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***“OUR BOATS
ARE OUR
HOMES”***





Home sweet boat : a brisk morning in the shoe dhonis.

“OUR BOATS ARE OUR HOMES”

Text by Venkatesh Salagrama
Photographs by E. Amalore

A profile of a remarkable community – the fisherfolk of Chollangi near Kakinada in Andhra Pradesh, India. They live in their boats, the shoe dhonis, and make a living collecting shells for sale to traders.



It is seven in the morning. The sun has half risen in the distant horizon. The men are half awake. The women have already swept their houses and started preparing the day's meal.

Market cacophony is slowly building up, as vendors arrive from town, with vegetables, milk and water — yes fresh water for sale! The children are already enjoying the day's first ice-cream. The village is almost awake.

Four hours later. The sun is fiercely hot overhead. The vendors have gone — and so too, is the village! Men, women and children — everyone's

gone. It's as if the houses have sprouted wings and gone — not with the wind, but with the tide.

This is a regular occurrence at Chollangi creek, about 5 k.m. from Kakinada in Andhra Pradesh. The

"houses" are a type of indigenous fishing craft, called "shoe-dhonis", because of their resemblance to a shoe. The 250 dhonis are unique. Each of them houses a fisherfolk family that lives in the dhoni for almost eight months in a year and makes a living by collecting shells from the Kakinada bay and selling them to traders.

The dhonis come to Chollangi from various places. Balusutippa (100 dhonis), Mulletimoga (50), and Bhairavapalem (50) account for most of them. Five other villages — Kothapalem, Gadimoga, Yetimoga, L p Puram and Teerthalamoga — together contribute another 50.

Many of the dhoni people come to Chollangi after a 20 to 30 hour journey through mangrove swamps, using sails and long poles. Women and children tend the rudder and even help in punting. "We need either tide or wind to push us — without one of them on our side it is difficult to move", says Dharmavaram, whose wife and one-year-old child accompany him on the dhoni. They return to their villages only for festivals and during the floods. They observe three important festivals, each lasting from 10 to 15 days.

At Balusutippa, about 2 hours by motor launch from Yanam (a Union Territory near Kakinada), one finds the doors of many a house closed shut and fastened with padlocks. Almost a fourth of the 5,000 people of the village either collect shells or fish

in creeks with their families. Many parts of the village are virtually deserted. Only the old and the infirm are left behind.

For the dhoni fisherfolk, life centres on the family and of course the dhoni. Some families have eight members — family planning is almost unknown. But the dhoni fisherfolk don't regard their lifestyle as particularly adventurous. "What is so different about living on dhonis? It's the same as living in homes on land", says Pemmada Ramaswamy. They are surprised when

some one says that dhonis are not meant to be homes.

"We spend more time here than on land. You want to know about our home? This is it," snaps Meeramma, pointing a finger at her dhoni. She lives there with her husband and six children.

A dhoni is wide and flat forward with a short stem; it narrows a little to the aft and has a square transom stern. The fore and aft parts are decked in; about two-thirds of the length has tumble home-sides and the well is narrow and restricted. A high transverse coaming protects the well at the fore deck.

The dhoni is stocked with everything a family need for daily living. There's a home-made stove placed amidships to cook food. It uses wood as fuel, cut from mangroves and stacked neatly on the floor. A plastic barrel for fresh water lies astern. Some dhonis have earthenware pots. The forward "shoe" part of the dhoni, where the deck makes a canopy, is where the crew sleep, also where they store clothes and provisions.

Boards are nailed to the walls of the interior, making them efficient shelves for transistors and odds and ends. Some dhoni families take hens along — the occasional egg is very welcome. A period of one week around each full moon and new moon, when the lowest tide prevails in the bay, is ideal for shell collection. At such times, each member dives from the anchored dhoni into

the shallow waters up to two yards deep, with baskets tied to their backs. Women and children too participate in shell collection.

Each shell collector carries an Ethudu Vala (hand net) made of a rectangular metal or wooden frame with a small

net attached to it for scooping the mud. Small shells along with mud enter the net. The mud is washed away and the cleaned shells emptied periodically into baskets. A person collects 2 to 4 baskets of shells a day, children get very much less. The larger shells are picked by hand.

"Shell collection during the day in summer and at night in winter is just hell", says Ganga Raju. "The sun burns our faces in summer and the cold kills us in winter".

While they wait for low tide, youngsters from the shoe dhonis capture fishes and crabs with nets or with bare hands to eat at their next meal. If the catch is good, they sell a part of it.

The shoe dhoni folk prefer to return to the creek every evening, but sometimes, if the provisions and fresh water permit, they stay for 3 or 4 days. On days when there is no shell picking, they stay in the creek, catching fish for the day's meal, occasionally going to Kakinada to buy provisions.

