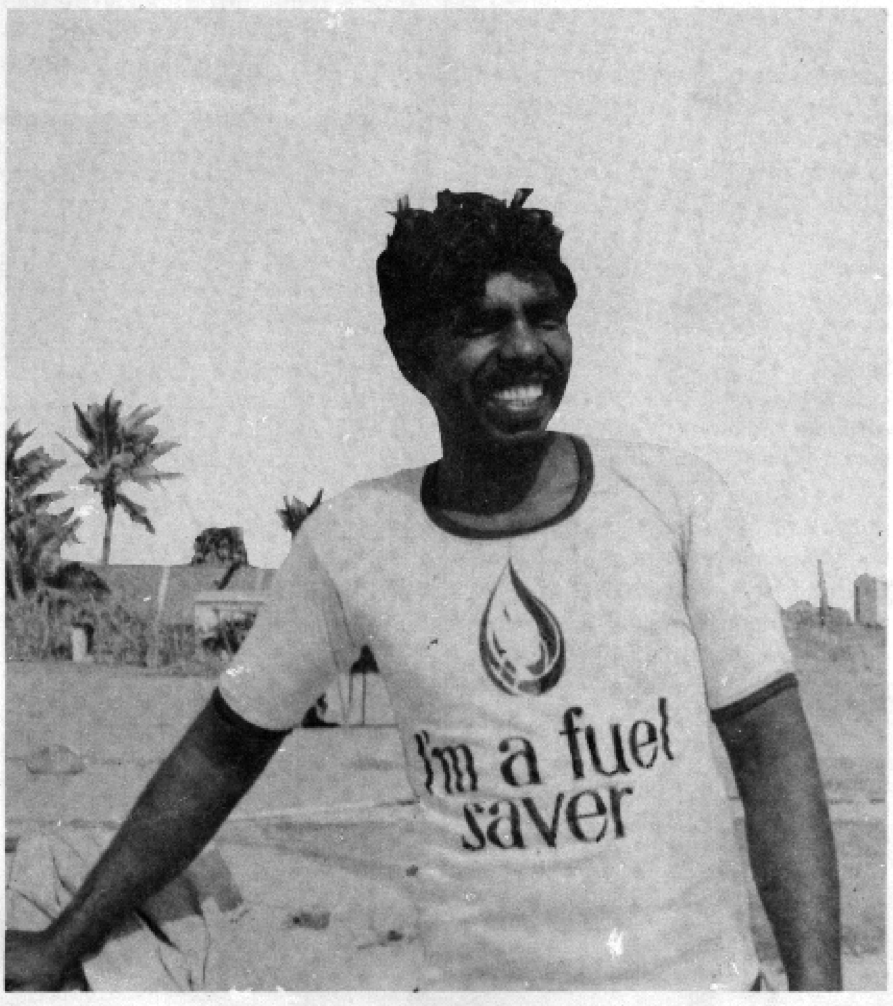
BAY OF BENGAL NEWS

SEPTEMBER 1982
ISSUE NO. 7

A PUBLICATION OFJHE
BAY OF BENGAL PROGRAMME
FOR SMALL-SCALE FISHERIES DEVELOPMENT

HOW TO SAVE FUEL

BOBP consultant Qyvind Gulbrandsen recently evaluated.. Sri Lanka's fishing craft and recommended measures to improve their fuel efficiency and to develop new craft. Some of his findings — which are perhaps applicable to other countries as well — are summarized in this story. To promote the fuel-saving ethic, Guibrandsen suggests "I'm a fuel-saver" stickers, such as the one below.



As fuel costs rise and profit margins diminish or turn into losses, fishermen stay at home and are deprived of much needed income. This is what's happening in many countries. How to save fuel?

In Sri Lanka BOBP consultant Oyvind Gulbrandsen has come up with some specific answers which are also in general applicable elsewhere. Besides technical recommendations on engine power, propellers, sails, etc., he also suggests an imaginative campaign to persuade fishermen to adopt fuel-saving measures. Posters, I-am-a-fuel-saver stickers, T-shirts, catchy melodies, all are feasible — "anything that might attract the attention of the fishermen". Sailing regattas for fishing boats with cash prizes could be one way of popularising sails.

Lower the RPM : In general, the existing fishing craft are overpowered, says Gulbrandsen. Considerable savings can be effected by reducing the rpm of the engines. A speed reduction of 10% results in fuel savings of 30-40%. Fishermen may initially resist a move to reduce speed — the speed of the boat is partly a status symbol. But it is in their own interest since a slight speed reduction is not crucial. Information, persuasion and time are required to get the message across.

Sails : Sails definitely help to save fuel but it is difficult to quantify the savings without long-term trials; the savings may also very considerably from one fishery to another, depending on fishing operations and the force and direction of the wind.

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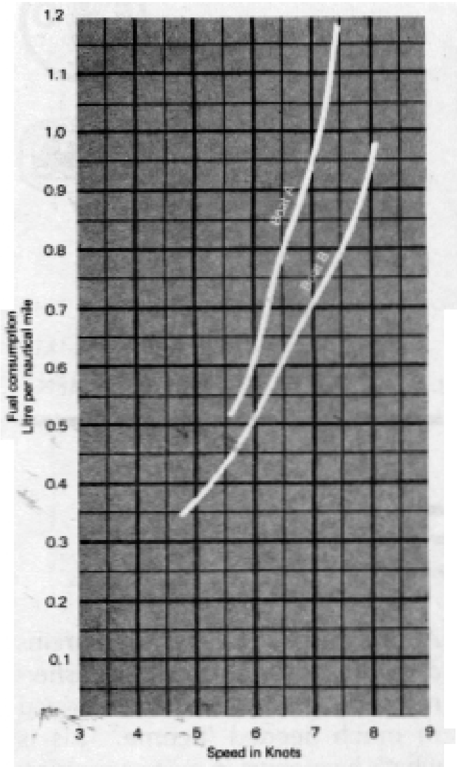


Figure 1 Fuel consumption per -nautical mile : Boat A vs. Boat B (both 28-footers)

The sails their rig and accessories like centre boards also represent an additional cost. Guibrandsen therefore suggests a rather cautious approach; existing craft should be equipped with simple lug sails to be used "when the wind blows" and during emergencies. However, fuel cost is a perennial problem and good sailing qualities should be incorporated into all new craft.

The Sri Lanka Government is contemplating immediate measures to improve the economy of the existing fleet coupled with long-term measures in boat design and operation to facilitate the sustained viability of the sector. It is in this context that BOBP, at the request of the Sri Lankan Government, conducted a techo-economic evaluation of fishing craft early this year, followed by technical trials.

Fuel consumption per nautical mile was adopted as the most relevant measure of fuel efficiency by consultant Gulbrandsen. Fuel consumption was measured with a special guage (see page 8). The engine rpm was measured with a hand-held tachometer on the flywheel of the engine. Speed was measured with an electronic trailing log.

28-footers

The fuel consumption on the 28-footers (or 3½ tonners), of which there are about 2,700 in operation, increases rapidly with speed. Fig 1 shows the actual consumption against speed of two boats during trials. A one-knot reduction from 7 to 6 means a saving of about3O%. In money terms this is equivalent to Rs. 60 for a 20-mile return trip, but each leg will last about half an hour more because of the reduced speed.

Cleaning the hull : The fuel economy can be improved by keeping the boats hulls clean of barnacles and shells. During fue! and speed measurements of one of the 28-footers, Gulbrandsen discovered that its hull was heavily fouled. "We made a trial run as it was and then stripped it and had it cleaned before a second trial," says Gulbrandsen. "The difference in performance was remarkable. . . . The cleaning of the hull resulted in a fuel saving of about 35% (Fig.2) I don't know whether this boat is typical of the fleet but the matter deserves a close look".

New propellers : The performance of the 28-footers can also be improved by changing the propeller to work at a lower engine speed. Both diameter and pitch should be increased. The size of a propeller is commonly 20"x11½".The aperture of most of existing hulls is unfortunately not wide enough to accommodate a larger propeller. However, with a 2½"pitch increase (20" x 14") about 10% fuel may be saved (Fig 2). A 23" x 13" propeller was tested in Boat A by a special spacer arrangement to move the propeller further aft. This resulted in savings of the order of 20%.

Fairing of the skeg The fairing of the skeg can affect fuel consumption. Gulbrandsen suspects that the 20% difference between boat A and boat B (Fig 1) might come from the skeg. Boat A had a very wide skeg, grossly disturbing the flow in which the propeller was working.

For new 28-footers, smaller engines giving a power of about 12 hp at cruising condition are recommended. These should be combined with high reduction gear and aperture to take the propeller up to 26 inches in diameter and ensure better fairing of the skeg in front of the propeller. This would result in fuel savings in the order of 30% compared with the existing boats.

The existing 28-footers have proved their worth. However, no fishing craft is appropriate for all needs and fishing methods. Guibrandsen suggests two alternatives to the existing 28-footers for specific needs. (a) For extended trips of two to three days duration (example : large-mesh driftnetting during the monsoon), a larger craft than the 28-footer is recommended, in which better crew accommodation and fish-hold facilities can be provided. There is already such a boat in the market in Sri Lanka. It is 34 feet long and would need an engine of abou't 20 hp. In addition to having the of a larger boat it wilfloffer fuel savings of 25-30% compared with the existing 28-footers (Figure 3). Further improvements of propeller performance, mentioned above, also apply. (b) As forday trips, SRL-12, a shallow beachable craftdeveloped by BOBP . offers promise. It is 28 feet long and is equipped with a 15 hp engine with a gear reduction of 5:1. The fuel savings relative to the existing 28-

(Continued on page 4)

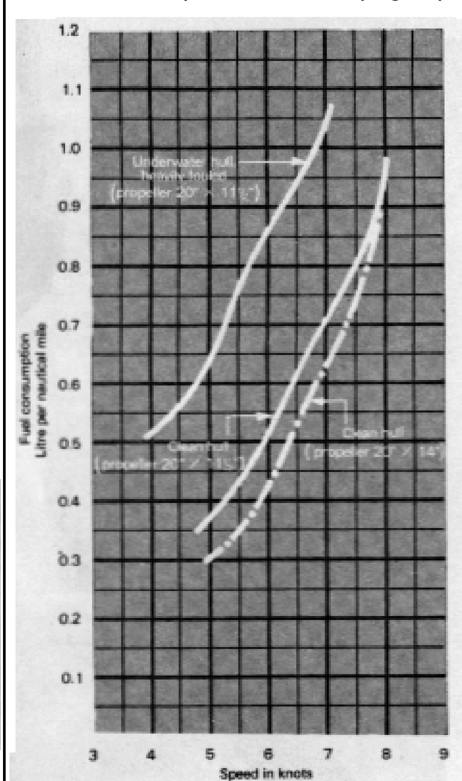


Figure 2 : Fuel consumption per nautical mile. Heavily fouled hull vs. clean hull.

A Letter from the Publisher

coastal aquaculture, by which we mean the farming of fish, crustacea and other living orgaisms in brackishwaters, did not come within the scope of BOBP when the Programme was conceived way back in 1974. But in the draft project document prepared in 1977 there was a small component of consultancy services for coastal aquaculture. This component has since grown to become one of our major areas of work along with fishing gear and mehtods, fishing craft technology and extension methodology. This change has been brought aboUt thçough the medium of our Advisory Committee which consists of representatives of the BOBP countries, SIDA, and FAO and meets yearly to monitor our work. The change is therefore a true reflection of the wishes of the member governments.

Why has this change come about? More and more emphasis is being given to aquaculture. It is seen as a supplement to the marine capture fishery particularly in situations of dwindling marine fish resources. Large areas of swamps and backwaters now lying idle might be used for rational farming. Another less rational factor appears to be a wish on the part of planners and administrators to get away from the primitive hunting practices which only the lonely fisherman at sea really understands and to develop aquaculture which is more controllable and even understandable to laymen. Whatever the reasons, it is certainly a step in the right direction though there are many 'buts' as to its dimensions.

