri Lanka is spread widely. (b) The catch is mainly of adults rather than juveniles and (c) If the bigger varieties spawn at the same size, like the smaller variety does, there's no danger of the flying fish stocks getting overfished, provided a sufficient quantity of eggs is allowed to develop in the sea.

large flying fish along the Coromandel Coast.

Species **composition of catch:**
The main varieties caught were Sutton's flying fish *(Cypselurus sutton!),* Indian spotted flying fish *(Cypselurus fisher folk* large-scale flying fish *(C. oligolepis)* and tropical two-wing flying fish *(Exocetus volitaus).* Average size recorded : 28 cm in length. All the species were non-spawners: where and when the large species were spawning was not clear.

Performance of the beachianding craft
The IND-20 proved to be a good craft for capture of large flying fish from a beach-based fishing village. Besides the features mentioned earlier, the craft had both surf-crossing and gear-carrying capability. Its deck layout was adequate for easy handling of fishing gear and removal of flying fish on board. Though somewhat slow, the craft was mobile enough to reach the offshore fishing area and return in time to dispose of catch in the market. It was fuel-efficient. It was a very safe craft, with an efficient sail rig for protection against engine breakdown.

**How the gilinet performed**
The gillnet performed well. It is a fishing gear easy to use on offshore-going craft – those that are large enough to carry enough gillnets to justify offshore operations. The PA monofilament netting used for the gillnets was transparent in water, and had the softness and strength needed to hold large flying fish species. Damage to netting was limited; it was caused mainly by large predators feeding on flying fish. Given the limited duration of the fishing season and the nature of the fishery, it was believed that the gilinet would have a service life of at least four years.

The mesh size of 52 mm stretched mesh was adequate. Loss of adult flying fish from the nets was negligible.

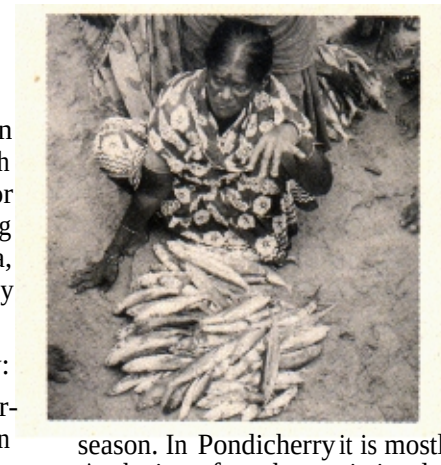
The depth of the net in water was appropriate. Most of the flying fish were found in the upper part of the nets.

Hanging ratio of 0.72 length of framing lines : The length of stretched netting was appropriate. It provided the correct mesh opening for gilling of fish. All told, no further refinement to the gillnet was considered necessary.

All told, no further refinement to the gillnet was considered necessary.

*(Continued on page 19)*

# Marketing of flying fish



A market survey was conducted in Juhe-July 1990, during the flying fish season, to, assess the potential for increased marketing of Sutton's flying fish. Select centres of south India, mainly in Tamil Nadu were covered by the survey.

The two main elements of the survey:

- *a four-week field study* of fishermen, consumers and traders in Thirumullaivasal; plus consumers and traders in Thanjavur, Pondicherry and towns nearby, besides Madras and Bangalore. This study aimed at procuring information on the flying fish marketing network, details of prices and evaluation of consumer preferences.
- *A trial marketing exercise* of Sutton's flying fish. Two consignments of the species were procured in Thirumullaivasal and sent to Madras where it was sold fresh.

Some findings

- Low and middle-income families are the main consumers fo fish. The middle-income groups go for fresh flying fish, the poorer ones buy dried flying fish.
- Some 1,6oot of flying fish is marketed in the region surveyed, of which about 50% is sold fresh to urban consumers and 20% to rural. The remaining 30% of the flying fish is marketed dry, mostly through shandies in Mayavaram and Villupuram, which during the peak season regularly handle up to 25t/week.
- While the fresh fish is sold locally within Tamil Nadu, the dried product is distributed widely and reaches north and northeastern states such as Assam.
- The mid-May-to-mid-July capture pattern of flying fish has led to consumer demand during these months for the "bird fish" or the "fish with feathers". Flying fish curry, made with coconut milk, is a popular recipe at some centres. In Thanjavur, Trichy and Salem, flying fish is considered tasty and is a preferred fish during the season. In Pondicherry it is mostly a' substitute for other varieties that are not available. In Bangalore, flying fish is sold without the characteristic pectoral fins, which are cut off. It is bought as a "last substitute" by low-income groups sensitive to prices.
- Sutton's flying fish appears periodically in Tanill Nadu markets in small quantities. Traders confirm that its better taste and bigger size, as compared to the traditional Coromandel variety, ensure it both a higher price in the market and readier consumer acceptance. In general, Sutton's commands a price 30 to *50%* higher than Coromandel.
- Thanjavur, Trichy, Pudukottai and Salem are considered to be the markets which can absorb increased quantities of Sutton's flying fish.In Thanjavur, Sutton's sells at up to 12 Rs/kg, as compared to Coromandel, whose highest price is 8 Rs/kg.
- Two consignments of Sutton's were sent from Thirumullaivasal to Madras on different dates. The fish sold in the Chintadripet market at an average price of 6.60 Rs/kg. Buyers were not prepared to pay more. There seems to be little market potential for this fish in Madras.

The survey was carried out in 1990, when the traditional fishery was abnormally poor. The data and the conclusions ought to be substantiated by a survey under more normal supply conditions. Further, caution should be exercised in promoting the marketing of Sutton's flying fish, to prevent an adverse impact on the sales of' the traditional Coromandel variety.


# *Needs and concerns of A view from*

Text by
Photographs

Needs determine functions, and functions dictate form. Or, to put it another way, fisherfolk needs determine the extension activities necessary to address the needs; and the activities, in turn, dictate the form and content of the extension organization.

In 1988, when the Ministry of Fisheries and Agriculture of the Republic of Maldives decided to establish a fisheries extension service to help their fisherfolk, scattered in 200 inhabited islands in 20 atolls which lay over several thousand square kilometres of Indian Ocean, it decided to begin at the beginning and determine the needs of fisherfolk.

With the BOBP assisting them, the MOFA staff set about getting acquainted with and familiarizing themselves with fisherfolk communities in order to better understand the fisheries and the fisherfolk. What was intended was more than just a study. The aim was to meet fisherfolk, build rapport with them, and start a working relationship building bridges as it were.

Three atolls were selected as a pilot area; Meemu, Vaavu and Faafu, all lying south of the capital island of Male. In August 1989 a series of visits began to the 19 inhabited islands in those atolls, which resulted in what can best be described as an extension tool : a book of information, ideas and relationships that extension officers could carry around, dip into when required, and add new information to.

It is difficult to do justice to 19 fisherfolk communities, their fisheries, their economic and social concerns, their needs and problems, in a short article but let us try and consider a series of snapshots, as it were, views from the beach, and see whether they blend into an understanding of sorts.

A country that is home to some 214,000 people scattered over 200 inhabited islands can be forgiven if they don't worry excessively about population pressures. And sure enough, not one person met during our travels did. But look at the concerns and problems the communities prioritized again and again — shortages of firewood, inadequate drinking water supplies, health and school facilities that cannot cope with demand, difficulty in disposing of garbage, increased weed growth in lagoons, probably due to nutrient loading. These problems not only ranked high in people's minds but oddly appeared in clusters in some islands, suggesting that they perhaps were symptoms of some hidden process. And the demographic information collected from

*Hauling of boats up the beach calls for many hands women lend a helping hand.*


# *Maldives fisherfolk – the beach*

Rathin Roy
by Hassan Maniku

island offices shows considerable population growth, at least over the last decade. To take an extreme case, Nilandhoo Island in Faafu Atoll doubled its population between 1985 and 1989. More significant was the fact that crude birth rates, calculated from the percentage of population under 15 years added up, on average, to a staggering 49. In spite of small absolute size, given the geographical limitations of small islands in terms of space and resource, population can and does negate development and is obviously an important concern that has been identified.