They pile up the shells on the banks of the creek. Traders buy the shells at prices ranging from Rs. 4 to 12 a basket, depending on the size of the shells. A family earns about 40 - 100 rupees a day. During festival times, when lime is in demand for white-washing houses, shell prices shoot up to Rs. 20 a basket.

Traders sell the shells to cement industries at Vijayawada or export to Madras or Kanyakumari, where they are made into ornamental and decorative articles. Oyster meat from the shells is removed by boiling and sold to poultry and fish farms at Rs. 3 a kg. Women and children help the men in sorting and marketing the catch.

The women also have to cook food and look after the children. Is it not difficult to cook in the dhoni? The women say "No". The utensils won't fall off the stove even when there is heavy pitching and rolling. "We cook as easily as we do on land", says Pallamma, a housewife (boat wife?) who has been cooking on the dhoni for over 30 years.

But during cyclonic storms or heavy rain, cooking is difficult because the dhoni is covered with a tarpaulin and becomes a virtual tomb. If the stove is lit at such times, smoke accumulates in

no time, suffocating young and old alike. They try in vain to make openings by using small sticks to hold the cloth aloft.

There are times when the dhoni women can't cook for days together. "Last October, when there was a big cyclone, we couldn't cook for 20-days", reminisces Appayamma. Her three small kids cried all the time for food and it was only after the rains had abated that she could cook. The only shelter in the area is a temple near the creek which is invariably over-crowded at such times.

Another major problem, ironically, is again water or the lack of it - it's scarce. When they run out of water, the women walk to a village well at Pagadalapeta, about 2 km away, with buckets in their hands, and face the wrath of hostile local villagers who don't like intruders. Nowadays a new tradesman has emerged in summer who brings water on a cart and sells it at Rs. 1.50 a pot.

The shell collectors are not fastidious about cleanliness. It is seldom that they bathe. They regard themselves as inferior to their traditional fisherfolk-kinsmen in this regard. "We are dirty. We never take a bath (while at the creek). What will your neighbours think, if we come to your home?" Vyadada Apparao asked his cousin (my guide) who repeatedly invited him to his home at Kakinada.

Summer, autumn or winter, every season brings its own share of miseries. In addition, the shoe dhoni folk are prone to attack by squids, octopi, jelly fish and catfishes while collecting shells. The wounds take a long time to heal. Wild herbs and traditional remedies are applied for relief. A doctor is called in only when the wound gets serious.

(Continued on page 13)





Shoe dhoni fisherfolk in action.

Top: Woman, child and man look for shells.

Centre from left: A rich harvest on deck; cooking on the dhonis; boiling shell for meat.

Left: While the adults are busy with shells, this child mixes his own food; woman hurries to load shell basket; shells are loaded on to a trader's lorry.

Where *is* smoked in India? Come to BCV Palem, Andhra Pradesh

Text by Venkatesh Salagrama
Photographs by E. Amalore



Smoke curing is a centuries-old method of fish preservation. In tropical countries, especially in West Africa, parts of north-western South America and the Indo-Pacific regions, fish smoking is an economic method of prolonging storage life while also imparting desirable flavours to the fish. Fish smoking is quite rare in India, but a fascinating exception is a fishing

