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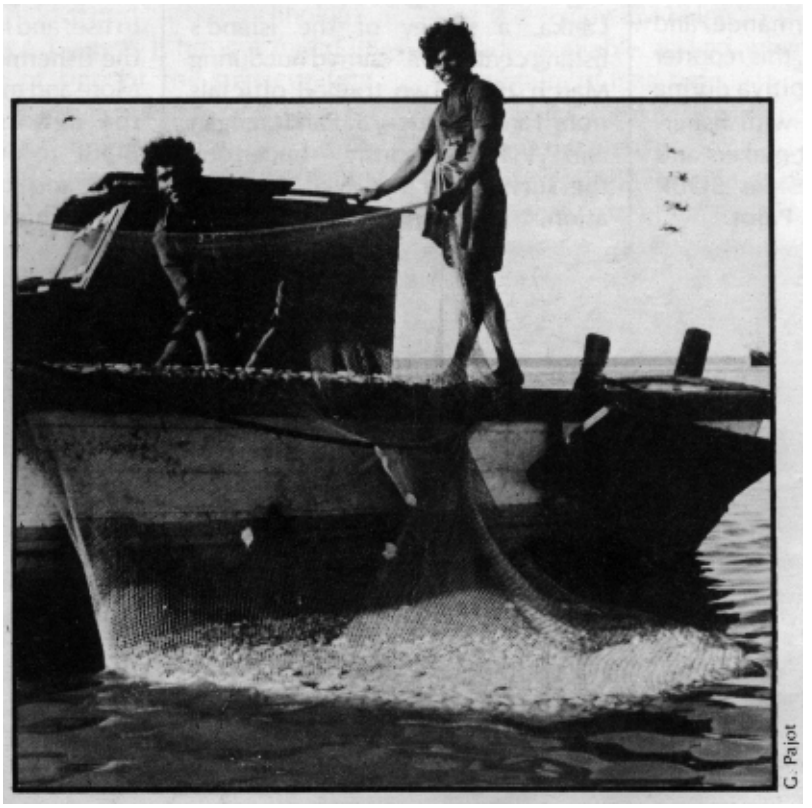

EXCITING NEW FISHERY IN SRI LANKA

Higher catches and incomes for fishermen in Pesalai and Kolpitiya

The BOBP-designed bottom trawis, which have generated much excitement in India during the past four years, have now made a splash in Sri Lankan waters — in Pesalai and Kolpitiya.

In Pesalai, a fishing center off Palk Bay between Mannar and Talaimannar, 50 of the 65 trawlers use high-opening shrimp-cum-fish trawls for a good part of the year. ("These catch as much shrimp as our old shrimp trawis and much more fish," says fisherman Nicholas Logu.) And in response to fishermen's demand,

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more nets are being made at a "net-making centre" established in Pesalai; "This new gear has brought us new hope," says Rex Culas, an influential Pesalai fisherman-entrepreneur.

As for Kolpitiya, industrialist Joe de Livera describes the new trawls as "fantastic" gears. "The viability of my fleet of 38-footers seemed to be in doubt, and I was losing large sums of money but this new gear has rescued the operations and turned around the profitability of my fleet".

To observe the performance and impact of the new trawl, this reporter visited Pesalai and Kolpitiya during mid-October, and met with fishermen, entrepreneurs, net-makers and BOBP counterparts besides BOBP fishing technologist **G. Pajot.**

'We have helped to raise catches and incomes, promoted management and organized the fishery so that fishermen get essential supplies easily."

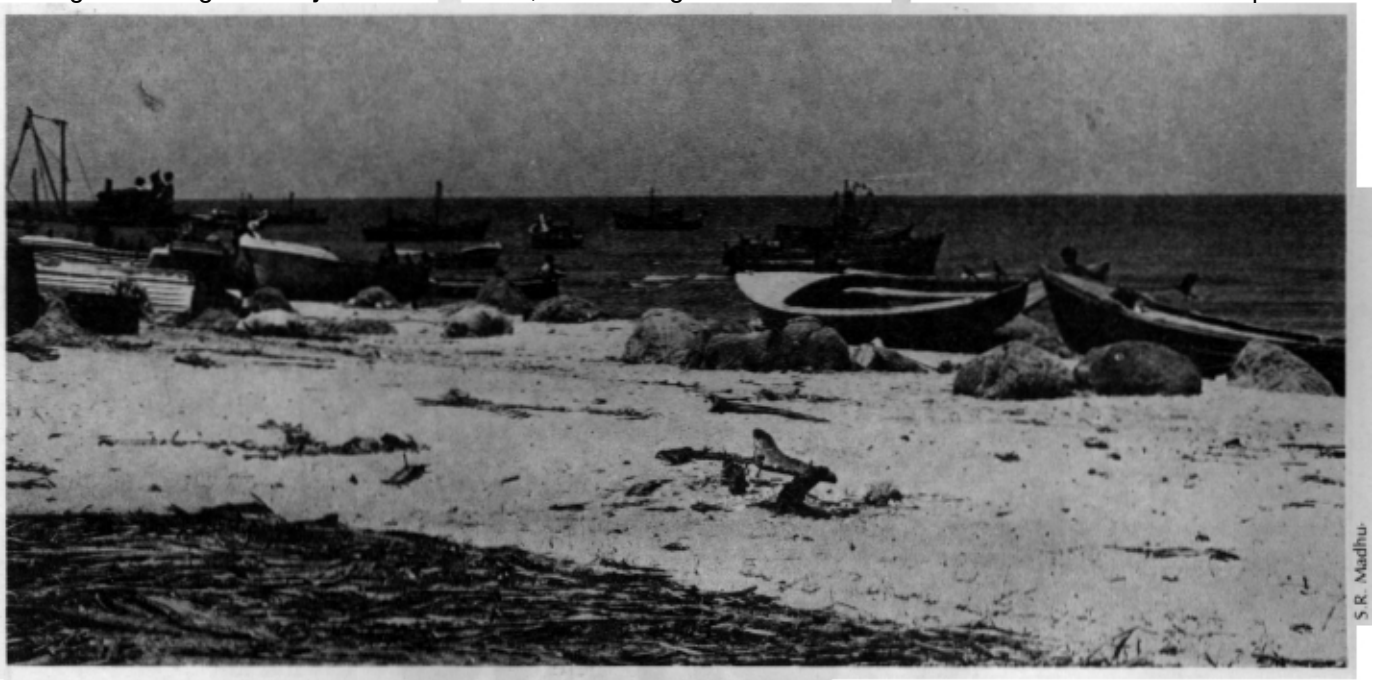
evening and return early morning; day fishing is for species other than shrimp.

How did BOBP's Pesalai project begin? Following a request from Sri Lanka, a survey of the island's fishing centres was carried out during March 1983. Two trained officials from Tamil Nadu — S. Pandurangan and P.V. Ramamoorthy — undertook the survey. On their recommendation, trial fishing of one-boat and two-boat high-opening fish trawls commenced in Pesalai in June 1983. The use of a fish trawl during the day was given up after a few months — it catches fish alone, while fishermen like to catch at least some shrimp; further, this gear proved to be rather heavy for the Pesalai boats, resulting in low towing speed. New shrimp-cum-fish trawls designed by Mr. Pajot, using thinner twine than in the earlier trawis, were tried out during January and February 1984. Their performance was monitored by **Marianayagam Soosai,** 43, gear instructor with the Fisheries Training Centre in Maligawatta. He joined the project late 1983 as BOBP's couterpart. Results were very good — these trawis brought in as much shrimp as conventional shrimp trawis and much more fish (usually bottom-dwelling fish such as silver belly).

Says Mr. Soosai : "Initially two designs of nets were tried out, later a hybrid version — with 520 meshes of 50 mm size in the top, lower wing, upper and lower belly, and 40 mm meshes in the baiting and 30 mm in the cod-end. This net was smaller and lighter than the earlier versions, simple to construct, easy to use; and its performance delighted the fishermen."

More and more fishermen demanded the new trawls, and also asked BOBP to organize a regular extension and training programme for them This was done in cooperation with the Training and Education division of the Ministry of Fisheries, from May 1984. Net-maker Ezhumalai, who has constructed scores of high-opening trawis for fishermen in Rameswaram and Tuticorin on behalf of BOBP, made his first visit abroad, and began work in Pesalai in May 1984. During one and half months, he trained Soosai, another BOBP counterpart, N. **Peter** (who was deputed to the project early 1984), and five local fishermen in making shrimp-cum-fish trawis. Together, they constructed more than 50 trawls, all of which were bought at cost (Rs. 4,400) by Pesalai fishermen.

(Continued on page 4)



S R. Madhu.

At the beach in Pesalai. A quiet little town but a busy fishing centre.

We left Colombo well before dawn broke, at 2 a.m., for the six-hour drive to Pesalai. It is a quiet little town with a population of about 10,000. Three-fourths of these are fisherfolk, mainly Tamils. Beach-seining, driftnetting, gillnetting and prawn trawling are the predominant fishing methods. The main fishing craft are the 18-footers (about 50 of them) and the 28-footerc. also known as 3½ tonners, of which there are 65.

Trawling for shrimp goes on almost throughout the year. The peak season is June through August, the dull season from January through March. The shrimp trawlers go out in the

A Letter from the Publisher

The ongoing BOBP is scheduled to continue for two more years. The project documents governing thework, with contributions from SIDA and UNDP have a termination date of 31 December 1986. But these agencies have not closed the door for continued support beyond 1986. Positive interest has also been expressed by other Scandinavian agencies and the UK's aid agency, the ODA. The ODA had in fact already sanctioned a Programme component in thefield of post harvest technology; this has not taken off yet, as it has got mired in the bureaucracy of one of the participating countries.

Although two years of Programme operation remain, the effective time would only be about half of that. In this type of programme, activities cannot be maintained atthesame level of briskness throughout the project duration. A long phasing-out period is required for most major activities. This meansthat ifthe Programme isto be continued beyond 1986, it should get into a new phase from early 1986 to prevent discontinuity and loss of momentum.

Considering the cumbersome procedures for project extension both within sponsoring agencies and among some of the member countries, the 8th Advisory Committee meeting held in January 1984 of the SIDA-funded small-scale fisheries project urged FAO to initiate action to secure continued fundingassoonaspossible. In response to this, FAO organised a working group meeting in September 1984 (which was preceeded by a two-member consultative mission) in which countries around the Bay of Bengal (Maldives, Sri Lanka, India, Bangladesh, Thailand, Malaysia and Indonesia) were represented. The objective of the working group meeting was to outline essential features of a continued multi-disciplinary support programme for the Bay of Bengal Committee (BOBC) beyond 1985. The report of the working group will be discussed at the 3rd session of the BOBCs for February 1985.

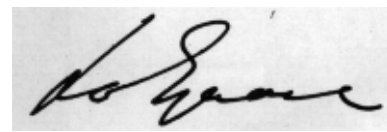
THE BAY OF BENGAL PROGRAMME

- Duplication of effort is reduced in respect of problems that are common to several countries.
- It serves as a useful support mechanism for spurring projects and programmes launched by international agencies in various countries of the region by providing an input of on-the-spot knowledge and experience.
- The services of experts who have become conversant with the problems and conditions of the region by being in the region can be made available as and when needed with a minimum of lead time.
- It enables the sharing of costly and scarce fisheries expertise.
- It ensures optimurñutilization of experts' time (the most costly iteTh in a technical assistance programme) by enabling easy switching from unproductive activities to productive ones.

In sum, a regional programme can achieve good results at a low cost.

Despite these conspicuous advantages, most funding agencies seem reluctant to whole heartedly support regional activites. Perhaps there is a suspicion (evident from comments at international gatherings) that member countries subscribe to regional programmes only because of the prospect of additional support on top of their national country allocations from different agencies. This issue was brought up in the working group meeting. There is no doubt that member-countries welcome this additional support, but it is also equally clear that they are interested in regional cooperation. As an earnestofthis interest, some member-countries have expressed willing-ness to provide cash contributions to local over-head costs of a future BOBP.

So there is obviously a genuine interest in the mechanism of a regional programme.



— It is an excellent vehicle for promoting and generating cooperation between the parti-cipating countries.

BAY OF BENGAL NEWS

BAY OF BENGAL NEWS is a quarterly publu itiOfl of the Bay of Bengal Prugrdmme (BURP).

The BOBP is a regional fisheries programme executed by the Fopd and Agriculture Organisatiori of the United Nations (FAO) and funded by the Swedish International Development Authority (SIDA) and the United Nations Development Programme (UNDP). It covers countries bordering the Bay of Bengal.

The BOBP's main aims are to develop, demonstrate and promote appropriate technologies and methodologies to improve the conditions of small-scale fisherfolk, and to assess arid monitor fishery resources.

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EXCITING NEW FISHERY IN SRI LANKA

(Continued from page 2)

The BOBP's 'net-making centre' at Pesalai is just a straw-roofed shed, within the compound of the Ceylon Fisheries Corporation. While a transistor radio blares out music, the net-makers are busy stretching ropes, rigging webbing to sweeplines, attaching floats, splicing together yellow and white ropes.

THE FISHERMEN SPEAK

Senamoria Nahiladas, 60, is one of the five trained net-makers. He works 6 days a week and earns a wage of Rs. 75 per day. He says the new trawl is simpler to construct than the old one : it comes in just three mesh sizes (30 mm, 40 mm, 50 mm) while the old trawl was in many sizes, ranging from 20 mm to 45 mm. Another difference is that the traditional trawl uses 3 m bridles — 'Weusel0tol5 m bridles." By how much has the shrimp-cum-fish trawl increased the earnings of local fishermen? Is it possible to quantify its superiority over the traditional trawl? Says fisherman **Nicholas Logu** : "When shrimp are available, the BOBP trawl perhaps earns about 25% more than the conventional trawl. When shrimp are not available — or if night trips are not possible — the BOBP trawl is the only one that provides some income . .

During late 1984, the traditional shrimp fishery has suffered a severe setback, says fisherman **Hippulite** Croos. This is because of bad weather (strong winds), also because of anti-terrorist security curbs which have led to a "sea curfew" at night. Result: only day fishing has been possible most of the time, and BOBP's shrimp-cum-fish trawl has become all the more attractive.

Hippulite Croos uses a conventional shrimp trawl ; he doesn't own. a BOBP-designed trawl yet, as he hasn't paid for one. He earnestly requests a BOBP trawl on an instalment basis — it will "help him at this critical time." However, the BOBP is unwilling to deviate from its principle of supply against full payment. "If we make an exception for one, we will. have to make an exception for all."

Another fisherman who drops by says that no trawler has gone out to sea more than 25 days during the past three months . . and losses have resulted on many of these days. He hopes, however, that weather conditions will improve in November-December.