What do the people do? In Meemu atoll with good fishing to be had, fishing was the most important earner of income, with coconut coir rope making and coconut thatch making in the second place. The civil service came third. In Vaavu atoll things looked a little different in that tourism-related work came in second to fisheries since two tourist resorts are located in the Atoll. Faafu atoll is really quite different. There is hardly any fishing there and people seem to be making their living off coral and sand mining for construction.

It is never easy to determine how much people earn or how well off they are, but various indicators can and do give us a feel. Fisherfolk communities in the three atolls, when looked at in international development terms may be considered "poor", but when compared with their fellow-fisherfolk in South Asia were found to be relatively comfortable. They were housed in reasonably permanent structures, were well clothed, had access to nutritive food in terms of carbohydrates and proteins, though vegetables are not too common. Incomes from fishing, agriculture and trade are being increasingly supplemented by incomes from community members working in tourist resorts, in Male and on ships at sea.

One is tempted to say that all is well, but that is not entirely true, for the visits and the study raised a concern which may, in the future, be problematic. One set of questions asked of households tried to elicit shifts in main occupations in the recent past, say five years. The single most important shift in all three atolls was away from fishing and processing of fish amounting to a significant 10% in Meemu, 16% in Vaavu and 14% in Faafu. These numbers don't ring bells in themselves, but when one considers the shift away from fisheries as a percentage of all occupational shifts one realizes that close to half of all occupational shifts are away from fisheries. This is something to worry about. Fishing, barring tourism, is the most important economic activity of the Maldives and a very large number of its people depend on

it for a livelihood. And people are moving away from it! Fisherfolk said that fishing was not earning them enough, or to put it another way there were other occupations that did earn them more. The costs of fishing, particularly fuel costs, are going up and prices of fresh and processed fish remain stagnant. The fishery "industry" was obviously losing its youth to "easy" and more paying occupations. In fact reinforcing this was the fact that the community in identifying income-use options gave investment in income – generation activities a low priority.

Status aside, the main purpose of the study was to identify needs and concerns. If one looks at the needs and concerns identified by fisherfolk and by the island chiefs, one begins to see some patterns and there is much to be learnt from these.' First, and most importantly, problems seemed to cluster, and in clustering often raised an underlying, often hidden problem. The clustering of problems was not merely happenstance but was due to the fact that these problems were related and often interacted and fed each other, resulting in more or different problems. The symptoms and problems can be grouped by causal linkages and impacts conveniently into five clusters

(a) The crisis in the fisheries
(b) The energy crisis (primarily firewood shortages)
(c) Inter-sector labour shift
(d) Lowering of environmental quality
(e) The decline in health

One of these clusters, also shown diagramatically, is discussed in detail later in this article.

Second, the fact that problems are inter-related suggested that any action to help the community to remedy its problems would have to be multidisciplinary and acting in concert. In fact, as a study meant to give directions to the Ministry of Fisheries and Agriculture in establishing its extension service, it showed clearly that the Ministry alone could not do anything because several if not most parts of the problem clusters were out of its mandate and the responsibility of other ministries. This would suggest that more than direct action, the needs dictate coordination and catalytic action to enable various agencies to come together for comprehensive action.

Lastly, the clustering suggests that a nexus is evolving between resources (and their availability), the environment (and its carrying capacity) and the population (that depends on both). The problems resulting from the combined impacts of these three aspects are beginning to be visible, but if the population scenario is anything to go by, from visibility to concern to crisis may not take a long time and the need to act seems clear.

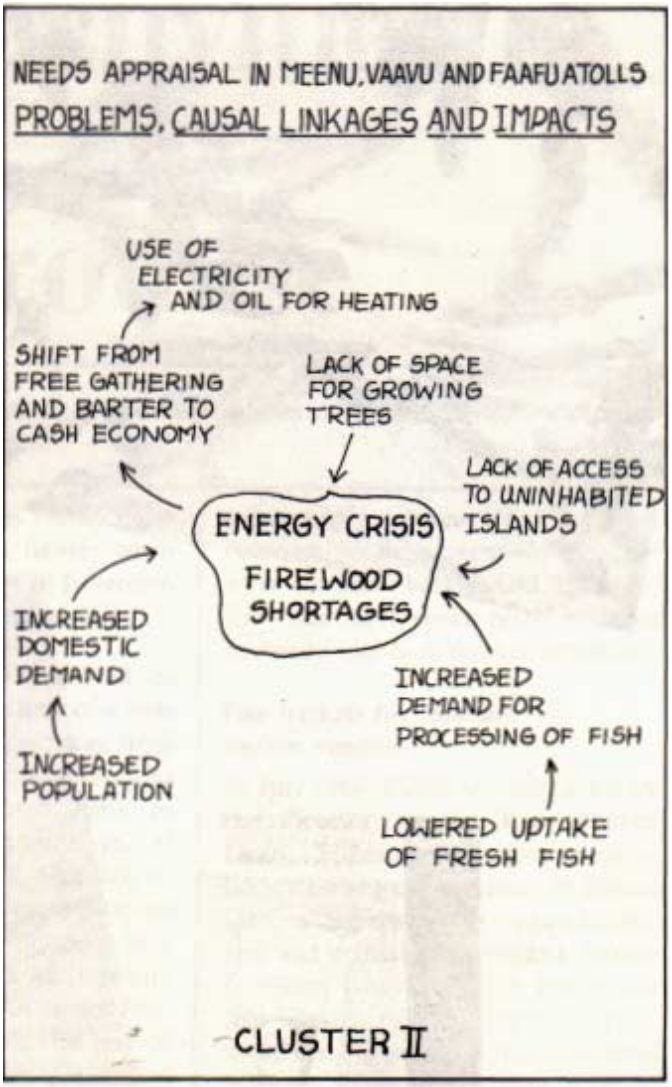
Let us consider one of the problem clusters in detail. In most islands the number one concern was, shortages of firewood. Consider the diagram. On the demand side the need for firewood is increasing because of increased domestic consumption, probably due to increased population, This demand is aggravated by the fact that the wood stoves in use in the islands are of very low efficiency. The more efficient traditional stove made of sand and coral cemented with wood ash seems to be in decline. The other demand for fuel wood comes from the fishery. Fisherfolk are unable to sell all the fish they catch because the collection system does not have the collection and sharing capacity. So the unpurchased fish has to be either salt dried (which does not fetch good prices!) or smoke-dried into "Maldive" fish and this needs fuel wood.

On the supply side the picture is grim. The more crowded islands have no space for growing trees. And, nearby uninhabited islands are often not accessible as they are leased out to individuals. The result is that the community is moving from tree gathering and barter to a cash ecOnomy in fuelwood, purchasing wood collected and brought in by contractors from uninhabited islands.

Moving on to fishing. There seem to be no problems with either the availability of fish or in the methods of capture. The problems begin with having to cease fishing earlier in order to reach collection vessels in time and the delays there in queuing up. The waiting time can last several hours. Due to capacity shortages collection vessels cannot buy all the fish caught, which means that after the delays the fisherfolk return with a part of the catch to be processed and it is not uncommon to reach their islands after dark. By this time the quality of the fish is often so bad that it has to be thrown away. If the quality is good or passable the fish has to be cut, cleaned and cooked for later smoking.

Fuelwood shortages make 'making Maldive fish' more expensive, and the low price of salt-dried fish does not encourage the option. Meanwhile fuel oil on which the fishery is totally dependent continues to go up in price.