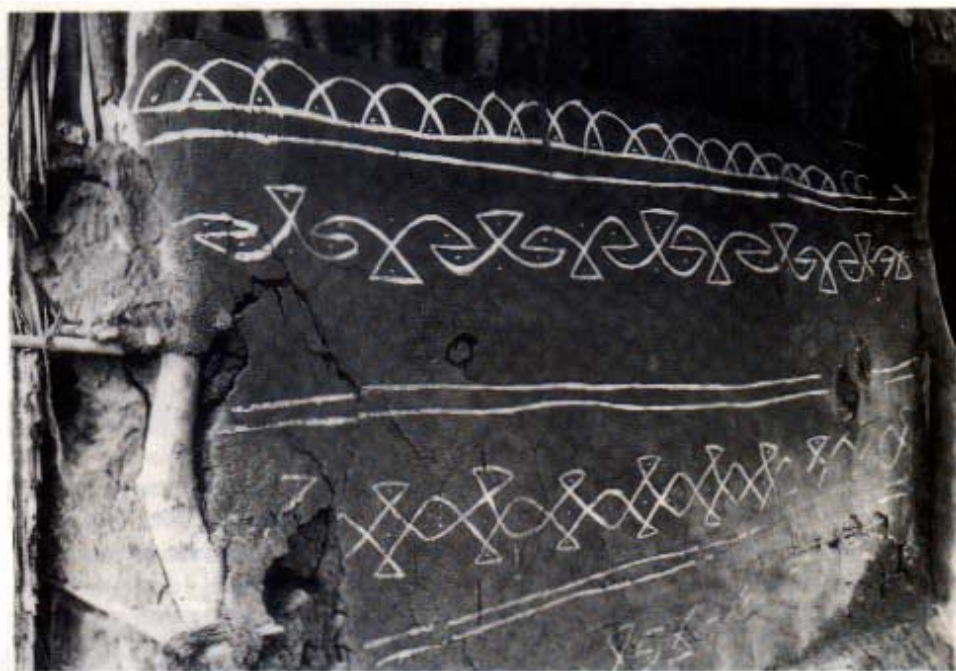
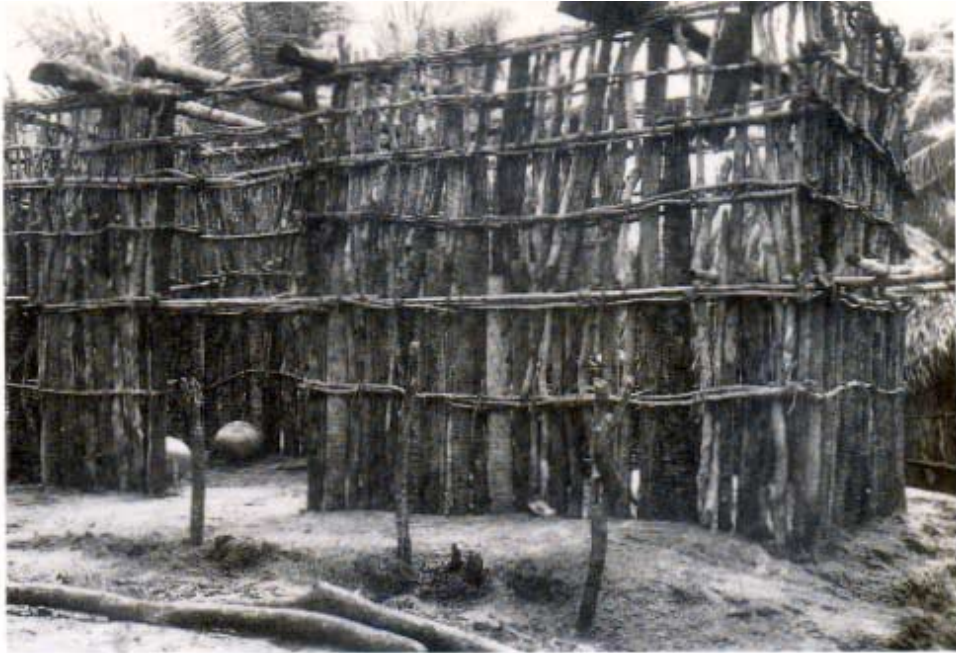
1. These are the navas that bring their catches from around Kakinada to sell to the villagers. The creek branches out from the River Godavari.
2. Removal of guts and scales is done singly or in groups by both men and women.
3. Guts and scales removed from jew fish.
4. The basic structure of both dwelling and fish smoking houses. Mangrove poles are used for reinforcement and the main load-bearing columns and rafters are palmyra trunks.
5. Picturesque designs painted on the walls with lime.
6. A smoking house with reed covered roof.

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village in Andhra Pradesh, known as Boddu Chinna Venkatayapalem (BCV Palem for short). It has a population of about 2,000, and is part of a cluster of small fishing villages 20 to 25 km south of Kakinada. The smoking tradition here appears to have arisen many generations back within the small Godavari delta communities. These communities, virtually isolated from their neighbours, discovered that fish smoking was a very effective way of preserving their catch. To this day a strong demand for this product still exists in the area.

Smoked prawn from BCV Palem is sold at markets in and around Kakinada, also wholesale to places in the northeast of Andhra Pradesh and the interior of Orissa, and even as far as Bihar. Jewfish, mullet, eels and ribbonfish are also smoked. "The products are of very high quality and have an excellent flavour", says Mr. Tim Bostock, BOBP's post-harvest fisheries adviser. "This is due to a combina-



