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BAY OF BENGAL PROGRAMME
FOR SMALL-SCALE FISHERIES DEVELOPMENT

Finfish cage culture In Phang Nga, Thailand

by V.L.C. PIETERSZ

In south Thailand, bordering the Bay of Bengal, lies Phang Nga bay. It is a place of great scenic beauty .the James Bond film *Goldfinger* was shot here, and tourists flock here every year in increasing numbers.

The bay is dotted with numerous uninhabited islands. Some of them consist merely of scrub-covered limestone rock formations that jut out of the tranquil waters — the result, perhaps, of some ancient volcanic upheaval.

Much of the land fringing the southern shores of the bay is covered

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Fishermen of Ko Pan Yi rigging riets for cage culture.

with dense mangrove vegetation criss-crossed by many stream systems. Occupying the few areas of usable land but more often nestling on stilts over its'tidal zone are 16 villages in which live some 8,500 people, many of whom have been traditionally earning tbeir livelihood from small-scale fishing in the bay.

In recent years the incomes of the villagers declined to a level far below the national average due to declining. fishery resources. Though increasingly compelled to undertake non-fishery occupations such as manual labour in the tin mines; gathering the tailings from them, and transport of tourists, fishing continued to be their main occupation. The Government's concern to rehabilitate these poverty-stricken fisherrhen by providing them with a viable fishery-related alternative to their uneconomic fishing operations, was the raison detre of the coastal aquaculture pilot project in Phang Nga bay. The project is being executed by the Thailand Department of Fisheries in collaboration with BOBP. The first phase of the from March 1979 to September 1981, was executed on behalf of the BOBP by the South China Sea Programme.

Preliminary si.te surveys carried out by Mr. T.K. Mok of the Hong Kong Department of Fisheries and by the Thailand. fisheries department's brackishwater fisheries division in 1978 and 1979 showed that favourable conditions existed in the bay for the cage culture of finfish and the culture of cockle, mussel and oyster. A socio-economic survey carried out in 1979 showed that while the villagers had.no experience. of.fish culture, manyof them were favourably inclined towards learning moreabout it.

Six target villages — Ko Pan Yi, Ko Khiam, Sam Chong, Ko Mak Noi, Ko Mai .Pai and Bang Patana — were selected for the project on the basis of the site surveys and the socio-economic survey, and the project commenced in 1979.

Of the aquaculture techniques sought to be introduced by the. project, it is finfish cage culture of the seabass *Lates calcarifer* and the grouper *Epinephelus Tauvina* that has so far had the greatest impact — as is shown by the following story of trial and error, luck and conviction and a rapid multiplier effect yet in the process of gathering momentum.

Of the six villages,.two i.e. Ko Pan Yi and Ko Khiam were initially selected for the cage culture trials. Sam Chong was added at a later stage. Two trials were carried out in 26 cages at the two first-named villages commencing in November 1979 and April 1980, and one trial in four cages at Sam Chong commencing in September 1980. In these villages, several groups of villagers, closely supervised by p.roject staff, were in charge of culture operations.

Each cage measured 3 × 3 × 3 m and was constructed out of synthetic webbing. They were rigged to floating rafts which were constructed using sawn timber and bamboo with polyfoam floats. The cos.t of a raft of six cages, inclusive of the timber, webbing, floatation material, anchors, anchoring ropes was baht 19,629 (US $ 982 at the prevailing exchange rate) or baht 3,271 per cage.

The performance. of the trials is summarised below:

	No. *of fry stocked*	*Stock at harvest*	*Survival*
Ko Pan Vi.			
1st trial Nov.'79 - Sept.'80	712 seabass fry	287 fish weighing 207 kg	40%
	40 grouper fry	40 fish weighing 37 kg	100%
2nd trial July '80 - Oct.'81	5,600 seabass fry	1,886 fish weighing 1,697 kg	34%
KoKhtam			
1st trial April '80 - March '81	1,500 grouper fry	450 fish weighing 188 kg	30%
2nd trial Sept.'80 - Oct.'81	1,400 seabass fry	94 fish weighing 55 kg	7%
Sam Chong			
Trial Oct.'80 - Oct.'81	2,000 seabass fry	710 fish weighing 572 kg	35%

(Continued on page 4)

A Letter from the Publisher

Bay of *Bengal News,* produced by the BOBP information service, completes its second year with this issue: Newsletters and the like are common features of permanent national and regional institutions but very rarely of limited-duration technical co-operation projects like BOBP. But the excellent response to our newsletter and to other information activities organized by us, such as photo exhibitions and audio-visuals, is a pointer to the fact that the amount of attention paid to information aspects in technical develop-tnent is usually inadequate. BOBP is an exception, thanks to the foresight ofthe designers of the Programme.

The objectives of our information service are to inform fishery specialists, administrators and laymen about our work, and to promote small-scale fisheries development in general by supplying information and provoking debate, particularly among non-specialists. Initially, our major effort was devoted to the preparation and distribution of technical reports and working papers on completed and ongoing activities. These publi-cations, however, reach only a relatively small specialist audience.

A certain amount of formal reporting is of course required to comply with the demands of various agencies concerned with a project like the BOBP. In some cases, it is also needed for documentation of essential technical or scientific data. Too often, however; reports seem to be written merely for the record, to satisfy bureaucracy, for the con-sumption of a few specialists' or just for the sake of writing a report.

Even though the readership of such reports can be increased by making more popular presen-tations in simple language with pictorial, supple-ments, they are not sufficient to achieve the objectives of the information service,

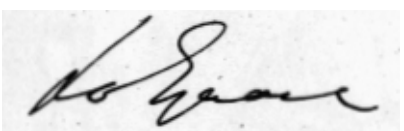
The response to our newsletter indicates that it is a suitable medium for reaching.a wide and diverse audience. A shortarticle summarizing a study or a project activity appears to have far greater impact than a complete and comprehensive report or working paper. Another advantage is that the newsletter format is suitable for reproduction in newspapers. Several *Bay of Bengal News* stories have been used by the regional press and by fisheries magazines, thus multiplying the impact. We are taking note of this, and may in the future cut down the production of formal reports and resort more to the publication of summaries in the newsletter.

A photo exhibition on small-scale fisheries was organized in Madras and Colombo last year. The direct impact of the exhibition itself was limited—there were only about1500 visitors. On the other hand, the indirect impact was significant. Photo-graphs from .the exhibitions were reproduced in several papers and journals within and outside the region. The effort also led to the organisation of a photo library, which is of immense value in our work as well as for servicing the press and the fishery institutions of the region.

Recently we prepared three audio-visuals. One of them presents the work of the BOBP as a whole; the other two concern specific activities—exten-sion training and high-opening bottom trawling. They have proved to be very effective, for providing information as well as for putting the message across.

In a regional programme like the BOBP, with activities and target groups spread over a vast geographical area, a regular information service is essential. We would suggest that' for other projects also—small or large, national or regional—the designers should pay greater attention to information dissemination.

LARS O. ENGVALL



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

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

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

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F1NFISH CAGE CULTURE IN PHANG NGA, THAILAND

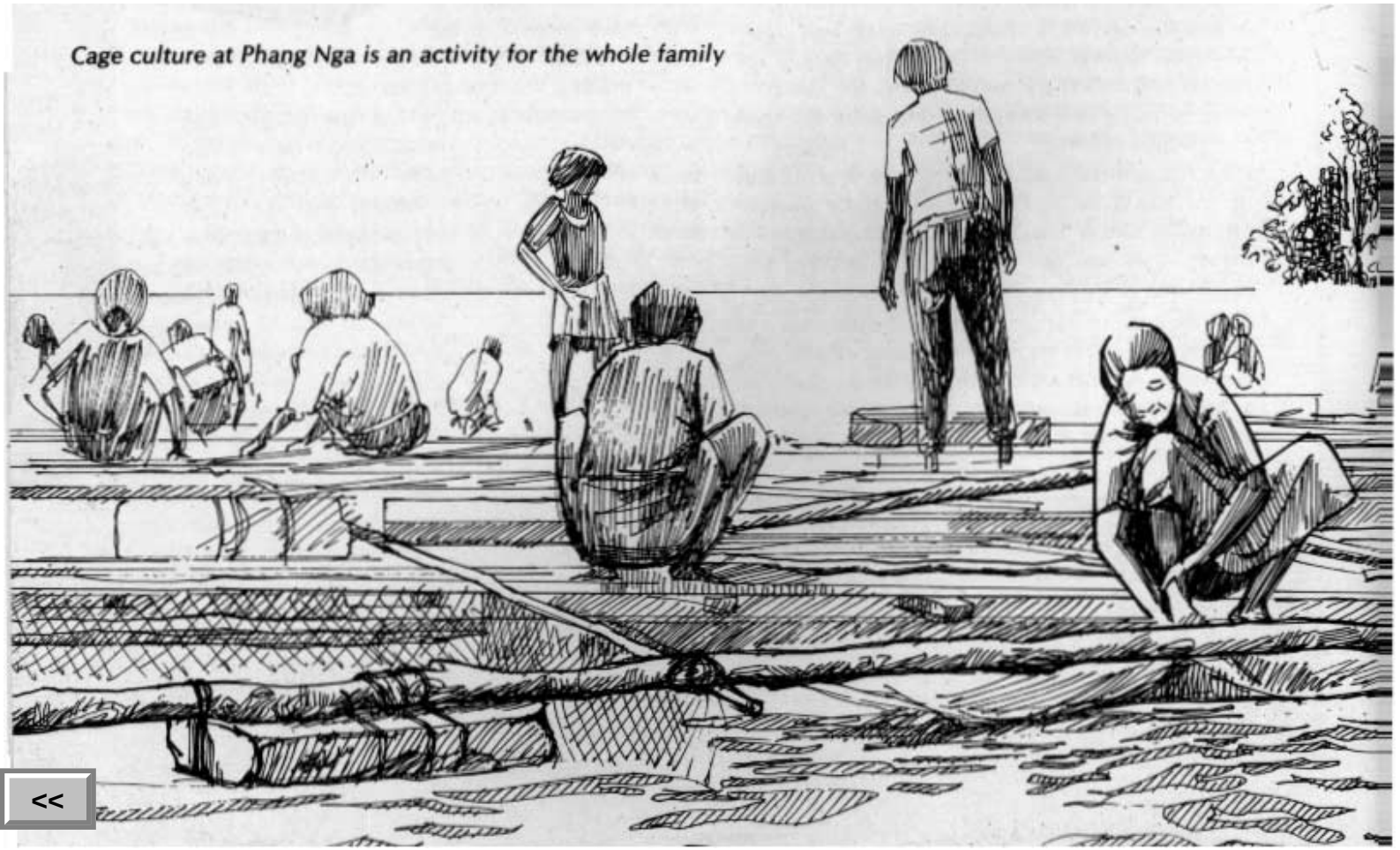
(Continued from page 2)

On the face of it, the total performance was not too satisfactory. The use of too small fry, the viljagers' lack of nursery experience, and irregular and inadequate feeding were probably responsible. A part of the performance data was tabled at a project review..carried out inSeptember 1981. Considering the gross yields Obtained, cage culture was considered a doubtful proposition in terms of economic viability, particularly since an economic model prepared at the review showed that viability was dependent on the cost of the trash fish feed – 1-3 baht/kg.. Af'this point, however, the pains taken to involve the villagers closely in the cage culture trials paid off. With their intimate knowledge of the production from each cage, the villagers of Ko Pan Yi knew that apart from the grouper cage with 100% survival, one other seabass cage had also given similar results, though this was not reflected in the gross performance figures. They equated these results with the special care with which these particular cages had been tended by the two villagers in charge. They too realised that the cost of feed was a crucial factor. But to them the inedible trash fish they were netting daily in their capture operations was a 'cost-less' item. They were quick 'to see that certain 'cost-less' materials were also available at hand for making the rafts – a plenitude of mangrove poles and huge blocks of used-up polystyrene discarded by the tin mining operations in the bay, which were still usable as floatation material for the rafts. All this reduced the capital cost of cages virtually only to the cost of the webbing and the ropes – an amount of 800-1,000 baht per cage.