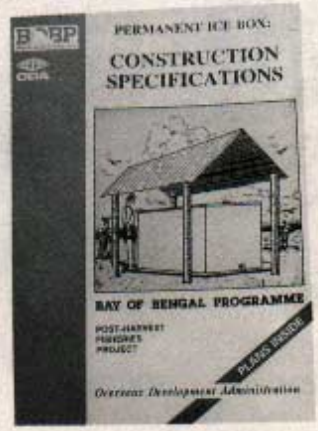
The problems are visible, the solutions not entirely so. But a good beginning has been made. We now know the needs and some important lessons have been learnt about the needs. Needs will determine function and functions the form and that is the challenge that now faces the Ministry of Fisheries and Agriculture and they are determined to rise to the occasion.




*Right: One of the five 'clusters' of problems the author refers to. This one centers on the shortage of firewood.*


*Drying racks improve the quality of small-scale dried anchovies so that they tap export markets.*


*New aluminium fish containers — fisherwomen find them light, durable, leak-proof, smell-proof.*




*2-tonne "permanent" ice box stores fish in ice, enabling their sale at the right time for the right price.*



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# Post-harvest activities in Kanyakumari, India show promise

*Post-harvest fisheries adviser Timothy Bostock describes simple technologies to cut post-harvest losses and thereby raise the incomes of small-scale fisherfolk.*

In their effort to augment the incomes of small-scale fishing communities, both governments and development agencies alike have tended to concentrate on increased productivity. It could however be argued that attempts to tackle the problems of post-harvest economic loss may be more effective in achieving this goal, particularly in view of diminishing fishery resources.

### Economic losses - what are they?

One of the more fundamental problems encountered in small-scale fisheries is that the catch often does not earn the revenue that it could. Along with the physical decay resulting from poor handling and lack of an effective means of preservation, we commonly observe a corresponding decrease in value. This economic loss is difficult to quantify, but can be substantial and, by and large, has its greatest impact on the small-scale fisherman and trader/processor.

Economic losses are probably much more common than is generally recognized and occur throughout the post-harvest chain from fisherman to consumer. For example, we see high value fresh fish such as seer landed in poor condition fetching on average 20% less than their top quality iced brothers; stored dried fish which is infested with dermestid beetles and larvae may attain only 25% of the potential value of best quality dried fish. A study carried out on fresh fish marketed to Delhi from Veraval, Gujarat in 1986 indicated annual economic losses of around Rs. 70 million due to downgradation of fish as a direct result of quality deterioration (Table 1). Our recent studies in South India indicate possible losses of perhaps Rs. 6-7000 per kattumaram fisherman per year owing to the poor quality of the dried anchovy produced. It is hardly necessary to say that this figure, when multiplied by the number of fishermen involved, speak for themselves.

Overall economic losses should be considered within the context of a wide spectrum of values. These range from a hypothetical "ideal" value (such as high-value exported fresh fish), to "zero" value when the same type of fish is simply discarded with no, or negative, revenue. However, what we are mainly concerned with here is how to achieve improvements which ensure top local market prices for landed fish. Indeed, there is little doubt that general improvements in both fish quality and marketing efficiency would result in considerable benefits accruing to the sector.

It must also be borne in mind that value losses are, of course, not just a direct result of poor handling and quality deterioration. Market forces in any particular country will inevitably dictate prices, these ultimately depending on what the consumer is willing to pay and to what extent he will be influenced by fish quality. Moreover, his quality judgement will depend on past experience and will be modified by exposure to various factors such as the availability and price of alternative varieties of fish and other foods.

As part of ODA's post-harvest project at BOBP, a number of specific problems related to economic loss have been identified through close association with several small-scale fishing communities in the Kanyakumari District of Tamil Nadu, South India. What may be regarded as cost-effective, socially acceptable means of alleviating these are now being tested. Interestingly, whereas all of the target communities have essentially the same socio-economic background, the problems that have arisen relate to three mutually exclusive market activities.

### Fish baskets for itinerant women vendors

**In July 1988, BOBP** was contacted by **the** director of the Kanyakumari District Fishermen's Sangams Federation (KDFSF) and secretary of Shanti Dan, a fisherwomen's organization, and was invited to investigate certain problems concerning the traditional fish baskets used by many of their members. As many as 10,000 women in Tamil Nadu alone engage in "employment of the last resort" by using baskets to carry and market fish. They serve a vital function in implementing the distribution of the lowest-value fish to every corner of the hinterland.

What are the problems? "The buses won't allow us to carry our fish to the market because of the bad smell and the leakage", complained one woman who also bemoaned the filthy state of her working clothes. Bus drivers complain that their passengers, "especially school children and government officials, grumble about the smell from the baskets and delays in loading and unloading them". "What is worse", explains Miss' Kamila, the ODA project's local extension worker, "is that due to the lack of alternative transport in the district and the often stiff competition, fighting can break out!". Apart from the general social deprivation the women suffer from, their everyday life is full of irritations. As a result, their incomes suffer.

What could be done to help the women out? Clearly the root problem lay in

the nature of the existing baskets and transport systems. The real problem of "drip" from the fish, especially if ice is used, could not be remedied by simply introducing a better quality basket. Several women had opted to use aluminium buckets and despite their slightly better durability, they were still not ideal, nor were they readily accepted by the bus drivers. After eliciting recommendations from the women themselves through a series of questionnaires and working groups, several new designs of container were produced. Moreover, it was found that, with several ergonomic modifications, designs similar to existing cooking vessels could be adopted satisfactorily by the women. This meant that less tooling-up was required by the manufacturers, resulting in a container which was competitive with its less satisfactory alternatives. Key considerations were

- the dimensions, which stipulated a maximum height of 35 cm allowing stowage under the bus seats;
- a tight fitting lid, reversible for fish vending purposes;
- easily borne on the head or hips;
- easily lifted with upto 35 kg; and
- should be leak-proof.

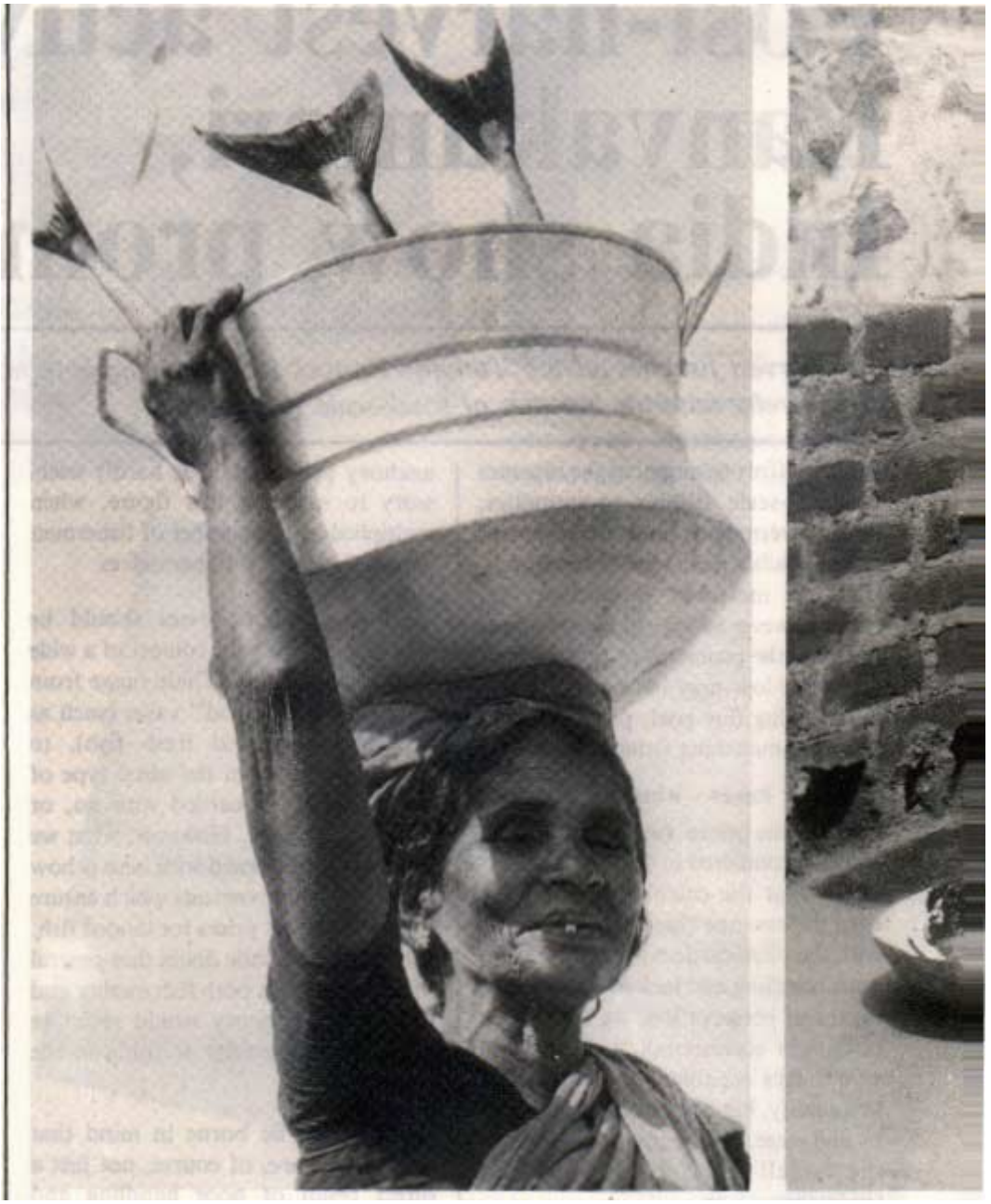
Further consideration was given to hygienic design and efficiency of material usage to keep the price down to around Rs. 250.