Coastal aquaculture in most BOBP countries is in its infancy — and in one country perhaps in its youth. Our experience is also limited and we would like to share our thoughts with readers. A general observation is that too often the cart is put before the horse; big plans are drawn up for aquaculture development with hypothetical projections of high production, foreign exchange earnings, high incomes for fish farmers and increased protein supply. Expectations are high; one sometimes even hears talk of aquaculture replacing capture fisheries. However very often these plans are based on ideas and wishful thinking rather than on technical, economic or sociological facts or experience.

At best only rough surveys of the extent of brackishwater areas have been carried out. But how suitable are these areas for aquaculture? The exchange of water and its fertility might be insufficient; the salinity may be too high or too low or too seasonably variable; the soil quality may not be right; there might be risks of pollution; certain areas might have alternative uses; the costs of construction and maintenance of structures and facilities might be prohibitive. These factors, and there might be others, considerably reduce the area in which viable farming can be carried out. And in order to single this out, detailed surveys and culture experiments have to be conducted.

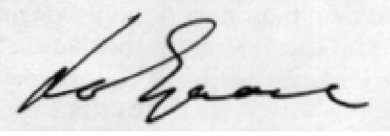
The feeding of carnivorous species and particularly the larger ones is a potential problem in the long term. BOBP has supported quite a successful project in Thailand on culture of seabass (Lates calcarifer) in cages. However, the viability depends on cheap supplies of trash fish. To produce one kg. of seabass eight kg of trash fish is required. Will the feed continue to be available at a low cost? Another long term problem is the ecological damage that large-scale brackishwater farming development may cause. The areas suitable for farming are breeding and nursing grounds for some species on which the capture fishery depends. We cannot expect an answer to this problem in our generation, and it is quite likely that development efforts in fields other than fisheries are or will be more damaging to ecology.

What effect will coastal aquaculture have on development objectives — protein supply, employment and foreign exchange earnings? The supply of protein to those who need it most may be disappointing. The farmer's interest is to maximise his returns and this he will seek to achieve by culturing high-value species for affitient markets. Additional employment will be created for laboure'rs but the distribution of ownership is likely to be limited at least in pond farming. High capital investment and need for skilled and careful water management and monitoring of the culture may necessitate large-scale rather than single-family operations.

A crucial problem for aquaculture in the future is the availability of seed. The big plans referred to above usually include a hatchery to produce seed for stocking the farms. Here again there is an element of wishful thinking. Technology in the region has not reached the level where reliable commercial seed production is possible. There are still too many hazards in hatchery operations of marine shrimp and finfish, and it's unsafe for commercial farms to depend on them. Big single unit hatcheries to service a larger area of farms is a common concept. Because of the many hazards, it may be better to encourage small units to spread the risks. Perhaps more effort should also be devoted to perfecting techniques of collecting seed from the wild...

These thoughts are being voiced not in a spirit of pessimism but in a constructive spirit — to provoke discussion. We believe there is a good future for coastal aquaculture, but feel that both the debate and the actual work need to be more down-to-earth, and that technical development needs to be intensified to improve the basis for planning. BOBP is making a small contribution to this. On page 9 you may read about one effort which shows some promise. But let us emphasise — it is too early yet to cash in on the results. The important thing, in our view, is that something practical is being done under actual field conditions. Success or failure — trial and error — will add to the knowledge without which planning is futile.

LARS O. ENGVALL



BAY OF BENGAL NEWS is a quarterly publication of the Bay of Bengal Programme (BOBP).

The BOBP is a regional fisheries programme executed by the Food and Agriculture Organisation of the United Nations (FAO) and funded by the Swedish International Development Authority (SIDA). It covers five countries that border the Bay of Bengal : Bangladesh, India, Malaysia, Sri Lanka and Thailand.

The BOBP's main aims are to develop, demonstrate and promote appropriate technologies and methodologies to improve the conditions of small-scale fisherfolk and the supply of fish from the small sector in member-countries. The BOBP began in 1979 and has a duration of five years. BAY OF BENGAL NEWS was started in 1981.

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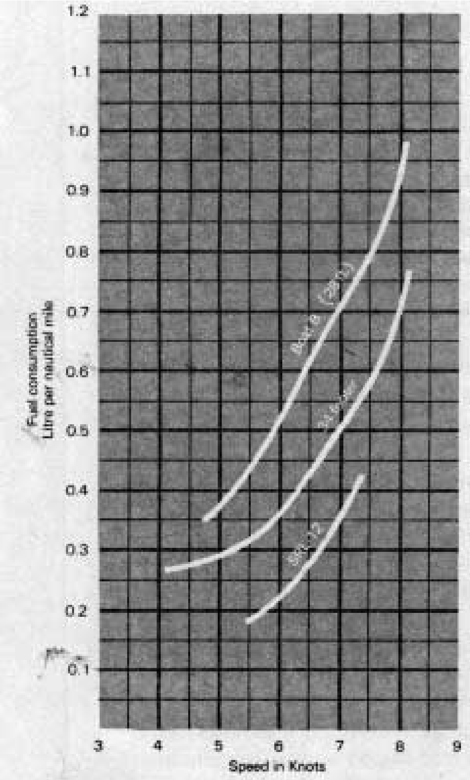

Figure 3 : Fuel consumption per nautical mile : 28-footer vs. 24-footer vs. SRL 12.

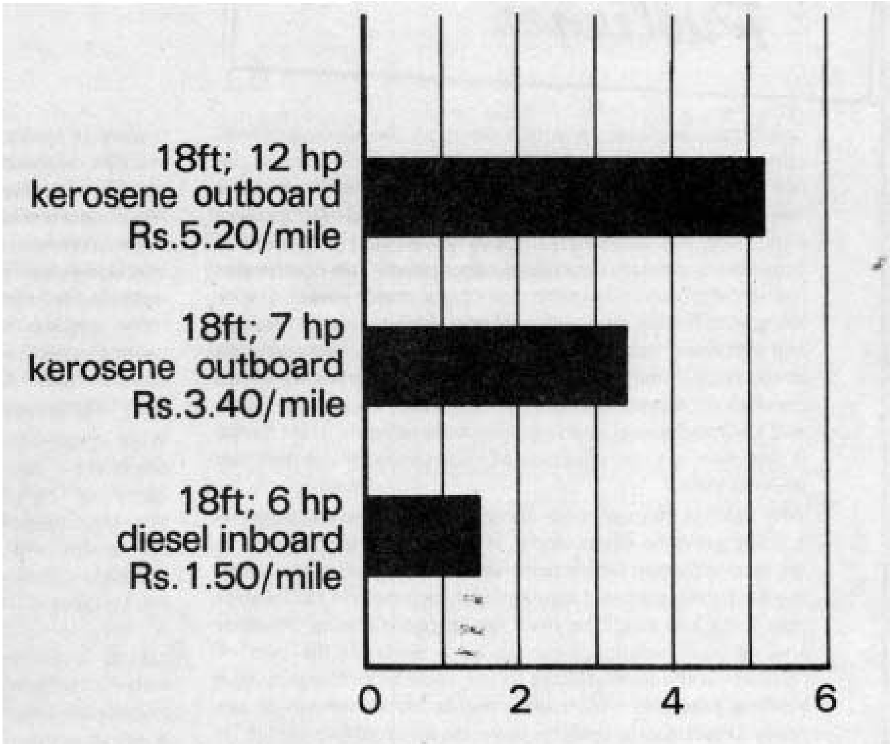

Figure 4 : Fuel cost per nautical mile: Three 18-footers with different engines (12 hp, 7 hp, 6 hp).

footers are 50-60% (Figure 3). It also has a very efficient sail rig but, as already mentioned, the actual savings by the use of sails are still to be assessed.

18-footers

18-footers with outboard engines are popular craft for the inshore fisher;,'. Some of them are equipped with 12 hp kerosene-driven outboard engines, some others with 7 hp engines. The 12 hp outboard engine is a fuel-expensive propulsion device : it costs Rs. 5.20 per nautical mile (Fig. 4). Gulbrandsen thinks that this type of engine will phase itself out because of the high cost but suggests that the government accelerate the process by withdrawing subsidies.

The 7 hp engine is also expensive to run but can be made cheaper by reducing the throttle. Data in the table below was measured during trials with a 18-footer loaded for fishing. It shows a 40% fuel saving with speed loss of just six knots!

The BOBP had developed a prototype of an 18-footer with a 6 hp inboard diesel engine. While most 18-footers are more or less flat bottomed, this one – the CEYNOR type – has a conventional hull with a skeg enabling the fitting of an inboard engine. A very low cost permile wasattained – Rs. 1.50: the speed was 5.4 knots. The high potential saving by employing small diesel engines instead of the outboard engines leads to the recommendation that new beach landing craft be developed along the lines of the ongoing BOBP work.

Commenting on Gulbrandsen's work, BOBP Director Lars Engvall says "It is useful as it offers concrete recommendations on fuel saving based on carefully undertaken trials. The government, the industry and the fishermen should get together and work out modalities on how best to make use of these recommendations. The BOBP on its part will continue to support efforts to save fuel." – **L.O.E./S.R.M.**

Fuel consumption data : 18-footer

Throttle setting	Engine rpm	Boat Speed (knots)	Fuel Consumption lit/hour	Fuel Consumption lit/nautical mile	Savings (%)
Full	4500	5.8	3.5	0.6	0
Cruising	4000	5.4	2.5	0.46	23
Low	3600	5.2	1.9	0.36	40

HOW TO SAVE FUEL ON EXISTING 28 FT. BOATS

Suggested innovations	Possible saving in per cent
1. Reduce the cruising speed from 7 knots to 6 knots	30 - 35%
2. Keep the hull clean of barnacles and shells	10 - 40%
3. Change propeller to diameter 23", pitch 13" (not possible on all boats due to limited aperture)	25 - 30%
4. Change propeller to diameter 20", pitch 14" (possible on all boats)	10 - 15%

OCEAN WAVES AND SURF CROSSING

Australian surf specialist Geoff Gowing describes the types of waves that travel the seas, the factors that determine wave size — and what a person thinks about when he's going out and coming in through the surf.

One of the most apparent features of the sea is that it is seldom flat. Even on a calm day with little wind, the rhythmic breaking of waves on the shore is a constant feature of any sea coast.

The waves that travel the seas range in size from the awesome "tidal waves" known as tsunamis which can travel at speeds around 700 km/hour, through the powerful ocean storm waves measured in heights up to 34 metres, to the minute capillary waves which appear as a roughening of the water surface as a puff of wind moves over it.

The effects of waves are also felt on the coastline. Under severe storm and cyclone conditions extreme damage can be done to jetties, piers, beaches and harbours, not to mention the damage and devastation to fishing villages and effect on the livelihood of the fishermen and those associated with the fishing industry.

Let's look at some of the groups of waves that we are most familiar with :

Tides (I bet you didn't think of the tide as a wave?) Tides are actually long period waves that have a noticeable effect over a span of some hours. The nice picnic spot on the beach at midday can be underwater by mid afternoon. The main driving forces of tides are the gravitational fields of the sun and the moon. The main periods are one of 12 hours and of 24 hours. The amplitude, that is, the difference between the high point and the low point of the water, can vary from place to place. In the Bay of Bengal the tidal variation is of the order of 2 metres. The Bay of Fundy in Canada has a 10-metre tide — imagine what that would do to the Madras harbour! At low tide Marina Beach would be as wide as it is long.

Storm Waves and Swell

As the wind blows over the water waves are formed, and as the wind continues the waves gain energy, building in height and gradually increasing the periods between them. Once generated, these waves can travel large distances with the longer period waves losing only a small proportion of their energy. Once these waves are out of the storm area they become ocean swells. These can have periods of around 15 seconds to 30 seconds, and as they approach the coast they make ideal surfing waves. Since Madras is located in the Bay of Bengal, most of the waves are generated locally and so have shorter periods of 10 to 15 seconds.