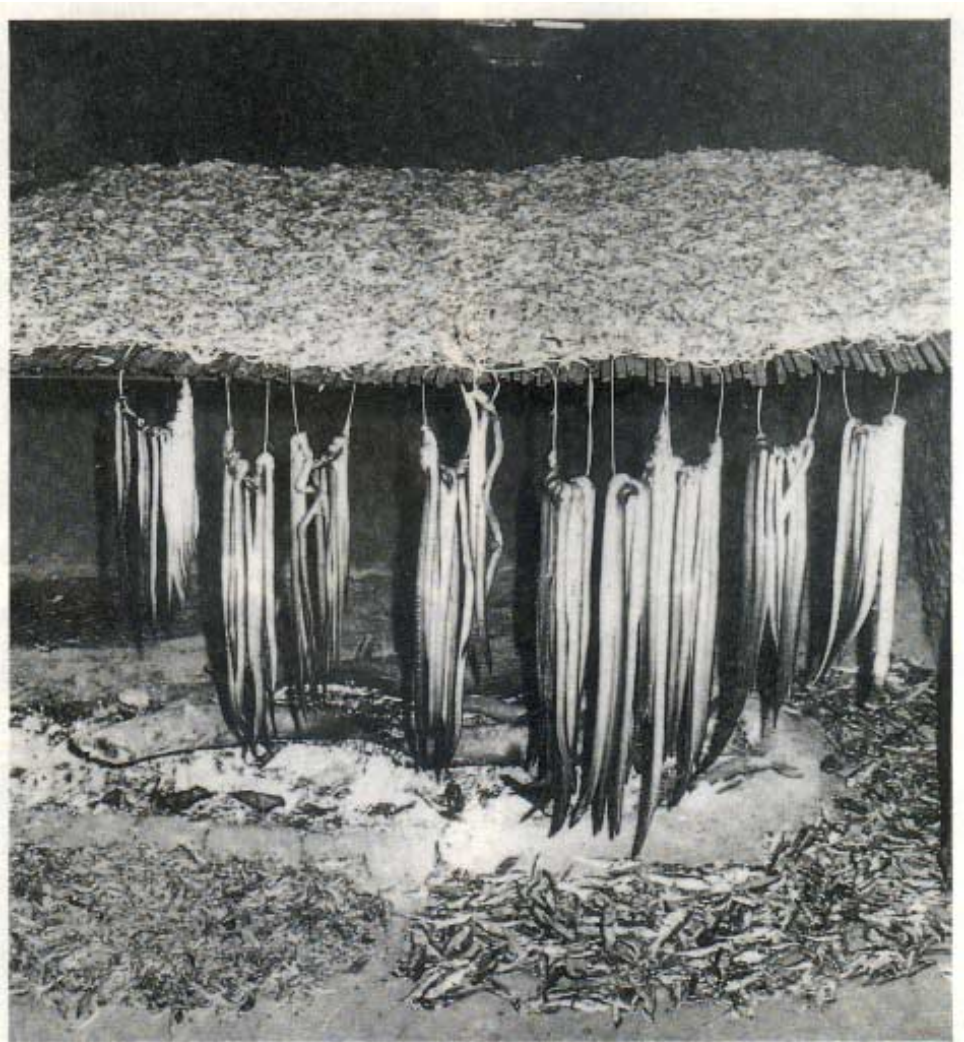


tion of good post-harvest handling of the catch and carefully controlled processing”.

The Fish: The fish smokers buy fish from navas which land catches at BCV Palem almost round the clock. Says fisherman Dorna Veeraswamy, “During the peak season (February to July for fish, September to January for prawn), “we don’t sleep at all. Catches come in at 11 p.m., then at midnight, at 2 a.m, 3 a.m., 5 a.m. — there is no telling when they come.” Fish smokers compete for purchase of fish with traders in fresh and salted fish. “The catch, not the money is what limits our purchase,” says Sangadi Gangaraju. One estimate is that the village can process fish and prawn worth Rs.1.5 lakhs per day. What’s actually processed is of course less.

The bigger processors advance loans to fishermen to ensure that they get a fair chunk of the catch at reasonable rates. Sometimes the processors go to Bhairavapalem about 15 km away, or to Chollangi near Kakinada, where small navas and shoe dhonis land their catch.

The Workplace: Some processors have built huts specially for fish



Below: A bamboo mat is spread on this table-like structure, above a fire pit fuelled by mangrove sticks. Fish is spread on top of the mat. The fire does not touch the mat since it is 3 to 3½ feet high. The fish are turned every hour or two. Generally the smoking time for a batch is about 12 hrs. *Above:* Shrimps and ribbon fish are smoked. A small opening on a window on the rear wall allows the smoke to escape.





This 80-year-old woman says she smokes fish worth Rs. 2,000 every day.

smoking. These are rectangular in shape, with walls of mangrove shoots and bamboo poles, plastered over with mud to provide cohesion and protection. Roofs are laid with bamboo and casuarina poles arranged concentrically. Thatching is also done with reed grass and palmyrah leaves. Floors are paved with mud and cowdung. Women plaster mud on the walls and paint wonderful patterns on them with lime powder : picturesque workplaces indeed!