It was the villagers' appreciation of these factors that triggered off the spectacular increase of finfish cage culture that has taken place in the -bay during the past year – first in Ko Pan Yi where the two successful cages have now begotten 165 under culture with another 83 waiting to be stocked with fry and 54 in the other five villages with a further 53 constructed and awaiting fry. Even the villagers of Bang Patana, whose waters were initially adjudged unsuitable for cage, culture' due to heavy pollution caused by tin mining, have set up three single cage rafts.

Complete data is not yet available on the performance of the cages set up by the villagers out of their own resources, but they are being continuously monitored by the project staff., Preliminary figures show that the villagers are achieving survival rates which are in fact better than the rates obtained in the initial project cages. Survival rates of 50% and 54% in Ko Pan Yi and 65% and 70% in Sam Chong have been recorded in August 1,982. A rough estimate of the quantity of fish under culture by 130 villagers is about 28,0O0 kg (75% seabass, 25% grouper) with a farm gate value of about 1.32 million baht (about US $ 57,000)

Apart from the six project villages, the practice of cage culture has already spread to two other villages in Phang Nga province – Tup Khào Poon and Ko Krai. In the former there are yet only two cages, but in the latter there are 40. At Ko Krai, during a recent visit, I met the villager who had first asked for and obtained two cages from the project



Cage culture at Phang Nga is an activity for the whole family

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staff in November 1981. 'He copied them, made eight more cages, stocked them with grouper fry and had recently sold his harvest of 875 kg at 80 baht/kilo for baht 70,000. Other villagers had,constructed 30 more cages in record time.

In October 1981, a second'unit of the aquaculture project was set up at the village of Ban Bakan Koei in Satul province. Finfish cage culture is -again one of the aquaculture practices being demonstrated in 20 cages, each under the charge of one village family. In September this year, 535 kg of seabass which obtained a price of 60-70 baht/kg was harvested out of 960 fingerlings stocked in the first trial in. these cages. While the trials will be continued in this village, they will be extended from October to another village in Satul province and to two villages in the adjacent province of Trang. Meanwhile from Phang Nga, during a third phase of the Phang Nga unit, cage culture trials are being extended to three villages in the adjacent Krabi province. Thus the pilot project's cage culture activity will cover all four southern provinces bordering the Bay of Bengal.

*What factors are likely to influence the growth of commercial fish cage culture? The most important appear to be seed, feed, space, and market.

Are adequate supplies of fish seed available? As far as supplies of seabass fry are concerned, the answer is in the affirmative. The existing government hatcheries in the area produce sufficient fry to meet the present and expected demand. In fact, they have excess capacity now and export fry to Malaysia. Grouper fry have still to be collected from the wild.

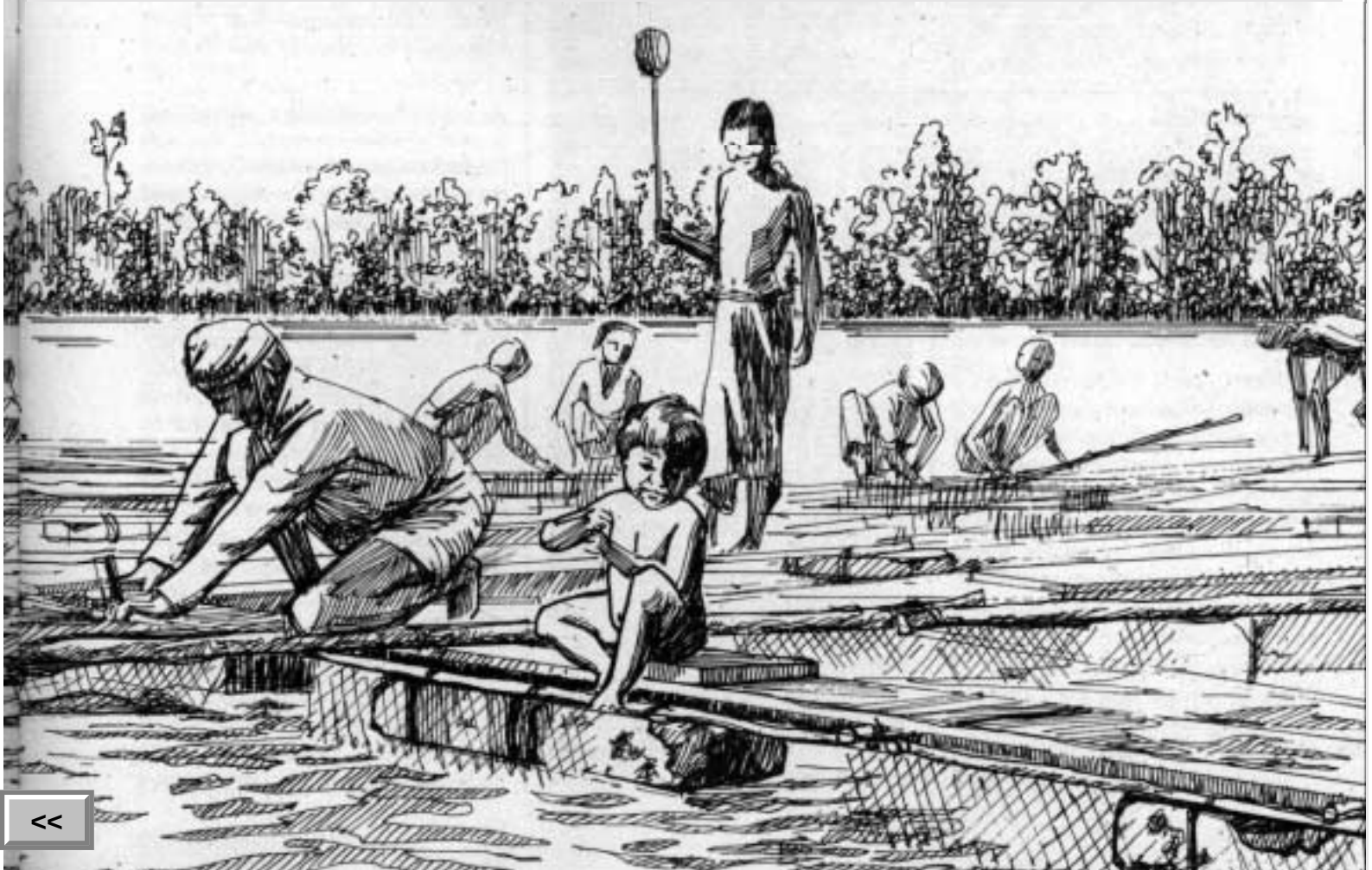
The pains taken to involve the villagers closely with cage culture. trials at Phang Nga have yielded rich dividends.

But artificial spawning of grouper was achieved for the first time at the Satul hatchery at the end of last year and supplies of grouper fry too are likely to be available from this and other hatcheries as demand builds up.

The feed used is trash fish. Feed consumption is about 8 kg 'for a fish with a grow-out size of 1 kg. For the present, trash fish is caught in sufficient quantities in the dip nets, push nets and tidal nets used by the small-scale fishermen. The quantity of trash fish available on a virtually 'cost-free' basis is likely to be a factor- which will limit the expansion of cage culture.

Although Phang Nga bay and the stream systems in the other provinces offer large expansespf water spread suitable for cage culture, the water area that can be utilised for cage culture is limited in practice by 'human' considerations – it is easy to poach the fish under culture; the fish in the cages have to be fed regularly (a task often performed by the women and children). Thus the cages have of necessity to be set up close to the villages.

There is at'present no problem in marketing the cultured fish. There is a heavy unsatisfied demand from restaurants in the Phuket area for the fish of prime quality that is being *produced and already some of the fish has been bought by traders from Bangkok. While the- initial price obtained for sea bass was 35 to 40 baht/kg, the price is now about 60 baht/kg. for sea bass and about '70 baht/kg for grouper. Considering the other factors which are 'likely to limit the number of cages that can be effectively set up and the possibility also of intermittent sale of fish belonging to different size groups, serious marketing problems are not likely to arise for some time to come,



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glimpses into BOBP projects

Pilot Sri Lanka project to raise incomes of fisherwomen

Ninety women from three fishing villages of the west coast of Sri Lanka—Ulhitiyawa, Mirissa and Kudawella—are presently undergoing vocational training in a BOBP pilot project aimed at raising the: incomes of women from' fishing communities.

Training is being imparted for six months by qualified instrUctors in coir work, 'beeralu' lace-making, tailoring/sewing and 'wetakeiya' work—activities identified by a team of specialists from the Ministry of Fisheries, the Ministry of Rural Development, the Lanka Mahila Samiti (a rural women's organisation) and the BOBP.

Products being turned out by women inckide coir ropes for shipping and industry; lace-work for women's and children's garments; clothes for men, women and children; and school uniforms. Each trainee receives a stipend of five rupees a day, and the products are being marketed by Laksala, a government agency, and a private handicraft shop.

A two-week course in mahagement of a production centre is to be conducted at the end of the six-. month training course. It will include the mechanics of buying raw materials, marketing 'the finished products, accounts or book keeping and quality control. After this course, the women will start commercial production—mainly for the local market, also.to a limited extent for tourists. 'A consultant in textile design will be engaged to improve existing products and propose new products.

As the women learn new skills, their children receive pre-school education. In Ulhitiyawa, where most of the trainees are mothers, the Ministry of Fisheries has provided a building for pre-school learning.

The entire project was preceded by a BOBP funded field study of the socio-economic status of women in Sri Lanka fishing communities by the Women's Bureau. The study revealed that the majority of women do not take part in the fish economy —even in the curing and marketing of fish---as such activities are being handled by fish traders. The study also revealed that most women need to supplement regular family incomes.

On account of the limited scope for raising incomes through fishery-related work, activities such as coir work and tailoring were identified for the pilot training project, says Ms. Edel Drewes, BOBP socio-economist.

This girl making a doormat from coir fibre is one or those from three west coast fishing villages of Sri Lanka who are undergoing a six-month BOBP-funded vocational training course.

Progress of aquaculture demonstration project in Satkhira, Bangladesh

There are more than 16,000 ha of traditional brackishwater shrimp farms in Khulna district, Bangladesh. The BOBP-supported aquaculture demonstration project set up in 1981 in Satkhira, Khulna district, therefore has sighificant extension potential.

The pcoject seeks to demonstrate improved methods of shrimp culture, transfer techno'ogy to local shrimp culturists, impart shrimp culture training to local fisheries officers and generate scientific data.

Pre-culture activities have been in progress during the past year, and preliminary culture trials may be launched from the February-June 1983 culture season. A consultant– Mr. A. N. Ghosh, Managing Director of the West Bengal Fisheries Development Corporation—has been engaged to direct the culture operations.

As part of pre-culture operations, land has been acquired, the site has been surveyed, detailed engineering plans including pond layout and design have been drawn up, plans for lab construction have been prepared and most of the scientific equipment has been procured.

Engineering designs and cost estimates were made by local consultants who earlier toured shrimp culture projects in West Bengal to gain experience. Local contractors have been engaged for a number of constYuction jobs.

By January 1983, the present phase of work will be completed. This includes construction of

- two east-west embankments to completely enclose the 20 ha project plot.
- four of the 10 experimental ponds
- reinforced cement concrete sluices for the four ponds and a

bigger sluice pond for the paddy-catch basin.

By February end,'a'field laboratory with generator is expected to be ready for use. By the 'end of the second phase (end 1983) dykes and sluices for the.six ponds will be completed.

Two Bangladesh officers, Golam Kibria and Habibur Rahman, are monitoring day-to-day progress and collecting basic field data. They have also completed a cthe-week study tourof coastal aquaculture methods and practices in West Bengal.