So how does all this become surf and why do waves wait till they reach the shore before breaking? Well, we have already seen that

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waves are formed by the wind and its size is determined by three factors

(i) the strength of the wind
(ii) the length of time it blows, and
(iii) the distance over which it blows.

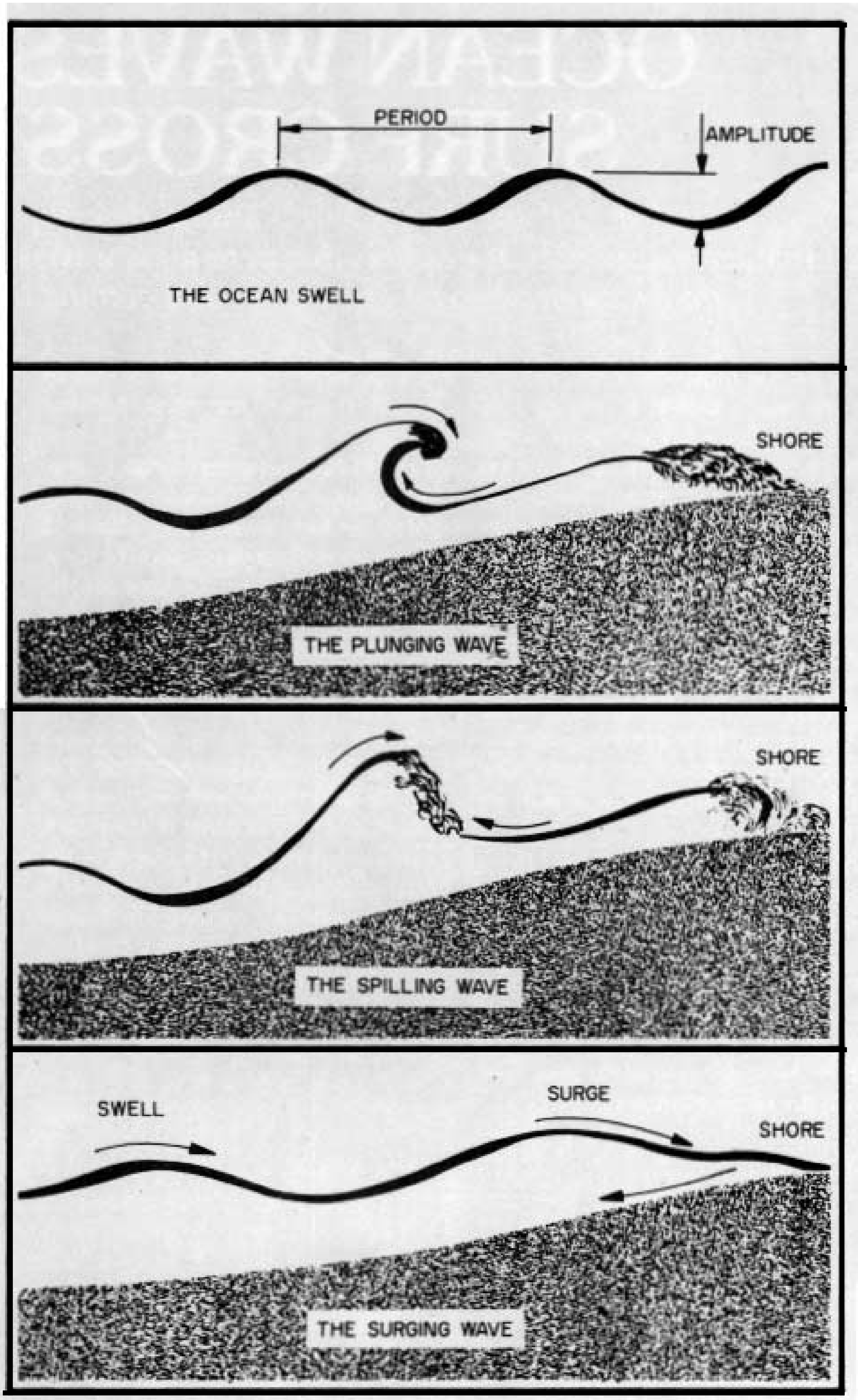
These three factors produce the ocean swell that approaches the shore. As that swell approaches the shore the depth of the water becomes more shallow. This causes the wave to slow down, but in slowing down its height increases. When the shore-ward side of the wave cannot supply enough water on the face of the wave to keep its shape it collapses down the face. This is SURF.

Surf can be divided into three general categories –

(1) There is the *Plunging Wave,* often known as a "dumper" because it builds its height rapidly and drops with great force;
This type of wave is quite common on Marina Beach at low tide and is the most difficult wave to cross because of the Jarge amount of wave energy U'eing dissipated in such a short time.

(2) There is the *Spilling Wave* sometimes known as "rollers" because the surf starts from the top and rolls down the face of the wave.
Sometimes during high tide at Marina beach these waves can be seen. They are the ideal surfing wave – the energy of the wave is consumed over a longer period than the crashing dumper and so the spilling wave is a gentler wave.

(3) Finally there is the *Surging Wave.* This wave never actually breaks but surges up the beach and washes over the sand. At Tangaserry Beach in Kerala I saw fine examples of this type of wave, and the fishermen make very good use of the surge into land and the run back to launch their craft.



So this is how waves are formed, how they get to the shore and what they do when they arrive. Having generalised and categorised waves and surf I will now state that no two waves are alike – just as snowflakes have as many patterns as there are flakes, so waves are as variable. And this is the challenge of the surf that surf-board riders, wind surfers, body surfers travel to all parts of the world to seek – the perfect wave.

I have surfed all around Australia, in South Africa, the West Coast of the United States, Sri Lanka, the West Coast of India and even the famous Marina Beach in Madras.

During the many surf crossing and beach-landing and departure trials at Marina Beach I have had people ask me what I do and what I think when I'am going out and coming in through the surf: "How do you know what to do?" That's a bit like asking a fisherman how he knows where to find the fish, where to go fishing.

I guess the answer lies in experience and knowledge I've gained over the years by being in the surf.

Let's go through an example of a surf crossing, and I'll tell you what I'm thinking as we go out through the waves and then back in again through the surf.

We have just started off from the beach .and are crossing the channel to the surf zone (that's where the waves are breaking). I'm checking a number of things now—

Is the boat balanced?
Are the crew in position?
Are we developing full power?

Is the boat responding to the rudder? What waves are coming in behind the break — are they big or are they bigger?

Actually, it makes no difference, because at this stage you cannot turn around.

No point worrying about the waves — we're in there now.

Keep the boat square on. Is it going to drop on us? Hang on crew here we go!

Throttle back a little and we'll be airborpe as we go Over.

Crash — 'the wave comes over the boat.

Glad I'm down the back here — the ride's not so rough. Whew! Made it through that one.

The engine's still going, the rudder's still responding. Okay, keep going. Here comes the next wave. Hey! that one's bigger than the last.

Oh, well — we're here now. The boat's been designed to take it.

(And that's what I'am here for — to see if it does.)

Wish I was back on shore watching. Too late now. Here we go. Square the boat up.

The crew are all looking happy — well, they're smiling anyway.

Maybe they're saying to themselves, wait till we get you back on shore — or, 'What's this crazy Aussie trying to do — no way we would take a kattumaram through this lot!"

Crash. Down comes the wave over us. The boat lurches and lifts up through the wave. Foam rushes down the deck and submerges us all.

We're through. Oh no! another wave. That one's okay. We've crossed the surf zone, we'll just ride over this one.

Now we're out the back behind the surf. So here comes the tricky bit, coming in through the surf zone.

Have a look out to sea and read the swells. Try and find a big one, it makes for a better trial. Hope we don't roll over this time.

Here comes a good swell. Check the boat's position. Are we all ready? Better have the crew near the back; this wave's a big one. Full poweç on!

Heck — the boat doesn't seem very powerful. Must be the water running back slowing the boat down.

Look back, check the wave see how it's building up.

Check the boat, line it up so that it will run true and square.

Check the rudder — is the boat responding? Yes, thank goodness!

Don't look back or the boat will swing off. You're in there now, just wait for the wave to hit. It sure is taking its time.

DON'T LOOK BACK — just keep it all lined up.

You feel the back lifting as the wave picks up the boat. The bow dips down, the boat accelerates.

Careful, it may veer off to the right or the left.

FEEL that rudder. This is the critical moment, just as the wave hits. The boat could go any way.

You hear the wave crashing down behind you and the foam comes around your feet as the boat rides the wave. The crew are smiling.

We've made it through once more.

Okay — get ready for the beach-landing.

HOW WAS THAT? EASY WASN'T IT?

I WASN'T WORRIED — WERE YOU?

That, very briefly is what a surf crossing is like.

Mind you, the next time the waves will be different.

It'll be a different boat.

The wind will be blowing.

The side current may be faster.

The tide could be higher.

The waves may be bigger.

There'll be a different crew.

The engine might fail.

And so on.

SEE YOU AT THE NEXT TRIALS!

USEFUL PUBLICATIONS ON FISHING GEAR AND METHODS

Is there a dearth of technical literature for fisheries development, training and extension? Not really so. Several fishing gear catalogues, manuals and booklets have been prepared for the purpose by various national institutions and the FAO.

It is true, however, that those in need of the right information do not always know what is available and where and how to get it.

Listed below are fishing gear catalogues, manuals and booklets prepared by the FAO:

1. **Catalogue of fishing gear designs.**
2. **Catalogue of small-scale fishing gear.**
3. **Echo sounding and sonar fishing.**
4. **Mending of fishing nets.**
5. **Tuna fishing with pole, and line.**
6. **Netting materials for fishing gear.**
7. **Otter board design and performance.**
8. **Fishing with light.**
9. **Training fishermen at sea.**
10. **Pair trawling with small boats.**
11. **Fishing with bottom gillnets.**

These publications contain a wealth of useful information and advice. They are published by Fishing News Books Limited, 1, Long Gardens Walk, Franham, Surrey, England, under a special arrangement with the. FAO. On request, Fishing News Books Limited will send you its catalogue with an order form.

glimpses into BOBP Projects

imp!e Device to Measure Fuel Consumption

Over the last 10 years the price of fuel has increased 10 times. The fuel efficiency of fishing boats has become a very important issue. Norway, Denmark and Iceland are now cooperating in a 3-million dollar project to investigate ways of reducing fuel consumption on fishing vessels. The goal is to reduce fuel consumption by 50%. In the Bay of Bengat region, this kind of money may not be available to investigate fuel consumption, but the need to look into the fuel efficiency of different boat types is even more acute here. Crew cost in the region being low, the fuel cost constitutes a large part of the total operating cost.

When BOBP was requested to investigate means of reducing fuel consumption on the standard 28 ft Sri Lanka FRP boat fitted with a 30 hp engine (please see story on pages 1, 2 & 4), the question of how to select the best apparatus for measuring fuel consumption arose. Consultant Oyvind Gulbrandsen contacted several organisations working in this field. The answer was : There are two ways. You can buy instruments off the shelf costing US $ 3,000 or you can utilise the foolproof method of measuring by stop-watch the time taken by the engine to consume a fixed quantity of fuel.