The final product, manufactured by a major Madras aluminium company (Sun Metal Co. Ltd.) is extremely durable, with a 10-15 year estimated lifetime (traditional baskets at about Rs. 35, may only last 2-3 months). One hundred of these are currently undergoing monitored field trials with women users and results so far are very encouraging.

We see this as an example of how simple, intuitive design considerations can be linked up to modern manufacturing technology to help solve a major problem in a simple way.

Dried Anchovies

Dried anchovies are produced in large quantities by many of the Kanyakumari fishing communities during a short season (August until November). Unfortunately, this season also coincides with the south west monsoon producing climatic conditions which



*Close-up of women fish vendors using the new aluminium fish containers (above). Permanent ice box under construction fright).*

are generally unsuitable for sun drying. The result is that much of the catch spoils before it has been dried. The degree of spoilage is reflected by the price paid and, as discussed above, the economic loss suffered by the producer/fisherman can be considerable.

During the 1990 season, we attempted to quantify and categorize these losses and suggest alternative, cost-effective technologies for drying. Some data for the former are presented simply in Table 2 which derives a "total loss" estimate by comparing actual income to potential, non-realized income.

The traditional drying method involves simply laying out the anchovy on the beach. This has several inherent problems:

- contamination from adhering sand which often comprises 20% of the product weight;
- insanitary conditions on the beach which may lead to contamination of the product with micro-organisms of public health concern;
- high temperature of the sand during periods of bright sunlight which tends to cook the fish, producing a fragile product which disintegrates easily during subsequent handling and distribution;
- slower drying in wet weather due to proximity to damp sand.

An alternative to this system, seen in many countries, is to use an elevated open drying rack system. In this case the anchovy is laid out on two layers

of fine nylon fishing net stretched between a wooden pole frame made from casuarina branches. Protection from rain showers is afforded by the timely use of polyethylene sheeting. The system used attempts to maximize the drying surface area whilst at the same time keeping costs to a minimum.

The capital cost per square meter of drying surface is Rs. 25, each $m^2$ producing 1.6kg of dried product every two days. This means that a family possessing a 50m2 two-layer unit (measuring 25m x im) could produce 80kg of dried anchovy every two days. Assuming, conservatively, an increase in product value from around Rs. 6 for the traditionally dried product, to Rs. 10 per kg for the rack-dried product, the difference of Rs. 4 per kg would be sufficient to pay off the cost of the whole 50 m2 system (Rs. 1250) in only 5 days!

The solution is however not altogether that simple. Will the market pay this additional "quality" premium for the improved product? In many cases of traditional cured fish markets, the answer would probably be a qualified no: the vast majority of the product is consumed by the lower socio-economic end of the market where price is the prerequisite consideration and demand elasticity is weak. Indeed, alternative products are readily available. In the case of dried anchovies, however, special circumstances exist in the form of an important export market to Sri Lanka.

Sri Lanka is by far the most important market for Indian dried fish products generating some Rs. 50-100 million per year of which a considerable proportion is regenerated to the wholly artisanal and small-scale producer. Of the total dry fish exports of 4,175t in 1988, over 96% were destined for Sri Lanka. Although this percentage has varied little throughout the 1980s, overall exports peaked towards 10,000 t in 1984/85 due primarily to a boom in the trade for dried anchovies.

Data covering the latter half of the last decade, however, show a dramatic decline in Indian dried anchovy imports into Sri Lanka over this period. While overall imports of this commodity have tended to increase, the market share enjoyed by the Indian product has dropped from 97% in 1985 to just 11% in 1989. Investigations carried out by the project in both countries show that the reasons for this are principally twofold: (a) recognition by Sri Lankan buyers of the poor quality of the Indian produce and (b) the introduction of a high quality Thai product into the market at a competitive price.

The total market for dried anchovy in Sri Lanka is large and currently stands at around 10,000 t per year, about 30-50% of the total dry fish imports. Given this scenario, it is clear that opportunities are available for those who wish to re-enter the Sri Lankan market with a high quality Indian product such as that obtainable using the drying racks described.

During the 1991 season it is planned to carry out extensive test marketing of the improved product in Sri Lanka where trade contacts already established are enthusiastic about the project.

**The use of ice**

An area of project support in Kanyakumari district relates to yet another market, that of high-value fresh fish: Many kattumarams and other small-scale fishing craft of this region target species such as seer which fetch high prices in distant inland markets. Traditionally, the fish is caught by hook and line although more recently, gill nets are being used. The fish is purchased directly upon landing through auctions which are to a greater or lesser degree controlled by various commercial interests.

Value losses occur for two main reasons. First, the prices paid for hook-caught fish tend to be better than for net-caught fish. More often than not, the soaking times of the gill-net operators are simply too long and the quality of the fish upon hauling commonly leaves much to be desired. Secondly, problems arise once the fish is landed. The traders favour morning purchases while much of the fish may be landed in the afternoon. This lack of competition tends to depress prices, as the fishermen have no alternative but to sell.

**On behalf of the** Kanyakumari sangam the KDFSF approached the ODA project with this problem with a view to investigating the possible deployment of ice and ice box systems. These would, it was hoped, demonstrate that an overnight storage facility may help to reduce the risk of distress selling by its members. In this case the problem was complicated by the fact that over 60 kattumaram operators were to be potential beneficiaries with individual catches of a mere few fish each per day.

The result, which is currently in its sixth month of testing, is a 2t capacity insulated permanent ice box (photo), constructed by a local builder using materials bought on location and administered by the sangam fishermen members themselves. In times of large supplies, by purchasing the fish from its own members at the current market rate on any one day, especially during the afternoon and evening when traditional channels are closed, the sangam is able to ice the fish and release it for sale on subsequent days at prevailing prices. The personal economic loss to the fisherman is then minimized and any premium is paid back to the individual member according to the quantity sold to the sangam. A small percentage is withheld to cover the costs of the ice, capital cost of the box, administration and savings. This system has several advantages, other than those already mentioned, both to the trader and sangam. The trader benefits from regularity of supply and high quality and the sangam, by interposing itself as a trader, plays a role in price regulation within the whole community.

Overall, the three activities described in this article attempt to address community problems by applying simple, known technologies and by testing basic economic viability i.e. an increase in the individual fisherman's earning potential.