A socio-economic survey of the prOject area is to be carried out. Details' of the survey have to be worked out: some preliminary discussion has been held.

Bangladesh officials at the site of the Satkhira aquaculture project.

Are fish traps viable in Sri Lanka?

Should fish traps be. used in Sri Lanka to catch bottom-dwelling marine fish? Are theyeconornically viable?

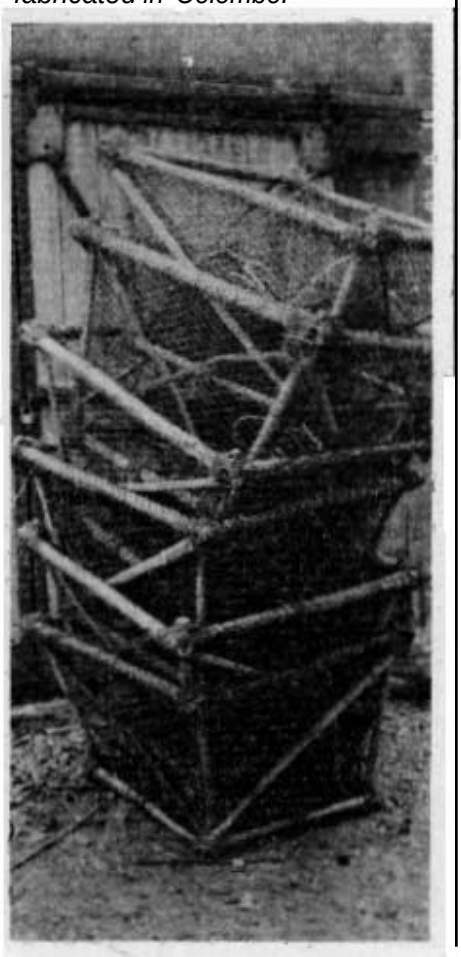
Following a suggestion. by former l3OBP fishing technologist G. Pajot, a consultant was engaged for three months (September-November 1982) to test the economic viability of fish traps. He is Ted Hammerman, 31, o'f South Carolina, U.S.A., who has designed, fabricated and sold a variety of fish traps mainly in the U.S., also to a few countries in Asia and Africa.

During,three months of trials on the east and west coasts, Hammerman tried out traps of several designs, shapes and sues. There were traps of bamboo, cane, and steel; round, rectangular or heart-shaped. The mouth openings were of many types-straight funnel, 'vertical, wedge, tube, double conical etc. Some traps were U.S.-made, many were fabricated by local fishermen at the Fisheries Training Institute and at the Ceylon Fisheries Corporation' fish harbour in Colombo.

Trapping operations began out of the Colombo fish harbour with a hired 38' boat, anavérage of 14 traps being used for each operatiOn. Initially the soak time was' 3 to '4 hours per set. This was later extended to 8-10 hours on a day trip and 12-13 hours on overnight fishing trips. When the weathé'r turned rough, Hammerman switched to• the east coast, with Trincomalee as base. Squid and ,'fish—sometimes in combination with cyalume chemical lights— and bread were used as bait.

Hammerman sums up the procedure for fish trapping thus:"Find the continental shelf, using charts and local fishermen. Look for depressions and valleys on the rocky ocean floor Do not place traps too near the edge of the shelf, whence they may tumble off due to currents... . . An area where fish can be brought up quickly and consis-,tently by handline strike is likely to be good for laying traps Use the oiliest bait available Use a leader buoy, or. float about 10 feet' before the "high flyer" marker buoy. Place two marks on each buoy Average soak time may be 8-12 hours.,.... ample time is then available to pursue other passive fishing methods".

Stackable bamboo traps designed by consultant Ted Hammerman and fabricated in Colombo.



Evaluating the performance of the traps, Hammerman says the bamboo frame -trap fabricated locally was the cheapest, the easiest to build and also one of the most effective. It costs only SRL rupees 220, can last a whole season, and the traps can be telescoped into each other for easy stacking. A 38' boat can easily carry 30 to 4Q bamboo fish traps in this manner and still have room for other types of passive fishing gear.

On the whole, the catches from the traps were very low. "I came out with high hopes," says Hammerman, but f,ound the bottom fish "not very plentiful. But then I went only about 40 times. During a three month experiment, when one has gone out only 4Q times, results can't be 100 per cent positive.".

It seems doubtful whether fish trapping is viable by itself but it might be' if combined with other techniques. Further trials are needed for more conclusive results.

FISHING CRAFT DEVELOPMENT IN INDIA

Unless the government agency concerned with fishing craft development, the banker and the private boatbuilder get together, there can be no development, says R. Ravikumar, BOBP's fishing craft consultant. The lack of such cooperation is why "the boatbuilding industry is in a state of collapse when it should be thriving".

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In almost all maritime states of India, fisheries can be divided into inshore fishing with traditional non-motorised craft, inshore shrimp trawling with small mechanized boats and shrimp trawling. in distant grounds with larger trawlers. Small purse seine boats operate in Goa, Karnataka and Kerala. One also finds a few motorised boats gill netting in most of the states.

To date,' most of the development input by the Government has been for the shrimp industry. Almost all states have set up their own boat-building yardsto build 30 and 32 ft shrimp boats.

Agencies like the Central Institute of Fisheries Technology (CIFT) – which develops improved techniques and implements to increase fish production – and the Central Marine Fisheries Research Institute (CMFRI) – which provides research and development support for capture and culture fisheries'— have catered mainly to the shrimp industry.

To develop the fishery to exploit the EEZ, the Government has been talking about 250 large sized vessels for the &th plan. Imports of fishing vessels were made from 1968 onwards. However these again have been for shrimp trawling rather than for fishing methods necessary'to exploitthe EEZ. No Indian designs have materialised as'there seems to be some reluctance on the part of fisheries development agencies to place orders with Indian shipyards. Naturally one cannot develop in terms of design and construction experience without orders.

Spécialised personnel like naval architects and marine engineers are very few in the fishing boat industry. Openings in Government institutions are not attractive enough and in the private sector fishery, bOat building has never been of a continuous nature.

FAO as part of a technical assistance programme in the late 50's and early 60's designed and helped to promote small inshore fishing motorised boats viz, the 25 ft pablo, the 30 ft 1.8., the 32 ft .STB and the 36 ft. ZB. These boats account for a majority of the mechanized fishing boats in the country and nearly all fish for shrimp. There has been no development or updating of these designs,. only a few minor changes – like increased propeller aperture to suit higher powered engines and the use of new construction materials like fibreglass and ferrocement have been made.

Development inputs to improve traditional fishing craft or provide new replacements have been very few anc!include attempts like motorising kattumararris (log rafts)' with 'outboards, fibreglass flat bottomed boats 18 ft long in Tamil Nadu and fibreglass'canoes in the Gujarat coast. Considering the fact that the traditional craft account for mQst of the 'marine fish landings in the-country,' a more concentrated effort is surely, justified.

Development is not an overnight event. It involyes concentrated effort in various directions. The development process is slow and lessons unfold through trial and error.

To develop new fishing craft, one needs to:

1. Compile existing facts, record existing problems and needs of the fishermen.
2. Design new boat types to fit the parameters.
3. 'Build and test the prototypes to assess technical and economic viability over a sufficiently long period of time.

Tamil Nadu Director of Fisheries V. Sankara Subbaiyan (second from left) and Joint Director A. Daniel (second from right), discuss beachcraft development with BOBP's Arild Overa and R. Ravikumar.

4. Work out a scheme to introduce successful prototypes.

To introduce boats on a large scale in a short time, one needs to:

i) Standardise the designs so that any yard could build it with quality.

ii) Have back-up services to provide repair and maintenance to boats, engines and equipment.

iii) Have loan schemes operational.

It is very unlikely that any single institution,' either government or private, can perform all the above functions. A private boatbuilder may have the capacity to design and build new boats but it is not possible for him' to organise the rest. The Government on the other hand may not have the necessary technical expertise. So unless the government agency, the banker and the private boatbuilder get together to share the functions, there is no development. This in fact has been the problem, and the boatbuilding industry is ma state of collapse when it should be thriving. Its products don't meet the needs any more.

One must remember th•at development is a continuing process. The parameters of tomorrow may be quite different from yesterday's. For example, a decade ago the price of diesel fuel in proportion to the shrimp trawler's catch was very low. Today it is not economical for the same boats to operate in the lean season. Take the kattumaram fisherman. Ten years ago the capital investment on his logs was low enough to permit him a level of income which is insufficient today due to the increased cost of logs and general inflation. He needs to catch more today than he did yesterday and very soon he will find that he needs a bigger boat. It is clear that updating-designs with technological improvements or even designing to totally new parameters is also part of the development process.

The BOBP is presently engaged in the development of small-scale fisheries. In the field of fishing boats, its efforts can be listed as:

1. Design of small beachboats up to 7.5 m to replace kattumarams and dugouts.
2. Medium-size beachboats up to 8.5 m long to replace navas and canoes.
3. Large-size beachable boats up to 10 rn for shallow draft operations.
4. Engine installations Of light weight diesels up to 15 HP.
5. Construction techniques in plywood, fibreglass, aluminium and laminated timber.
6. Suitable sailing rigs and sail cloth.
7. Corrosion resistant fittings and hardwaye.
8. Hauling devices for beachboats.

All this would still constitute only the first phase of development. A lot more input is needed from fishery bodies to bring out successful boats on a large scale. Only then can we say that development has begun.

Development of National or Regional Boat Types

This is an extract from "Fishing boats for developing fisheries", an article by Peter Gurtner in "Fishing Boats of the World" (Volume 3), published byFishingNews Books (Ltd.), London, by arrangement with the FAQ.

A specialised fishing boat naval architect with supporting staff should be included in any group concerned with the planned development of fisheries.

A government desiring to develop its inshore fishing fleet in the framework of a national development plan 'will find three main possibilities of obtaining the necessary technical knowledge and assistance.

- Securing the services of a local naval architect,
- Engaging an expatriate naval architect$_2$
- Requesting expert assistance through the UNDP or other aid machinery.

From experience the first approach is rarely possible in developing countries because of an acute shortage of technically. qualified personnel. The second is not often resorted to by governments, while in past years many boat designs and fleet development projects were actively assisted by U.N. technical assistance personnel.

Apart from securing technically qualified personnel for design development (and possibly to direct boat construction programmes), any Fisheries Administration called upon to undertake such activities will have to create the technical services indispensable for their success. The establishment of a specific Fishing Boat Office would be a pre-requisite for success. Such an office should group together technicians from the three main fields of activity:

- Boat design
- Boatbuilding
- Marine engineering

The work programme of a Fishing Boat Office should list:

- Survey of existing boats.
- Determination of requirements for new boats.
- Preparation and distribution of designs.
- Construction supervision.
- Recommendations concerning marine engines, propellers, deck machinery and electronic equipment.
- Provision of free advice to private enterprise regarding boats and equipment.
- Provision of information to the boatbuilding and equipment manufacturing industry regarding development trends and future requirements.
- Staff training.
- Where necessary, training of outside personnel.
- Advice regarding legislation affecting boat development.

In many cases itwould be necessary 'to startvery modestly and to expand the scope of activities as general fisheries development gains momentum. The important thing is to refrain from formulating rigid, long-term work programmes, but to organize the work according to the needs of the fishing industry which should be based on information supported by serious scientific investigations at least in such cases where a new resource suddenly creates large investment and production possibilities.

Profile

E. Srinivasan

It has been a busy but happy period —of adventure, challenge, excitement and recognition — feels E. Srinivasan, 41, Inspector of Fisheries,' Tamil Nadu, as he looks back on the two years he has served as local counterpart to BOBP in its beachcraft development project.

Adventure? In May this year, the IND-21 (BOBP's buoyancy-block craft, of which 30 are to be introduced in Injambakkam by the Tamil Nadu government) capsized near the shore. Srinivasan fell overboard and was momentarily stunned–but he soon clambered aboard and rode safely ashore.