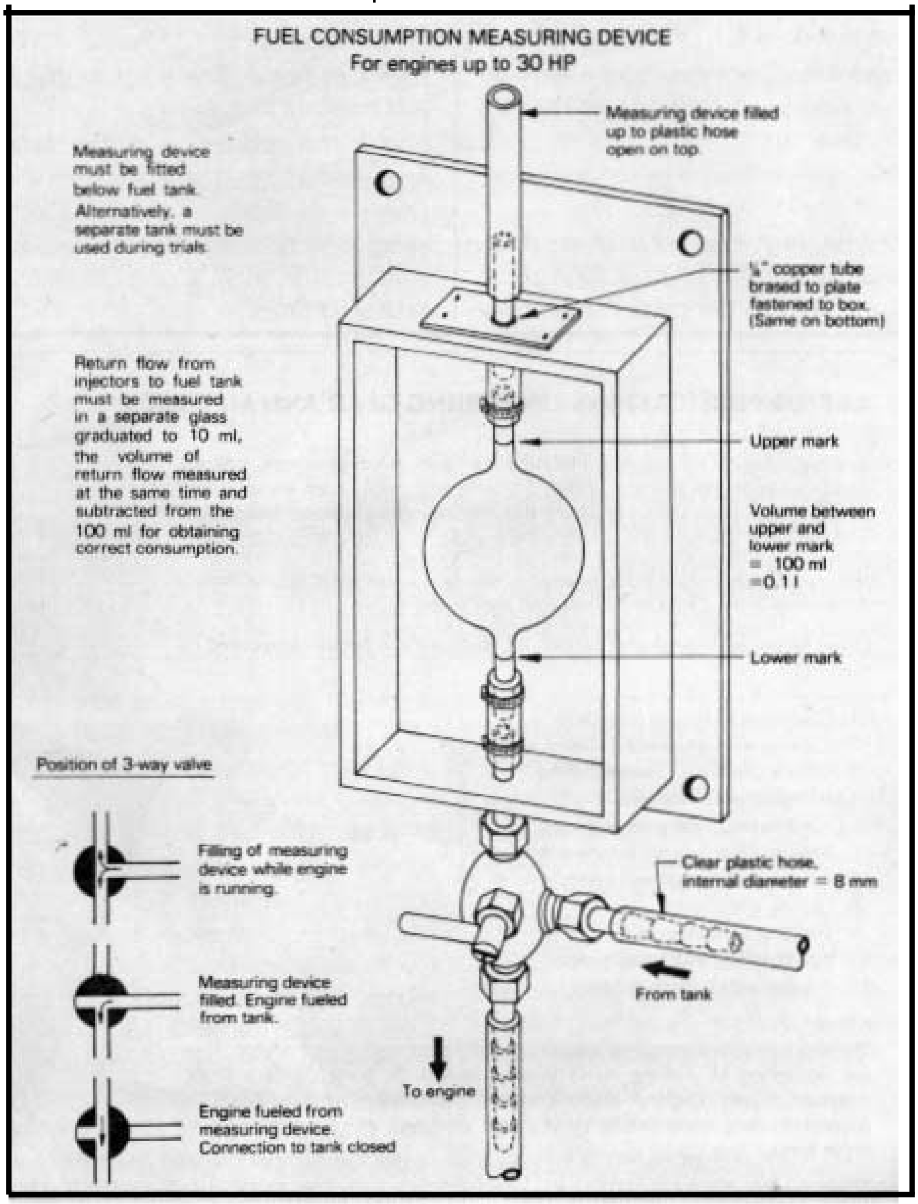
The apparatus for the second method is evidently too low-cost to be produced commercially, but Gulbrandsen was able to borrow one from a technical training institute in Norway. The principle of the apparatus, which intervenes between the tank and the engine of a boat, is shown in the sketch alongside. It should not be difficult to manufacture it locally in the Bay of Bengal region.

The glass container has an accurately determined volume of 100 ml. (0.1 lit) between the two marks. This gives adequate accuracy for engines up to 30 hp. The three way valve permits easy refilling of the glass container while the engine is running, provided the measuring device is fitted lower than the fuel tank and all air has been excluded from the system by opening the bleeding screw on the engine.

With a diesel engine, not all fuel passing from the tank to the engine is burned in the cylinders. Some fuel is returned through the injectors and back to the tank. This return flow must also be measured at the same time as the fuel consumption is measured with the device. Guibrandsen found this return flow to be fairly small and relatively constant (3 ml at low speed as well as high speed). The quantity burned by the engine was therefore not 100 ml but 97 ml. The return flow varies from one engine to another and should always be determined. The formula for the fuel consumption is as follows

$$\text{Fuel consumption (l/hour)} = \frac{3600\ (\text{Fuel measured} - \text{return flow})}{\text{Time measured (sec)}}$$

If boat speed is simultaneously measured by using an electronic trailing log, one can calculate the fuel consumption per nautical mile which' is the true criterion of fuel efficiency. In the future this criterion will just be as important for boats as miles per gallon or km per litre is for cars.



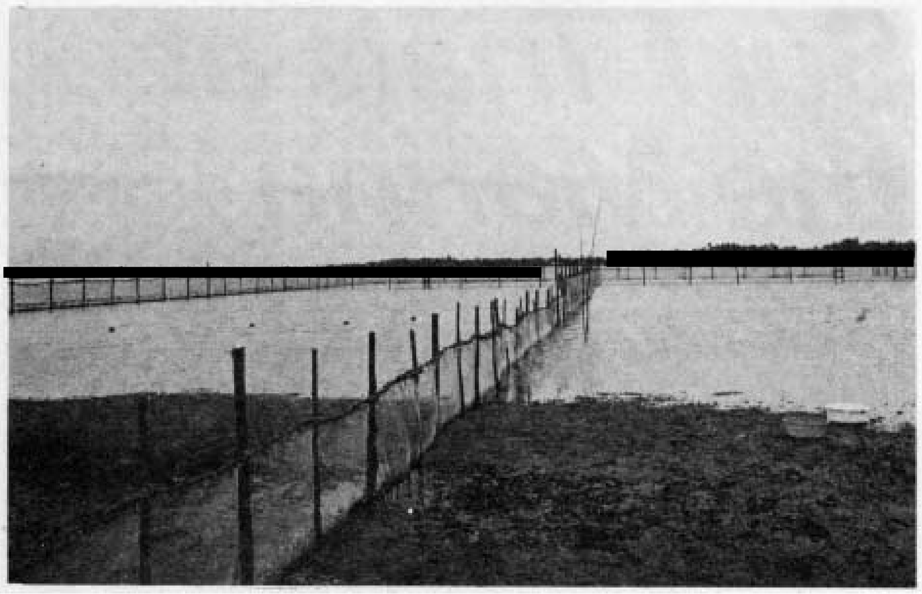
Pen Culture of Shrimp in Tamil Nadu

Mastering shrimp culture technology in order to expand shrimp production is now a prime objective in the Bay of Bengal region. At Killai, about 15 km. from Chidambaram in Tamil Nadu, a BOBP-assisted pilot project is trying to find out whether pen culture of shrimp is possible and profitable. Under a multi-phase 20-month project launched in July, severa' thousand shrimp "seed" have been stocked in four "pens" or enclosures of nylon webbing and their growth is being monitored by three officials who operate from a mud-floor thatched hut equipped with simple laboratory equipment.

The pens were constructed in two sizes — 70m x 25m and 25m x 25m — using nylon netting material, casuarina poles, ropes and locally available labour. The four pens together cover about 0.47 hectare of area of which 0.35 ha remains permanently under water and 0.12 ha is exposed during every low tide. Before constructing the pens, potential predators such as catfish, threadfins, seabass, crabs etc, were removed, mainly by small mesh dragnets. Seeds of two shrimp species — *Penaeus indicus* and *Pmonodon* — were used to populate or stock the pens. Fishermen from the area were employed on contract to collect shrimp seed from water areas nearby. Recently, a push net supplied by BOBP was used to collect seed and proved very effective. Repeated operations, each of two minutes, demonstrated that the net could catch at least 500 P. indicus seed, 30-55 mm long, from a vegetative tidal flat about half a kilometer from the project.

Shrimp in two of the four pens depend on natural feed while those in the two others are given supplementary feed, the idea being to assess how far the latter is needed for quick shrimp growth in the pens. Squid offal from Porto Novo is the main source of supplementary feed. A hand mincer is used to crush the feed before serving it to the pens.

A "sample harvest" of two pens, done mid-August with cast nets, showed that a number of P. mondon shrimp from the fed group had grown in size from 2g to 25g in a month. A good number of P. indicus shrimp had grown to 12-15g from about ig in a single month. It has been decided to periodically remove big-sized shrimp and put in fresh seed. "We hope for three harvests this season" (July-October), says BOBP aquaculture consultant M. Karim.



Project for pen culture of shrimp at Killai, Tamil Nadu. Top: Two of the four pens. Above : Project officials at work in the hut-office near the pens, where they examine water quality and study environmental data.

Team leader of the project is Assistant Director of Fisheries Victor Chandra Bose. His responsibilities — and those of his colleagues Rajappa and NelluChinnappan — include regular monitoring of tidal amplitude and temperature, besides salinity, dissolved oxygen and ph content in water; daily checking of the pens for crab damage; and occasional removal of predators. "We have of course also to guard the pens against poachers' adds Bose. A watch man has been employed for the purpose. Despite the obvious handicaps of the remote location — nofamilyor social life, no sanitary or refreshments facilities — the morale of the team is high, and they enjoy their work. "The main problem so far", says Karim, "is that crabs •in and out of pens cut the webbing. We try to mend damage promptly."

The first phase of the project is scheduled to last 3-4 months. In later phases, bigger pens will be operated. "We hope to get data on what size and layout of pens, what webbing material and what combination of inputs best ensure shrimp survival and growth, allow easy recovery of cultured shrimp and optimise profit," says Karim.

Surf Trials at the Marina

Four fishing craft developed by the BOBP underwent surf and technical trials at the Marina beach in Madras, India during May-June. Fishermen and officials from many states of India, and a few from other countries, took part as crew or observers. This report describes how the trials were organised, how the craft performed, what lessons were learned, and what they may lead to.

It truly a multilingual discussion: fishermen at the BOBP conference hall spoke volubly in Tamil, Telugu, Malayalam and Oriya. And English was heard in at least five distinct accents — Norwegian, Australian, Malaysian, Indian, Sri Lankan — the source being the experts and officials present.