Pre-smoking operations: Before the fish are smoked, several operations are carried out : cleaning by submerging baskets of fish into the water; sorting out and salting less fresh fish; removing the scales of fresh fish with sharp knives; sun-drying the dc-scaled fish for a day on a fish-curing platform.

Smoking operations: After sun-drying for six to eight hours, the fish are taken to the smoking room or smoking hut. This has a smoking platform known as *jithaga*. It is about three feet high, held on either side with three supporting mangrove shoots. Mats of bamboo sticks tied together with metal wire are spread on the platform; these serve as a mattress for the fish or prawn that's to be smoked.

Beneath the *jithaga* smoking platform are located one or two fire-pits or hearths. These are oval in outline, about one foot deep and lined with clay and cowdung. The fuel used comprises local hard wood varieties including mangrove, a common tree in this coastal region which is currently being threatened by a rapid expansion in prawn farming. The fire burns slowly. It is never allowed to burn too much and never rises more than 1½ feet — i.e. about 1½ feet below the platform. Only smoke reaches the fish. Therefore it won't get burnt. The temperature slowly reaches 80 to 90 degrees celsius.

Fish are kept in this position for five to six hours, turned over by hand and then smoked for another three hours. Fresh batches of fish are put in alongside earlier batches. As the fish decreases in size on smoking, it is possible to place more on the *jithaga*. Even after the smoking is over, fish are retained on the platform with a simmering fire burning underneath for another 12 hours.

Smoked fish can stay without spoiling for about a week, but owing to its crumbly nature, tends to disintegrate into powder.

Expenditure on smoking? About 250 Rs/month for smaller processors, about 750 Rs/month for the larger processors.

Prawn smoking takes less time than fish smoking. The prawns are sun-dried for a day before being spread on the *jithaga*. Sun-drying removes about 40 per cent of the water; about 1½ hours of smoking is enough for the processing to be completed. Smoked prawn keeps for about a month; even then only the colour changes; it remains edible and marketable for another 1½ months.

After smoking: Smoked fish or prawn are taken to the shandies nearby. Smoked fish is sold only in the Godavari deltaic region especially around Amalapuram. It doesn't go north to Kakinada. But smoked prawn and salted fish are sold wholesale at Kakinada and retailed in non-delta regions including Kakinada.

In sum, the fish-prawn smokers of BCV Palem are a hard-working community. Kilns burn almost throughout the year. When festivals are on, fishing is banned. This is the only time when the fires burn out and the people earn a welcome breather.

Venkatesh Salagrama

RADIO PROGRAMMES FOR SRI LANKAN FISHERFOLK HOW GOOD ARE THEY ?

Despite drawbacks, the radio programmes for Sri Lankan fisherfolk are a worthwhile endeavour and deserve continued encouragement and support, says an expert after a candid evaluation.

The small-scale Sri Lankan fisherman is not an avid reader. He does not attend seminars or watch TV. But he listens to his radio—whether out on the seas, repairing nets on the shore or relaxing with family at home.

From January 1989, Sri Lankan fishermen have been listening to radio programmes, said to be the first of their kind in the world, aimed exclusively at them. There are five-minute programmes every week day (news and features, weather forecasts, fish prices, music), and a 15-minute programme every Sunday (news and views, discussion, entertainment). The programmes are aired on the Sinhala commercial channel of the SLBC (Sri Lanka Broadcasting Corporation). The daily five-minute programme is broadcast at prime-time —

immediately after the Sinhala evening news.

The radio for fisherfolk programme aims at stimulating fisherfolk development, and giving fisherfolk a voice through participative programming. The programmes are prepared by a Fisherfolk Radio Unit (FRU) set up by the Ministry of Fisheries and Aquatic Resources, with technical and material assistance from BOBP and some funding support from NORAD.

Audience profile

The programme's strategy was drawn up by a senior staff member of the SLBC, Ms. Chitra Ranawake. It was on the basis of an extensive audience profile that the commercial channel was recommended for the fisherfolk radio programme, though airtime on

the popular commercial channel has to be paid for.

The programmes have been broadcast without a break ever since—an achievement in itself considering the political turmoil and the fact that FRU staff are fisheries officials with no experience or even exposure to broadcasting. The programme is being monitored by IRED, a local voluntary agency. Recently, after 18 months of programming, the BOBP brought in a professional radio consultant to evaluate it.