Challenge? It was a rough sea and a windy morning at Injambakkam, and a BOBP boat had to be taken back 20 miles to Royapuram across a boisterous surf. Srinivasan took independent charge of the boat with its four-man crew from Royapuram, and they made it safely.

Excitement? On one occasion the SRL-12, the 28-foot plywood boat being tried out for pair trawling off Ennore, lost its propeller in the high seas. But Srinivasan and crew kept calm, until the partner boat moved in for rescue.

And there was the time when two boats (the plywood SRL-12 and the aluminium IND-23) were used to support an international surf regatta organized by the Royal Madras Yacht Club. The two boats transported regatta judges, officials, pressmen and photographers across the surf to naval coast guard vessels, anchored about a mile from the shore. They were also used to rescue anyone who fell overboard. "It was a very responsible role, and the BOBP boats proved themselves," says Srinivasan.

Recognition[1] Srinivasan is happy with the appreciation accorded to his work by BOBP experts.

It hasn't been adventure and excitement all through. Beachcraft development requires a good deal of patient slogging, of tedious attention to detail: arranging for purchase of gear, transport of boats from yard to beach, arranging for the crew, getting mechanics to rectify engine defects, monitoring of fishing trials. A moped provided to Srinivasan is inconstantuse. 'H

BOBP's fishing craft consultant R. Ravikumar says about Srinivasan.i- "He performed very well during the beachcraft trials—he took active part, and was useful in getting the crew to cooperate."

Fishing craft engineer Arild Overa says, "Srinivasan has been invaluable in organizing the nitty-gritty of prOject work, particularly in connection with surf trials."

Srinivasan joined the Directorate of Fisheries in 1964 as sub-inspector after his SSLC and a three-year diploma course in fisheries tech nology an.d navigation at the Central Polytechnic, Madras.

His first major seagoing experience was as deckhand in 1971-72 aboard two trawlers of the Fisheries Department. Promoted as Inspector of Fisheries in Noveniber 1972, he did a fishing secondhand's course at the Central Institute of Fisheries Operatives, and later underwent in-vessel training for 33 months on board big and small boats of the Fisheries Department.

Later assignments included serving as'boat dues collection inspector in Rameswaram, Pudukottai and Tanjavur districts; as an instructor for sons of fishermen (in modern fishing methods, navigation and boat maintenance) at the Fisheries Training Centre, Cuddalore; and as Extension Officer with the Fish Farmers' Development Agency, Cuddalore.

Srinivasan's assignment with the BOBP began in May 1981. He values what he has learnt about the building of keelless and self-draining boats, the performance of low HP engines, engine installation, hauling devices, surf-crossing and the use of sails.

As for extra-eurricular activities, Srinivasan is president of the 3000-member Tamil Nadu Fisheries Executives Subordinates Association. He represents the grievances of a variety of subordinate professionals to the Director of Fisheries and the Secretary of Fisheries. His family (Srinivasan is a father of five) and his sports interests (athletics, badminton, volleyball, tenniquoit) also keep him busy. **—S.R.M.**

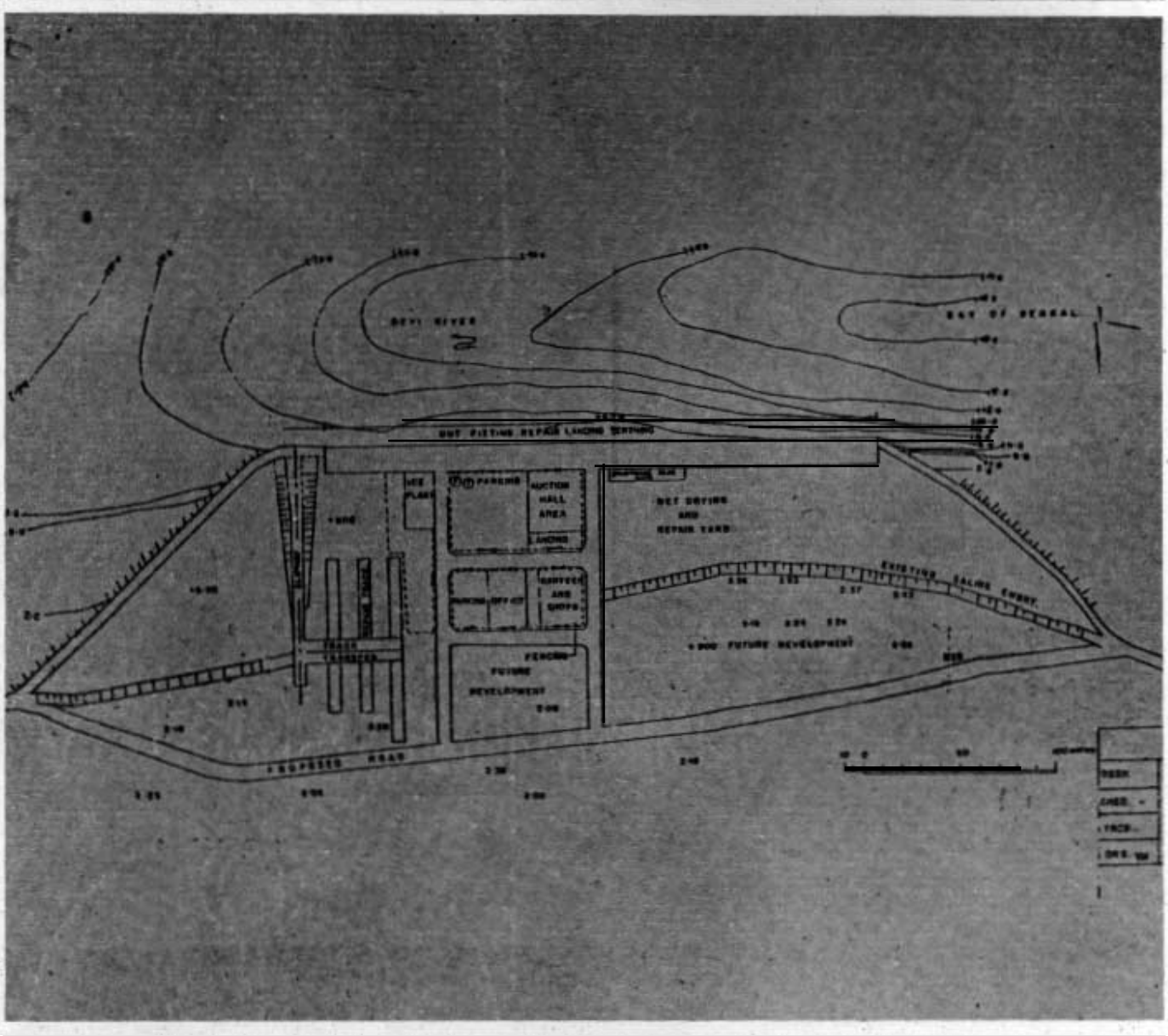
Srinivasan lends a hand as a BOBP boat, IND 21, lands ashore near Madras.

U.K. AID"FOR ORISSA SMALL-SCALE. FISHERIES

A profile of the Nuagar harbour project

by D N F Hall

A five-year *U.K.-aided project to help small-scale fisheries is being launched in Orissa, India. Under the project, a fishing harbour and associated shore facilities will* 'be *built at Nuagar village (Pun district), and 80 motorized boats will be constructed to be operated by a fishermen's cooperative. The U.K. component of the 'project will be £ 3.9. million. This article – by the Principal Fisheries Adviser of the U K's Overseas Development -Authority—explains the project's background, aims and strategy. A harbour layout plan is reproduced below.*



In 1976, a British mission consisting of two advisers of' the Overseas Development Authority (ODA), Mr D.N.F. Hall and Mr J. Sidney, discussed U.K. aid to Indian fisheries and recommended assistance to traditional fishermen of the east coast. The Government of India's Exploratory Fisheries, Project (EFP). had identified fishing grounds in Orissa state, and in 1977 the Pre-Investment Survey of Fishing Har-, bours (PISFH) prepared initial plans for a harbour at Nuagar village in Pun district.

Project description

The main aims Of the'project are to improve the financial circumstance,s of poor fishermen and their families and to boost foreign exchange earnings through mechanized fishing. The two major aspects'of the project. are:

1.-The construction of a fishing harbour with essential shore facilities at Nuagar.
2. The,building of eighty 10,m fishing vessels.

By these means the project provides for:

a), Exploitation of underfished resources off Pun district, in particu'lar of the highly valued penaeid prawns for export, consumption in Calcutta and locally.
b) Employment for some 2,040 people in a particularly poor region of the state.
c) Food, in the'form of one good fish meal every day, for at least 70,000 people
d) Annual foreign exchange earnings -equivalent to about £ 1.83 million (Rs 30.5 million a year at full operation, 1982 prices).

The British cost will be about £ 3.9 million of which £ 2.25 million will be for the harbour and ,shore works and £1.65 million for the vessels.

Traditional fishing dominates Orissa with an estimated 14,000 traditional craft and only an estimated 400 motorized fishing vessels. The main MFV centres are Paradip (250 vessels) and Chandipur (130 vessels). Recently, 30 MFVs have started perating from Nuagar. Compared with the west coast of India, where MFVs abound, Orissa's fishing industry is undeveloped. Nevertheless, the State catch increased from an, estimated 5,000 tonne in 1960/61 to 21,000 tonne in 1975/76. The current goal is to increase that figure to '65,000 tonne through meachanization in which it is proposed that this project will play a part. ODA advisers estimate that 65,000 tonne is less than half of Oris.sa's trawl fishery potential.

Traditional fisheries dominate in Orissa — there are 14,000 traditional craft.

Coastal conditions

The east coast of India is subject to heavy storms and there is no road immediately along the coast. Villages are mainty served by tracks from' the 'coastal' road, which is some distance inland. They have no power supply and inadequate, frequently saline water. There are almost no natural harbours along the coast because of a heavy littoral s-and drift. Constant heavy surf is a feature even when the sea is fairly calm. Craft cannot be moored beyond the surf indefinitely because of the cyclones which are,a constant danger from May to August and recorded frequently from September to December.

T.hese conditions hinder mechanization of the fishing fleet and result in the village fishing communities 'being poor and isolated from other communities and fish markets. When fishermen land their catch, it is sold to local traders who are often the owners of fishing 'craft and gear operating in the traditional fisheries.