**Table 1**

**Fresh fish: estimation of overall economic losses during marketing for domestic consumption (from Veraval, Gujarat to Jumma Masjid, Delhi).**

| Classification | Quantity (t/year) | Unit value (Rs/kg) | Down grading[1] (%) | Drip loss[2] (%) | Total revenue ('000 Rs) Actual | Potential |
|---|---|---|---|---|---|---|
| **Class I** | 12,000 | 25 | 5 | 5 | 277,875 | 300,000 |
| **Class II** | 18,000 | 15 | 7.5 | 5 | 246,881 | 270.000 |
| **Class III** | 18,000 | 10 | 10 | 5 | **162,450** | 180,000 |
| **Class IV** | 12,000 | 5 | 15 | 5 | **52,931** | 60,000 |
| **Total** | | | | | **739,931** | **810,000** |

**Loss of potential revenue Rs. 70 million**

**Notes:** [1]**The lower the class, the higher the quantity downgraded**

[2]**Drip loss of 5% taken as overall standard value imposed although this may be higher in spoiled fish and lower in fresher fish.**

**From Bostock T.W. (1987), Marine Fisheries of Gujarat : Post harvest losses and** possibilities for development. TDRI report L75 V + **32PP, NRI, Chatham, Kent, UK.**

**Table 2**

**Estimated economic losses in dried anchovies incurred by 30 fishermen in 5** villages **of Kanyakuman District during** 1990 **anchovy season (August - November)**

| Actual revenue through sale of dried anchovies (Total catch : 50,500 kg) (Weight after drying : 25,250 kg) | | | | Potential revenue (on the basis of Rs.12/kg) | Total loss of revenue | Loss per Fisherman |
|---|---|---|---|---|---|---|
| Percentage sold | Quantity sold (kg) | Price (Rs/kg) | Actual revenue (Rs) | | (Rs.) | (Rs.) |
| 0.5% | 126.25 | 14.00 | 1,768 | 12 x 25,250 | 303,000 | |
| **0.1%** | 25.25 | 12.50 | 316 | = 303,000 | 108,439 | |
| 1.7% | 429.25 | 10.00 | 4,293 | | = 194,561 | |
| 0.2% | 50.50 | 9.00 | 455 | | | |
| 0.4% | 101.00 | 8.00 | 808 | | | 194,561÷30 |
| 33.9% | 8572.40 | 6.00 | 51,359 | | | = 6,485 |
| 2.4% | 606.00 | 5.50 | 3,333 | | | |
| 0.2% | 50.50 | 4.00 | 202 | | | |
| 60.6% | 15,301.5 | 3.00 | 45,905 | | | |
| 100 | | | 108,439 | | | |

Source: Marketing survey, Kanyakumari District, BOBP-ODA/KDFSF, 1990

NOte: 1. A 50% weight loss during drying is assumed.

2. The sample comprised 6 fishermen from each community; data collected daily.

# God and the diminishing fisheries resource

by S Muthiah

*A journalist examines how fisherfolk look at fishery resources, and how they explain the phenomenon of falling catches. Can the gap between the perceptions of scientists and fisherfolk be bridged? Effective tools of communication with fisherfolk are needed. Comic books, which BOBP is experimenting with, may be one such tool.*

"The catch is a gift of God. He decides everything". This is what a Bangladesh fisherfolk group recently told a Swedish research team, Eva Skagerstam and Torben Brattstrom, who were investigating the perceptions of small-scale Bangladesh fishermen about fishery resources and their conservation. But is God the answer to a diminishing fisheries resource?

That the fisheries resource is diminishing worldwide is indisputable. Dr Armin Lindquist, FAO's Assistant Director General of Fisheries, was categorical about this when he spoke to *Bay of Bengal News* a few weeks ago. "The conditions of coastal fishing are deteriorating because of uncontrolled fishing, pollution, siltation, mangrove extraction and several other reasons. This is particularly true in the developing countries", he said. Citing the example of the world's biggest fishery, Peru, where the anchovy catch dropped from 12 million tonnes in 1970 to a little less than three million tonnes in 1988, he warned that despite the greater all-round awareness of the dangers of overexploitation, "it may not be possible in the future to have or sustain so many coastal fisherfolk".

Drawing attention to another aspect of this problem, Dr Lindquist estimated that by-catch worldwide for every kilo of shrimp caught was *ten kilos!* About one tenth of this, according to BOBP's Senior Fishery Biologist Dr K Sivasubramaniam, is real "trash fish" not fit for human consumption. Though the rest consists of valuable species, at least half is "immature fish or fish that had no chance of spawning even once". Capture of such small-sized fish deprives the future of many species on which most of the artisanal fisheries depend.

Dr Lindquist suggested that the answer to these problems lay in avoiding nursery grounds, limiting certain areas to passive gear, imposing a more rigorous off-shore limit for bigger vessels and developing economically viable new technologies that would enable small-scale fishermen to tap deeper waters and off-shore fishing zones. China has already been laying down the law in this respect.

There are allocations of horsepower quota for each area, a ban on the construction of new fishing boats, freezing of the number of vessels, a resource protection fee, closed areas and seasons, a ban on trawling in certain areas, mesh size regulations and a number of other bureaucratic measures. Though the enforcement seems to be taken seriously at the official level, FAO fisheries economist Rolf Willmann who studied the process in China, feels that in practice implementation is difficult. Consequently, exploitation of the fisheries resource continues to thrive.

Curiously, many of the fisherfolk engaged in marine fisheries, interviewed in several Bangladesh villages by the Skagerstam-Brattstrom team, revealed a similar understanding of the situation. Trawler-fishing was cited as the main reason for the depletion of the fisheries resource by villagers in Selimpur. Pollution by industrial waste is also "causing trouble", they told the interviewers. And they gave erosion by floods as yet another reason.

Fisherfolk in Sandip Para echoed the trawler theory, accusing trawler operators of "operating in the spawning areas and catching everything," thereby decreasing the catches of traditional fishermen. Latif Pur blamed the trawlers and alleged that because of them "the stock is overfished". Likewise, fisherfolk in Kawar Para stated that "over-fishing is due to increasing numbers of nets and mechanised boats" and charged that "the trawlers destroy everything". And in Ghorok Ghata they said "the trawlers and also the mechanised boats are catching all the big fish".

While Bangladesh fisherfolk were unanimous that not only was their catch smaller but also the size of the fish they caught, as compared to ten years ago, none considered their fishing methods, estuarine or marine set bagnets, as harmful to the stock. In fact, the general attitude appeared to be that if the trawlers and mechanised boats were removed from the scene all would be well with their world. But that such an eventuality was unlikely seemed evident from the resignation they displayed.

Even if set bagnet fishing with a small mesh size was eventually harmful, "we do not have any alternative," Selimpur fisherfolk told the interviewers. It was a view echoed by Kawar Para fisherfolk: "Our methods are harmful to the stock, but we can't do anything about it. We have to fish to survive." Such compulsions are compounded by their total faith in God as the arbiter of their destinies. In village after village, God's will was repeatedly cited as the prime reason for everything that happened around them and no effort was made by the villagers to explore the discrepancy between "the rational causes" put forward by the fisherfolk and their fatalistic attitude expressed in terms of "What can we do? God decides everything!"

The God-view was stated as a primary reason for resource depletion in every

village. In Selimpur they blamed the depletion on "the time of evil now" and "the anger of the Gods". But almost in the same breath there were fisherfolk in Selimpur who averred that "the stock is unlimited (because) God creates new fishes all the time". To bridge the gap between these two views and explain their small catches, these fisherfolk added, "God decides everything, who gets big catches and who small".