Michael Pickstock, formerly with the **BBC, now with the World Radio for Environment and Natural Resources**, London, is an agricultural broadcaster specialising in developmental and agricultural programming. Some highlights of his evaluation, which was based on discussions with officials and FRU

Giving Sri Lankan fisherfolk a voice. Staffers of the Fisheries Radio Unit reach out to fishermen and fisherwomen at the beach. Extreme right: Going on the air at the SLBC studio.



staff, field trips and interviews with fisherfolk

- The programme is meant to reach “primarily artisanal and small-scale fisherfolk” and “secondarily the entire fisherfolk population” but (according to Pickstock) has veered from this objective to cater more to trawler crews, traders and multi-day boat operators. “Colombo fish prices are not so important here” says a fisherman from Hambantota. He would rather know about cooperatives, subsidies for buying nets and fishing gear, maintenance of engines, navigation, direction finding. Many fishermen want a service in Tamil.
- The programme has no relevance to women in fisherfolk communities; consequently they never listen to it.
- The broadcast timing could be shifted to between 12.00-1.00 p.m. and 7.00-8.00 p.m. This will best suit off-shore and deep-sea fishermen out at sea, also the womenfolk.
- All radio programmes of whatever duration should start at the same time each day. This will encourage a loyal following of listeners. If the

programmes are re-scheduled the new timings should be publicised with posters, T-shirts and radio spots.

- The programmes should switch from the commercial to the national channel after making a mark in the former. Advantages more broadcasting time, more creative freedom. (Studio production of commercial programmes is the prerogative of the SLBC; right now FRU staff do the researching, interviewing and writing but not studio presentation. Result : The programmes are presented by people who have no knowledge of fisheries and no contact with fisherfolk, and thereby lose accuracy and lack immediacy. Incidentally, moving to the national channel will save the cost of commercial air time — money that can be put into better programming.
- The FRU has five male broadcasters and a male programme coordinator. A female broadcaster should be added to the team: her inputs would improve the programmes’ relevance to women, also perhaps their quality in general.
- The FRU should be moved from the Welfare Division to the Extension

Division, since extension is what radio does. Further, the staff badly need a communications environment to provide the critical and creative stimulus that’s vital for professional broadcasts.

- The FRU staff should work more closely with the programme’s Steering Committee that was set up to guide and direct the FRU and insulate it from external pressure. No one should be on the Steering Committee for more than two years. At least one technical division from the Department of Fisheries must be represented on the committee by rotation.
- The 5-minute programme often has **2½** minutes of music ! Instead of using music as a ‘filler’, the FRU staff should plan ahead, and prepare well-researched stories that are persuasive and credible. There should be interviews at work places and group discussions. The staff also need better equipment in the second phase of the programme.
- By working with the Mahaveli Community Radio, the FRU staff could learn how to interact better with their audience in development programmes. Media experts could spend half a day every month with



all FRU staff, one at a time.

The FRU staff — whose only radio training earlier was in hardware basics from the SLBC — obtained some invaluable software tips from Pickstock. Sit within a foot of your interviewee and hold the microphone unobtrusively in the middle. Ask specific questions. Research thoroughly. On a two-day field trip produce at least two 15-minute programmes. Pickstock showed FRU staffers how to use background sounds to add colour to a flat report. Above all he tried to pass on that elusive journalistic skill — how to recognise a good story.

A story about a story. Pickstock and two FRU staff enter Tangalle village. Some fisherfolk huddled together on a pier are looking out into the sea, some of them weeping. The FRU staff is ready to move on, but Pickstock stops in his tracks and probes around. A fishing boat is four days overdue; kith and kin of the missing fishermen are worried and tense. Soon B. A. Hemachandra of FRU puts together a human interest story on safety at sea.

What next ? Pickstock is due in Sri Lanka again in October for intensive training of FRU staff. Coupled with speedy implementation of his recommendations, the training should further improve the quality of the fisherfolk radio programme, which today is peppier than those of old.

While the radio for fisherfolk programme has its flaws, everyone — Pickstock included, agrees that the whole endeavour is worthwhile. It is a pioneering effort at self-reliance which other countries within and outside the region are watching with interest. Success here may well lead to more substantive and exciting developmental radio programmes in several countries. (BOBP, which is scheduled to support the Sri Lankan radio programme till 1991 end, plans a radio workshop for fisheries officials of the region sometime next year). So the FRU, now led by a new coordinator, Mahinda Fernando, needs continued encouragement, opportunities and training — so that they, learn to tap the radio's excellent communications potential by giving fisherfolk a voice.

Shivani Ganesh



"Their" programme is on. Fisherfolk are all ears.

Radio programmes: A sampling of quotes

"We are struggling to live — we don't have time to listen to the radio".

"We listen regularly to the daily programmes but not the Sunday programme."

"I don't listen very much because I am a church leader and I am too busy. I also watch TV. Radio programmes should not be on at the same time as TV."

"We listen to the programmes occasionally but feel that they are for people with big boats. We don't find very much of interest in the programmes and many of our people speak Tamil and don't understand Sinhala."