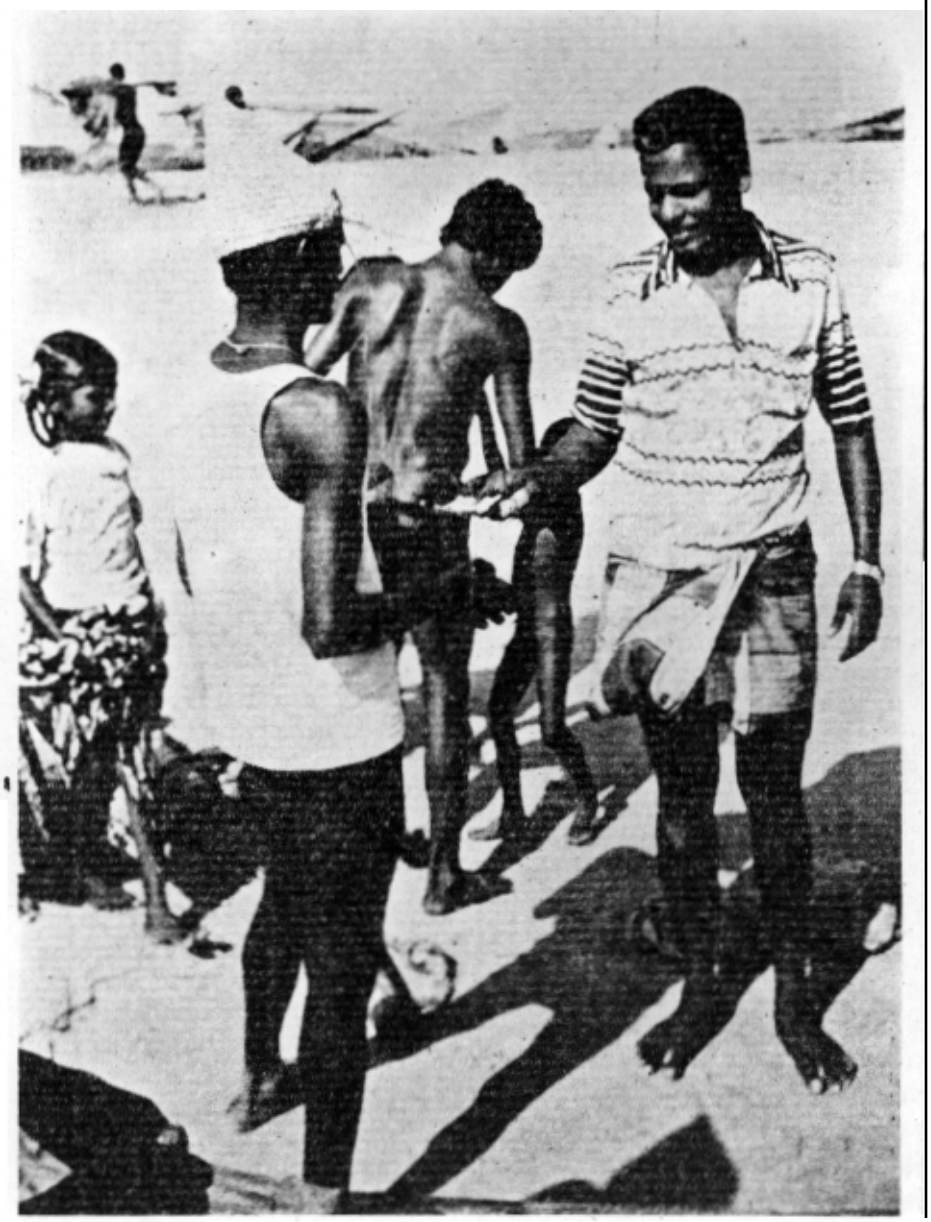
Nuagar — present status of fisheries'

Nuagar is one such fishing village in the Astarang area, Purl district. It' 'ties on the southern bank of the Devi River, close to its mouth. The river provides natural shelter for, the fishing craft but passage from the river to the sea is made 'difficult by a sand bar across the river mouth. Currently some 30 mechanized fishing vessels operate from a flimsy bamboo structure which is purely a fair-weather expedient and likely to be swept away during the next flood. There are no repair facilities of any kind for gear or craft. The nearest supplies of fuel, water and ice are at Astarang eight kilometres away from where they are brought by lorry and manhandled over the flimsy landing to the vessels. The traditional,fishermen are the worst hit in every way.

The population of Nuagar and the surrounding villages is estimatedto be 6,300 of which 1,600 are active fishermen: it is from these fishermen that the 700 crew members of the fishery vessels will be recruited. The project will, thus, have a very considerable impact on the income of the area; but, in general terms, there will be no change in the form of the villages: 'the fisnermen will continue to live in thei'r present homes. For every fisherman at sea there are several people employed in associated activities ashore.

At Nuagar, the big and the small traders have been' doing quite well by themselves. But the traditional (artisanal) fishermen are dominated by middlemen who control the marketing of the catch and often own the boats and the gear. The

Above : A typical Orissa fishing community. Below: Traditional fishermen often borrow from middlemen – the owners of the boats and gear – and later sell catch to them at prices below the true value.



control of the middlemen is exercised by providing credit to the fishermen to tide them over the non-fishing season and to meet social needs like weddings and the like.' Although they provide a necessary service in the present institutional structure, the middlemen control the price structure of the market to their own,. benefit. Thus many artisanal fishermen are obliged to sell their catch at prices far below, the true value. This one factor, more than any other, limits the improvement in the standard of living of the artisanal fishermen; Attempts to remedy this have been made in the maritime states through the introduction of co-operatives and fisheries corporations.

The"Nuagar Fishermen's Co-operative (NFC) is registered under the co-operative law, but it has been completely controlled up to now by the Orissa Directorate of Fisheries, which provides a staff of six people to assist the fishermen to run the co-operative. However, there are plans to develop the NFC and, as experience is gained, it is hoped that fishermen will take a larger role in the management of the society and that, in course of time, it will become financially self-sufficient. This method of developing fisheries co-operatives has had some success in other Indian states.

The first aim of this part of the project is, therefore, to enable the fishermen, through their co-operative, to become boat owners. The project provides for all fish landed to be sold through the auction hall under the control of an independent auctioneer so,that fishermen would no longer sell their catch directly to traders under the traditional system outlined above. ,Later, as the NFC moves towards independence from Government and achieves full financial viability, the intention is that it should expand its activities, into marketing and processing.

-The mechanized fishing vessels

The 80 vessels to be built under the project will be of wood. They will be built at one or more of the existing five boatyards in Orissa, where ample capaCity exists. Construction will be at the rate of 20 a year over four years.

By the time the 80 vessels are constructed, the total number of vessels

operating from Nuagar will be 140. This number will consist of 80 provided through the project and operated by fishermen of the NFC; 30 provided through the NFC, about 15 of which are already in operation; and 30 private vessels, about 15 of which are already in operation.

The 10-metre vessels should be able to operate for about 180 days a year netting a total annual catch of 60 tonne. Of this about 13% would be shrimp. The total annual catch of the 140 vessels is estimated to be 8,400 tonne.

Each fishing vessel will carry a crew of five: a skipper, a mechanic and three sailors. Total manpower requirements are, therefore, 140 skippers, 140 mechanics and 420 sailors, making a total of 700, but at the moment there are virtually no trained fishermen around Nuagar. The Directorate of Fisheries will provide primary training at a school near Nuagar, at Astarang, and follow-up training by training officers attached to the NEC and paid for by the Directorate of Fisheries.

The harbour

The permanent harbour, when constructed, will provide at the quayside fuel, water, ice, supplies of fishing gear, a facility for gear repairs, a slipway and workshop for the repair and maintenance of fishing craft. The harbour is not needed to provide shelter even in cyclone conditions, in which event the vessels disperse into the numerous inlets.

Handling and processing

Approximately 1,100 tonne of prawn and 7,300 tonne of fish will need to be handled and processed each year. Because of weather conditions and fish abundance, fishing will take place mainly during the period September to April giving an average daily landing of about 4.5 tonne of prawns and 30 tonne of fish. It has been assumed that peak daily landings would not exceed 10 tonne of prawns and 65 tonne of fish.

Shore facilities required consist of an auction hall, ice for preserving the catch, storage facilities for iced prawn and fish, freezing for prawns and drying facilities.

The project will provide for a number of other general facilities associated with the harbour, including a boat workshop water-tower, offices, barracks, toilets and first-aid centre. An essential feature of the project will be the construction of an 11 km all-weather road to link Nuagar with the nearest township, Astarang, from which a good road runs inland. The project includes provision also for 6 kilometres of overhead power line supplying 500 kva at 11 kv and for the ancillary transformer and distribution lines.

The Chief Engineer (Irrigation) of the Government of Orissa with assistance from other relevant departments will be responsible for ordering all equipment and for planning the construction work and the technical supervision. The Department has recently completed a similar harbour at Dhamra. The Directorate of Fisheries will be responsible for the acquisition of the land: at March 1982 this was well advanced.

If the project is to operate successfully for the benefit of the fishing industry, two important factors must be covered. The first is that all fishing vessels returning to Nuagar must land their entire catch at the Nuagar harbour; in particular there should be no fish landings by mechanized fishing vessels within close proximity (say 5 km) of the harbour. The second is that their entire catch must pass through the Nuagar auction hall.

The ultimate aim of the project is for the catching, handling and processing operations to be under the control of the NFC or public sector bodies. Only in this way can the maximum benefits be obtained by the fishermen, as they gain relative freedom from the hold of the middlemen, but a crucial factor is the speed with which the management capability of the NFC develops. Harnessing the full potential of the area will be a matter of management, training and experience.

Ten-metre vessels engaged in stern trawling from Nuagar:

Forecast **of annual catch by grade**

Detail of catch	Proportion (%)	Catch (tonne) per vessel	Catch by 140 vessels (tonne)	Remarks (species)
Prawn Grade				
A1	2.4	1.44	202	
A2	6.3	3.78	529	
A3	4.3	2.58	361	
Sub totals,	13.0	7.80	1,092	
Fish Grade				
A	0.6	0.36	50	Pomfret
B	7.4	4.44	622	Seer fish, perches
C	54.0	32.40	4,536	Mostly croakers & catfish
D	25.0	15.00	2,100	Eels, shark, soles and miscellaneous fish
Sub totals	87.0	52.20	7,308	
Total	100	60	8,400	

For every fisherman at sea, several work ashore — such as these women and children who carry headloads of fish to the market.

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FISH AGGREGATING DEVICES

Magnus Bergstrom, BOBP fishery biologist, takes a look at FAD types used round the *world, traditional and modern, and describes the basics of this efficient fuel-saving fishing method. All of them attract fish and make possible bigger catches.*

"An idea from the past, a method. for the future". That is what FADs represent. But what is an FAD?

For a fisherman'iñ Tamil Nadu it is a dozen palm leaves hung oil a rope and set out in near-shore waters. For -a Malaysian fisherman it means almost the same. For a, Filipino fisherman it means a bamboo raft furnished with a draping of some kind and anchored in very deep waters. For a Japanese'tradi-' tional fisherman it is artificial spawning nests for squid. And for an island fisherman in the South Pacific it nowadays means a raft of modern materials anchored with a synthetic rope. But all FADs have one thrhg in common': they attract fish and facilitate bigger catches!

The phenomenon of fish aggregation has' been described by many'. It is mentioned while discussing fishing methods, artisanal fishery, fishing craft, traditional fishing gear, energy saving, tuna fishi'ng, trap fishing, purse seining, and' so on. One could' probably take almost any fisheries subject and find some kind of reference to fish aggregating.. Let us take a closer look at all this!

The basic idea is that fish anywhere in the 'free water are attracted to three-dimensional structures. A three-dimensional structure of any kind will after a while enhance biological production and thus provide food for the fish. The structure may give small fish some hiding space from carnivores, 'or it may be a navigational reference point for migrating pelagic fish like tunas. It may also create a good environment for spawning.

This knowledge has of course been utilised by traditional fishermen. They have taken up the easiest available materials to produce fish aggregating devices. The simplest and cheapest that one could think of – palm leaves – has been traditionally in use in TàmilNadu. That fishery was described as early as in the 1920s in the reports of the TamilNadu Fisheries Department. Figure 1 is taken from there. Similar designs and methods continue to be used also in Malaysia and Indonesia.

In the Philippines, where the shelf drops off very steeply, the deep waters can be easily reached by the traditional craft. Here a bamboo raft is part of the. FAD, with its buoyancy holding the very long anchoring line required.A draping of palm fronds or old netting enhances the fish aggregation. See Figure 2.