FISHERMEN INCREASE MESH SIZES

Pajot says that a major achievement of BOBP in Pesalai — besides improving the incomes of fishermen — is that it has persuaded fishermen. to increase the cod-end mesh size of their trawls. This is excellent from .a management standpoint — it helps ensure that long-term productivity is not hit.

BOBP initiated a mesh-size selectivity experiment in Pesalai in cooperation with NARA (National Aquatic Resource Agency), the idea being to find out the best mesh size for the cod-end. Dr M S N Siddeek, NARA researcher and BOBP's technical liaison officer in Sri Lanka, conducted the experiment during March-July 1984.

Catch from a traditional Pesalai boat is loaded on to a bullock cart for transport to the market.

G. Pajot

Technology transfer in progress. Left : BOBP fishing technologist G. Pajot with M. Soosai of the Sri Lanka Ministry of Fisheries (BOBP counterpart). Right : Soosai explains net-rigging to a fisherman net-maker.

"I stayed one week every month in Pesalai for the study," says Dr Siddeek. "I was accompanied by a research assistant and a laboratory attendant. We went out to sea on 28 ft trawlers, equipped with the new BOBP-designed trawls ... Different cod-end sizes of the trawl were tried — 25 mm, 28 mm, 30 mm, 40 mm.

"During each *trip,* we collected data relating to the composition of fish by weight, the composition of prawn by weight, the length distribution of prawn and fish. The data is still being analysed, but preliminary observations indicate that a 30 mm cod-end is ideal." (A 40 mm cod-end size let off some commercially valuable prawns while a 22 mm cod-end caught small-size varieties).

Pesalai fishermen using BOBP trawls have now switched to 30 mm cod-end size. "The idea of the mesh-size selectivity experiment," says Dr Siddeek, "was to effect the best compromise between conservation and exploitation."

Another innovation was the use of new otter boards, lighter and simpler than the traditional otter boards. Initially tried out by a few fishermen, these are now in widespread use. A blacksmith and a carpenter in Pesalai have been trained to make these otter boards. Their order books are now full!

A FULL TECHNOLOGY PACKAGE

Mr. Pajot says that Pesalai fishermen, like those elsewhere, should have access to a whole technology package relating to their trawling activities. "Whatever gear materials or accessories they require should be available off the shelf at Pesalai whether it is nettings, mending twine, ropes, floats, split links, otter boards ... This means that the manufacture, import and distribution of these materials has to be systematically organized.

BOBP has helped the process through some initiatives

— Formerly, webbings for Pesalai nets were hand-made, from Rameswaram polyethylene twine often acquired through irregular channels. This twine was expensive and the quality of hand-made netting was deficient.

On a trial basis, BOBP imported polyethylene twine from Bombay and got netting machine-made by Cey Nor (a government plant in Colombo). The trial was a success; henceforth, Cey Nor will import twine directly from Bombay, and make nettings for use by the Sri Lankan fishermen. Thus Pesalai fishermen will get machine-made nettings readymade: these will be cheaper and better than the hand-made nettings now in use.

BOBP also organized a study trip **to Madras for Mr. S A C M Mansoor,** production supervisor of the Cey Nor fish net factory in Nunuwila. He studied the manufacture of polyethylene webbing at the factory of the Tamil Nadu Agro Industries Corporation, Madras.

— Cey Nor will also import mending polyethylene twine, polypropylene rope and PVC floats from Bombay. The floats are available within Sri Lanka as well; split links and otter boards are already being made in Pesalai.

Cey Nor is now considering the possibility of appointing a wholesale dealer in Pesalai to sell a variety of fishing gear material and accessories to fishermen. "Once this is done, fishermen will be free to concentrate on fishing," says Mr Pajot.

TECHNOLOGY EXTENSION IN KOLPITIYA

After a day in Pesalai, we left the following morning, this time at 3 a.m., for Kolpitiya on the northwest of Sri Lanka.

Says Mr Pajot: "In Pesalai, our work concerns training and technology extension with several individual fishermen. In Kolpitiya the object is the same but we deal with a single company (Ceylon Sea Foods) and its staff. This is easier in some ways, though Pesalai-type conditions are more challenging."

Interviewed in Colombo, the company's managing director, **MrJ T de Livera,** is eloquent in praise of the technology assistance provided by the BOBP which has increased incomes all round.

Says Mr Livera : "The 38-footers operating in Kolpitiya were orginally used as gillnetters. In 1980 they switched to trawling, using the Rameswaram-type shrimp trawls. I setup a fish meal plant at Kolpitiya in 1981.

"Unfortunately, shrimp catches fell over the years and I incurred losses of Rs. 100,000 per month. We were virtually dying as an organization in Kolpitiya. It seemed as if we would have towind up activities

What we wanted was a new lead in technology. And Mr Pajot provided that leadership. He came here in August 1983 and visited us subsequently several times. He introduced the new trawls here, told my people how to operate them; he also brought a net-maker here and trained my men in rigging the trawls

"After that we haven't looked back. We turned a new leaf around December 1983. Now we are totally self-supporting and the profitability of my fleet has been turned around. The incomes of my fishermen-crew have increased substantially — these range from Rs. 1,500 to Rs. 7,000 per month, depending on sea time."

At Kolpitiya, manager Marianayagam shows us round the complex. There's a net loft designed by Mr Pajot and set up some months ago, now used for net-making and net-repair and much appreciated by fishermen. At the landing centre, we meet the BOBP counterpart; Mr **Suraweera** of NARA, and his assitant, Mr **Susantha.** They train the supervisor of Ceylon Seafoods Co. to monitor the fishing operations of trawlers, collect and compile operational data.

Here, as in Pesalai, a major gain has been that fishermen have started to use larger net mesh-size and cod-end mesh size. In fact the cod-end mesh size has been doubled to 40 mm — it was formerly 20 mm. This is definite improvement from the management standpoint.

Says Mr Pajot : "No fisherman will increase the mesh size of his net if you merely tell him it it's necessary for the future. But if you introduce a new trawl design that works, that catches more fish and increases his income, the fisherman would like to use it even if it means larger mesh size. That's exactly how we've got both Pesalai and Kolpitiya fishermen to increase mesh sizes."

Three new trawl designs have been finalized for the Kolpitiya 38-footers for future operations

- a high-opening bottom fish trawl: 370 meshes of 120 mm
- a high-opening fish-cum-shrimp trawl : 620 meshes of 60 mm
- a long-wing shrimp-cum-fish trawl : 550 meshes of 60 mm.

A systematic training programme is to be conducted for the construction and rigging of these trawls. Mr Soosai, BOBP counterpart at Pesalai, will conduct the programme, and trained net-makers from Pesalai will assist him.

Summing up BOBP's experience in Pesalai and Kolpitiya, Pajot says "We are heartened that we have helped raise catches and incomes . . Other achievements are that we have promoted management, so necessary for the future, and organized the fishery so that fishernien can buy gear materrals and accessories cheaply and conveniently."

— **S R Madhu**

Crew and helpers size up the catch from the shrimp-cum-fish trawl.

S.R. Madhu

glimpses into BOBP projects

Investigating the Hilsa resource in the upper Bay of Bengal

The Indian shad, hilsa *(Hilsa ilisha),* is a major fishery resource in the upper Bay of Bengal. Both Bangladesh and India tap this resource.

Under the BOBP's UNDP-funded project "Marine fishery resources management in the Bay of Bengal," a working group meeting on the Hilsa resource was held in Dhaka, Bangladesh, 22-26 September, 1984. (Earlier meetings under the auspices of the project, held in Penang and Colombo,• have discussed the mackerel resource in the Malacca straits and the tuna resource in the Bay of Bengal respectively. See *Bay of Bengal News,* June 1984 and September 1984.)

Seven delegates from Bangladesh, besides FAO staff and consultants, attended the Dhaka meeting. India and Burma, two other invitees, did not attend. The meeting discussed the status of knowledge on the hilsa resource and its fishery, identified problem areas and prepared a work plan for further studies.

Though the hilsa is found in marine, estuarine and riverine environments, the work plan suggested that the project's emphasis in future investigations might be initially restricted to the marine and estuarine segments. This work could later be linked up with national efforts on hilsa in inland waters. The areas to be taken up for immediate attention are the chittagong-Cox's Bazar coastal belt and a representative site in the estuarine area.

The work plan recommends immediate follow-up on a variety of subjects: a census of craft and gear; collection of catch and effort data at three sampling stations; species separation and familiarization; sampling for data on length frequency, maturity and spawning; experimental fishing with multi-panelled gillnet of a graded range of mesh sizes; racial investigations through biometrics and, if possible, through biochemical studies; and collection of environmental data.

The work plan, presented by Dr. K. Sivasubramaniam, Senior Fishery Biologist of the project, was based on the recommendations of three consultancy reports, the national work programme of Bangladesh and the opinions expressed during the meeting.

At the meeting's inaugural session Mr. A.Q. Choudhury, Director of Fisheries, said that Bangladesh's annual yield from the hilsa fishery had recently touched 150,000 tonnes. While the availability of the fish in the upper reaches of the rivers was failing the marine fishery catch and related effort had increased steeply. This posed the question : Do the riverine and marine catches originate from a single stock or do they constitute different stocks?

Mr. Choudhury said that the Bangladesh Government is very anxious to strengthen hilsa research. In this context, he welcomes the idea of a regional programme which will facilitate exchange of ideas and information on resource development and management.

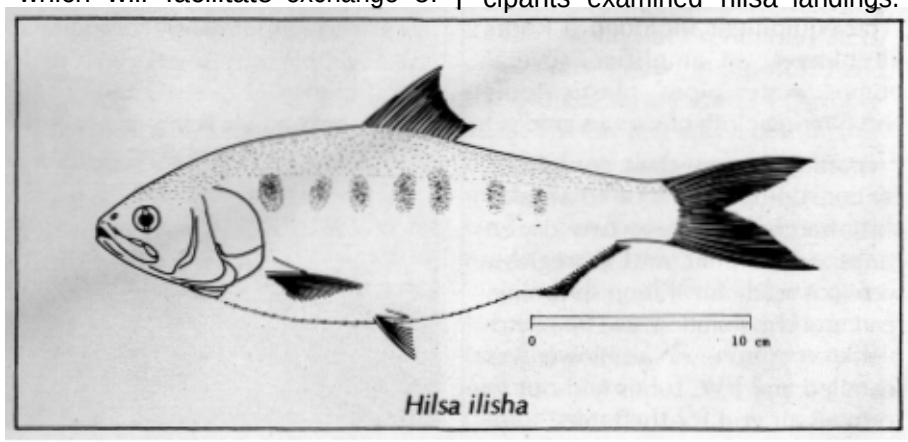
Discussing current knowledge on the hilsa fishery, Dr. B.T. Antony Raja, BOBP consultant, said that studies on the marine hilsa population have suffered almost total neglect till now. Understanding of the hilsa resource in its totality is difficult and confusing because of the possible existence of three eco-types — purely riverine, anadromous and purely marine; at least two morphologically distinguishable variants; two separate spawning runs having probably three peaks of spawning activity. Besides, the available statistical data base is minimal, and it is difficult to trace tFiç source of the landings which are widely dispersed.

Participants appreciated the need for immediate investigations on the marine segment of the resource. They also stressed the importance of coordinated studies to cover all three types of the hilsa habitat.

The increasing trend of hilsa production in Bangladesh was highlighted in the "country status paper" presented by Mr. Md. Sanaullah, Deputy Director, Freshwater Fisheries Station. The paper called for close monitoring and management of the hilsa resource. Declaration of certain areas as sanctuaries; protection of brood fish; and a ban on fishing during spawning time were advocated.

Dr. Quddus, Assistant Professor, University of Dhaka, suggested the conduct of racial investigations through biometric, physiological, biochemical and karyological methods.

The meeting was preceded by a field trip to Chandpur, where participants examined hilsa landings.



Hilsa ilisha

Inspection of shrimp breeding at the Pitipana hatchery.

Seed for tomorrow's shrimp farms : pilot hatchery at Pitipana, Sri Lanka

At picturesque Pitipana in the coastal town of Negombo, 20 miles from Colombo, what was once a brackishwater fisheries research station is now a shrimp hatchery. It is a pilot activity being executed jointly by the Ministry of Fisheries and the BOBP; the immediate aim is to train Sri Lankan officials in hatchery planning and management and to demonstrate techniques of shrimp breeding and rearing of shrimp larvae to stockable size.

On behalf of BOBP, consultant K H Mohamed (formerly of CMFRI, Cochin) visited the Pitipana station during April 1984. He assessed its facilities and advised on how it should be equipped and modified for use as a makeshift hatchery.

Most of the recommended equipment was acquired before MrMohamed's second visit late September : it was imported from Japan or India, or acquired locally.

(The equipment included a Roots air blower, an amplifier, several pumps, water pipes, plastic tools and filtering cloth of various grades.)

Preparations were then completed for converting the station to a makeshift hatchery. Nearly two dozen tanks, in cement and fibreglass, were got ready for shrimp spawning, rearing and maturation, and for phytoplankton culture. An air blower was installed and PVC tubes laid out to form an air grid for the tanks.

The next step was to fill the hatchery's tanks with seawater. This posed some logistics problems because the hatchery has a total seawater capacity of 100 cubic metres while the Ministry's fry transport vehicle has only a 1.5 ton tank. It took nearly three days to fill all the tanks. Phytoplankton (feed for shrimp seed) was developed in two fibreglass tanks by adding small quantities of nutrients to seawater and exposing this to a full day of sunlight.

To collect mature gravid shrimp to begin breeding, Mohamed and aquaculturist R P Samarasinghe went out to sea on a shrimp trawler near Chilaw, afishingvillage 30 miles north of Colombo. Nine spawners, 180 to 200 mm in size, were collected and put in individual spawning tanks. The eggs obtained the following morning however were not viable. Two possible reasons, according to Mr Mohamed : Non-fertilization, stress during transport.

On November 10, some fishermen brought a few spawners to the laboratory in fairly good condition. One of these was selected; this spawned the following morning and 93,000 nauplii were obtained. These were stocked in a rearing tank. Subsequently, 40,000 post-larval shrimp (PL-5) were obtained; these were put info nursery tanks.

Talkin& about shrimp growth, Mr Mehamed says that a shrimp egg takes about 10 days to reach post-larval stage — a size of 10 - 11 mm. (It undergoes six stages of nauplii growth, three stages of protozoa growth and three stages of mysis growth). It is moved to a nursery at the fifth post-larval stage.

Team leader R A D R Samaranayake says "A commercial hatchery is to be set up in Sri Lanka next year with ADB (Asian Development Bank) assistance. One aim of the Pitipana pilot hatchery is to make trained manpower available to implement the ADB project." As part of the training a workshop on the breeding and culture of prawns is likely to be held for project staff early in 1985.