"I listen to the Sunday programme only, but I try to make a point of hearing it and pass useful information to others."

"Music is available on other radio programmes, also on cassettes. So we would like more information and less music in the fisherfolk radio programmes."

"We would like to know more about safety methods. We don't know what distress signals to give."

"We would like to know more about

fishermen elsewhere in the country and would like to talk about them — but nobody comes to ask us about these things".

"There are different fishing methods in Trinco and the south and we would like to know about these"

"We would like to hear where there has been a good catch so that we too can go there."

"We would be interested in new technology for catching prawns".

"More information should be given about safety at sea — distress signals, safety measures, survival at sea, use of sail to save fuel whenever possible and not just in emergency. Skippers should be encouraged to tell boat owners where they intend to go before leaving."

"Information on icing and preserving fish should be of interest to fishermen and also how long to leave nets in the sea."

"If the mudalali says the radio people tell lies, about fish prices, who should we believe? It is the mudalali who is there to buy our fish and he is the man who gives us a loan when we need money."

“Our boats are our homes”

(Continued from page 5)

The shoe dhoni men are quite lost without the womenfolk. “Our men can’t do without us,” says Gangayamma. Her husband concurs: “We never collect shells by ourselves — our women come along and help. And they do the cooking of course — none of us can prepare a meal.”

Pregnant women continue life on the dhoni till the seventh month, cooking and shell picking too, and barely 10 days after delivery, they are back at the dhoni with the new born. Sometimes children have been born on the dhoni. Pemmada Satyavati delivered a baby girl on the dhoni — she couldn’t keep track of her months.

The children learn to swim before they learn to walk. At the age of 4 or 5 they start picking shells. “If the children are reluctant to start, we beat them with ropes and get them working. How else can they earn a living?” asks Vyadada Sesharao. On days when the family is not collecting shells, Sesharao’s son Laxmi Narayana (5), along with his kid sister Ganga (3) goes with a hand-net to the creek and catches fish enough for the day.

The children never go to school. It is as alien to them as life insurance is to their parents.

“We don’t object to their going to school, but who will look after them when we are gone?” asks Dhana-Iakshmi, Sesharao’s wife. Also, “the children are productive so long as they are on the dhonis collecting shells — what use will they be, if they go to school?” asks Meera Saheb.

Nobody knows exactly when the practice of fishermen going out with their families to pick shells started. “My grandfather used to tell us that his grandfathers did the same”, remarked Pemmada Jagannatham (60) who is a grandfather himself.

Why do the shoe dhoni fishermen take their families along? No hands are available from outside the family wives and children must help out. This is perhaps why the shoe dhoni folk beget so many children — few families have less than four. However, when the children grow up, they are no longer a part of the family. It is the father’s responsibility to arrange a dhoni for a son who gets married. Afterwards, father and son rarely operate together.

In many ways the customs and practices of the shoe dhoni fisherfolk are the same as that of the other fishermen. A council of elders settles disputes and decides on many issues, like fixing a date for departure to Chollangi. The shell collectors cannot move into the village earlier. “Anyone who ignores the elders and goes ahead will be fined,” says A. Apparao, a village elder. The fines are quite substantial and are paid without a murmur for fear of ostracism.

Marriages outside the community are quite common. Ganga Raju’s elder daughter Venkatalakshmi is married to a fishing trawler driver and the second daughter Gangaratnam married a nava fisherman who goes for gill net fishing. However, the dowry is high in such cases. Fishing with “silk vala” (nylon nets) is considered socially superior to shell collection. “If the



Fair-sailing fowl aboard the dhoni.

groom is one of us, the dowry is Rs. 1,000 - 3,000, but we pay up to Rs. 10,000 for a “silk vala groom”, says Venavadi Sathiraju.