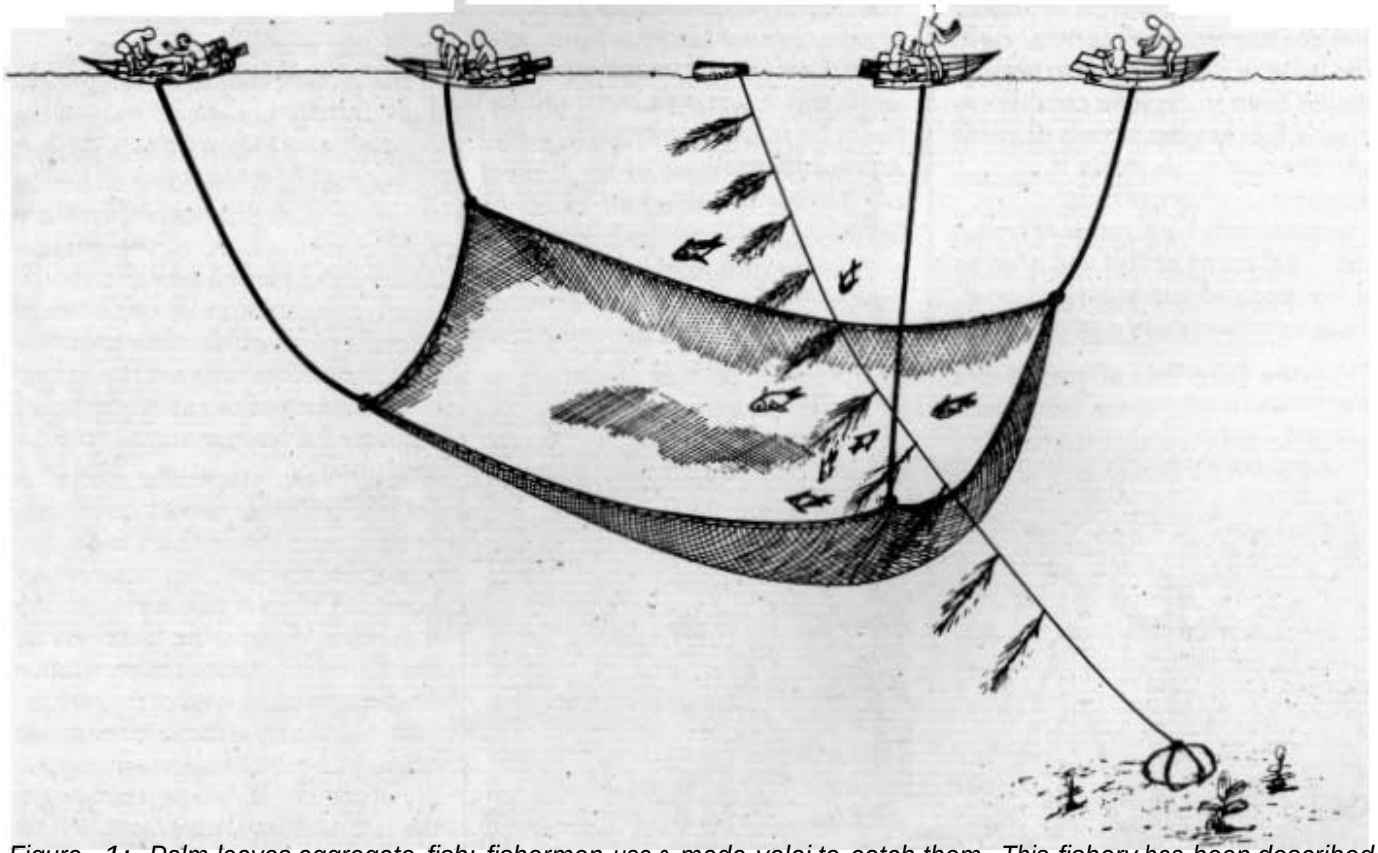
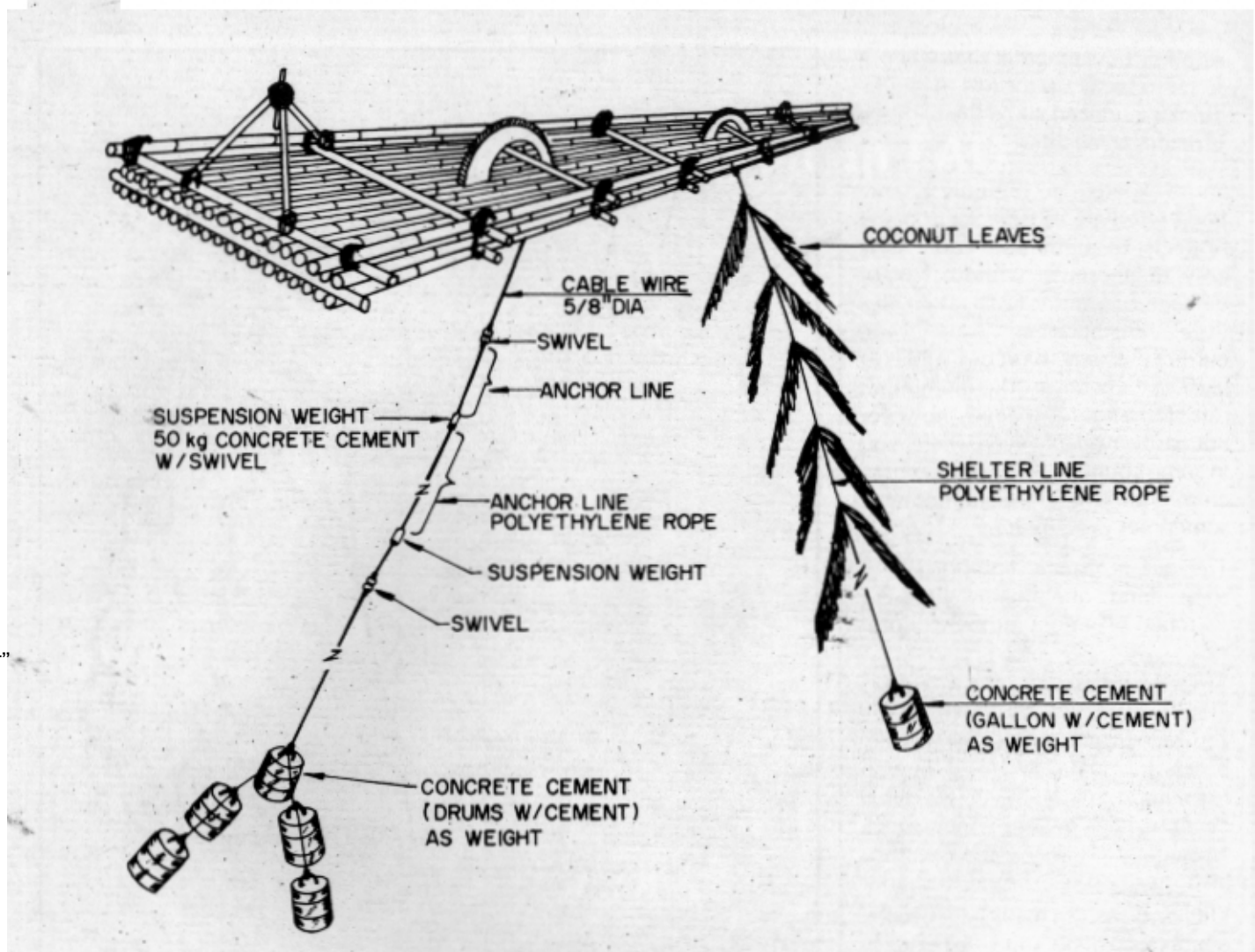


Figure 1: Palm leaves aggregate fish; fishermen use a mada valai to catch them. This fishery has been described as early as in the 1920s in reports of the Tami! Nadu Fisheries Department.



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'As synthetic' ropes and buoyancy materials become' more easily available, and as fuel costs mount, FADs are becoming more and more attractive as a modern, efficient and fuel-saving fishing method. Tuna purse-seiners realised early the bonanza from fishing around drifting objects, so some of them started to release their own 'bamboo rafts. Some spectacular results have been 'reported — from Filian waters catches as high as 55 tonne in one set'; from a Japanese purse-seining firm catches ranging from a low of 10 tonne to a high of 96 tonne; from the Philippines a catch pf 36 tonne of tuna in one set.

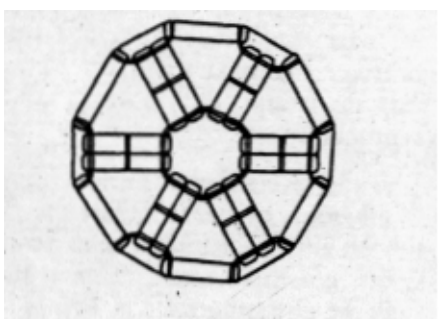
Governments as well as private fishing firms have lately -taken to improving the performance of anchored rafts for aggregating fish. Commercial fishing 'trials have so far concerned mainly larger-scale FADs. Figure 4 gives an-example of a modern FAD design. and its principal parts. These'are anchored in deep waters to aggregate tunas and tuna-like fish. Such FADs must be able to withstand storms and heavy oceanic currents. The trials have therefore mainly aimed at identifying a strong anchoring system and a raft that cannot easily be broken up by waves.

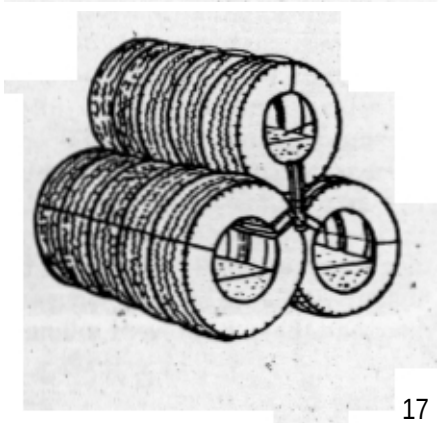
To start from the topbf this FAD, let us look at the raft. It should give only a minimum of resistance to waves and currents. It should also be buoyant enough to carry a mast with indicator light and to keep up the appendage that provides the three-dimensional structure. Three, major types of rafts have been used:

1. Bamboo clusters held together with chainlinks, wires' or car tyres.
2. Aluminium hulls.
3. Polystyrene foam filled inside iruck tyres.

The choice has depended partly on price and availabilityof material in the local market. Naturally the life span of bamboo raft is much shorter than for the others, but the production cost is so much less that it is an attractive option to fishermen in the Philippines for example.

Figure 2: The payaw of the Philippines. A bamboo raft with a long' anchoring line plus a draping of palm fronds or coconut leaves is used to attract schools of yellowfin, skipjack and little 'tuna. Below: Figure 3 — tyre fish shelters.





Another'advantage is that when if starts to break.up (or rot), it can' be quickly replaced since the bamboo is readily available.

Some experts rate the polystyrene-filled tyre type as superior in many respects to aluminium rafts. It is easy to approach without risk of damage to boat or FAD; it creates little resistance to waves and currents; is easy to set out, and is at least as buoyant as'the aluminium raft. Polystyrene foam is however not easily available everywhere, and in some countries even costlier than aluminium; therefore aluminium is sometimes preferre&

The raft is usually equipped with some kind of blinking light — switched off in day time by photo-cell.

To the underside of the raft is attached the anchoring line. The first piece of 50 metres or so usually consists chain and/or wire with breaking strength above 5 ft. This is because, here the stretching shock 'caused by waves is greatest; also, this part is exposed' to sharks. Then follows the main line,, usually' a polypropylene rope. Experience, indicates that it is.necessary to use polypropylene rope of at least diameter 18 - 20 mm to prevent the anchoring line from breaking i'n a storm or in heavy oceanic currents.

The anchoring line is attached to the anchor weights with a 30-50 mm chain or wire. This is very important since'it keeps the rope, which has at least some buoyancy, off the bottom; contact with 'bottom material would very soon tear off a synthetic rope.

To decide weight and configuration of anchor is tricky. For a large FAD the weight needs to be about 1500 kg to remain in place. Even with such weights, the FAD in extreme cases is reported to have drifted, sometimes disappearing into the deep. In a few trials the anchors have been made of concrete-filled oil drums, and some, FADs are believed to have been lost as a result of such drums rolling along the bottom into deeper waters. It has been suggested that anchors be made with iron bars sticking out here,and there to prevent rolling.