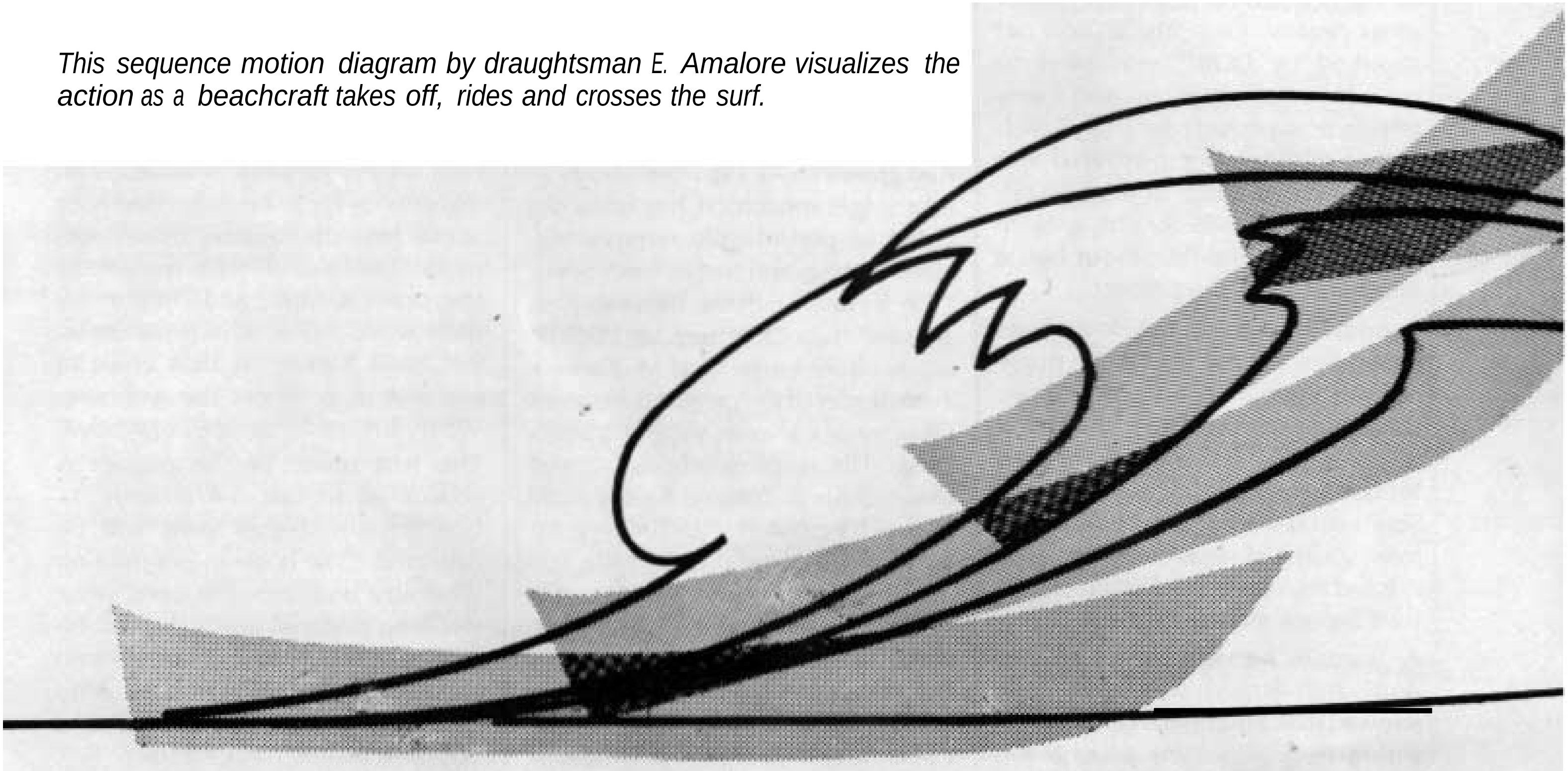
The subject of the discussion was the BOBP beachcraft trials of May-June at the Marina in Madras, where four craft underwent surf and technical trials. Conducting the trials were BOBP staff Arild Overa and R. Ravikumar and surf consultant Geoff Gowing. Serving as crew were fishermen from Tamil Nadu, Andhra Pradesh and Orissa, deputed by the fisheries directorates of the respective states; five fishermen from Tranquebar, Tamil Nadu, where DANIDA funds a small-scale fisheries project; and a fisherman from Muttom, Kerala.

Officials present included S.B. Sarma (fisheries inspector and BOBP counterpart) from Andhra Pradesh; E. Srinivasan (fisheries inspector and BOBP counterpart) from Tamil Nadu; P. Mohapatra, Additional Director of Fisheries from Orissa, along with two extension officers from his state; Fr. P. Gillet, the Belgian missionary who runs the Centre for Appropriate Tech no logy at Muttom; V. Joseph, Coordinator for Fisheries in Kerala; R.A. Patrick, fisheries official from Sri Lanka; and Leong Phinepeng and AbduUah Bin Che Din from Malaysia.

The four craft tried out at the Marina were the latest in the series of intermediate boat BOBP is building for Tamil Nadu, Andhra Pradesh and Kerala in India; and for Sri Lanka. They were the IND-20, a28ft. fibreglass beachboat for Andhra Pradesh; the IND-21, a 25 ft. buoyancy block craft for Tamil Nadu; the IND-23, a 23 ft. aluminium beach-boat prototype; and the SRL-12, a 28 ft. beachable boat for Sri Lanka.

These boats belong to the second generation of BOBP beachcraft. The

This sequence motion diagram by draughtsman E. Amalore visualizes the action as a beachcraft takes off, rides and crosses the surf.



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first generation was originally tested in 1980; some of these craft have been undergoing long-term fishing trials which have produced useful information for the design of new and modified craft. The main objective of the May-June 1982 trials was to assess how far the performance of BOBP boats has been improved through adjustments and innovations to engine, hull form, sails and hauling devices.

Preparations, for the trials lasted several months, beginning with the construction of boats at the Royapuram yard in Madras. To build in aluminium, fibreglass and plywood the boatyard was equipped with power tools and equipment, and some workers were given specialized training in aluminium welding (at the Welding Research Institute in Tiruchirapalli) and fibreglass boat building.

In view of the problems posed by the 5 hp engine used in earlier BOBP boat, it was decided to try out a different 8 hp engine.

CAPSIZE!

During approximately 2,000 surf trials, various BOBP craft have capsized a total of seven times (a capsize record of 0.3%). Of these capsizes, two occurred in Madras, four in Uppada, one in Kerala.

Three of the seven capsizes occurred during trials when the crew were being tested to the limit. The other four occurred when fishermen were handling the boat; two of these were caused by engine failure, by the engine stopping in the surf and rendering the boat "powerless".

Says BOBP fishing craft technologist Arild Overa "What happens after a capsize — damage to boat, engine or crew — is more important than the capsize itself. In none of the seven capsizes did any boat sustain major damage. In most cases the only damage was of broken rudder stock. The engine could always be readily started after cleaning and oil change."

As for sails, new demonstration sails were to be fabricated in the U.K. from cotton cloth specially made for the purpose by Madura Coats, Madurai. Since the sails did not arrive in time, Andhra Pradesh-type kattumaram sails were used during the trials.

Pre-trial training on boat handling, engine use, etc., was imparted to the crew by surf specialist Gowing.

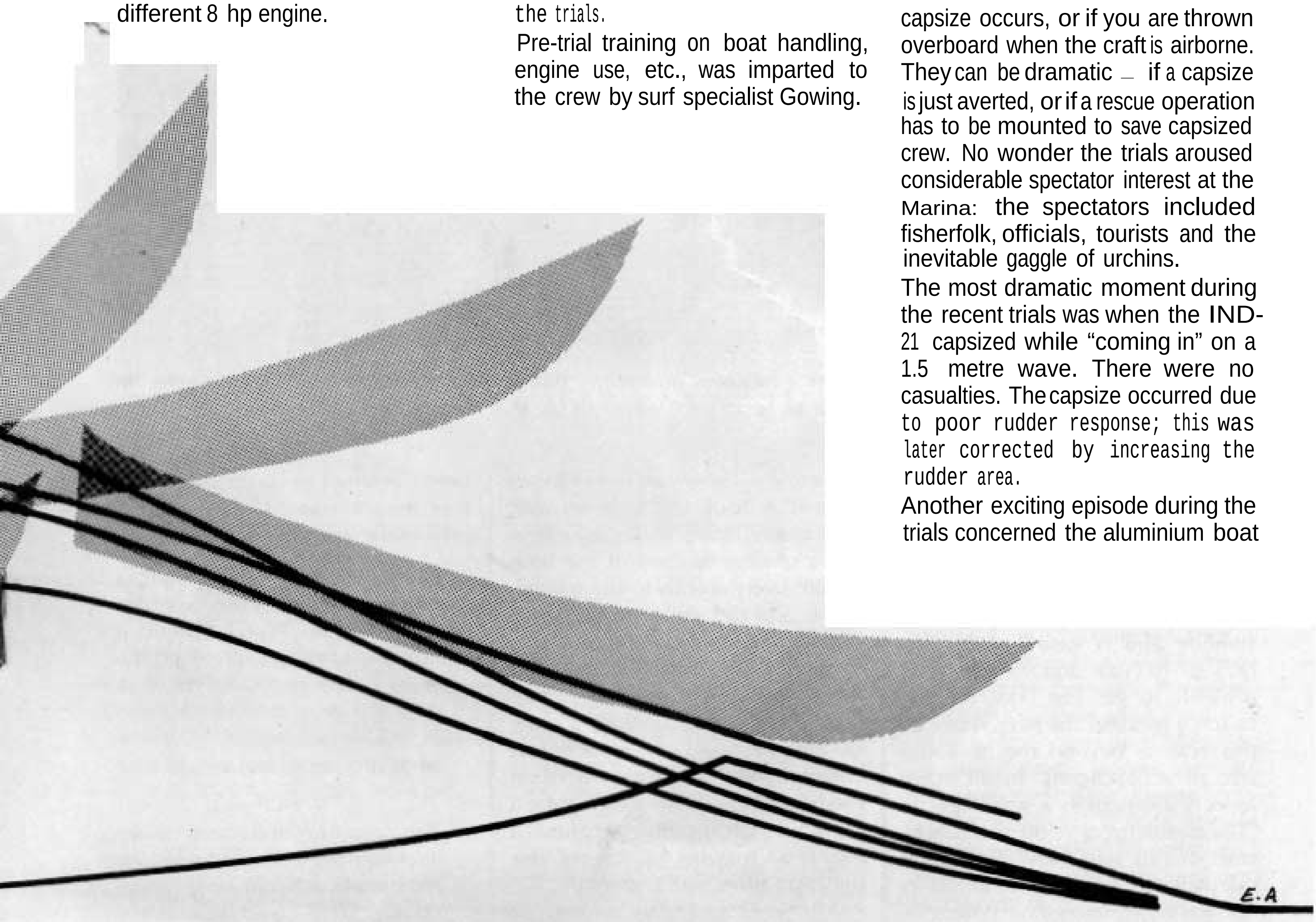
Highlights of trials

As on earlier occasions, the trials consisted of four steps — launching of the boat; surf-crossing while going out; surf-crossing while returning; and landing. Each craft thus went through two surf zones, and every attempt was made to simulate the toughest surf conditions. "The actual trials were conducted on a tot4of nine days" says Gowing, "in surf ranging from 1 metre to 3 metres, with the waves breaking over a sand bar approximately 50 metres from the shoreline and then at the water's edge."

Surf trials can be exhausting and debilitating: long hours at the beach under a blazing sun, constant buffeting by wind and wave. They can be spectacular: the sight of craft meeting sunlit waves head-on, riding them high and then sloping down, is an aesthetic delight. They can be frustrating: if the surf is non-existent, or if the engine breaks down. They can be hazardous — as when a capsize occurs, or if you are thrown overboard when the craft is airborne. They can be dramatic — if a capsize is just averted, or if a rescue operation has to be mounted to save capsized crew. No wonder the trials aroused considerable spectator interest at the Marina: the spectators included fisherfolk, officials, tourists and the inevitable gaggle of urchins.

The most dramatic moment during the recent trials was when the IND-21 capsized while "coming in" on a 1.5 metre wave. There were no casualties. The capsize occurred due to poor rudder response; this was later corrected by increasing the rudder area.

Another exciting episode during the trials concerned the aluminium boat



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IND-23. On a particular day it was hit by three successive waves so big that the boat and crew were airborne.