Seawater to fill the Pitipana hatchery tanks was collected and transported by this vehicle. It took nearly three days to fill all the tanks.

A pilot pen culture farm has also been set up at Pitipana. It consists of two pens, stocked with *P. monodon* and *P. indicus,* and a guard shed. This is the first time that shrimp are being cultured in pens in Sri Lanka. (This activity will be described in a later issue of *Bay of Bengal News.)*

Talking about the hatchery and the pen farm, BOBP aquaculturists M Karim and J A I Janssen say that the two pilot activities support Sri Lanka's efforts to tap its coastal aquaculture potential. That potential is good : some 80,000 ha of estuaries and deep lagoons, plus 40,000 ha of shallow lagoons, tidal flats and mangrove swamps. "We hope the Pitipana hatchery and pen farm will spur and stimulate commercial and research activities in coastal aquaculture on a significant scale."

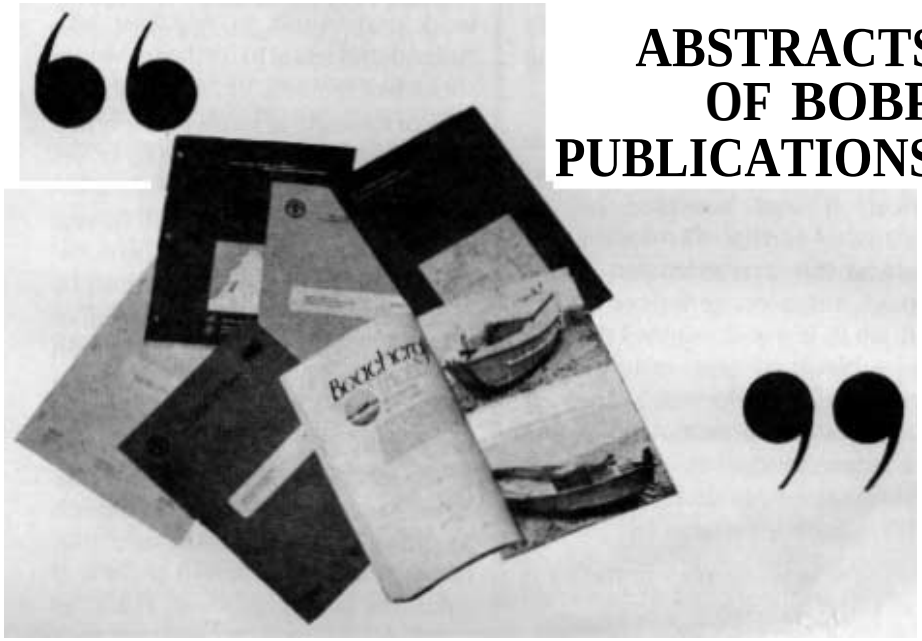
Swedish scientists study BOBP's extension experience

Four seminars relating to BOBP's extension activities were held from October 2 to 8 in three Swedish cities — Vasteras, Uppsala and Stockholm. The seminars were meant to familiarize Swedish participants with BOBP's extension activities among small-scale fisherfolk, so that they could critically analyse these activities and learn from them if possible.

Sponsored by SIDA (Swedish International Development Authority), the seminars were organized by the National Swedish Board of Fisheries. Some 20 to 30 delegates attended each seminar. They included SIDA officials; an officer from NORAD (the Norwegian Aid agency); scientists from the universities of Stockholm, Uppsala and Lund in the disciplines of nutrition, education, social anthropology, sociology, rural development and fisheries; two BOBP extension specialists (Patchanee Natpracha and Edeltraud Drewes) ; plus four project associates from Sri Lanka, Bangladesh and India.

Mr Ingemar Sorensen, Chairman of the Swedish Fisheries Advisory Committee to SIDA, opened the seminars. In an introductory speech,

(Continued on page 27)



ABSTRACTS OF BOBP PUBLICATIONS

Abstracted here are BOBP publications out in recent months. Earlier abstracts appeared in the September 1984, December 1983, September 1983, December 1982 and January 1981 issues of Bay of Bengal News.

BOBP/!NF/6: Marine small-scale fisheries of Sri Lanka : A general description. Madras, India, November 1984.

This is a concise factual and statistical summary covering all aspects of Sri Lanka's marine small-scale fisheries : the fishing fleet, the resources, the techno-ec'onomic infrastructure, the administrative set-up, government policy etc. It may be found useful by students, scholars and planners, and by experts from development or funding agencies.

BOBP/INF/7: Marine small-scale fisheries of Orissa : A general description. Madras, India, December 1983.

A brief factual presentation on the main features of the marine small-scale fisheries of Orissa, India, part of the BO[3P's general description series.

BOBP/WP/29: Artisanal marine fisheries in Orissa : A techno-demographic study by M H Kalavathy and U Tietze. Madras, India, December 1984.

This paper describes the methodology and results of a census of fishing villages in four coastal districts of Orissa. The paper describes the state's marine resources and the infrastructure in the four coastal districts. It discusses the assets owned by the fisherfolk and assesses the "balance" between labour, craft and gear — a "balanced" relationship means that all capacities are utilized to the maximum.

The methodology developed for the census can be applied elsewhere in the Bay of Bengal region as well.

BOBP/REP/20: Coastal Aquaculture Project for Shrimp and Fin fish in Ban Merbok, Kedah, Malaysia. Madras, India, December, 1984.

This paper describes the background, objectives, *modus operandi* and implementation of a coastal aquaculture project in Ban Merbok, Kedah, Malaysia. Preliminary activities commenced in June 1979 and the project terminated in October 1983. The project was a demonstration and training centre for fishermen, fish farmers and officials. Under the project, efforts were made to verify the economic viability of small family farm units for shrimp and finfish culture in brackishwaters ; new culture techniques were verified and demonstrated.

PROJECT RESULTS
The BOBP

by Lars C

In a piece of critical self-analysis, the Director of BOBP looks back at five years of work with small-scale fisheries development in the Bay of Bengal region.

The purpose of the FAO/SIDA project "Development of Small-Scale Fisheries in the Bay of Bengal" is to develop and demonstrate new technologies and methodologies by which the standard of living of fisherfolk can be improved. It is a 'technical assistance' project and most of the work consists of physical experiments, trials and demonstrations.

It is a multi-disciplinary project, and concerns most aspects of small-scale fisheries development including those of a social nature. The sheer variety of these activities is remarkable – building and testing of boats; fishing trials; fish and shell fish farming; socio-economic surveys; training courses at different levels; in-service training schemes; provision of village infrastructure; consultations and workshops, etc.

The project has a general reputation of being a successful one. A lot of good work, some of it unique, has been produced; the performance has been quite smooth and free from "disasters". In a conventional project evaluation, the project would probably receive a fairly high score. This is an achievement which we of course are proud of, but one should not rest on one's laurels.

The impact of the project on small-scale fisheries development in the region is the ultimate criterion. A project. or activity may be admirably executed, yet its impact may be negligible or even negative.

The project was designed for five years; at the completion of this period, it was extended by 18 months; a further 18 months are likely as the final extension. What impact has been generated so far and what is yet to come? That is the subject of this article. The reader will understand that it represents not a complete review but some thoughts on impact evaluation around examples of BOBP's work.

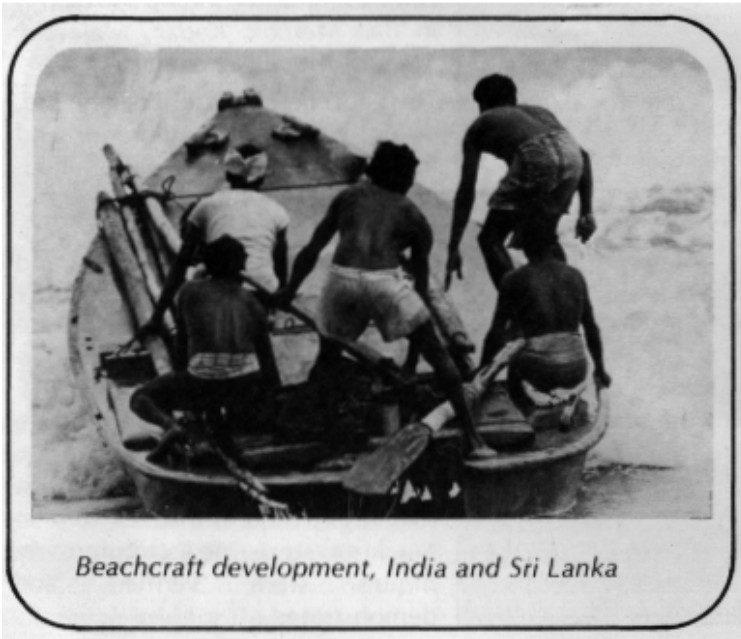
The discussion on impact is structured as follows

- negative impact
- negligible or no impact
- impact of positive results
- impact of negative results
- potential impact

NEGATIVE IMPACT

"Impact" usually has positive connotations, but the possibility of a negative impact should not be ruled out Serious mistakes or Unusually poor performance during implementation of development work may result in negative attitudes detrimental to further development work.

One of the early activities concerned the introduction of insulated boxes at a fishing centre for preservation of the fish onboard small fishing craft. The purpose was to demonstrate how spoilage of fish could be reduced and quality improved to generate higher prices for the landed fish. The experiment failed on account of several technical and organizational factors, largely because of inadequate homework before starting it. A mistake which aggravated the situation was that rather than test different technical solutions on a very small scale, as



Beachcraft development, India and Sri Lanka

High-opening bottom trawling, India and Sri Lanka

AND THEIR IMPACT
Experience

Engvall

many as 50 boxes of one type were introduced. They were hidden in a store after we had realized that they wouldn't serve the purpose and remained there as mementoes of failure. It is of course difficult to assess the degree of negative impact caused by the failure, and it might not be very serious. But it has probably planted some scepticism among fishermen about new ideas, and in this particular case fish preservation, which might hamper future development in this area.

Another type of negative impact, which at least in the short term could be more serious, is the better and quicker absorption of improved technology by people other than the target group and in competition with it. A new fishing craft, for instance, developed with all good intentions for the target group might be put into use by more affluent groups in a much shorter time because of their easier access to capital, higher skills and better organizational and management abilities. This may also be valid for improved fishing technology and more effective aquaculture systems.

Some negative consequences of this nature are unavoidable in technology development work, but can be reduced by means of incentives and regulatory measures for the target group. We have no evidence of such happenings yet in BOBP work, but they may well surface in future. A positive aspect might be that the technology gets introduced quicker – in the longterm this will also benefit the target group.

NEGLIGIBLE OR NO IMPACT

In a project like BOBP, which attempts new technologies and methodologies, one cannot expect everything to be successful and produce positive impact. In fact the project is designed to take risks. Perhaps about 25% of the ideas and concepts that have been taken up resulted in activities without impact. In terms of expenditure the percentage is less, since in most cases it became clear at an early stage that the activity would not produce impact and was therefore discontinued. The reason for the "failures" has in most cases been technical for instance an idea didn't work, or the information and assumptions on which the approach was based were perhaps wrong. We have encountered this experience in all the technical disciplines – i.e. in connection with diversification of fishing methods, construction of a certain type of craft, improvement of fish handling, and in the culture of shellfish. In some other examples Of no impact, the activity was not pursued because of lackof support from the Government concerned. This has happened with pilot projects concerning extension.

Some study tours and a couple of regional consultations conducted or sponsored by the project have probably had very little impact. No effort has been made though to assess this experience in detail.

Some training courses too failed to generate any significant impact. Two of them, concerning training of fish marketing personnel, were thoroughly evaluated and a working paper (BOBP/WP/22) resulted. While the curriculum and the conduct of the courses were satisfactory it was concluded that the courses were of very little value. Reasons

Income-earning activities for women, Chittagong, Bangladesh.

Aquaculture demonstration project, Phang Nga, Thailand

most of the trainees were either not directly concerned with fish marketing before or after the course or were unable to put into practice what they learned because of procedures and practices in the organizations they worked in.

IMPACT OF POSITIVE RESULTS

The most successful BOBP activity so far has been the **aquaculture demonstration project in Thailand.** It essentially concerns introduction and demonstration of techniques for culture of fish and shell fish in poor, mostly remote, villages along the west coast of Thailand but has also strengthened the village infrastructure (water supply and jetties) reached. InthePhangNgaprovince there are about 1000 cages distributed over about 150 different owners! It should be mentioned though that in some other provinces there appears to be a higher concentration of ownership. In cockle culture, on the other hand, which requires larger starting capital for seeds, allotment of farm sites and a more elaborate organization, the ownership is more confined to a few.

The changes in attitude in the communities have also been assessed by two socio-economic studies, one at the beginning of the project and one after 4½ years of operation. is made of larger meshes, thus less damaging to the stocks.