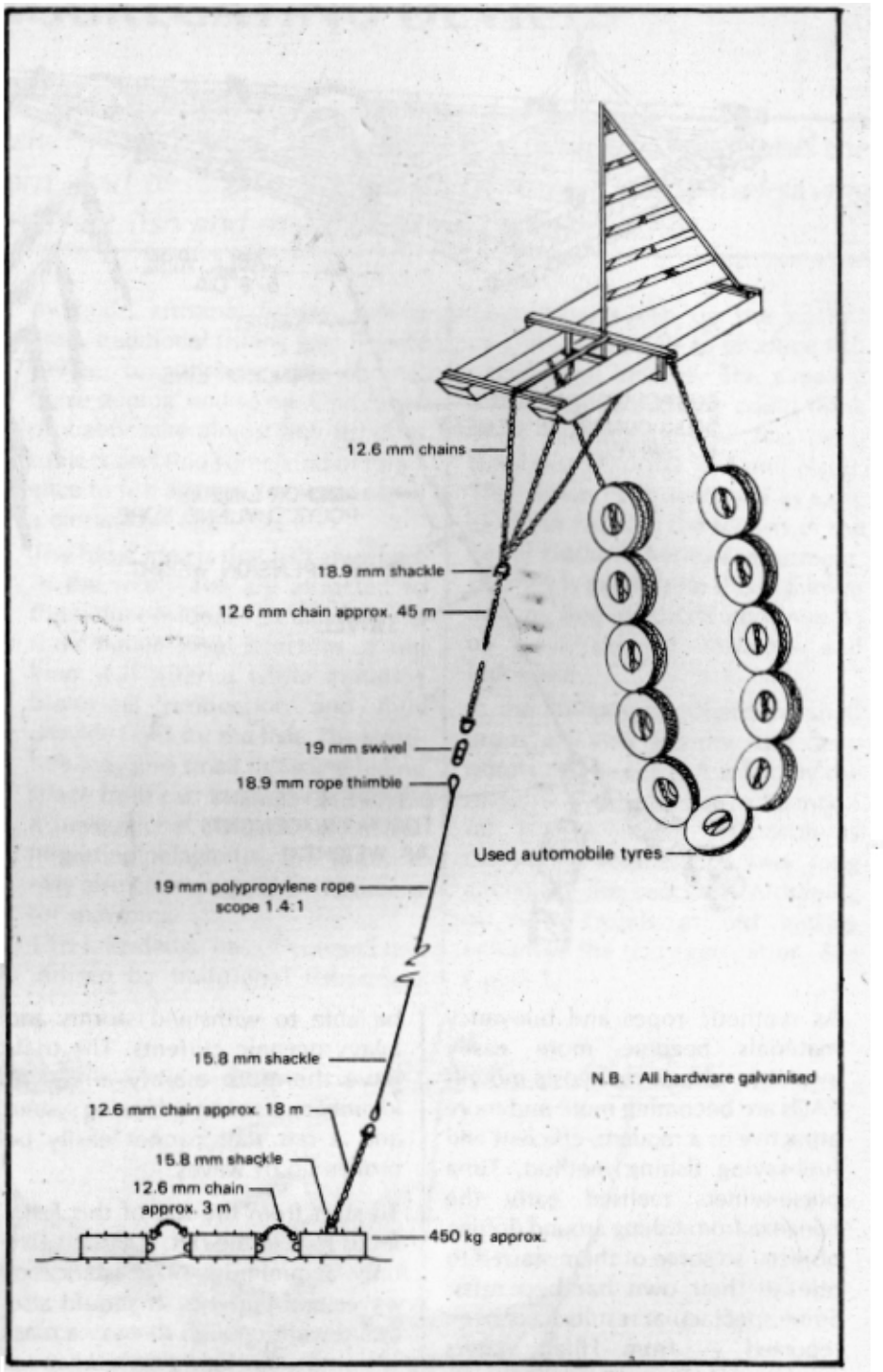


Figure 4 : Design of a modern FAD structure used in Samoa, and its principal parts. It is anchored in deep waters.

Currently a couple of reports are being pçoduced through FAO describing successful applications of these principles from different parts of the world'; the titles are given below. A BOBP paper reviewing the experiences with FADs worldwide is also under print. This paper, among other things, describes a number of small. experimental FADs that have prospects of success and should therefore be of interest to the Bay of Bengal region.

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deSan, M :, Fish aggregating devices or payaos. Notes on cQnstruction, together with some criteria for placement and examples of utilization. Fl : DP/RAS/73/025. Working Paper June 1982, FAO.

Going tuna-hunting on an FAD

Arild Overa, BOBP fishing craft technologist, is a keen FAD enthusiast. In this lively image-filled story, he recalls one of his FAD hunting trips in Samoa, where he served before his current assignment.

The Samoan village is quiet in the dark of the tropical night. Even the ever present pack of stray dogs have ceased fighting and wailing at this hour.

But as it approaches 4 a.m., a few lights flicker on in some huts around the shoreside villages. A quick coffee, bits of taro, palusami and bananas cooked last night in the umu (earth oven) are put in a basket and off we go.

Down on the beach the sleek Alia (catamaran) is ready, the outboard motor already clamped on. At twelve knots we cross the star-lit lagoon and push out through the narrow entrance, the jagged reef glaring at us in the fluorescent light of huge breakers destroying themselves.

We are going tuna hunting on an FAD, anchored at a thousand fathoms, 10 miles off Apia. But how do we find it in the dark? We put a light on it when we anchored it but somebody has long since removed, broken or covered the light to prevent other fishermen from finding it.

So we must time our run since we know from past experience how long it takes and we line up lights in the town behind us to keep ourselves on course. As we approach, everybody keeps staring ahead and to the sides. Ah, there is something! But a quick deviation proves it to be a competitor. Ah, but there it is! The FAD, or pole, is slowly moving its unlit mast against a greying skyline. But to our dismay, there are too many boats here already. Hope there won't be another shooting incident!

Before dawn the dark sea starts boiling, stirred up by thousands of atu (skipjack) tails and the wild chase starts. At twelve knots the boats race around fairly close to the pole. Bang, bang bang, the rude but efficient wooden reels start racing; we cut the engine and the crew jump to grab the reels. "Oh boy, good size this one", cries one as he forces the fish in as fast as he can.

Various other comments are heard in the turmoil: "it's gone, full speed!" or "no, it's just a kavalau (small tuna)." Man's hunting instinct really surfaces on a tuna school in feeding frenzy. I have seen otherwise calm quiet people getting a strange evil-looking light in their eyes, probably a reflection of the light in your own eyes.

Fishing is extremely intense, and due to many boats operating at high speed, accidents and fights are inevitable. One boat was shot at close range with a shotgun blasting a hole under the waterline after its trolling rod knocked out somebody's teeth in another boat. Fortunately, the hull was of aluminium, so half a lava-lava (loincloth) was stuffed in the hole and fishing resumed!

In Samoa—obviously a successful trip! Arild Overa holds up a yellowfin tuna caught around an FAD from a twin-hull catamaran.

But after one or two hours, the fish disperse and catch rates go down. Some boats break off quickly and head for shore at full chat to get the best price from the crowd waiting ashore for an atu in blood (raw fish), while others stay on to catch a few more or even go farther off into the ocean, looking for other schools.

Some of the crew will take the last caught fish, poke a hole through the belly using two fingers and fish out the living heart. After a quick rinse in the sea it is eaten. Delicious, pure Tartar beef! Then holding the head and tail, he says "manuia" and drinks the blood. This I was less fortunate with since, instead of poking with my fingers, I used my Swiss army knife. By accident I cut the gall bladder.

ABSTRACTS OF BOBP PUBLICATIONS

The first issue of Bay of Bengal News (January 1981), contained abstracts of about' 20 BOBP publications. Papers published and distributed since then are abstracted here.

BOBP/WP/1 1: *The Possibilities of Technical Cooperation between Developing Countries (TCDC). in' Fisheries. By E H Nichols, August 1981.*

This paper briefly assesses possibilities for TCDC (Technical cooperation Among Developing Countries)' in the fisheries sector of countries in the Bay of Bengal region. It outlines "proposals for TCDC activities in the region, and gives a fairly detailed description of institutions in the region through which TCDC may be implemented. It also assesses the interest and willingness of governments in TCDC, and describes funding and administrative arrangements.

BOBP/WP/12: *Trials in Bangladesh of Large-Mesh Driftnets of Light Construction. By C Pajot, and T K Das, October 1981.*

This document is the second report of a fishing gear improvement project in Bangladesh.' It describes' the rationale, the mechanics and the findings of experiments with large-mesh driftnets of thin twine conducted near Chittagong from October 1,980 to February 1981.

The experiments were carried out in cooperation with the Kalidaha Fishing Project of CAR ITAS, a social service "agency. The experiments yielded the finding that driftnets of thinner twine, which are, about 40% cheaper than the traditional nets, also catch more fish than the traditional nets. Experiments were 'also carried out with driftnets of different mesh sizes. Here the conclusion was that large mesh sizes are more effective than the smaller.

BOBP/WP/13: *Trials of Two-Boat Bottom Trawling in Bangladesh by C Pajot andJ Crockett, October 1981.*

This document describes the rationale, mechanics and findings of experiments with two-boat bottom trawis in Bangladesh. The experiments were carried out between Octo.ber 1980 and March 1981 near Chittagong in cooperation with the Swedish Free Mission and the Kalidaha Fishing Project of CARITA5. The trials yielded the conclusion that while trawling with two-boat high-opening trawls for the capture of demersal and semi-pelagic resources is technically feasible, its commercial viability is still to be ascertained. The paper recommended that the trials should be continued over a wider geographical area.

BOBP/WP/14: *Three Fishing Villages in Tamil Nadu : A socio-economic study with* speclal *'reference to the role and status of women.*

By Edeltraud Drewes, February 1982.

This paper describes the results of a socio-economic study conducted during March-May 1981 in three fishing villages south of,Madras – Perianeelánkarai, Chemmencheri and' Pattipulam. With the help of ten selected women investigators, a survey was made to examine the socio-economic conditions of marine fisherwomen, their involvement in productive activities and the scope for new income-generating activities. The. paper will be of interest to planners, sociologists and economists, and to those co,ncerned with small-scale fisheries development in genera' and women's role in fisheries in partlcular.

BOBPtWP/15: *Pilot Survey of Driftnet Fisheries in Bangladesh. By M Bergstrom, May 1982.*

This documenti-eports on the observations and findings of a pilot survey of marine driftnet fisheries in Bangladesh. It is intended as a first step towards an adcurate and comprehensive account of this fishery. The survey was conducted during February and March 1981 and,was planned and executed by a Fishery Biologist of the BOBP, assisted by a team of four fisheries officers from the Marine Fisheries Department in Chittagong. Some 280 fishing units were interviewed. The survey contains suggestions as to how'similar surveys could be designed and carried out in the future.

BOBP/WP/16: *Further Fishing' Trials with Bottom-Set Longlines in Sri Lanka, July 1982.*

This paper is the second report of a project to stimulate interest and effort, in more intensive exploitation of Sri Lanka's bottom-dwelling 'marine fish resources. The report describes the second series of trials, using the same method of capture as used earlier – bottomset longlines – carried out on the east and west coasts between August 1980 and luly 1981.

BOBP/WP/17: *Exploration of. the Possibilities of Coastal Aquaculture Development in Andhra Pradesh, August 1982.*

By Soleh Samsi, Sihar Siregar and Mattdno of the Directorate - General *of Fisheries, Indonesia.*

This paper is the report of a three-member mission from the Directorate-General 'of Fisheries, Indonesia, which visited 'Andhra Pradesh for sixweeks early in1981 atthe request of the Government.

The mission was undertaken in the spirit of TCDC (Technical Cooperation Among Developing Countries). The mission reviewed existing activities in coastal aquàculture, identified potential sites for shrimp cultureby small-scale fish farmers, and outlined the requirements for the establishment and operation of a pilot project.