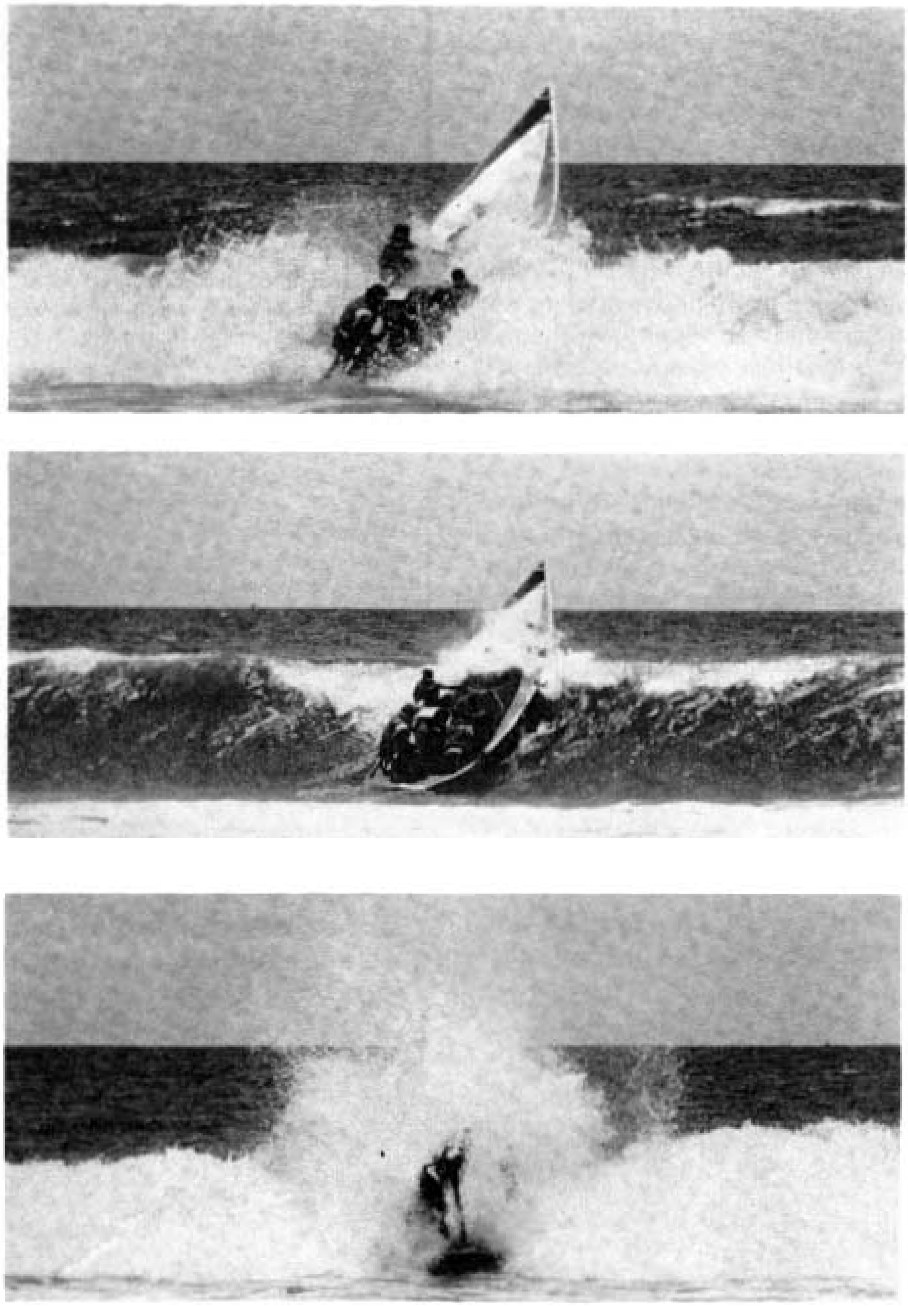
Cowing sums up the surf performance of the various craft as follows:

IND-20 — fibreglass boat: "This is a good surf-crossing and beach-landing boat. It is quite fast and the wave riding ability is acceptable. Its tendency to broach after the wave broke, whereas not desirable, is acceptable since the craft does not exhibit any capsize traits. Modification of the bottom to assist with launching the craft across the wet sand would be desirable. Engine power is adequate."

IND-21 — buoyancy block craft: "This is a good surf-crossing and beach-landing craft of already proven design (IND-II). It handles quite well, both coming in and going out. Correct placement of the crew and load is important, and some form of foredeck to deflect the water coming over the bow when going outtbrough the surf would make it more comfortable."

IND-23 — aluminium craft: "IND-23 is an excellent surf-crossing and beach-landing craft. Its light weight makes it easy to handle on the beach and provides it with good free running qualities in the surf. The design of the hull appears to be ideal, with plenty of buoyancy at the stern to prevent squatting when overtaken by breaking waves. Crewmen must be aware of the lightness of the boat, making it prone to throw them out. 'Some form of handles or grips for handling the craft are required. Plenty of power from the Mitsubishi engine ensures that there is reserve power for difficult situations."

SRL-12 — plywood boat: "SRL-12 is a good surf craft showing excellent stability and is easily controlled. Due to its size and weight, it is difficult to get the boat off the beach. I feel that the overall size of this craft is beyond the desirable size of a beachcraft. In all other aspects the craft is a good one..." "The reason for developing a beach-craft of this size", says Overa, "is that it is the minimum required to operate large-mesh gillnets offshore in Sri Lanka".



Exciting moment during the trials : the aluminium boat IND-23 being hit by three successive waves so big that the craft gets airborne.

The crew — fishermen from various regions — took to the boats with enthusiasm. Those among them who got a chance to control the boat adapted very quickly to the requirements and did well. Cowing says "SoLne of the crew did not pay enough attention to the fact that they could get injured. Their positioning was incorrect." Twice during the trials, fishermen lost balance and fell overboard when the boat came down after hitting a big wave. On the first occasion, a fisherman hurt his leg, on another occasion there was a lip injury.

At the joint post-trials meeting of fishermen, officials and BOBP experts referred to earlier, discussion was free and frank. The fishermen's preferences for the craft varied:

- Bahnu fishermen from Andhra Pradesh liked the fibreglass boat IND-20 while Teppa fishermen from the same state preferred the aluminium boat IND-23. However they felt that it might be too expensive and wanted to know what the same boat would cost in plywood.
- The Andhra fishermen were unanimous that without an engine, a beachcraft would have no advantage over the kattumaram, but would cost more.

- Fishermen from Injambakkam, Tamil Nadu, voted for the IND-21, while those from Tranquebar preferred the SRL-12 (suitable for deep-water fishing and long-lining.) They also liked the aluminium boat for use with small-mesh nets.
- Kanyakumari fishermen liked in order of preference, the fibreglass boat (IND-20), the buoyancy block boat (IND-21) and the large plywood boat (SRL-12).
- The Orissa fishermen liked the aluminium boat because it is light and can be easily hauled up the beach. They said they could afford it because subsidies would be available.
- The visitors from Malaysia expressed interest in building SRL-12 (the large plywood boat) in aluminium, since they already have the facilities to do so.

On the future development of beachcraft the following steps are likely

- The fibreglass IND-20 is to be introduced by the Andhra Pradesh government in coastal districts through various loan schemes.
- The Tamil Nadu Directorate of Fisheries have decided to introduce about 30 boats of IND-21 design at Injambakkam with a 50% subsidy.

Below: Three of the surf-tested FAO boats – SRL 12, IND 21, IND 23 – snapped together at the Royapuram harbour. Bottom: The fibreglass IND 20 taking off from the beach

- The future of aluminium for BOBP boats will depend on the experience with IND-23 and accesso"ries already constructed. Problems at present include the high cost of aluminium boats and the unsatisfactory quality of aluminium welding. The IND-23 may be built in marine plywood to offer the same design more economically.
- A fibreglass version of the large plywood boat, SRL-12, is likely to materialize in Sri Lanka.

Cood progress was made on the development of a winch (needed to haul up the large boats) and a manual longline hauler. A winch with a pulling capacity of 1,200 kg and using a 8 hp engine was fabricated sand tried at Injambakkam. The Rs. 16,000 winch can haul up several boats through a system of pulleys on the beach. Its cost can therefore be shared by many boat owners.

Looking back on the trials, and on the people involved with it, Ravikumar paid a handsome compliment to E. Srinivasan, Inspector of Fisheries, who is Tamil Nadu's counterpart for the beachcraft development project. "He is the sheet anchor of the project... very hard-working, he gave us invaluable assistance, both at the preparatory stage and during the trials."

About the carpenters at Royapuram who built the boats, Cowing says "They have begun to develop a feeling for the project, and work tempo has picked up appreciably. The crew's enthusiasm is evident at the boat dedication ceremonies, when coconuts are cracked and incense is lighted. ..." (The Royapuram workers were quick to note that the only boat which had not been properly "dedicated", the IND-21, capsized!)

Towards the end of the trials, Tamil Nadu Director of Fisheries V. Sankara Subbaiyan, accompanied by Deputy Director A. Daniel, visited the Marina and observed the trials. Briefed by Overa and Ravikumar on the boats' design, Mr. Sankara Subbaiyan expressed great interest in the performance of IND-21, the buoyancy block craft for Tamil Nadu. He was also pleased with the potential of the winch for hauling up boats, and on joint use of the device by several boat owners. **S.R.M.**

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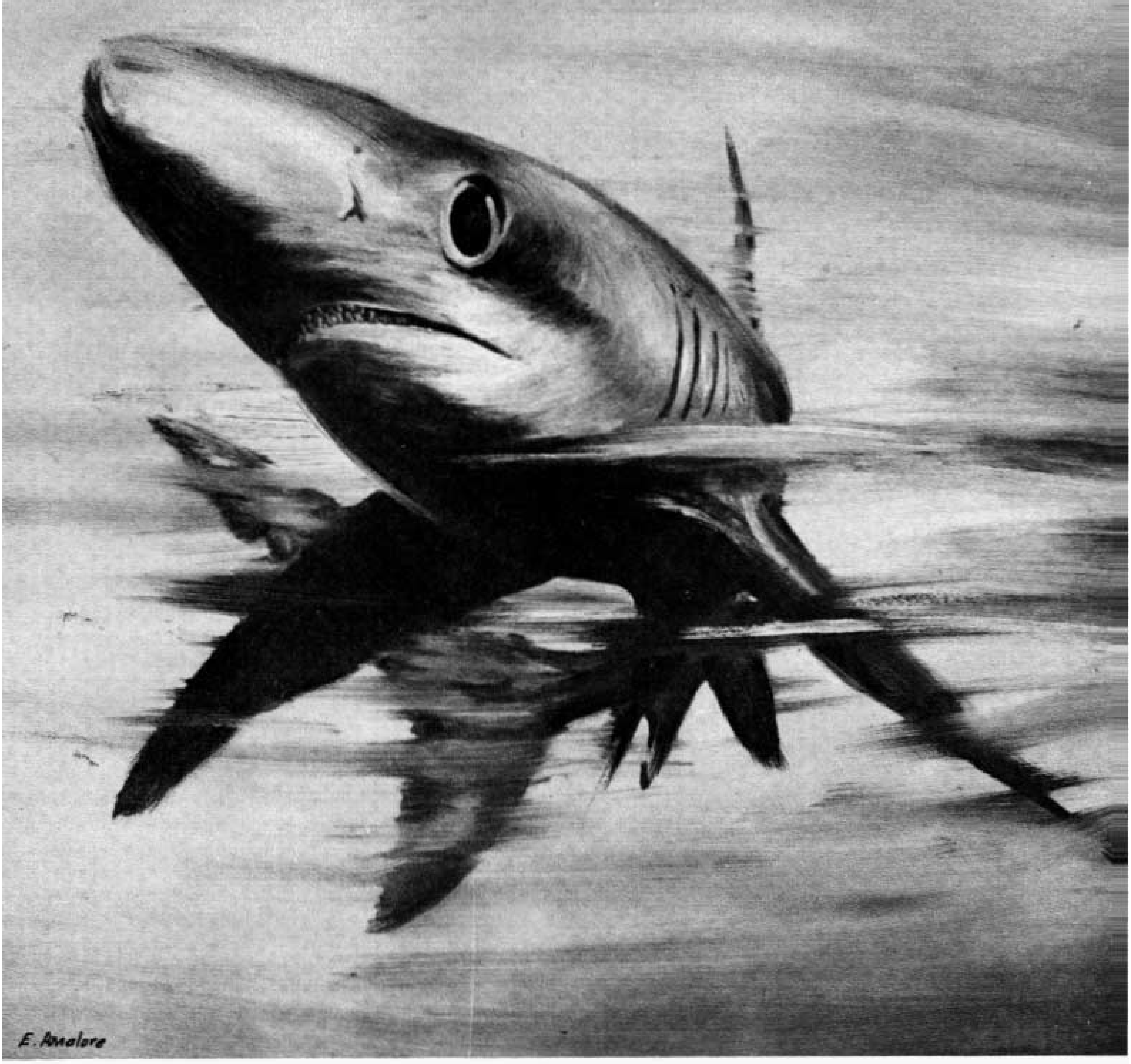

A dark fin breaking the surface of the sea delights the angler and the fisherman but strikes terror in the heart of a skin-diver. The tiger or leopard on land has its counterpart in the sea – the marauding shark. The largest shark in the world is the whale shark, *Rhyncodon typus* or "mini-muthu mora" to the Sinhalese. It grows to 50 feet in length and several tons in weight. It is timid and peaceful and lacks the sharp pointed teeth of predatory sharks – the teeth are granular. The jaws are tough and leathery and its mouth a yawning gulf. The gills pulsate as water filters through the gill-rakers and millions of tiny creatures – the plankton – find their way into its stomach.