An interesting observation is that at locations where the demonstrations and extension work have been terminated, the number of units employing the new gear has declined in recent months. The reason could be that the gear has been found less attractive after initial enthusiasm or it could be because of seasonal variations in the availability of fish. But it might also be that the extension support given to the technology needed to be of longer duration. Since experimental work started in 1980, the new technology has been taken up

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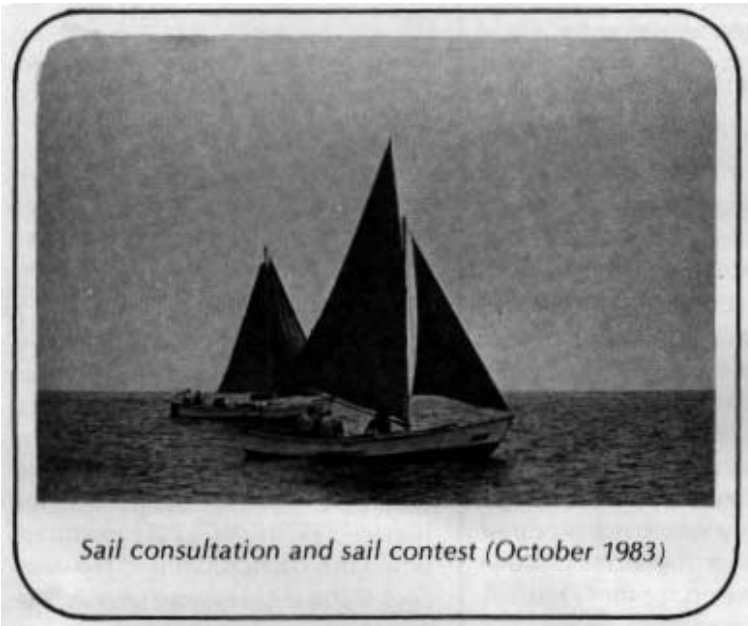
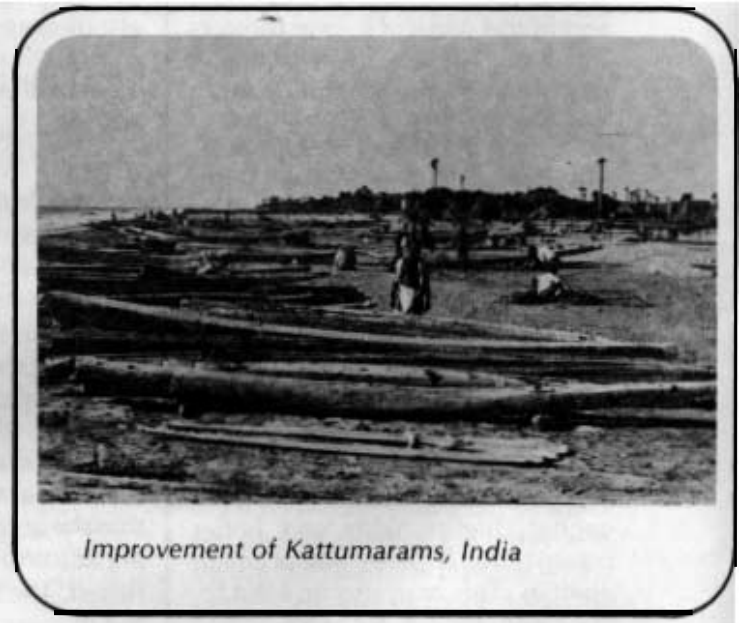


Sail consultation and sail contest (October 1983)



Improvement of Kattumarams, India

and promoted women's participation in fishery activities. As a result of demonstrations and extension work, the cage culture of fin fish (seabass and groupers) expanded from zero level in 1979 to a production of over 350 tonne a year valued at over a million U.S. dollars in 1983. It is a clear case of direct impact which can be easily quantified — so many people involved, so much higher income. Apart from the success of cage culture, significant quantifiable commercial development has also occurred in the area of cockle culture. In the case of cage culture it appears that the target group has been satisfactorily They indicate a qualitative impact on socio-economic betterment and technical development.

Another activity which has led to tangible direct impact is high **opening bottom trawling.** This work aims at better economy of small (about 30 feet in length) trawlers by diversification of the trawl gear to catch more fish and more valuable species. Improvements introduced by BOBP. have led to higher incomes for the owners and the crew members.

An additional benefit of potential long-term impact for resource conservation is that the new trawl gear by hundreds of trawlers in Tamil Nadu and has also been transferred through a government institution (CIFNET) to other states in India. Similar work is in progress in Sri Lanka with positive results.

One of the BOBP's extension projects in **Orissa, India** — dealing with credit **for small-scale fisherfolk** — generated direct impact. A sum of Rs. 6 million has been sanctioned by a refinance institution and by state banks for credit to small-scale fisherfolk. This follows the disbursement of loans worth about Rs. 1 million in the first year of a pilot schemescheduledtogoonfor3-4 years. All loans are small and limited

to a maximum of Rs. 5,000 meaning that more than a thousand families benefit from the scheme.

It is felt that a couple of **regional** consultations have also produced impact, but this is of course impossibleto measure. The belief is based on the numerous requests for reports of these consultations. One of them, on Social Feasibility in Small-Scale Fisheries Development, was held in 1979. Another one is the Sail Consultation held last year in cooperation with the FAO regular programme. We are of course talking here about indirect impact which eventually will be felt at fishing community level.

IMPACT OF NEGATIVE RESULTS

The best example under this heading is probably the activity to promote and develop "demersal fishing" in Sri Lanka. Considerable effort was put into this activity during a period of more than three years. Fishing boats were chartered at different locations; a variety of fishing gear – bottom set gillnets, longlines and traps – were tried out under the guidance and supervision of expatriate consultants for catching demersal species. A comprehensive review was also undertaken of the demersal fisheries – of both commercial production and the earlier fishing trials. This resulted in a final assessment of the potential of demersal resources.

The fishing results were in commercial terms not very encouraging.

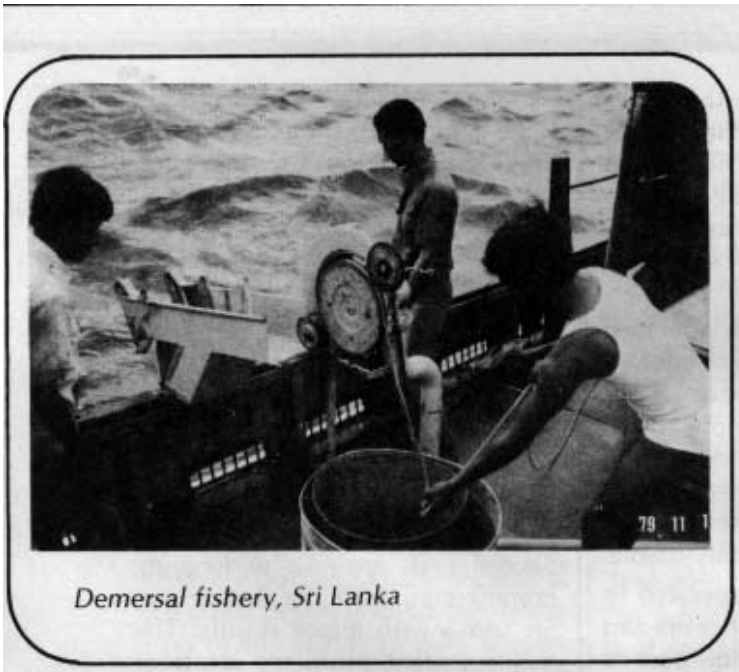
Trap fishing, for instance, failed completely; it was only the longlining that produced commercially acceptable catch rates at a couple of locations. On the whole, therefore, the activity produced a negative result. It is difficult to say what impact this negative result had, but it may have helped to improve the Government's planning.

Before the fishing trials began, there was optimism about the potential of demersal resources – one of the reasons why BOBP started the work. However the negative results have cast the earlier assumptions in a different light and they may make plans and investment projects for new craft more realistic.

Another major activity which led to a negative result is **"improvement of kattumarams". The conclusion** was that it is very difficult to bring about improvements in the economic performance of kattumarams of traditional design through technical development of the craft and its gear. Centuries of evolution have produced a craft that is next to perfect considering the environmental, technical and economic constraints within which it has to operate.

None of BOBP's investigations and considerations had led to any good prospects for technical improvement or to significantly better economic performance. Again, this negative result may be of value – it may have an impact on the planning and implementation of development projects for coastal fisheries.

A minor activity was a **pre-feasibility** study of a floating fish **receiving and distribution unit** in **Bangladesh.** The study resulted in a negative answer – that such a unit was not viable. Perhaps this study,

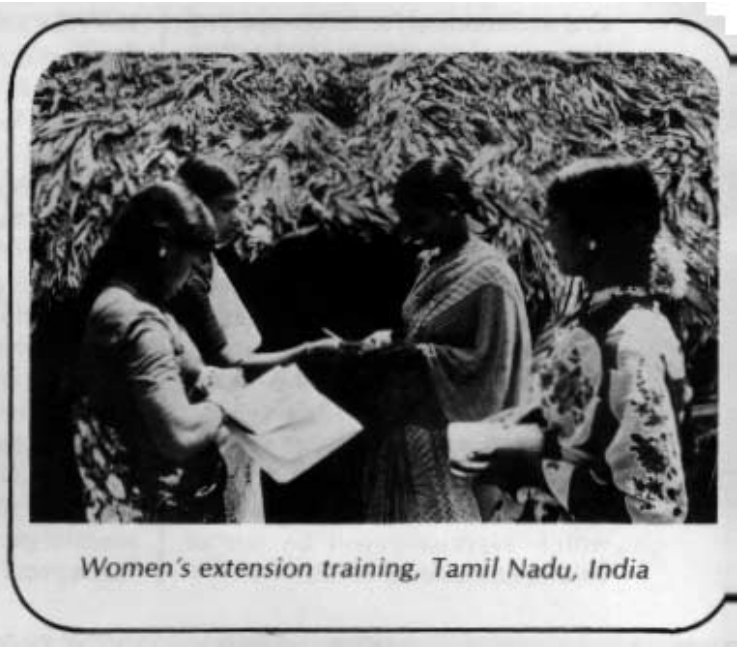


Demersal fishery, Sri Lanka

Improvement of large-mesh driftnets, Bangladesh

Another example of indirect impact is the **Information Service.** Its output includes more than 60 technical reports; the quarterly newsletter, *Bay of Bengal News;* several audio visuals; a couple of photo exhibitions. The impact of these is seen in the wide awareness of BOBP's work, within and outside the region; in the constant demand for BOBP publications, photographs, and slide shows; and in wide press coverage. Obviously, the impact is not directly on fisherfolk; it is on a wide spectrum of people – officials, planners, scientists, development agencies, journalists – whose decisions will benefit fisherfolk.

Pen culture project for shrimp. Killai, Tamil Nadu, India



Women's extension training, Tamil Nadu, India

along with other studies, prevented the construction of such a unit, which might have been a small techno-economic disaster.

POTENTIAL IMPACT

Most BOBP activities, both completed and ongoing, come under the category of potential impact. The reason for this classification is not the same for all projects.

Some activities have produced positive results but have not had any impact yet because of delays in follow up, or lack of it.

Others have not led to any impact because the positive results are not yet unequivocal : technical, economic or social problems still remain to be overcome.

It is too early to assess the impact of extension activities though progress on some of them has been very promising.

Under the first category is an activity that deals with "improvement of large mesh driftnets" **in Bangladesh.** It was demonstrated over several fishing seasons that thinner twine was as good as the thick one now in use, often catching more fish and being about 40% cheaper. The fishermen who have participated in the trials are convinced about the superiority of the new nets; the news has also spread widely in the Chittagong area. But the results have not had the desired impact because of import regulations. First, it took some time to convince importers and traders that they would be able to sell the thinner twine; after that they had to go through complicated procedures to obtain import quotas; so far this has not resulted in any increased supply.

Another activity with delayed impact is **"motorization of** country **craft"** in **Bangladesh.** After about two years of demonstrations with a long tail engine on Chandi boats in the Bhola area, it was established that motorization was technically feasible and economically viable. The fishermen who cooperated in the trials doubled their income and bought the engines at full cost at the end of the trial period; many other fishermen were queuing up for engines. A scheme for introducing about 250 of these engines was prepared shortly after the trial period for an international funding agency. A further two years have elapsed, but the investment project is not in sight yet.

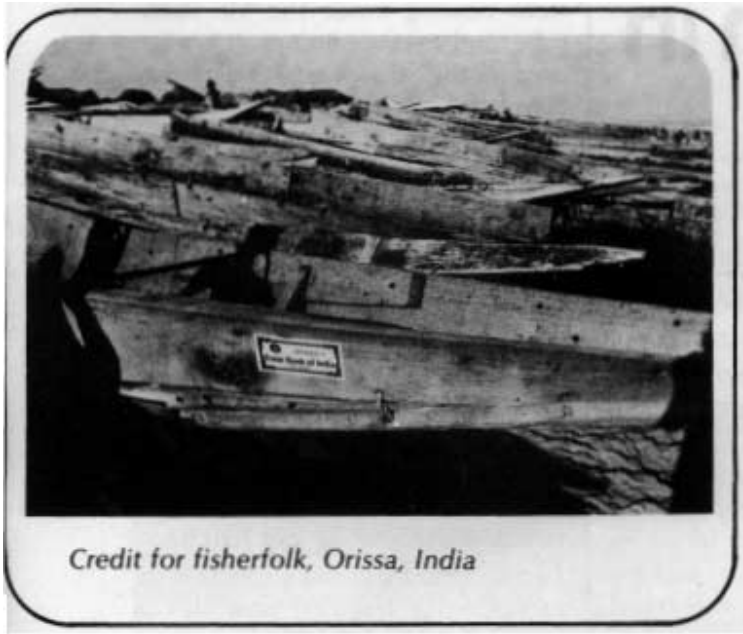
In Sri **Lanka** the project investigated the **fuel economy** of the island's **fishing** fleet and came up with a series of recommendations to improve it. Some of these recommendations are easy to implement but nothing has been done because of the dearth of technically qualified staff in the national administration. Lack of follow-up.

In the second group of "potential impact" projects, there are many technical activities which are yet to be concluded. These include the **development of beachianding craft.**

This has been one of BOBP's major activities. The development work over five years has resulted in a few prototypes which are technically feasible solutions. It took a little longer time than expected to reach this stage but one should then bear in mind that the beachlanding problem has been tackled by many others during the past 2-3 decades.

Several craft are now undergoing commercial trials in India and Sri Lanka with mixed results. The major current problems are poor maintenance of engines, inadequate spare parts supply and repair services in remote beach villages and the inexperience of fishermen in new types of fishing operations. In some places where these problems have been largely overcome, such as Uppada in Andhra Pradesh, the boats are performing well and show economic viability without subsidies in spite of their relatively high investment costs.

Before one sees a large-scale introduction of these craft, credit facilities and incentives will have to be arranged. The Government of India and the State Governments have already started on this and although it may yet take many years before BOBP beachianding craft are a common sight on beaches, the



Credit for fisherfolk, Orissa, India

Information Service

potential impact of the work is very high.

Several aquaculture activities, most of them started rather late in the project, belong to the same category of potential impact. Pond culture **of shrimp in Polekurru, Andhra Pradesh, and** pen **culture of shrimp** in **Killai, Tamil Nadu, for instance** show promising technical results, and there are indications that they would be economically viable. The main problem in .attaining the desired impact on the target group of small-scale fisherfolk will probably be managerial—organising the credit needs, distributing ownership of the ponds or pens among the fisherfolk, helping them to manage the farms.

The third group of "potential impact" projects consists of extension activities. In Tamil Nadu, assistance has been given to set up a fisherwomen extension service (FWES), to develop training packages and to train its staff and the women link workers in the villages over a three year period. The establishment of the FWES is in itself an impact; changes in attitude and better knowledge on the part of staff and link workers are noticeable too. Further, some tangible improvements have been attained in the target groups.' access to credit and social services in villages participating in the pilot work.

In Juldia, a village near Chittagong, Bangladesh, some 200 women take part in organised group action pursuing a host of income generating and educational activities that can improve their social condition. This work has generated a visible impact in the village. The women\\ are earning money from net braiding, goat raising, fish farming etc., and have tackled problems of sanitation, health and child nutrition.

Common for these, and a couple of other activities, however, is that the support requirements for organization and training are heavy and long-lasting. Crucial questions therefore arise.

To what extent is the impact of sustained value? Will it last only for the duration of the project? And how can it be multiplied?