BOBP/WP/18: *ReviewofBraçkishwater Aquaculture Development in Tamil Nadu, September 1982.*

By Kasemsant Chalayondeja and Anant Saraya of the Department of Fisheries, Thailand.

This paper is a report of a two-member mission from the Directorate-General of Fisheries, Thailand, which visited Tamil Nadu for about a month during September-October 1981 at the request of the Government. The mission was undeitaken in the spirit of TCDC (Technical Cooperation Among Developing Countries).

The mission of experts explored the possibilities for coastal aquaculture in Tam ii Nadu with special reference to the cultivation of shrimp in backwaters, in pens or other suitable enclosures.

BOBP/REP/11 : *Report of the Fifth Meeting of the Advisory Committee, November 1980.*

This document records the deliberations and the conclusIons of the 5th meeting of BOBP's Advisory Committee. The meeting was hosted by the Government of Malaysia and held in Penang, Malaysia, November 4-7, 1980. The document includes a summary of progress made by the BOBP in 1980.

BOBP/REP/12: *Report of the Training Course for Fish Marketing Person-'nel of Andhra Pradesh, November 1980.*

This document reports on a two-week training course held in November 1980 for some 20 officials of And hra Pradesh State in South India mainly concerned with fish marketing. The report outlines the rationale, preparation and conduct of the course. It discusses the structure of the business game, the principal method of instruction, and details the "marketing strategies" .for the game adopted by each group' of participants. It analyses the work submitted by them, the knowledge they gained from the course and 'their reactions to various course components.

BOBP/REP/13: *Report of the Sixth Meeting of the Advisory Committee, Colombo, Sri Lanka, December 1981.*

This report records the deliberations and conclusions of the meeting held in Colombo, Sri Lanka, December 1-5, 1981. The report includes a summary of progress made by the Bay of Bengal Prbgramme,in 1981, the third year of operation.

BOBP/REP/14: *Report of the First Phase of the "Aquaculture Demons-., tration for Small-Scale Fisheries Development Project," Phang Nga Province, Thailand. March 1982.*

This document reports on the implementation of the aquaculture demonstration project for smaii-scale fisheries development in Phang Nga, Thailand, during its first phase, 1979 to September 1981. The report gives a short account of the project's background, objectives, modus operandi and pre-operational activities. It also describes and assesses work done on each component of the project — aquaculture demonstration, community development and women's training. The assessment shows that in the period reviewed cockle culture was the most successful activity, while the commercial feasibilities of finfish cage culture and the technical feasibility of mussel culture were yet to be established.

BOBP/REP/15: *Report of the Consultation-cum-Workshop on the Development of Activities for the Improvement of Coastal Fishing Families, Dacca, Bangladesh,* October - *November 1981. Madras, India, May 1982.*

This report outlines the approach and conduct of the consultation-cum-workshop 'held OctOber-November 1981 in Dacca,' Bangladesh.Jhe 23 participants came from government and non-government organisations in Bangladesh, Malaysia, Sri Lanka and Thailand. The report sums up their ideas on possible approaches towards ameliorating the conditions of small-scale fisherfolk — with special emphasis on those of women —'in the countries represented at the workshop.

BOBP/INF/1 : *Women and Rural Development in the Bay of Bengal Region: Information Sources. - February 1982.*

This document constitutes a list of information sources on the subject of women and rural development in Bangladesh, India, Malaysia, Sri Lanka and Thailand. It provides two sets.of information : lists of organ i-sations and programmes concerned with women and development, and lists of publications on the subject.

BOBP/INF/2: *Fish Aggregating Devices Information Sources February 1982.*

FAD — fish aggregating device — is any method, object or construction used to facilitate the harvesting of fish by attracting and thus aggregating them. This document lists titles of papers on.,, FADs or references from secondary sources. A list of institutions which have engaged in work on FADs is also included.

Delegates to the Dacca workshop on coastal fishing families.

The Fisherman and the Farmhand

Fishermen and peasants both rank among the poorest of the poor. What do the communities have in common, and how do they differ? We asked Dr. Felix Sugirtharaj, Secretary of the Association of the Rural Poor, Madras, to attempt an answer. Dr. Sugirtharaj, who has worked with both communities and closely observed their lifestyles, shares his insights with readers.

Thirty-three year. old Jeyaraman is among the few million country fishermen of India who gather near the sea every morning and evening hoping a miracle will change their lives one day

Jeyaraman comes from a village called Panaiyoor Kuppam near Cheyyur of Madurantakam taluk in Tamil Nadu.

"My father, grandfather; forefathers — they were aU fishermen. I know only one thing — the Bay of Bengal. And I have one skill — fishing with the help of a kattumaràm. I studied up to'the third standard in the Panchayat Union School. I learnt fishing after I was eight."

Today, his family consists of his wife and three children. Their village has 40 huts and a population of 200.

"My village is cut off from the, roadside agricultural villages and is very backward. *No* electric lights or drinking water, no roads, no hospital if one of us falls ill".

Ninety per cent of the fishermen and the agricultural labourers may be described as squatters or hutment dwellers as they own neither land nor houses. A few of them however are lucky, like Murugesan. He belongs to a small village called Kettavarampalayam near Polur in North Arcot district.

"My grandparents were landless labourers and were perpetually bonded to the landed gentry of my village. But I am not bonded in the strict sense of the term. I never went to school. I am a hired labourer. I own a small house patta which was assigned to me in 1977 by the Harijan Welfare Department of the Tamil Nadu Government."

While both fishermen and farmhands have time and again been victims of Nature's fury, the fishing communities scattered over the shores of the Bay of Bengal in India are more prone to natural calamities and disasters. The few cyclone relief shelters built by the Red Cross Society could not accommodate even ten per cent of the fishing communities when disaster struck. That indicates the immensity of the problem.

The 'fishermen work fewer hours t,han the agricultural labourers but they. gamble with their lives for their daily bread.

"I go fishing for eight to ten hours, either day or night at least 20 days a month. If the weather is bad, nobody enters the sea for a whole month at a stretch. As I do not own a kattumaram or a net, I hire them along with three others — we are a team. We pay a nominal rent but we will not be allowed to use the gear and craft if we do not pay the hire charges after each catch."

Middlemen cycle their way to the villages and are ready to welcome Jeyararnan and his colleagues ashore. They buy the fish at a price ten times lower than the usual market price in small towns.

"We surrender all our daily catch to them. Bargaining will not help us. So we sell the fish soon after we return to the shores, collect the money and go homef

Home is Jeyaraman's euphemism for a good booze and sleep till his wife has his breakfast or lunch ready. Since most of them eat fish daily, they all look healthy.

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'Nearly everyone drinks cbuntry brew or illicit arrack because it is cheap, says farmhand Murugesan who takes recourse to it when he returns home dead tired after a long day's work:

"I work for at 'least 20 days a month. Occasionally I borrow from my landlord during festivals. But I never go beyond a limit. My'wife also works with me, as a labourer. When we don't find work, I go into the nearby forests to cut firewood illegally and sell a whole bundleforRs6to Rs7.

"When I work for others, I receive'a daily wage of Rs 5 with midday meals usually in. the form of cereals. If both my wife and I work, together we take home Rs '8. All our five children will have one good square meal that night. Whatever is left over, we gobble up' in the morningL"

Jeyaraman's wife, who is very vocal and business-like, 'is happy if he ,brings a lot of small 'fish which she can cure and sell as dry fish. in the local market. She can then afford to buy rice and groceries from the village shop as well as vegetables at the weekly shandies.

"My daily average income is Rs ,10 to Rs 15, If I am lucky enough to catch prawns, I can earn even Rs 100 a day. Once I caught prawns worth Rs 400. This is not possible any more.as the trawlers compete with us in the shallow waters. Trawlers and' mechanized :boats come close to the shores and tear our nets, and frequently there are quarrels."

On the one -hand, tourism which is promoted by the Government prohibits the fishing communities from using available space to park ka,ttumarams, dry their nets, season their fish, bury the dead, or whatever. On the other hand,, the green revolution has pauperised the marginal and small farmers and precluded their possessing 'any kind of land. Thousands of landless labourers are at the mercy of exploitative landlords.

"I prefer share cropping as it gives, me regular employment for 120 days.a year and I get wages in kind — 'two bags of padd.y of the 20 to 25 bags that one acre will yield if properly cultivated. Two bags 'of paddy fetch Rs'250 in the open market and this will be my income foF 120 days' hard work. During the share cropping season, I have no regular working hours. I sleep in the pumpshed at night to irrigate the fields. Nobody pays wages" according to the rates fixed by the Government."

Murugesan would like to hold a piece of land in which he could cultivate some crops at least during the rainy season.

"I believe that land reforms always benefit the rich and the middle-classJarmers far more than the poorest of the poor. In my viWage, there are four, kinds of labourers contract laboureirs, manual labourers, share croppers and some bonded labourers. The main reason for my semi-bonded condition and poverty is very poor wages."

What about his family?

"My eldest daughter is married to another landless labourer in our village and there has not been any remarkable improvement in their standard of living. My other children are not interested in going to school. The two boys look after the landlord's cattle and are given noon meals in his house. My youngest daughter

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is only-six years old and she gets a free meal at the mid-day meal centre run by the Government."

Does Murugesan have any suggestions to make to the powers that be?

"In my village, the community elders make all decisions regarding marriages, settlement of disputes, improvement of the village community and so on. I never interfere even in these affairs.

However, most agricultural labourers (who belong to the scheduled castes) recognise Ambedkar as their'leader and join movements for Harijan liberation. Caste fanaticism often sours harmony in rural communities. Only religious festivals would appear to be a temporary leveller of caste distinctions and social differences.

The fishing communities are not classified as a scheduled caste in Tamil Nadu. Consequently, they are denied many opportunities in higher education and government jobs.

"I believe in fishetmen's unity and in the need for a strong organization which will eliminate exploitation," says Jeyaraman. " do not know if cooperatives will be abLe to offer subsidies and loans to buy kattumarams and nets of my own." About education he says, "I will send my children to the village schOol for only a few years. I do not think traditional fishermen can study well or hold high positions in society."

What ranks high on Jeyaraman's list of priorities?

"I want a road to be laid as quickly as possible between my village and the connecting bus road. That will improve our village a lot: I often go to Cheyyur to see movies, no matter how old they are. And I like to wear costly clothes, because a well-dressed man commands more respect from the'non-fishing communities."

The outspoken corn meritof Jeyaraman and Murugesan help us compare them asindividuals, their lives, their problems. But what is the collective status of the few million fishermen and the several million farm labourers in the land ?

It would seem that, superficial differences to the contrary, fishermen and agricultural labourers are busy throughout their lives just struggling to exist at a subsistence level.

'Both the fisherfolk and the agricultural labourers hardly exercise any political clout. Their representatives at the Legislative Assemblies and the Parliament are just a handful. Most of them have 'not been politically conscious of their votes.

Various attempts have been made to organize the agricultural labourers in Tamil Nadu into trade unions. Wage strikes helped considerably to raise the wages. Class organizations consisting of small farmers, marginal farmers and labourers have been founded and promoted' to fight exploitation by the landed gentry. In the name of rural development, various voluntary organizations have been working for the welfare and upliftment of the agricultural cOmmunities. But very few have been the attempts made either to consolidate the fishermen into unions or to protect them from exploitation by the moneyed classes.

Though wage regulations exist on paper, they are not enforced. Likewise, trawlers are allowed to fish close inshore and this makes it difficult for traditional fishermen to earn their livelihood. Trade unions promote industrial labour but ignore the peasant and the fisherman. They should be unified under trade unions so that they may exercise their rights and combat exploitation and semi-bondedness.

Again, the agricultural labourers and the fishing' communities should be brought together under the banner of rural workers. This has to be done without delay.

Voluntary agencies and trade unions can help consolidate these communities. How to preserve and enrich their indigenous culture and skills and, at the same time, enthuse them to adopt appropriate technology is one of the major practical dilemmas of development.

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