In Sandip Para too they told the interviewers, "Everything is decided by God". That is why, they explained, "The catch is the gift of God". Similar sentiments were expressed in Kawar Para, where the fisherfolk stated, "Everything depends on Allah!". Expanding this expression of implicit faith, they told the Skagerstam-Brattstrom team that "God created the stock for the people and He creates new fish all the time. If the catch goes down, we pray to Allah and He is with us all the time. If the fish disappear, God will give us alternative ways to survive". In Ghorak Gota, the same thought was echoed, "The Almighty creates new fish all the time. The size of the fish depends on the Gods. And so too the size of the catch. The Gods are inside our boats and they direct the fish into our nets". This, the Gods would appear to partially do through the annual Lokonath Half Panoika, a calendar (almanac), which provides information on subjects ranging from the best time to go out fishing to the best time to have a baby.

So much is their fate considered a part of God's wish that when the fisherfolk of the Chittagong coast have to propitiate the Gods, they forget all their other obligations. "If we have to choose between returning money to CODEC for loans or spending this money for the Gods, CODEC must wait; we can pay them later," the interviewers were told in Selimpur. CODEC, the Community Development Centre, a non-governmental organization, has been very active in this area, motivating and organizing the fisherfolk to improve their living conditions, introducing a savings programme, giving them loans to buy craft and gear, and providing semi-formal education to children and adults (which includes knowledge on resource management and on how they can to some extent, control their own destinies).

CODEC's success, especially with the women, who appeared to react better and adapt faster to new ideas and new mechanisms, led the Skagerstam-Brattstrom team to conclude that the fisherfolk of the region are, "in general, open to changes concerning both working methods and work tasks". Their "conservatism", the study team felt, has been rather "exaggerated" by outsiders and they can be persuaded to adapt to new ideas and foreign technologies by trainers keeping in mind local cultural rules and working within that framework.

Sri Lanka has, meanwhile, formulated a five-year development plan for fisheries (1990 - 1994) that, independently, appears to reflect this same thinking. Since resource limitations have become clear in certain areas in the island, the Plan chalks out strategies to ensure better management of resources. This involves "educating the fisherfolk on the need to conserve and manage the renewable fish resource".

John Kurien, of the Centre for Development Studies, Trivandrum, Kerala, while speaking of the "fisherfolk's proneness to superstition" and their glorification and "worship of Mother Sea" the provider, says that "Kadalamma's barrenness you never reproach". Nevertheless, the fisherfolk community's traditional R & D, "based on a wealth of knowledge arising from their assimilation of the nuances of their eco-system", regularly seems to find answers to problems that seem without answer, especially with no experts around. Necessity leads to innovation, he says, and the others in the community of small-scale fishermen are quick to learn.

With the Bangladesh, Sri Lankan and Kerala experiences all pointing to the fact that if knowledge on resource management is provided, within the local cultural framework, the fisherfolk have the ability to assimilate fast what is taught, the question arises as to what would be the best way to teach lessons about the need to conserve the resources. At the same time, the method used must also help to convince them that saving the resource does not mean destroying the livelihood of fishermen, that it is only a way whereby everyone in the community, if they worked together, could ensure that only mature fish were caught and the resource thus saved. One answer the FAO's Bay of Bengal Programme for Fisheries Development has come up with is *comic books!*

The first of a series of publications under preparation is *Our fish — Our wealth.* Scripted by Kamala Chandrakant and illustrated by Razi, and prepared in consultation with Dr K Sivasubramaniam and Rathin Roy, the first booklet is in Telugu and discusses how the resource can be equitably divided among small-scale fishermen, those using mechanised boats and the trawlermen. Showing the community the way is the hero, Raghu, a fisherman's son who returns to the village after training at the Fisheries Institute.

In his introduction to the series, Raghu says

"For hundreds of years now, our people have depended almost entirely on the sea for a livelihood. So dependent are we on her that we revere and worship her.

"And yet, sometimes, when the catch is very poor and seems to decrease day by day whatever we do, we tend to blame her. We say she is angry, she has been unkind. Has she?

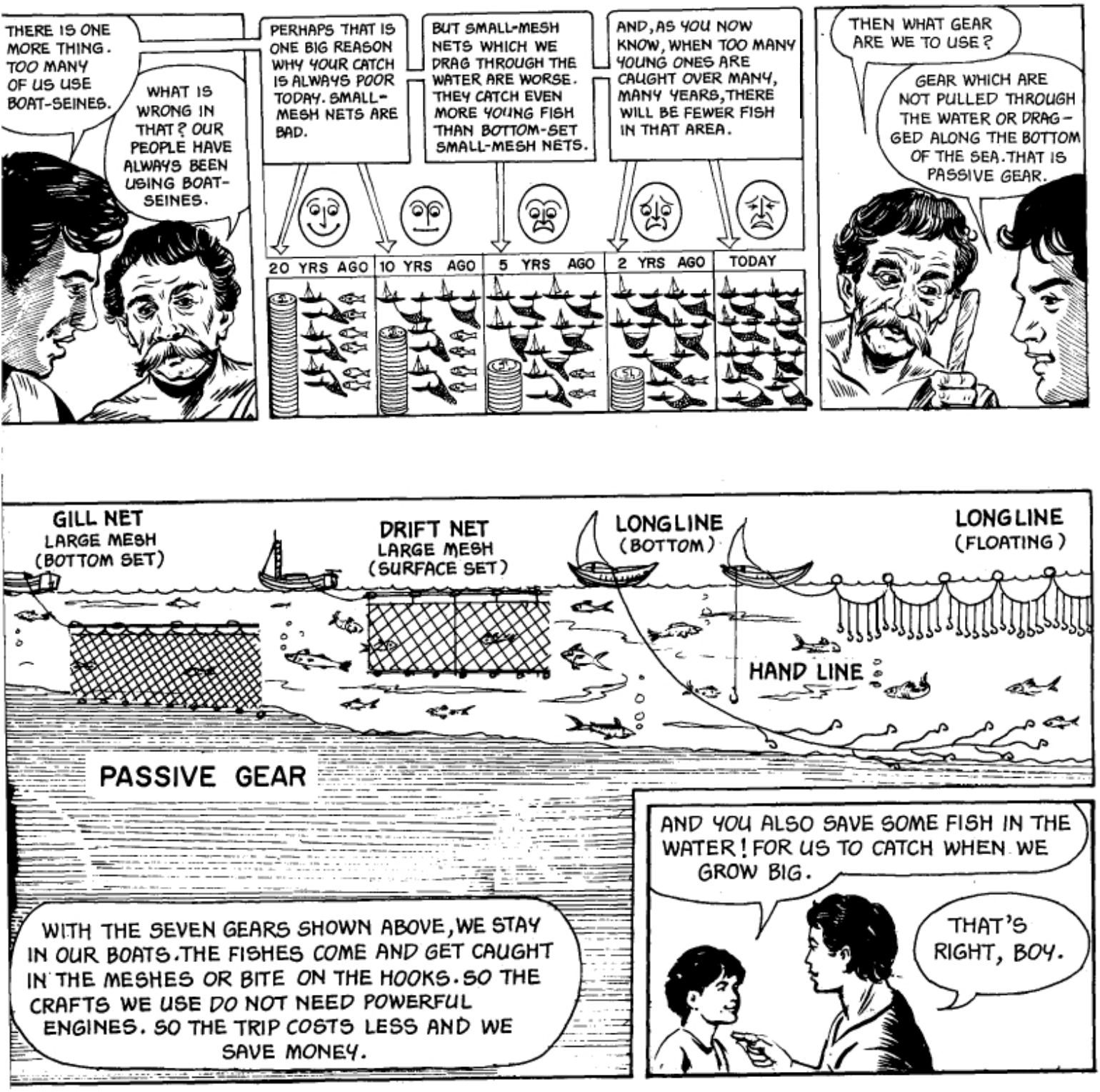
"Could it be that in our ignorance, our need, our greed, we are taking too much, too soon, from her?

"Are the fishing methods, gear and craft we use today the best ones? Do they do the best for us by way of catch weight? If they do not, what can we do about it?

"In a series of colourful picture books like this one, we will discuss these questions one by one and try to understand and learn about what we could do to protect and conserve the wealth that is ours — our fish stocks".