The answers depend entirely on the interest and support exercised by the administration concerned. The attitude to this type of work varies in the region but there is unfortunately a general tendency to regard it as "software" of low priority. It is relatively costly and progress is bound to be slow and non-spectacular. It will be many years before a reasonably sound impact assessment can be made if it can be made at all. Yet people-oriented extension work might be the most useful input for sustained development.

An area of work which BOBP has entered into relatively recently is **non-formal education.** Curricula and teaching material are being developed for fisherfolk – for adults in Tamil Nadu and for children's primary education in Orissa. Education Departments in the state are actively participating in the work and are likely to make full use of it as soon as it is ready. The project's work might therefore result in a rather quick and widespread indirect impact which undoubtedly is of direct benefit to the target group. The optimism is based on the high priority given to education by Governments and international cooperating agencies.

THE CHALLENGE

A project of limited duration like BOBP, covering five countries and many disciplines can hope for a couple of achievements in its lifetime. On most activities, however, it can do little more than generate and test new ideas, insights, technologies, methodologies. Using them to improve the conditions of the fisherfolk in any country is the collective responsibility of a whole lot of institutions – government and private – and individuals.

The percolation of project results to the target group is inevitably a slow process – much slower than one believes or perhaps wishes to believe. The time lag between idea and impact is frustrating – but that is what makes development a challenge. That's also what makes impact assessment such a humbling exercise – and an essential one.

Engine installation in BOBP beachcraft

by Arild Overa

In response to several requests, BOBP's fishing craft engineer describes the working principles of the engine installation devised and developed for beachcraft in India and Sri Lanka.

One of the keys to BOBP's success in developing suitable beachcraft for the Bay of Bengal beaches is its special engine installation. The device was first conceived by BOBP consultant Oyvind Gulbrandsen. Let us take a close look at it now that this device is in its final stage of development. A technical report on this subject is under preparation.

The basic concept consists of a longtail engine installation mounted below the waterline in a watertight pivoting box with a rudder attached and fitted into a flooded well in the hull. (See picture). Bolted on to this box are all the components fuel tank, throttle control, exhaust system, fuel filter and water separator. In case of a capsize, a flap is fitted on the combustion air intake to prevent hydraulic compression.

Since beachcraft are meant for the poor fishermen in the Bay of Bengal, our initial assumption was that the installation must be as cheap as possible and simple to repair. This assumption turned out to be a mistake: it js not possible to make a cheap installation that can stand up to the harsh beach environment. Sea with high temperature and salinity, mixed thick like soup with sand, is probably the most corrosive natural atmosphere anywhere. And in addition to corrosion, if sand is not kept out, it will ruin all running components, i.e. engine and stern gear.

Mild steel bolts are impossible to unscrew again after only a few days. Therefore, on joints which are to be opened occasionally, stainless steel fasteners must be used. These again must be positively locked, otherwise vibration will cause the nuts to fall off. Stainless steel is also used as liner for the bronze stern bearing inside the MS stern tube, and as pivot linings. It is also used for the exhaust pipe and rudder hinge and stock.

The air-cooled engine needs a lot of fresh air for combustion and cooling, while no water must be allowed to enter the engine box while crossing surf.

Many different lids for the engine were designed and tested. While they worked fairly well, most of them were heavy, elaborate, and therefore, costly. The final one consists of a large airscoop which can be turned fore or aft, a water trap and large hot air exit hatch.

Two different engines were tried in India. While the first one was a very light engine with a correspondingly 'light' lifetime, the second type has worked much better. At 115 kg, it is still fairly light for a 8 hp diesel, being primarily used on tiller tractors.

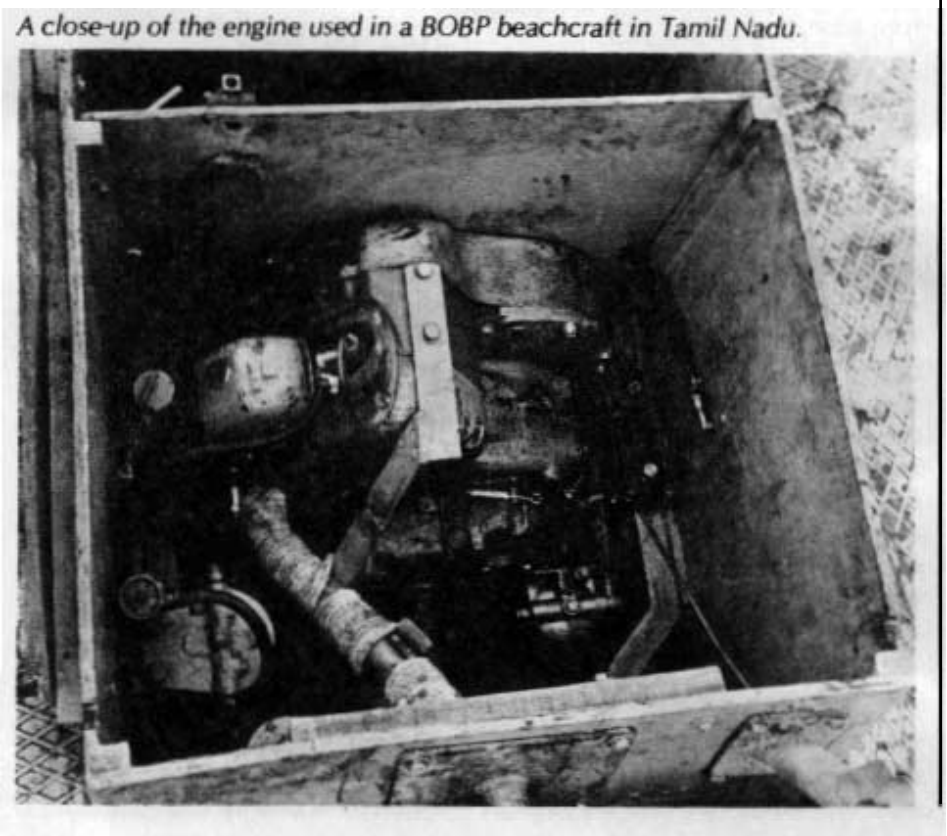
After 12 modifications to marinize it were carried out, such as raised engine brackets, fitting of internal thrust bearing, new throttle/stop lever, chromed sleeve on output shaft, etc., the engine has worked well, provided it is properly lubricated.

In the beachcraft developed for Sri Lanka, larger engines were used. The air-cooled engines failed due to overheating. The SRL-14 craft was therefore fitted with a water-cooled engine. A freshwater heading tank was fitted inside the box, and copper pipes exposed to the sea attached under the box. This principle is called keel-cooling; fresh water inside the copper pipe is cooled through the pipe wall and circulated through the engine. Sand, salt and other contaminants are kept out of the engine. An extra oil-cooler is also fitted. The system has been working well for several months now.

A similar water-cooled engine installation is planned for India, using a 10 hp engine and an indigenous gear box.

Why is the engine installation the key to beachcraft development?

1. A big, carefully shaped rudder can be used, giving control possibilities to hull shapes previously thought to be unsuitable for surf crossing.

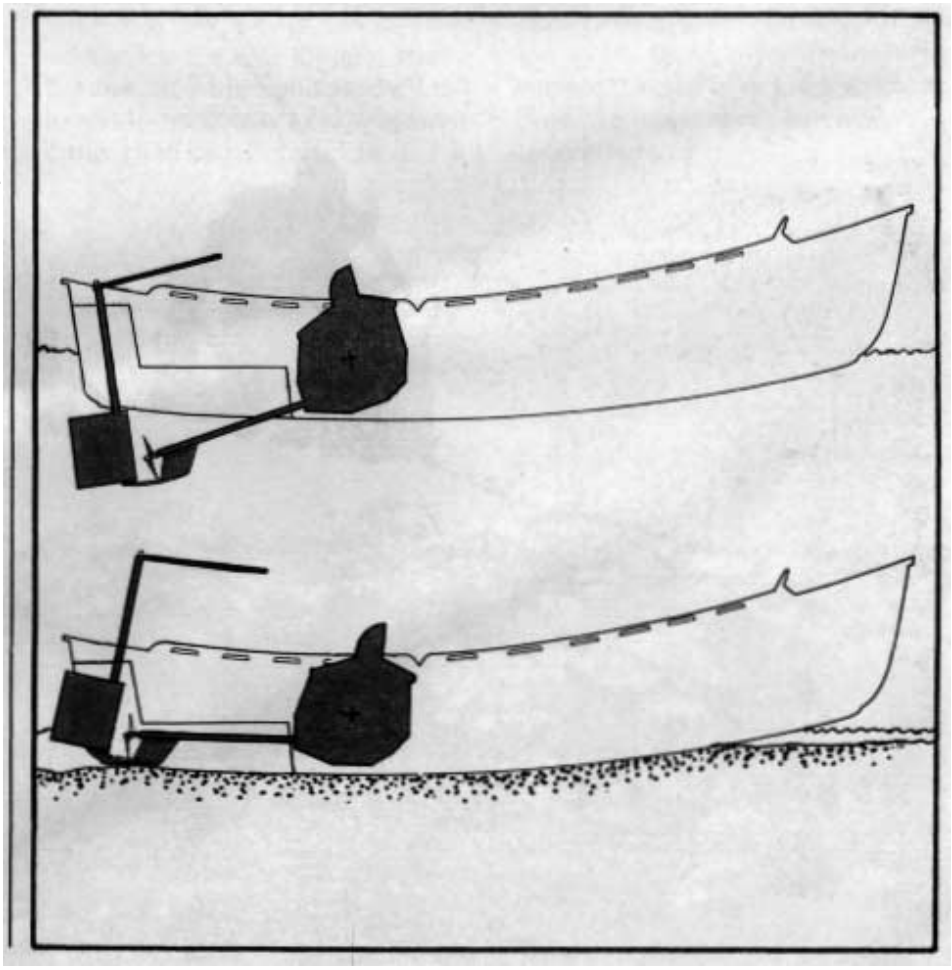


A close-up of the engine used in a BOBP beachcraft in Tamil Nadu.

Above: The engine box with propeller shaft and rudder at Injambakkam near Madras. Below: This diagram illustrates a special feature of the retractable propeller and rudder, which "disappear" into a well in the hull when the craft reaches shallow water. Therefore no fixed keel is necessary.

2. A large propeller can be used for good performance.
3. Rudder and propeller 'disappear' into a well in the hull when the craft reaches shallow water. Therefore, no fixed keel is necessary.
4. The installation can be built by a mechanical workshop and bolted on to the boat, which therefore does not require any special engine installation work.
5. The system should not be mistakenly taken for a conventional liftable propeller system. The beachcraft system is very smooth, lifts up instantly, and has no universal joints. When designing, it is very important to remember that the full rudder side force is taken up by the stern tube and finally by the grease-lubricated pivots.

So there we are, the revolutionary beachboats in the Bay of Bengal owe their success to their propulsion system — the unique beachcraft engine installation, devised and developed by BOBP!



Arild Overa, BOBP's Fishing Craft Engineer, describes the rationale, the main features and the performance of four prototype boats for India and Sri Lanka developed recently.

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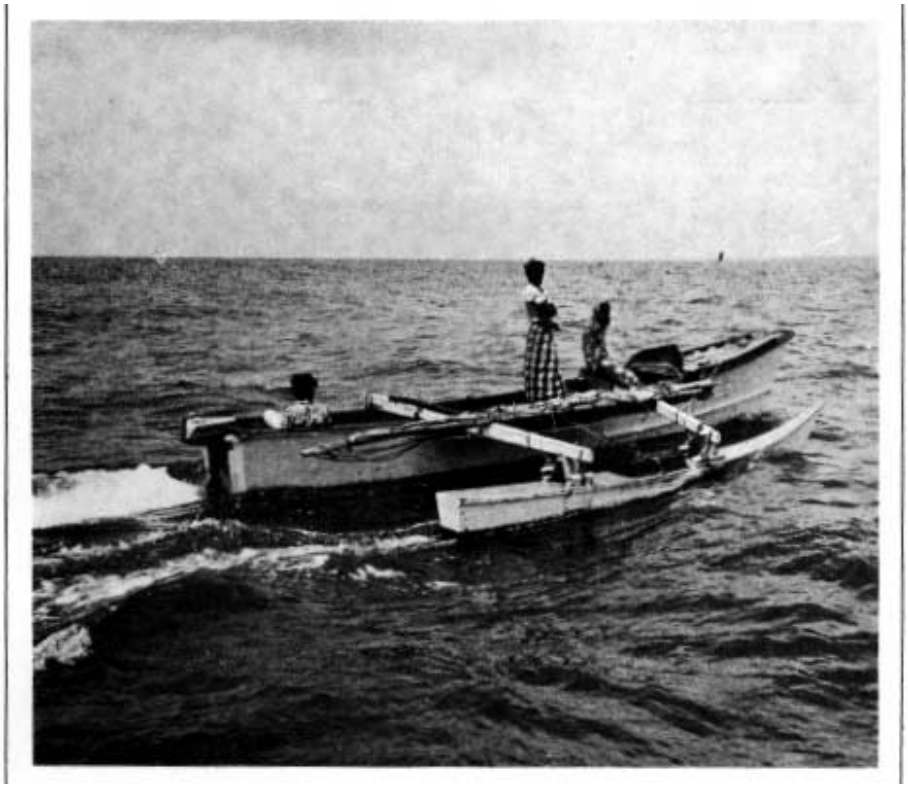
The boats described here, all undergoing fishing trials, are the IND-25 (India); and the SRL-14, SRL-17 and the large Oru (Sri Lanka).

Earlier issues of *Bay of Bengal News* have described the buoyancy block wooden craft IND-21, which has been fishing off Injambakkam, Tamil Nadu. The rising cost of timber – which has made it clear that a wooden boat costs about as much as one in fibreglass – and also the poor workmanship of the five IND-21 boats built by a local boatyard, made us go in for a FRP boat in the same size range as IND-21 : This became the *!IND-25*.

A boat for this area has to satisfy conflicting requirements : it should be small enough to be easily handled on the beach, yet large enough to carry large-mesh nets in adequate quantity to pay for itself and again small enough to conveniently handle shrimp nets whenever this "gold of the sea" is available.

A design solution offering a way out of this predicament was to try out an open undecked beachlanding boat! Here we met with a lot of scepticism, and we were not confident about the prospects ourselves. But consideringthe gains – the lower cost and the better working position, standing low down and leaning against the gunwale – we decided to give the undecked boat atry.



The SRL-17, a low-cost alternative to Sri Lanka's medium-size Orus and 18 footers. It is a 26 ft. outrigger canoe, built in fibreglass-sheathed plywood.