It is a nuisance to driftnet fishermen when entangled in the meshes of their nets and sometimes tows the boat several miles before it dies. It is common in the waters off Sri Lanka and several are brought ashore every year. It has conspicuous white spots on the head with a series of pale spots alternating with pale vertical stripes on its sides. The flesh is loose and flavourless and is marketed as dried salted shark-meat. Heavy and monstrous, it moves ponderously through its journeys in the sea.

Swift and fierce, and a formidable fighter when hooked, is the Mako shark *Isurus oxyzhynchus,* commonly known as "mini-mara" or killer to the Sinhalese. Sleek, torpedo-shaped and slate-blue in colour – its nose is pointed like a bullet. The mouth, lying underneath the head, bares rows of maliciously grinning recurved teeth, as it turns on its back to attack a swimmer or fast-moving yellow fin tuna. It seldom comes close to land and keeps to oceanic water 10 to 15 miles away following schools of skipjack and yellow-fin tuna.

A shark with its tail as long as its body is the thresher-shark *Alopias vulpinus* or "Kasa mora" to the Sinhalese. It too has a bullet-shaped nose and is fast and manouvre-able as it crowds little fishes into a ball with ever-decreasing encircling movements before pouncing on its terrified victims.

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SHARK ATTACK!

Do sharks attack human beings? How can such attacks be warded off? George de Bruin provides some answers on the basis of recorded experience.

Hammer-headed sharks are also feared by Sri Lankan fishermen. There are four varieties; and one, the arrow-headed hammer-head shark *sphyrna blochii* or "Udalu Mora" to the Sinhalese, comes close to the shore, when young, in schools of 20 or more. These schools enter estuarine waters in the north-west of Sri Lanka and are a potential danger to swimmers. They prefer to school in murky, silted waters which are uninviting to bathers. The other three varieties keep away from the shore and move around near the edge of the continental shelf.

A potential man-eater is the tiger shark *Galeocerdo covieri* or "Kotimora" to the Sinhalese. It grows to 20 feet in length and frequents deep reefs. The tiger shark was quite common on the Wadge Bank, south of Cape Comorin in India, in the early days of trawling operations. It feeds on the bottom as well as in mid-water. When adult it is dark grey above and white underneath. Juveniles have distinct bars of brown and grey — this gives it the name "tiger shark."

In the early days ot marine exploration, divers frequently saw sharks circling around them at a distance. Sharks would sometimes come dangerously close to you especially if you had a bleeding fish tied to your waist. Mercifully no shark has approached a human with malicious intent, and although its ominous circling movements have often driven a terrified diver ashore, there is no record of a diver ever being attacked.

In Sri Lanka sharks are known to enter shallow water especially over reefs. I can confirm that this happens quite often, especially a little after sun-rise. They apparently converge on the reefs to teed on small reef fishes which leave their hiding places in the reef during day-time. These sharks are frequently accompanied by schools of horse mackerel which visit the reef at this hour for the same purpose. The sharks and horse-mackerel, however, soon disappear after a diver has entered the water.

Sharks in Sri Lanka are, apparently, unaccustomed to attacking humans, and some varieties have been trained to perform circus movements such as, for instance, swimming throughloops placed in the water. Moreover, as a reward, they .13ave been hand-fed and behave quite friendly during such times.

For descriptions of shark attack we have to rely on the reports of ship-wrecked sailors or pilots shot down over the sea and spear-fishermen who have escaped after being attacked by sharks. All these reports of attack have occurred in seas other than the Indian Ocean.

Hans Haas and Eibl Sibesfeldt give a graphic description of the experiences related to them by Lt. Reading of the United States Navy who was shot down in the Pacific and drifted for several hours in the sea with his wireless operator.

In Reading's words, "We soon lost the parachute that we were clinging to and began drifting away from the blue marker-dye that we released into the water to mark our position. Within a very short time sharks were quite apparent around us as we were tied together by the dye-marker card which made it difficult for us to make any headway. An hour later we heard the droning of an aircraft and I said to my wireless operator "Let's kick and splash around to see if we can attract attention." This failed and suddenly, my wireless operator said he felt something strike him and his right foot hurt. I told him to get on my back and keep his foot out of the water. But, before he could do this, the sharks struck again and we were both jerked under water for a second. I knew that we were in for it as there were more than five sharks around us and blood as well all around us. He showed me his legs and not only did he have bites all over his legs but his left thigh was also badly mauled. He wasn't in any particular pain, but, everytime they struck, I knew it and felt the jerk. I finally grabbed my binoculars and started swinging them at the passing sharks. It was a matter of seconds when they struck again. We both went under water and this time I found myself separated from my wireless operator. I was also the recipient of a wallop across the cheek — done by the flailing tail of shark. From that moment I watched him bob about from the attacks. His head was under water and his body jerked as the sharks struck him. As I drifted away,

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FISHERWOMEN OF TAMIL NADU: A NEW BEGINNING

Mrs. Freda Chandrasekaran, Assistant Director of Fisheries, Tamil Nadu,describes the work of the recently set up fisherwomen's extension service in her state and its cooperation with the Bay of Bengal Programme.

Tiruchinankuppam, Karaiyàor Street and Tharavaikulam are not household names. But forfisherwomen of Tamil Nadu, these three remote coastal villages signify hope and promise.

For it's here that the Tamil Nadu Government has launched a number of pilot projects designed to raise the incomes of fishing communities atid'to encourage initiative and self confidence on'the part of the fisher-women.

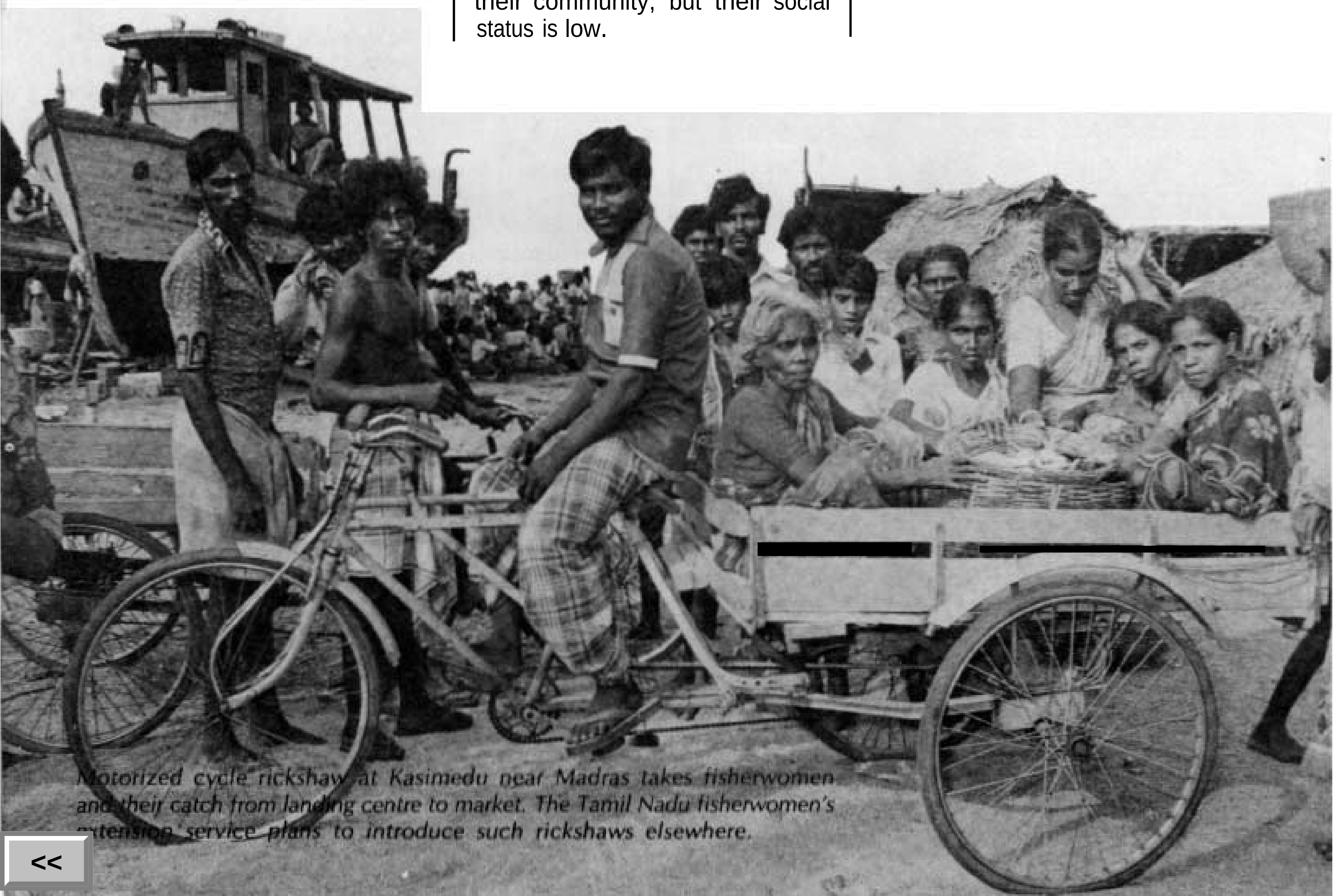
What are these pilot projects? Loans forfish marketing through cooperative societies in all these villages. Fair price shops in Karaiyoor Street. A child care centre in Tiruchinan-kuppam. Classes for adult education and for tailoring in Tharavaikulam. Plans for the future include better transport of fish through introduction of motorised cycle rickshaws and construction of curing sheds.

What has happened in the three villages is just the beginning, and more needs to be done. However greater awareness has Snow been generated among fisherwomen to tackle.and solve their own problems.

What i.s the general status of women in small-scale fisheries? They are benighted not merely by deep-rooted social and cultural attitudes, illiteracy, and lack of opportunities for study and jobs, but also by the vagaries of the fishing profession. Fisher-women contribute a good deal to their community, but their social status is low.

In this context, we derived inspiration from two workshops organised by the BOBP in Madras : onthetraining of women extension workers (held in April '79) and on social feasibility in small-scale fish eries development (helti in September '79). These work-shops gave us ideas on the approach weslioulld adopt.

A fisherwomen's extension service was consequently set up in Tamil Nadu in July 3 1. This has worked closelywith the BOBP. The objectives of the service are to improve the socio-economic conditions of fisher-women and their families, to assist



Motorized cycle rickshaw at Kasimedu near Madras takes fisherwomen and their catch from landing centre to market. The Tamil Nadu fisherwomen's extension service plans to introduce such rickshaws elsewhere.

Above, left : Fisherfolk get wheat, rice and sugar at reasonable prices at this fair price shop in Karaiyoor Street, *Adirampattinam. Right : Loans for fish marketing are a major feature in pilot projects to help fisherwomen.*

them in various fishery activities, to improve their skills (related to fisheries and to solution of village problems), to assist them earn supplementary income by introducing activities such as sewing and handicrafts, to encourage them in decision-making.

Pilot projects in pursuance of these goals were set up in Tiruchinankuppam (Chingleput district), Karaiyoor Street (Thanjavur district) and Tharavaikulam (Tirunelveli district). What are these places like? They are fairly representative of Tamil Nadu's fishing villages. Traditional craft predominate in all three, but earnings from fishing activities vary widely. A common feature in the villages is that fisherwomen here are active in fisheries and responsive to new ideas.