Comic books of course are not the only communication tool available to reach fisherfolk. Traditional media such as street plays and therukoothu are other tools that need to be looked at. Posters and sketches can be effective too, as demonstrated at a "Field Day" BOBP organised last year at Kothapatnam near Ongole in Andhra Pradesh. Dr Sivasubramaniam had used posters on tne occasion. That experience led to the comic book approach through recognition of the fact that in almost all the fishing villages on the Bay coasts there is now a level of literacy that can cope with such simple publications and enjoy them. An appreciation of these concepts is hopefully going to see several more booklets in this comics series, all of them in several languages of the Bay. And if they succeed in their mission, that will be God's will too.

*Extract from a draft comic book prepared by BOBP. Its Telugu version is being field-tested among fisherfolk.*



# National Workshop on Artificial Reefs on the West Coast of Thailand

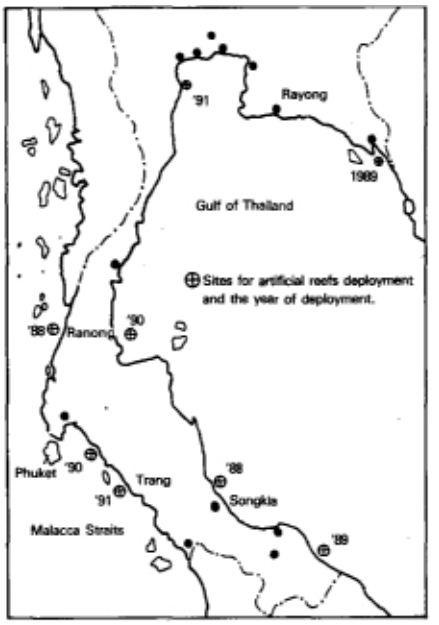
The workshop was held in Phuket, Thailand, from 6 to 8 November, 1990. There were 30 participants, all of them involved with the artificial reef programme on the east and coasts of Thailand. The Governor of Phuket and the Deputy Director General of Fisheries, Thailand, Mr Urupon Boonprakob, were chief guests at the opening ceremony.

Artificial reefs are fabricated with various kinds of materials such as wood, iron/steel, concrete, tyres, shells, stones and plastics. Their possible uses are many : to protect the environment/ecosystem; aggregate fish resources; enhance fishery resources by increasing the biomass or establishing new resources; prevent trawling; reduce erosion; build shelters; replace natural reefs destroyed by man; offer recreation and game fishing. The shapes and sizes of artificial reefs vary according to their objectives and the sea condition in the location.

Artificial reefs are an elaborate and expensive business. Fabrication and deployment must be preceded and followed up by surveys. Pre-deployment surveys are a must. They enable you to assess the status of the resources of all living organisms in the area, define the artificial reefs, formulate a management system for the reefs, identify responsibilities and liabilities for running them, examine property rights. Good pre-deployment surveys must advise on precautions to ensure that the deployed reefs do not sink or interfere with the hydrodynamics of the environment. In other words, the pre-deployment survey must thoroughly examine the technical, legal and socio-economic implications of the deployment.

Says **Dr K Sivasubramaniam,** BOBP's senior fishery biologist, "The importance of pre-deployment surveys is not adequately recognized. Without it, a post-deployment survey has only limited utility. Because you can't be sure whether any changes for better or worse are due to artificial reefs or some other cause. You can't satisfactorily quantify the economic and social benefits of artificial reefs — something necessary in view of the cost and the effort that they entail. Even from the technical standpoint, such issues as the degree of enhancement of the resources, the increase in the biomass, and absolute abundance of the fish as against mere aggregation, require a good pre-deployment survey."

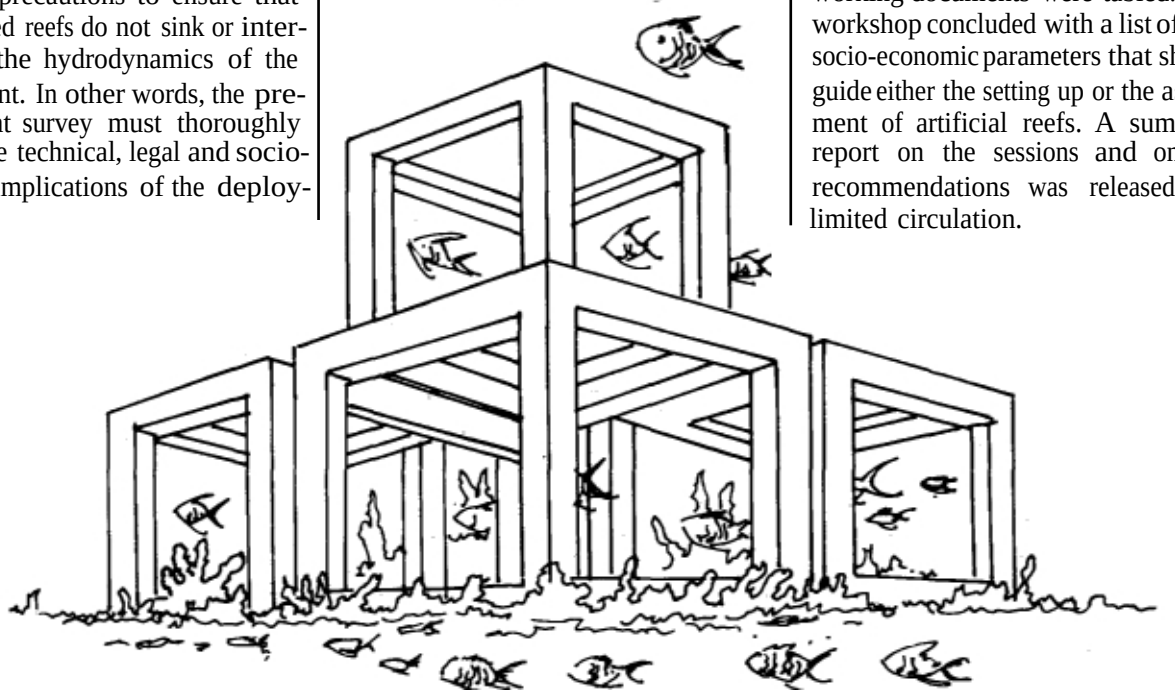
*Map shows artijlcal reef sites in Thailand, past and present. Bottom: One of the reef structures.*




The fabrication and deployment of artificial reefs depend on their objectives: these determine the location, the material used, the shapes and sizes of the reefs. Besides construction, transportation and placement of the reefs at site are also very costly; attention must be paid to selecting cost-effective materials and deployment methods.

Unless the resources in an area are effectively managed, the introduction of artificial reefs may only aggravate resource shortage, particularly if the resource is being overfished already. How far artificial reefs can obstruct trawling, and how effectively they can protect the ecosystem or the demersal resource, is not known at present, and needs to be determined.

Before the workshop began, there was a field trip to artificial reef sites on the west coast of Thailand (Ranong). The workshop dealt in separate sessions with issues such as site selection, structural design, resource management in artificial reef areas and socio-economics of fisherfolk communities associated with artificial reefs. Experiences on the east and west coasts of Thailand, as well as in other parts of the world, including neighbours such as Malaysia, were looked at. Twelve working documents were tabled. The workshop concluded with a list of bio-socio-economic parameters that should guide either the setting up or the assessment of artificial reefs. A summary report on the sessions and on the recommendations was released for limited circulation.



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# Advisory Committee discusses BOBP's third phase

Colombo was the venue for the BOBP's 15th Advisory Committee meeting, held 28-30 January 1991. Representatives of the seven member-countries, of FAO and the donor countries attended. Myanmar was present as observer. There were also observers from various fisheries organizations in the region.

The meeting was preceded by the Seventh Session of the Committee for the Development and Management of Fisheries in the Bay of Bengal, the inter-governmental body of the FAO's Indian Ocean Fisheries Commission. Both meetings were formally inaugurated by Mr Joseph Michael Perera, Sri Lanka's Minister of Fisheries and Aquatic Resources.