While on the drawing board, the boat got well flared topsides near the gunwale to deflect the waves. A round stern was believed to be strong in fibreglass – besides it would have a splitting effect on the following surf. Other design considerations : it was thought that a flat run aft would enable the boat to run in front of a following wave rather than be overtaken by it. The water line was to be kept sharp for good performance at sea while retaining some spoon shape up front for easy control in surf. There would be a footrest and handle on the outside of the hull and low freeboard in the "get-on-board area". As for sails, Gunter for those who wanted to sail the boat a lot in order to save fuel, for others a Lateen-type rig.

The SRL-14 crossing the surf at Negombo.

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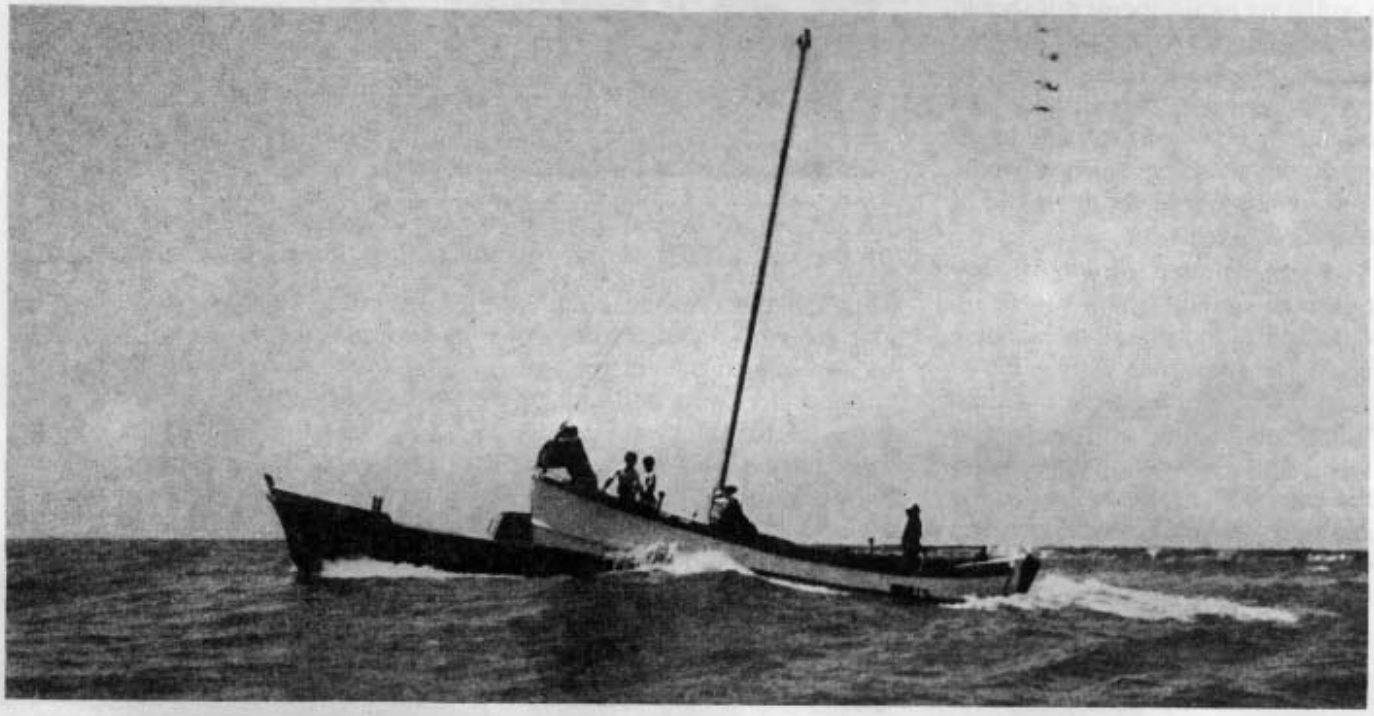
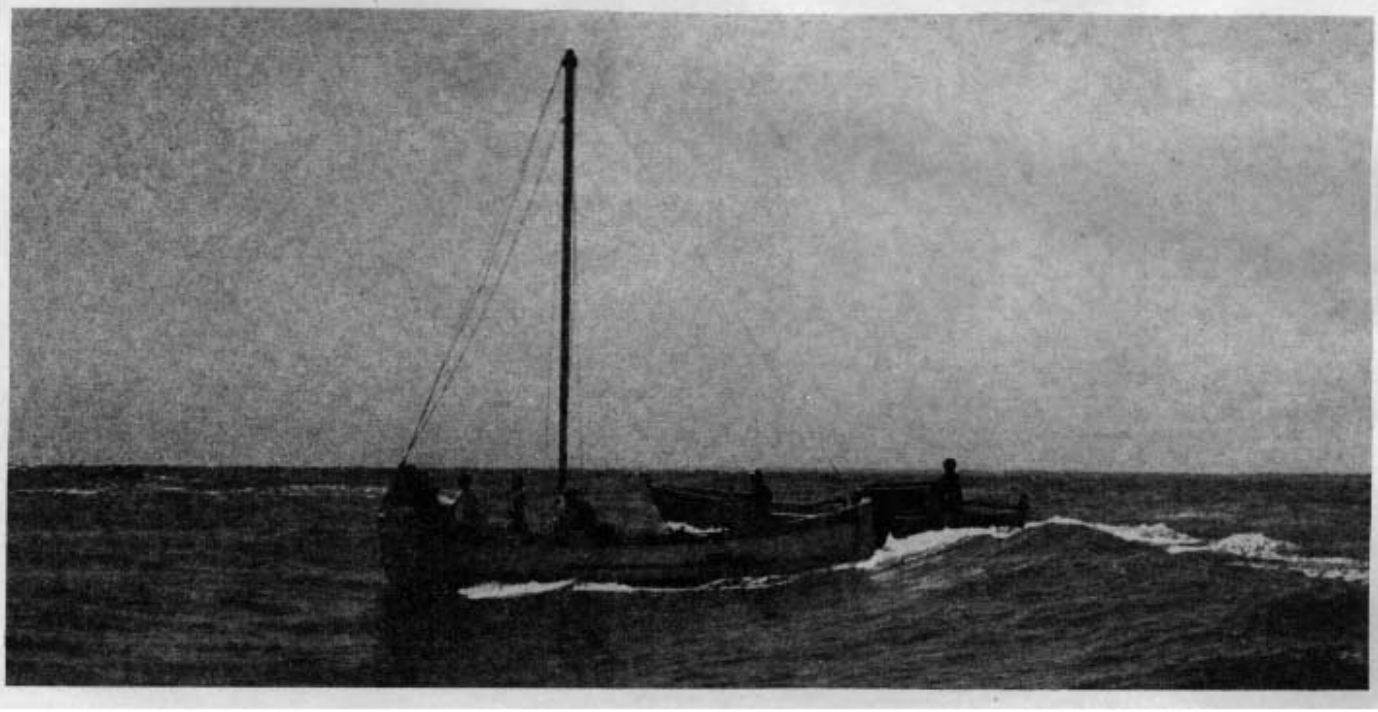




After trials for speed (6.3 knots) and sails, the boat was brought to Injambakkam from the boatyard for rather "confidential" beachianding trials. Scepticism gave way to enthusiasm, and as the surf built up during May, fishermen from other villages were invited to try out the boat. It has now been fishing for five months without any mishap. Fishermen from Injambakkam are now requesting that the IND-25 be introduced to their area rather than the wooden IND-21.

A beachcraft demonstration was held in Injambakkam early November, in view of the Government of India's scheme to introduce 90 beach-landing boats on the east coast. Officials and fishermen from Orissa, Tamil Nadu and Pondicherry expressed their preference for IND-25, while the Andhra Pradesh representatives opted for both IND-25 and IND-20 (those from the south of Andhra Pradesh preferred the larger IND-20, those from the northern area opted for IND-25).

TheSRL-14: Whilethe22ftIND-25 with a lot of weight on board cannot attain a high speed-length ratio, possibilities are quite different with the 28-foot long SRL-14. The SRL-14, now fishing off Negombo, north of Colombo, is meant to serve as a viable beachable and energy-efficient alternative to the standard 28-footer, which has been the mainstay of Sri Lankan fisheries for years. The SRL-14 is equipped with a 15 hp inboard diesel engine, while the standard 28-footer has a far more powerful 30 hp engine.

During sea trials off Negombo in rough southwest monsoon conditions, the boat's performance generated great satisfaction for user and designer alike. With sails and full 15 hp engine power, a steady 8.1 knots were recorded; the engine alone generated 7.3 knots. But what really counted most : a speed of 6.8 knots was maintained dead against the rough sea which at times had the entire boat airborne. As the photos show, the SRL-14 is able to overtake the traditional 28-footer at sea despite the latter's superior engine power. Says fishermen Adley Fernando. who used the earlier SRL-11 and now the SRL-14: "It's the first time in three years that I have overtaken a28-footer."

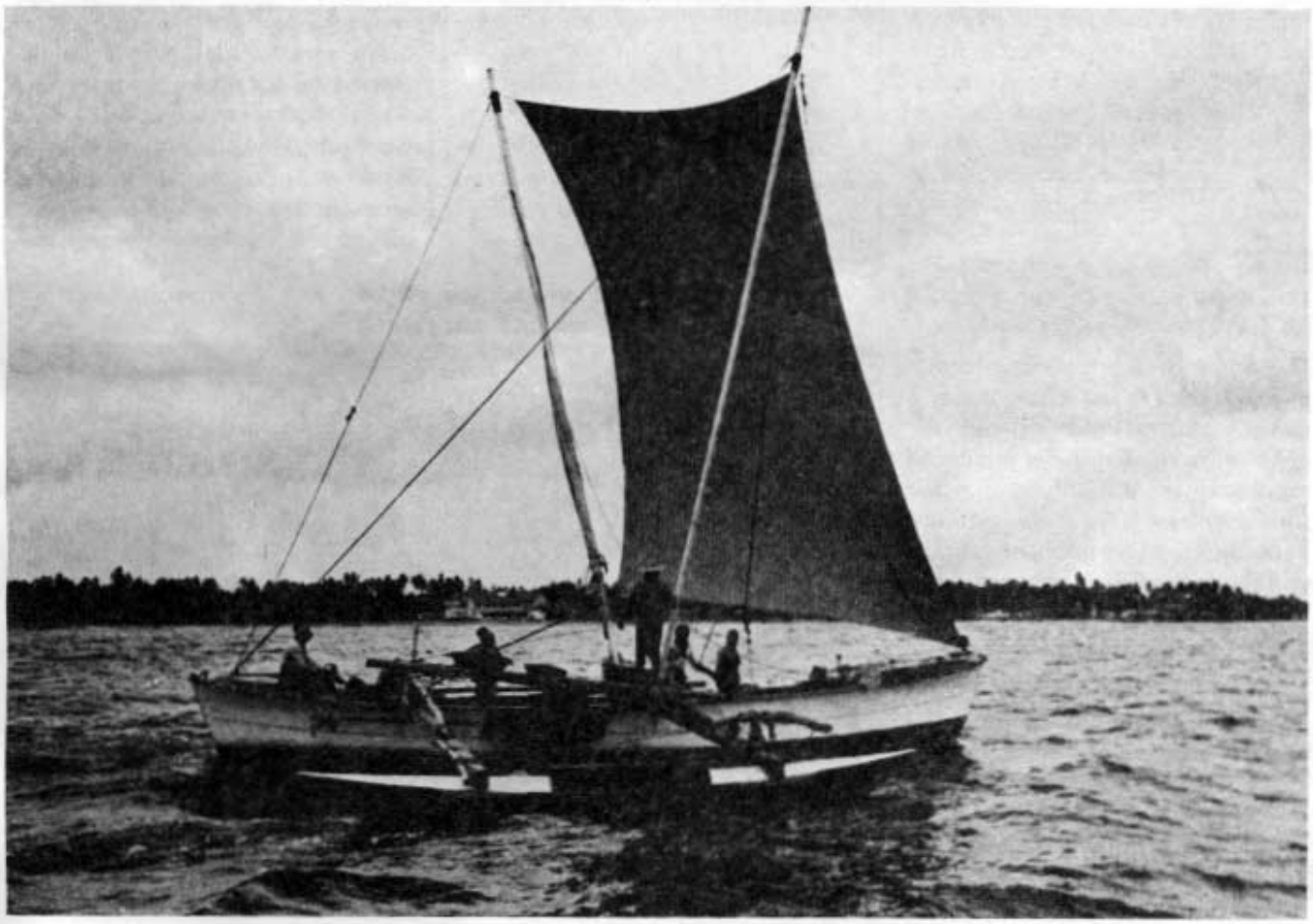
With effective spray stoppers forward and a deep foil-shaped centreboard, the SRL-14 also proved itself to be a dry and stable craft.

The effort behind the design of SRL-14 is considerable: It has SRL-10, 11 and 12 as forefathers while No. 13 was skipped for obvious reasons. The features of this boat:

- Long and sharp of course but ending up with a healthy beam in the middle for good seaworthiness;
- ....Gearbox specially made by Hurth in Germany with a 3.65 to 1 reduction ratio.
- Engine installation of normal pivoting beachlanding type but freshwater-cooled through

(Continued on page 28)

Facing page : This sequence of pictures shows a SRL-14 boat (which has a 15 h.p. inboard engine), drawing close to, then overtaking, one of the standard 28-footers of Sri Lanka (which is equipped with a more powerful 30 h.p. engine). Below: The 40 ft. outrigger canoe (the 'large Oru" developed by BOBP). It has a higher capacity and a better deck laytut than traditional Orus of this size.



ORISSA FISHERFOLK CHILDREN LEARN THE 3R's-AND MORE!

Till yesterday, they spent their time swimming, playing on the beach, helping to transport or dry fish, doing odd errands Today, they do all this and more they learn to read and write, add-subtract-multiply-divide, draw and paint. They learn history, geography, science and fishery science, health and nutrition, community life.

These are children of marine fisherfolk in coastal villages of Orissa. A large majority of them were either strangers to school or drop-outs. Now they attend a non-formal education centre with a curriculum expertly prepared and packaged to suit their needs and circumstances. There are 20 such centres in the four coastal districts of Orissa – Balasore, Cutack, Purl, Ganjam – under a pilot project executed jointly by BOBP, the Orissa Directorate of Fisheries, the SCERT (State Council of Educational Research and Training) and UNICEF. They aim at imparting a basic primary education to out-of-school fisherfolk children between the ages of 6 and 14. Those children who satisfactorily complete this curriculum can join standard VI of regular school if they wish.

There are already 700 non-formal primary centres in Orissa, under a Government of India scheme (see box) for children of under-privileged communities. But this is the first time centres have been set up, books written and published, and a variety of activities organized specially for fisherfolk children.

What is the role of the many agencies taking part in the project?