Fish marketing (sale of fish at auctions and transport by headload to neighbouring centres) is the main fishery related activity of women in Tiruchinankuppam (25% of the women engage in it) and net-making is the main activity in Karaiyoor Street (25% of the women as against 8% engaged in fish marketing). In Tharavaikulam, where literacy is high, only a few engage in fish marketing (2%) and net-making (6%) but many take up such occupations as sheep rearing and poultry.

What accounts for the difference in the degree of participation in fish marketing in the three villages? Fish availability is one factor, presence or absence of traders-cum-money lenders, economic need and cultural tradition are other factors.

An interesting occupation in Tiruchinankuppam is the making of what is described as "ornamental leaves". Used x-ray film (which is made of celluloid, a good ornamental material) is dyed green or red or yellow and cut into mango leaf shapes. Sometimes images of gods are embossed on them. These are sold to people in the village for use on festive occasions.

As a first step, cooperative societies were registered in the three villages and women were enrolled as members. There are now about 260 members in Tiruchinankuppam, 170 in Karaiyoor Street, and 150 in Tharavaikulam. Each society was given Rs. 5,000 towards share capital and up to Rs. 30,000 towards working capital.

A list of priority needs was then drawn up for each village in consultation with the fisherwomen. Topping the list was a credit and savings scheme : the fishing community is notoriously debt-prone.

In Tiruchinankuppam, about 250 fisherwomen were given loans of Rs. 100 each for fish marketing and for mango-leaf decorative work. A loan recipient was required to repay Rs. 1.25 every day. After 100 days, the loan recipient had paid up Rs. 125 as principal and interest. The interest was credited to her own account in the cooperative society, and became a saving. Some 200 of the 250 women were then given further advances of Rs. 200 each.

This system of credit worked so satisfactorily that it has replaced the decades-old chit system.

In Karaiyoor, loans were given to 16 women engaged in marketing and in Tharavaikulam, 22 women were given advances varying from Rs. 500 to Rs. 1000. What is most encouraging is that the loan repayments have been so prompt.

What is the *modus operandi* of repayment? In Tiruchinankuppam the society's managing committee collected the money door-to-door every day. In Karaiyoor Street and Tharavaikulam, the loan recipients themselves returned their dues in weekly instalments.

A few other projects were also taken up by the women's extension service

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A Day in The Life of Karpooravalli

Journalist Sabita Shetty talks to a harried but hospitable Tam II Nadu fisherwoman.

It is mid-day and the village is silent. The men are on the beach mending the nets. The women, back home early after marketing the day's meagre catch, are at the back of the houses cooking a meagre lunch and cleaning up after the night's rain. The only noise comes from the school building where the children are lined up on the verandah waiting for their free mid-day meal.

Karikattukuppam is a typical fishing village on the east coast of Tamil Nadu, except that the houses here instead of being mud-and-thatched are two-room brick-and-concrete tenements built bythe Slum Clearance Board. But they offer no better shelter or comfort. The roofs leak and the smoke from the cooking literally smokes out the inmates.

Karpooravalli lives here with five of her seven children, her mother-in-law and mother. She was widowed a year ago. Most fishermen are fond of drink but Karpooravalli's husband was a little too fond of it. He drank himself to death.

Karpooravalli looks pale, distracted. Her son who had gone out at 4 a.m. on his uncle's kattumaram had come back after daybreak with his share of 'the catch. Karpooravalli had carried the fish two hours (that's how she measures distance — by the hours it takes for her to get there) to Navalur earning exactly Rs. 1.50. On her way back she had gathered some greens growing by the wayside and collected some firewood. There were seven mouths waiting to be fed at home.

On days when the catch is good, Karpooravalli walks to villages six hours away, sometimes through waist-deep slush. If she has more than one basketload, her mother-in-law also goes with her. On these good days, she gets Rs. 10 to Rs. 20. But hQwever good the catch and however starved they are, only the littlest fish, the trash, is kept for the cookpot at home — all the rest is for the market. And today has been one of the worst days.

Karpooravalli does not know how to count, but she has her own system ot accounting, both of what she owes and what is owed to her.

Two ot her sons go out to sea but always on somebody else's kattumaram, using somebody else's net. They get less than 15% of the catch. Yes, it would be nice for the boys to have their own craft but where was the money to come from? It would take a few thousand rupees to get a small kattumarmam and net.

A third son is in school. He'll stop next year. What will he do with education, his mother sighs. He doesn't need education to catch fish. Doesn't she have any other ambition for her son? Maybe if he finished school he could get a better-paying job somewhere? No chance, says Karpooravalli's mother Desamma flatly. Our children who study in the city are not able to find jobs, what chance is there for a boy from a fishing village? The sea is our life — we have to accept that.

Desamma is bitter. Her third son who did extremely well in school and who rejected the sea hoping for a better life than his father is now selling flowers in the streets of Madras.

Desamma is a widow too. She is city-bred. She has never vended fish. She earns eparing eatables for salr She belongs to a fishing colony near the Marina, in Madras. She can't get along with her sons. So while her unmarried daughter cooks and keeps house, Desamma divides her time and tiny income between her home in Madras and her widowed daughter in Karikattukuppam.

Doesn't Desamma worry about her unmarried daughter? No, she belonged to the colony, her brothers were there — no harm would come to her.

Karpooravalli also has a daughter of marriageable age who is waiting for a suitable proposal. Among the fisherfolk, girls never go looking for husbands, they'd rather remain spinsters than lose face by asking a boy's hand in marriage. But times are changing. Girls who were once paid a 'bride's price' are now being asked to give a dowry.

Karpooravalli's youngest child, funny-nosed, naked, pot-bellied, is on her lap. The village children all seem pot-bellied — a sign of malnourishment. Karpooravalli is happy about the new free nutritious noon meal scheme of the Tamil Nadu Government — at least two of her children now get one good meal a day every day of the week.

What about medical help? Well, a van comes every week and distributes tablets (anti-malaria?), says Karpooravalli's neighbour. For anything more, they have to go to the hospital at Tiruvanmiyur, many miles away.

The men are now straggling back from the beach. The women and the younger children of the village have been converging on Karpooravalli's house to listen in our conversation. Nothing is private here. Anyone's affair is everyone's affair — but then anyone's problem is everyone's too. It is a tightly knit group held together by a strong feeling of kinship and community, a willingness to help and assume responsibility for one another. Karpooravalli has one mouth less to feed because her brother-in-law, who doesn't earn very much more, has taken one of her children into his household.

Karpooravalli has earned just Rs. 1.50 — not enough to buy rice for 'me meal for her large family. has begged, borrowed or big fish to cook for us and ay for lunch.

FISHERWOMEN OF TAMIL NADU: A NEW BEGINNING

(Continued from page 17)

through cooperative societies. At Karaiyoor Street, the cooperative society started a fair price shop in response to the demand. Such essential articles as wheat, rice and sugar were made available to fisherfolk at reasonable prices. Cloth was also distributed during festivals. Twenty kilos of nylon were supplied to 10 members of the society for making nets; they were paid for their effort, and the nets were then disposed of through the cooperatives.

At Tiruchinankuppam, the women wanted a balwadi (child day-care centre) for the village. After a place was selected, all the women joined in improving its facilities.

In Tharavaikulam, adult education was organised for some girls who had dropped out of school and tailoring classes for some others, the latter activity made possible by the Government of India's Integrated Rural Development Programme. The trained girls were later given sewing machines — one third of the cost was a grant, two-thirds a loan.

Much change has occurred in the three villages in recent months. The change will continue as we introduce more projects. We are thinking of providing motorised cycle rickshaws, curing sheds etc. to the villages.

The best testimony to the success achieved so far is the spate of requests received from other coastal villages to start similar schemes there. This augurs well for the future — for the emancipation of women and for a better quality of life for women as also for men and children.

Tiruchinankuppam, Karaiyoor Street and Tharavaikulam may become household names after all — at least wherever people fish!

Top : "Ornamental leaves" from x-ray film — an activity that has received a fillip in Tiruchinankuppam with loans for the leaf-makers. Below: The close cooperation between BOBP and the Tamil Nadu fisherwomen's extension service is symbolized by this picture showing, from left, social worker Valli, BOBP socio-economist Edel Drewes, Assistant Director of Fisheries Freda Chandrasekaran, social worker Veronica.

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Continude from page 15)

sharks continually swam about, and, every now and then, I'd feel one with my foot. At midnight I sighted a boat and was rescued after calling for help."

When does a shark attack? Can a swimmer anticipate a shark's malicious intent and flee to safety?

The experiments conducted by Hans Haas and Eibesfeldt in the Maldive Islands give us some clues. A large grouper was harpooned and placed in a crevice in the reef. Two sharks which had been following the divers were joined by a third and the trio snuffled above the reef like a pack of hounds on scent. One of the sharks found the fish and seized it. It snapped with its jaws and shook its head vigorously from side to side, sawing the grouper in two in a matter of seconds. This sawing motion excited the other sharks immensely, and as the first shark hurried off, they followed and snapped at its fins. Eibesfeldt shot another fish and placed it six feet away on the reef. This time, five large grey sharks milled around the corpse. They circled around excidedly, and, while they swam about, they shook their heads from side to side, going through the motions of sawing up the prey, as though they were cutting it up. One shark had scarcely sawed up the prey, when it flashed through the others like lightning. The others then snapped at anything that moved near them. This was a particularly dangerous moment as the sharks could attack a man if he did not keep petfectlv still. The to-and-fro sidewavs movement of the head definitely indicated an imminent attack."

Hans Haas advises divers on entering shark-infested waters to be armed with along metal-tipped stick which can be used to deter an inquisitive shark especially with a blow on its snout. It is also wise to enter such waters in groups of two or three. We are also advised to keep perfectly still in the presence of sharks and not splash around, as this simulates struggling prey. A "loud booming shout" under water may also send a shark scuttling away.

Although there are no authentic accounts of shark attack in the Indian Ocean waters, attacks on swimmers and divers have been frequent off Australia and South Africa. These attacks have been invariably on divers carrying bleeding fish tied-to their waists. The attacks have also been frequently by one species — the great white shark. Some believe that these attacks occur because of the apparent resemblance between a seal and a man swimming. The first attack may be a result of mistaken identity after which the shark may be habituated to human flesh.

Jack Randall recently observed the black-tipped shark of the Pacific defending its teritorial rights. He was witness to an attack on a co-diver who happened to intrude on the sharks' territory. Randall also describes warning behaviour in this shark prior to attack. The pectoral fins are slung downwards while'the head of the shark is moved from side to side with a sawing motion of its jaws as it circles around its territory. To-and-fro motions of the head and sawing motion of the jaws thus herald an imminent attack."

Over a period of seven years, 20 skin-divers have been scouring the sea in search of the crown-of-thorns starfish — the killer of coral reefs. Many divers too have engaged in collecting coral fish for export since the year 1945. Skin-divers have also been actively fishing for pearl oysters in the Gulf of Mannar since time immemorial.

There has not been one recorded instance of an attack. However, we have heard quite often the imaginative tales of youthful skin-divers of a shark attack.

We have still to see the corroborative scars from such encounters.

A 25-minute 220-slide audio-visual prepared by the BOBP gives an idea of the lives and the work of traditional small-scale fishing communities in the Bay of Bengal region and explains the work of the BOBP in the areas of craft, gear, aquaculture, extension and information.

The picture at left — converted from one of the audio-visual slides — shows a traditional fisherwoman of Andhra Pradesh.

The audio-visual has been shown so far to audiences in Stockholm and Gothenburg, Rome, New Delhi and Madras. Please write to us if you would like a copy of the script.

Published by Lars 0. Engvall for the Bay of Bengal Programme, Post Bag 1054, Madras-600 01
at Mesvag Process and printed at Nagaraj & Co., Madras-600 041. Editor : S. R. Madhu.