Some notable decisions:

* *It* was confirmed that the mother project "Small-Scale Fisherfolk Communities," funded by DANIDA and SIDA, has been extended by one year till the end of 1992.
* Plans were endorsed for the new projects on "bid-economics" and on "Women and their families in fishing communities" to be funded by UNDP and UNFPA respectively.
* The Committee noted with satisfaction that a new two-year project to assess "Pollution hazards in fisheries" will become operational from early 1991. It will be implemented by the National Swedish Board of Fisheries with funding support from SIDA. The Project hopes to stimulate and assist national institutions to consolidate and analyse data available to assess the threats to the fishery resource from pollution and environmental degradation.
* The project proposal for a new "mother" project for BOBP's third phase starting 1993 was discussed. The project (Working title : "Development and Management of Fisheries in Coastal Communities in the Bay of Bengal") will strive towards sustainable betterment of the socio-economic conditions of coastal communities and environmental protection. An intermediary objective is management of fisheries to ensure sustained production and maximum benefits for the small-scale sector.

  The new mother project will attempt to evolve methods and techniques for assessment of fisheries. It will identify strategies and measures to enable governments to better manage their fisheries; promote measures for small-scale fisheries development; introduce appropriate technologies in aquaculture and capture fisheries to enable higher incomes; and strengthen national fisheries institutions and agencies concerned with small-scale fisheries and fisheries management.
* In view of fishery resource limitations, the Committee stressed the need for more development work in post-harvest fisheries to reduce losses and increase the value added of the products. It was therefore hoped that a new post-harvest project would form part of the third phase.
* Thailand has offered to host the 16th Advisory Committee Meeting early 1992.

The theme for the Bay of Bengal Committee meeting was "Offshore Fisheries". The discussion centered on under-exploited offshore fishery resources, the means of harvesting them, and associated post-harvest problems. It was concluded that some of the under-exploited offshore resources are within the reach of the small-scale sector. The small-scale offshore fisheries development that has taken place in Sri Lanka in the recent past was cited as a striking example.

Between the two meetings, delegates had an opportunity to visit Doddanduwa, a fishing vilage south of Colombo, to observe BOBP's work on introduction of new types of outrigger canoes.

# Capture of flying fish

*(Continued from page 5)*

As regards the fishing operation, the best fishing was from early morning till noon. It was therefore necessary, regardless of wind or current, to reach the fishing ground by 5 a.m. and leave the fishing base around 1 p.m. or 2 p.m. depending on the fishing area. The net's soaking time was confined to two to three hours, depending on the catch and the current. About two or three sets were done for each day trip.

**The fishermen's response**

The fishing trials were conducted in cooperation with local kattumaram fishermen. They were initially reluctant, but the higher earnings made possible by the gillnets stimulated interest and co-operation. In fact, gillnetting for large flying fish was the most lucrative of all the fishing methods used in Thirumullaivasal. Fishermen and owners of motorized kattumarams got interested in large flying fish. Late in the season, one of them even undertook to rig new gillnets in order to rope in the large flying fish.

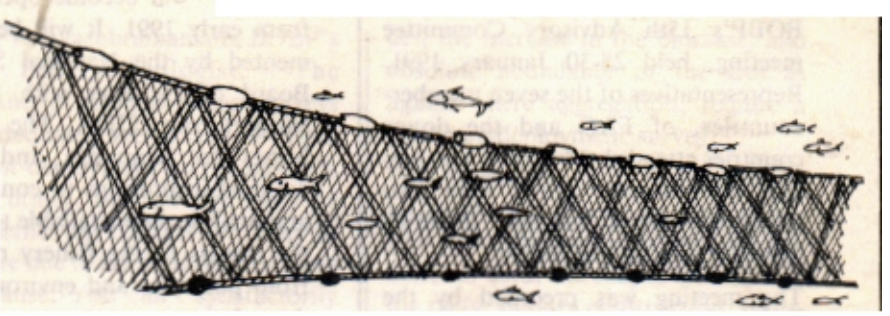
**Demand for** large flying fish

All flying fish were landed fresh or iced and auctioned on the beach. The auctioned price of large flying fish varied with the catch and with the landings of traditional craft, and ranged from Rs 1 to Rs 2 a fish.

As the catch could be disposed of easily, there was a good demand for flying fish landed fresh. Production could be increased without a sharp drop in prices. (For some facts on marketing of flying fish, see page 5).

Thirumullaivasal fishermen see the trials as very useful, and are keen to go after flying fish with gillnets during the next fishing season. However, traditional kattumaram fishermen, who constitute the majority, wonder whether flying fish gillnetting would be be viable with their non-motorized craft. Therefore further demonstrations during the next fishing season in Thirumullaivasal will be conducted with both motorized and traditional kattumarams.

# LETTER FROM THE PUBLISHER



## The Trammelnet

It's perhaps a century old in the Mediterranean sea, but in the Bay of Bengal it's been around for little more than a decade. It is fast catching on, however, and small-scale fishermen in the region who have used it swear by it. It is the good old trammelnet — which in these parts sometimes goes by the jazzy name of "disco" net.

The trammelnet is said to have entered the region through Thailand, spread quickly to Malaysia, then slowly northward through Myanmar (Burma). It simultaneously made its presence felt in Sri Lanka, and is now spreading along the coasts of India. (A boat development project in Kerala recently urged fishermen to pay greater attention to trammelnets, because of their high earning capacity). And there's word from Bangladesh about the net's effectiveness for catching shrimp in shallow waters.

What's special about the trammelnet is that the main panel of small-mesh (commonly 30 to *50mm)* webbing is "hung" both horizontally and vertically — a feature that strengthens the net's entangling capacity. This special hanging of the main panel is made possible by attaching two side panels of large mesh (about *250* mm) — which, so to speak, provides the frame for the main panel.

The trammelnet has been used in the European part of the Mediterranean sea primarily to catch flatfish, such as sole, but trammelnet users in the Bay of Bengal region go mainly for shrimp. The net may be set on the bottom, but it is commonly used as a bottom driftnet. It's modest in size, and not conspicuous for height or bulk. Small motorized boats without mechanical hauling devices can easily operate the net in shallow waters — usually 10 to 20m depth. Small and large kattumarams can also operate small trammelnets in 3 to 8m depth for shrimps. One disadvantage of the net is that the catch is difficult to disentangle: the process is slow and time-consuming, and nets can suffer damage.

A bio-economic analysis of a shrimp was conducted recently in one of the Bay of Bengal countries. One of the preliminary findings is that the trammelnet is an economically and socially efficient gear. The artisanal fishermen who operate this net from small craft are likely to be the main beneficiaries of any management measures.

Trammelnet operations would perhaps be even more effective than at present, were not fishermen afraid of their nets getting lost or damaged by shrimp trawlers.

Could the trammelnet be a substitute for the shrimp trawl? If we compare the two, the advantages of the former would be: it would give the small-scale sector a bigger share of high-priced catches. It would consume much less fossil fuel. It would catch fewer shrimp juveniles, thus leading to a healthier and more economic fishery. Finally, unlike the shrimp trawls, it would not produce big by-catches — large quantities of small fish which the crew discard or throw overboard.

But would the trammelnet match the shrimp trawl in the economics of shrimp capture? Trammelnets are usually used in waters up to 20m deep, while the best shrimp grounds are found in the 20-50m depth range. On the other hand, why shouldn't trammelnets be used in such depths too? If the technical problems can be solved, it remains to be seen how well the trammelnet would compare with the trawls in terms of catch rates and overall production. Systematic fishing trials over long periods — a minimum of one year — are necessary to yield answers.

Aren't the plus points of the trammelnet impressive enough to warrant such trials?

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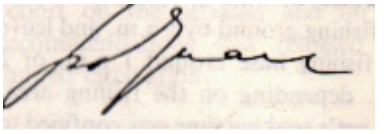

BAY OF BENGAL NEWS

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