– **The BOBP** helps prepare the booklets the children are using at the non-formal centres. Some 120 books are planned, about 30 are already in use. Each booklet is about 15 to 20 pages long. It has an attractive cover. The text, in large type, and the many sketches sprinkled across the pages, are also in colour. The language is Oriya. The author is Ms. Namita Ray, headmistress of a Railway School in Bihar and an educationist of more than 20 years' standing, whom the BOBP has-engaged as consultant.

The BOBP also organizes seminars and workshops to train teachers, discuss and refine booklet drafts, evaluate the utility of booklets already in use, and assess the performance of the non-formal centres.

– **UNICEF** funds the printing of the booklets. The funds are channelled through the NCERT tothe SCERT (which is responsible for all non-formal primary education centres in the state, including those for fisherfolk children).

– **The SCERT** approves of the booklets and gets them printed under its auspices. It also helps in teacher training.

– **The Department of Education** appoints teachers for non-formal centres and pays their salaries.

– **The Department of Fisheries,** through its 15 marine fisheries extension officers, motivates the fisherfolk to maintain the non-formal centres, obtains feedback from them, assists Ms. Ray, anf helps teach the children fishery science.

Visit to a non-formal centre

It is 12 noon and blazing hot in Penthakata, a fishing village near Pun. Ms. Emily Pradhan, teacher of the non-formal centre here, is a history graduate (most other non-formal teachers are matriculates). Ms. Pradhan has a way with kids and is evidently popular with the centre's 15 boys and 15 girls.

The centre is housed in a building owned by B L David, a priest and social worker. It was closed when we reached the place (classes usually begin at 2 p.m.) but within minutes an excited group of kids surrounded us. At Ms. Pradhan's request they

"Facilitator" Emily Pradhan with her students at a non-formal centre for fisherfolk children in Penthakata near Puri.

sang songs, read out from their colourful booklets, then joined her in tending the backyard garden.

Classes are held from 2 p.m. to 5 p.m., six days a week. More than 20 booklets ("capsules" in the jargon of non-formal education) have been taught so far. These booklets are not taken home, they remain at the centre, evidently ensuring that future batches of kids can use them. The children are receptive – the girls more than the boys – but one problem is that most of them speak Telugu, and are slow to learn Oriya. 'When they find something difficult, I speak to them .in Telugu," says Ms. Pradhan.

Any other problems? The kids often hint to their teacher that a missionary school nearby offers its students food and clothes... Ms. Pradhan tellsthem : "But those kids don't get these nice booklets," and the children agree!

Like Penthakata, most other centres have been offered to the project by the village communities themselves, while the BOBP has provided furniture and teaching aids.

Preparation of Booklets

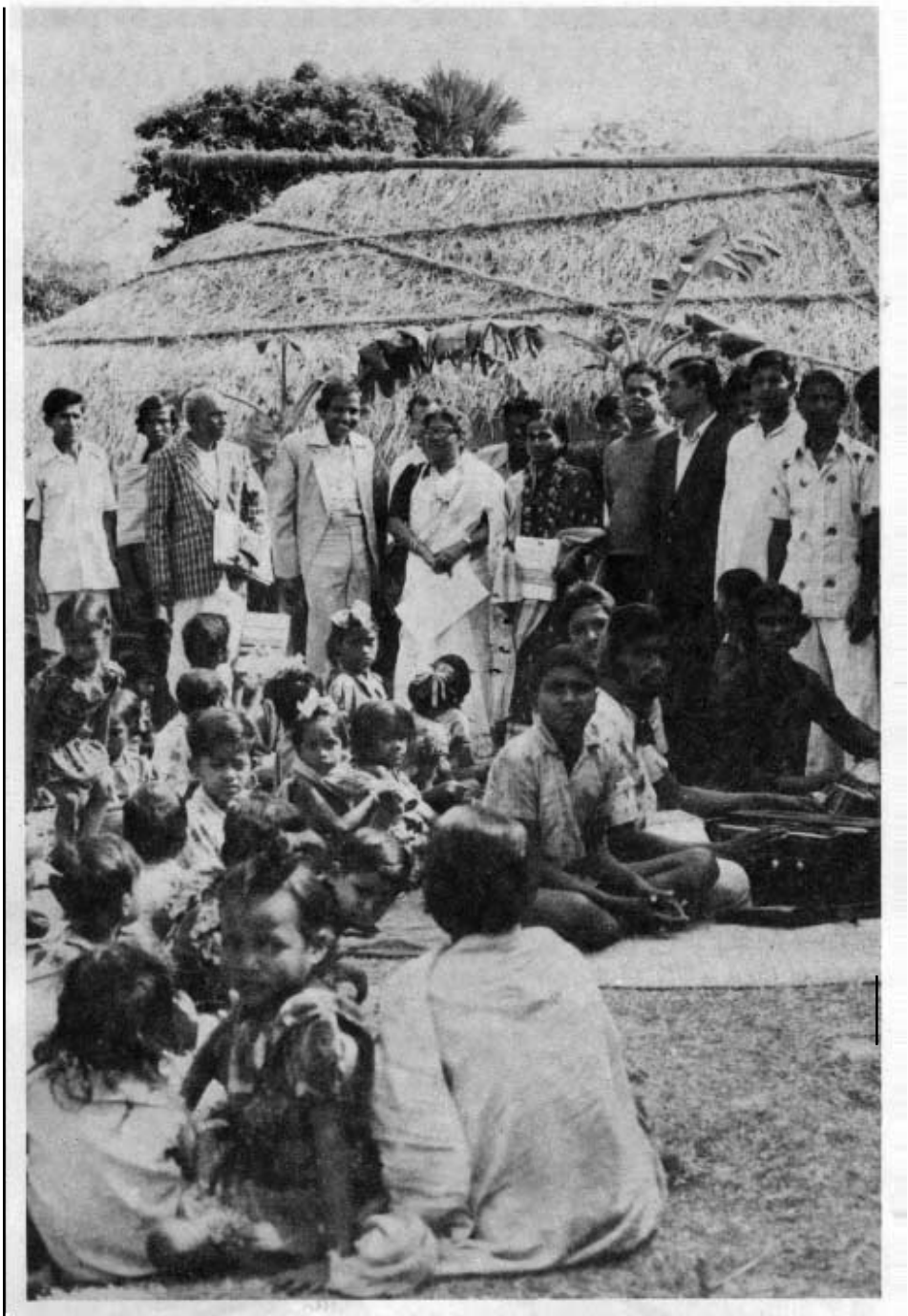
For Ms. Namita Ray, the project represents an entirely new experience – she hasn't written for fisherfolk kids before. To familiarise herself with fisheries, she travelled round the Orissa coastline. She was in for a few surprises. She did not know that there are so many types of fishing craft, so many types of gear.

An outline for the non-formal curriculum was developed at a July 1983 workshop in Bhubaneswar. Ms. Ray then started work on the booklets, in consultation with the SCERT and the Department of Fisheries and assisted by a researcher and an artist. Booklet drafts are usually discussed at the seminars organized by BOBP every three months, and approved by the SCERT's "advisory board" before publication. The first set of booklets were used when the centres were inaugurated in January 1984.

An important concept underlying the booklets, says Dr U Tietze, BOBP's Extension Training Officer, is that they should "integrate learning with life". Lessons in the booklets relate to the environment of fisherfolk children, and to the work, culture and lifestyle of the fisherfolk. Example : The first package of 36 booklets, designed to teach basic letters, words and numbers, has 12 booklets on each of three themes – 'We live on the seashore," 'We go to sea for fishing," and "Our craft and gear." Thus the children learn the unknown through the known. Familiar visuals (boats, fish transport etc.)teach the children "literacy, numeracy and linguistic competence."

Ms Namita Ray says that there is a systematic approach to the teaching of literacy. The first 12 booklets cover 18 letters of the Oriya alphabet, which denote different sounds, plus a few vowels. The second 12 booklets cover the remaining 27 letters of the alphabet; the third set of 12 booklets cover the remaining 13 vowels plus some essential compound letters formed by joining two or more consonants.

As for "numeracy", the children learn to recognize numbers and to add, subtract, etc., by means of pictures and real-life episodes and exercises. The first package enables them to recognize and use numbers



In Balasore district : fisherfolk, their kids, and Orissa officials are keyed up for the gala opening of a non-formal centre.

NON-FORMAL EDUCATION IN INDIA

By 1990, the Government of India hopes to meet its goal of providing a basic primary education to *all* children between the ages of 6 and 14.

To make this possible, both formal and non-formal education are being expanded. Non-formal education centres are being opened for the poor and the under-privileged under a scheme known as CAPE (Comprehensive Access to Primary Education). Special curricula and instructional materials are being developed under this scheme by the NCERT (National Council of Educational Research and Training), with assistance from UNICEF, SIDA and other agencies. In Orissa, the SCERT, regional wing of NCERT, is responsible for non-formal education in the state.

The BOBP-initiated non-formal education project for fisherfolk children furthers the goals of cAPE and is in conformity with it.

Objectives of non-formal education

- To promote self-help among learners and to help them to participate in democratization and in removing poverty and inequality.
- To educate out-of-school children in the age group of 6 - 14 along with drop-outs through a special type of learning materials (capsules/ modules/pac kages) developed, processed and refined as per their need, aspiration and interest.
- To prepare the learner to help himself/herself by translating technical know-how in the field of their interest or occupation.

Main features

- It should be flexible and adaptable to the learning needs of the community.
- Unlike the formal method of schooling it should be made available to its clientele when they want it, where they wAnt it, and "as much as they want it".
- curricula for non-formal education should be so designed that it will be closely related to local resources and opportunities.

Some of the booklets for fisherfolk children that are now in use at various non-formal centres in the coastal districts of Orissa.

beyond 100, and to master multiplication tables up to 10. Handwriting and drawing exercises give the children enough scope for developing these skills.

By the time the first package is over, the child is well-equipped for self-study. Five other packages relate to family and community life; environment and technology; history; geography; civics. Of these, the first two packages, which concern fisheries, are being developed by BOBP. For the other packages, material already developed by SCERT for primary school children will be used.

Some path-breaking work has been carried out for the 54 booklets on "Environment and technology". A basic essay for the whole package was prepared by a consultant, Ms Cathreena Cunningham of Ireland (who recently helped develop a fishery science curriculum for high schools in the Maldives). Sample package topics: analysis of the two monsoon seasons, life cycle of marine animals, the life-style of pelagic and demersal fish, migration of fish, various

Puri children greet their new non-formal centre. Some 30 such centres are now active.

fishing methods, the behaviour of fish vis-a-vis fishing gear.

To make her general essay fully relevant to local conditions, Ms Cunningham talked to fisherfolk and to fishery extension officers about local beliefs concerning winds, currents, cyclones and other environmental phenomena. She worked their comments into her essay, which is now being translated into Oriya by the Additional Director of Fisheries, Mr P Mohapatra. This will be rewritten in booklet form by Ms Namita Ray.

Talking of the problems she has faced as an author, Ms Ray cites the heterogeneity of her "target group". Festivals and customs among Orissa fisherfolk vary. So do types of craft and gear. The fish species landed in Balasore are different from those in Cuttack. Even the language is not the same. The absorption level of the students varies too : the age group rangesfrom6tol4, it includes. both freshers and drop-outs. Another problem is the seasonal nature of marine fishery — lean and hectic periods of about six months each. During the "hectic" season, attendance may be very thin.

Despite these problems, the children's response to the booklets has been very encouraging, says Ms. Ray. Equally heartening has been the response of the Orissa Government — which has decided to open 20 more non-formal centres for fisherfolk children in coastal districts. (Eight of these were already opened by early December).

'We are grateful to BOBP for all the work being undertaken for the fisherfolk children," says Dr S B Misra, SCERT consultant. 'We are pleased to add these booklets to our non-formal series ... Ms Namita Ray deserves our congratulations for completing 36 capsules in a short time ... The project is a dream come true for so many, and we are trying to extend whatever cooperation is possible ..

"This cooperation is most evident at the project seminars we conduct," says Dr Tietze. "They are a useful mechanism for training, discussion, evaluation and review." Taking part in the seminars dre representatives from BOBP, SCERT, NCERT, UNICEF, and the Department of Fisheries, teachers from non-formal centres and educators from the Teachers Training Institutes which supervise the centres.

The Regional College of Education (RCE), Bhubaneswar, one of four such institutions in the country, was associated with the most recent seminar, held in September 1984. This association was most useful. Non-formal teachers used newly developed booklets to simulate classes, and watchful RCE and SCERT educators commented on their performance.

Orissa's Director of Fisheries, Mr I Kindo, says: 'We are pleased with this project which enables fishetfolk children to attain their right to a better ... It is not our aim to make our fishermen 'white-collar babus', but we hope education will enable them to play a more active role in development while pursuing their vocation, fisheries." — **S.R.M.**

Fish stock assessment in the Bay of Bengal region

by Daniel Pauly, ICLARM

A training course under BOBP auspices was held recently in Colombo on the use of microcomputers to analyse fisheries data. The stock assessment models tried out during the course threw light on such phenomena as growth, mortality and recruitment patterns for fish species that occur in the Bay bf Bengal region. This article describes the findings of the course.

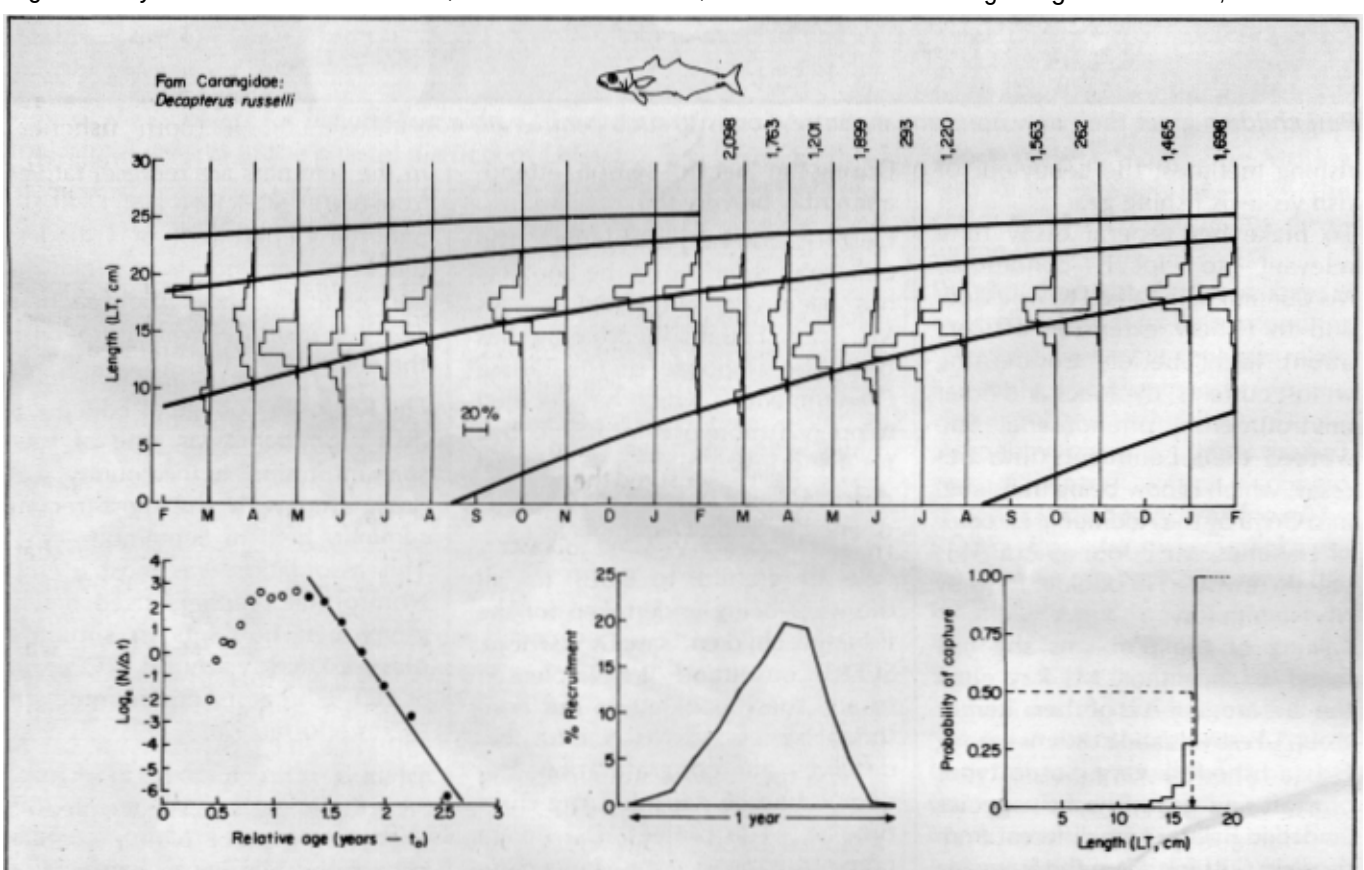
Lots of courses in fish population dynamics and stock assessment are being held these days in the tropics and elsewhere, but the one organized recently by the Marine Fishery Resources Management Project of the Bay of Bengal Programme in Colombo deserves special comment, as it differed in major aspects from other courses with similar aims.

The.major characteristic of the course — which ran from August 27 to September 7, 1984 and was organised by Dr K.Sivasubramaniam, Senior Fishery Biologist of the BOBP — was that it was structured entirely around microcomputers, in this case four Apple II e's purchased by the BOBP from a dealer in Colombo.

The idea was that the 12 participants in the course (two each from Malaysia, Thailand, Indonesia, MaIdives, Bangladesh and Sri Lanka) should be able to get immediate hands on training on filling and analysing fishery data (i.e. catch statistics) and using various stock assessment models, then return to their home institutions with "their" computers.

The four computers used during the course will be placed by BOBP in fishery research institutions in Indonesia, Malaysia, Sri Lanka and Thailand. One computer has already been seVt to the MaIdives, one will be sent Bangladesh.

The other major characteristic of the course is that the stock assessment methods taught were appropriate for the study of tropical fish stocks, such as occur in the Bay of Bengal region. This was, trivial as it



These graphs — pertaining to round scad in the Manila bay — are based on data obtained by using the ELEFAN I & II programs. They give an idea of the kind of information such programs can provide about fish species in the Bay of Bengal region. Dr Daniel Pauly says : "Note 'doubling up' of original data, which covered the period from March 1958 to February 1959, and which allow for tracing of uninterrupted growth curves, with the parameter L_∞ = 27 cm and K = 0.80. Note also the length-converted catch curve, whose straight right arm provided an estimate of apparent total mortality, the recruitment pattern, which suggests that recruitment occurred in the form of two events of unequal strength and the selection pattern (based on the ascending, left arm of the catch curve), from which the mean length at first capture could be estimated. (Adapted from Ingles, J. and D. Pauly, 1984. An atlas of the growth, mortality and recruitment of Phillippine fishes. ICLARM Technical Reports 13)".

may seem, no mean feat, given that most of the stock assessment models taught in various universities of the developed world are not applicable to tropical stocks.

Thus, rather than concentrating only on "age-structured" models, which require tedious, costly (and in the tropics often unfeasible ageing (determining the age) of individual fish, the methods taught in this course were mainly "length-structured", i.e. they were based predominantly on the detailed analysis of length-frequency samples, i.e. size composition data such as can be obtained quite straightforwardly by measuring fish at shoreside markets or in specially designed seagoing surveys.

The length-structured models which formed the bulk of the course are the ELEFAN (Electronic Length Frequency Analysis, with pun intended) programs developed by this author and some of his friends. These programs, which BOBP associate expert Jan Hertel-Wulff had helped implement on the Apple II's, are used to extract, from reasonably well-sampled length-frequency data, the following information

- *Growth* : growth parameters, seasonal growth oscillations, approximate life-span.
  Mortality total mortality, natural mortality, fishing mortality, exploitation rate,
- *Gear selection* : probability of capture, length, and mean length at first capture.

and finally

- *Recruitment* : seasonality of tecruitment into a fishery, spawning season, relative importance of cohorts produced within a year.

This is quite a lot of information, given that length-frequency data usually remain unanalyzed in the drawers of fisheries laboratories throughout the world.

The programs introduced in the course were ELEFAN 0 (filing of length-frequency data), ELEFAN I (growth) and ELEFAN II (mortality, gear selection and recruitment). Two other available ELEFAN programs (III and IV), which require ancillary data in addition to the length-frequency data themselves, will be made available to the participants (by this author) when their skills match the added requirements of these more advanced programs.

Impressive results were obtained – within days – by the participants, using length-frequency data they had brought from their countries. Thus, for example, the growth parameters of skipjack in the Maldives were estimated quite reliably, as were those of a mollusc, *Paphia undulata* from Malaysia. Also, growth and mortality rates for a sardine (Sardinella sirm) in Sri Lanka were estimated, and fishing mortality was found to have increased during the period 1980 to 1984 to values beyond the level considered optimum. Other studies were concerned with big-eyed scad in the Java Sea, Indo-Pacific mackerels off Thailand and Malaysia, shads in Bangladesh and yellowfin tunas in Sri Lanka and the Maldives.

In fact, so much emerged within these few days from the data brought by the participants of this course, that Dr K Sivasubramaniam suggested that a BOBP report should disseminate the information in the form of short papers.

'Writer's block" is a disease which seems to affect many fisheries officers working in developing countries – a problem worsened by the unrealistic standards of "rigour" which are sometimes applied to their work (mostly by people working in places where detailed statistical data and decades of previous research make such rigour appropriate).

To publish as a collection of short papers the results of our training course will, however, not only help some fishery officers overcome their "writer's block"; it will also help to show that there are ways to perform fish stock assessments quite straightfqrwardly in all tropical countries, including those in the Bay of Bengal area. Wait and see.

Acknowledgements

I would like to thank Dr Sivasubramaniam, Mr Jan Hertel-Wulff, the other BOBP staff and all participants of this course for their enthusiasm in helping demonstrate how to get tropical fish stock assessment moving faster.

glimpses into BOBP projects

(Continued from page 9)

Mr Johan Holmberg, head of SIDA's Agriculture Division, emphasized the need for socially feasible technology development and for approaches that ensured the amelioration of "target groups."

The seminars discussed the following subjects

- BOBP extension activities to improve the living conditions of small-scale fisherfolk
- Nutrition in fisheries development
- Non-formal education in fishing community development
- Social anthropology and its role in improving living conditions of small-scale fisherfolk.

The seminars were organized around four case studies of BOBP's extension work, prepared in Madras and distributed among participants in advance. These case studies described income-generating activities for fisherwomen (both fisheries related. and non-fisheries related); training and education for women "link workers" to facilitate self-help through community organization; the preparation of non-formal education material for adult fisherfolk and fisherfolk children; and enhancing the nutrition of fisherfolk.

The case study presentations were accompanied by slides and a BOBP audio-visual on extension approaches.

Some seminar participants said that development of a sector is often at the expense of the people who depend on that sector. It was pointed out that the BOBP, however, adopted the "target group" approach in its extension work – it focused on the poor fisherfolk. Project associates from BOBP countries helped explain problems encountered in implementing the projects and their impact.

Participants agreed that the seminars led to a better understanding of BOBP's work. It was suggested that the BOBP case studies be distributed among SIDA's field staff in various developing countries.

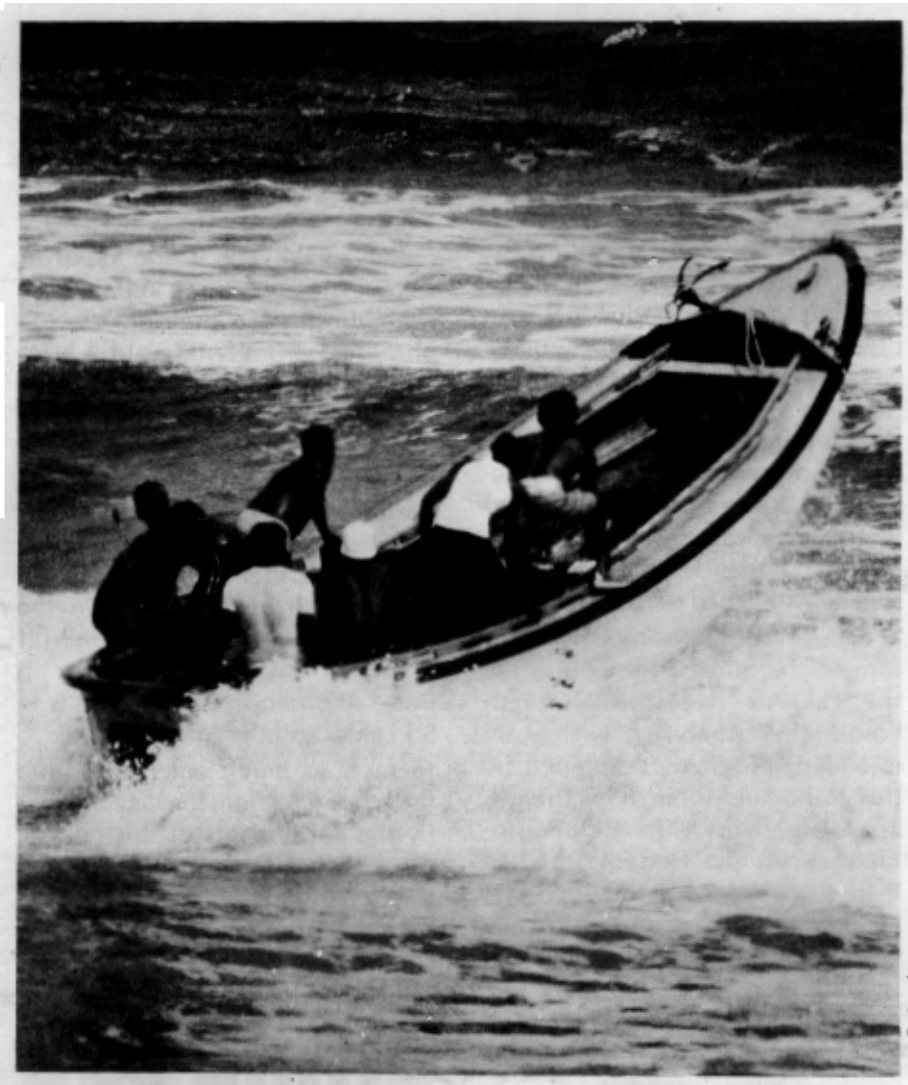
New boats from BOBP

(Continued from page 21)

copper pipes attached under the engine box (keel cooling).

- Rudder and centreboard of NACA 0012 aircraft wing profile.
- Standard aluminium pipe for mast with stainless stays and terylene bermuda sails with a total area of 36 square metres.
- Polystyrene foam built in to make the boat unsinkable.

The cost of SRL-14 is comparable to that of the 28-footers (also referred to as 3½ tonners). With the considerable fuel savings made possible by sails and a smaller engine, and a carrying capacity and seaworthiness similar to that of the 3½ tonners, the SRL-14 is beyond doubt potentially a more profitable craft than the standard 28-footers.



E. Amalore

The fibreglass IND-25, an improved version of IND-21, which has been fishing off !njambakkam near Madras.

The large Oru: This 40 ft outrigger canoe was used as a demonstration boat during the October 1983 sail consultation. (See *Bay of Bengal News,* December 1983). After long delays in shipping her to Sri Lanka, she was finally put into fishing operation there in July. Her wide and raised deck has proved popular with the Negombo fishermen.

The large Orus in Negombo engage in prawn trawling by sail power only, since motorized boats are not allowed to trawl in this area. However, the income from sail power trawling is marginal and it was felt that the new Oru – with a higher capacity and better deck layout than traditional Orus – should be tried for net and line fishing offshore to raise incomes.

For offshore fishing, the craft requires an engine for safety and for ensuring that the catch is brought back unspoiled in case the wind fails. Initially a 8 hp diesel, long-tail engine installation was fitted to the boat and a speed of 5.6 knots was recorded. A 8 hp outboard motor was also tried and a speed of 6.1 knots was recorded. The difference is of course due to the fact that all multihulls are very sensitive to weight.

Since a 8 hp outboard motor costs only one third as much as a diesel long-tail installation, and since this boat needs an engine only in very calm weather, the OBM is the best choice.

But take engines off, set the 420 sq. ft mainsail, then the 120 sq. ft. jib, and give yourself the treat of the beautiful Orus of Sri Lanka sailing at 11 knots! You will never forget it and you will see very clearly one good reason why the number of Orus in Sri Lanka today is higher than ever!

The *SRL-17* : The latest boat design for Sri Lanka is a 26 ft outrigger canoe built in FRP-sheathed plywood. With a transome, a 8 hp OBM and Gunter rig she is a possible "low propulsion cost" alternative to Sri Lanka's medium-size Orus and 18-footers.

A speed of 9 knots was recorded when she was new. This has now been reduced to 8 knots, probably due to water absorption in the timber and plywood.

Since July, she has operated large mesh gillnets up to 18 miles offshore and small mesh glllnets closer inshore, according to the seasons.

Subject to interest by fishermen, fibreglass versions of SRL-17 may be built. At present, a 26 ft version for net fishing and a 22 ft version for line fishing using the same outrigger design but different hull-to-hull distance are being considered.

5 hp kerosene outboard motors are now being developed, and once they are ready, small outrigger canoes may well become the energy-saving small craft of the future.

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