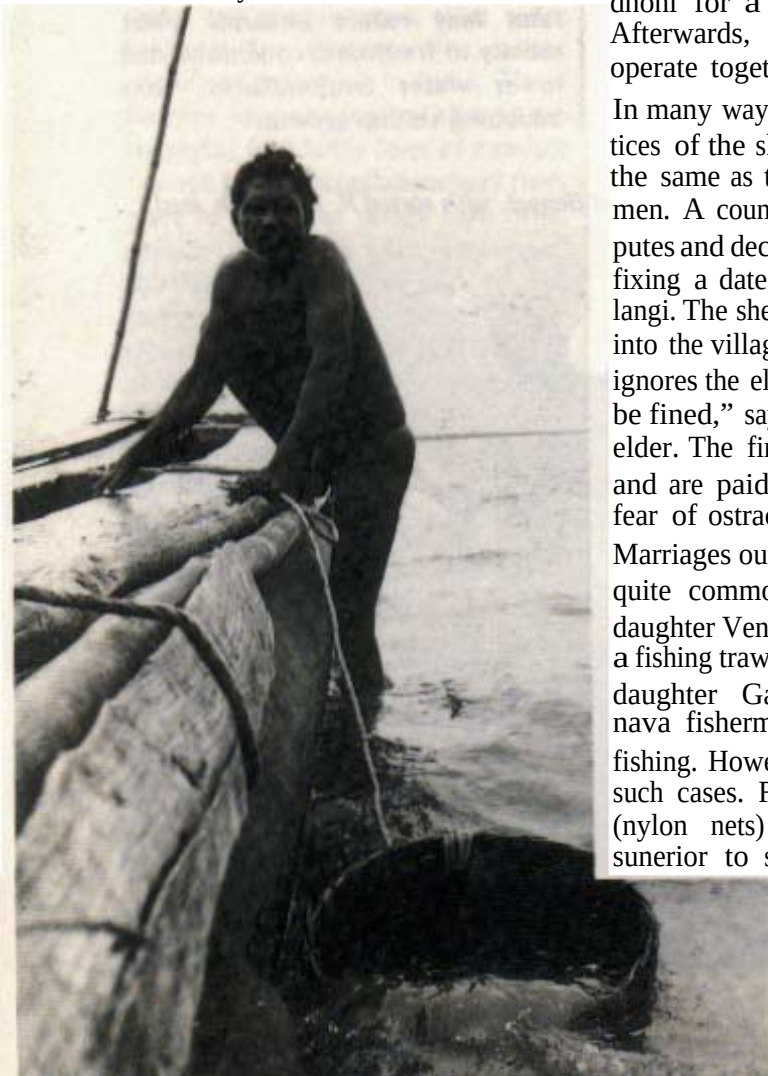
Some of the dhonis fish in the Godavari creeks for catfishes and hilsa. They practise “Vala Kattu”. Hilsa-fishing Stake nets are fixed against tides by an anchored dhoni, and a nava which the dhoni folk take along. The man in the nava and the woman in the dhoni together pull a net.

The dhoni fishermen don’t relish being away from the sea. “We stay idle on land, spend money and go in for loans”, says Sesharao.

Though many of the shoe dhoni folk own agricultural land, they don’t settle for a farmer’s life. They lease out the lands because their restless spirit never lets them stay in the village for long. They call it a day only when they are no longer able to collect shells. Then they sit back in the village to subsist on their meagre savings from yesterday, supplementing them with earnings from their lands and doing an occasional odd job. Very rarely do they depend on their children.

“We don’t make much money”, the shoe-dhoni folk say. The shell business just keeps them going. “Why do they still stick to it? “Because”, says Ramaswamy, “We were taught nothing else — this is what we have inherited from our fathers”.

The children have no other career option; the parents are reluctant to send them to school; “Our boats are our homes” may well be the refrain of the shoe dhoni folk even as they enter the 20th century.



Dhoni fisherman lands at shell ground.

Making high-quality shrimp feed in India : What do initial trials show?

by John Wood & Janet H. Brown

Can a nutritionally efficient low-cost feed for culture of tiger shrimp be developed indigenously in India? The BOBP's post-harvest unit is conducting trials and investigations towards this end. Preliminary results indicate that pelleted feed is preferable to dough-ball feed for high shrimp survival and growth.

The possibilities for increasing foreign exchange earnings and work opportunities in coastal areas by opening up low productivity Government lands to artisanal shrimp aquaculture has been receiving much attention in India. The most rapid developments appear to be occurring in West Bengal and Andhra Pradesh where shrimp farmers are actively adding supplementary feed. Fishermen and landless families are slowly taking up Government-sponsored initiatives and leasing lands for shrimp culture.

Seed and feed: prime inputs for shrimp expansion

However, in addition to land, the prime inputs for any shrimp expansion programme are seed and feed. Hatchery seed development has progressed to the level where there is an apparent over-production of post larvae. Unfortunately shrimp nursery developments have not kept pace with those of the hatcheries and hatchery shrimp of size p1 10-15, which are more susceptible to mortality during handling and environmental stress, are being marketed for pond stocking rather than the more hardy p1 20-30's. As a consequence, there is a regular demand and preference for wild caught post larvae, with all the associated potential for depletion of stocks which will ultimately make up the marine catch.

In contrast, there has been much activity both in the private and Govern-

ment research sectors to develop appropriate feeds to meet the growing demands from shrimp culturists, though few companies have reported regular or growing sales of their feeds. As in many countries, there is a natural reluctance within India to directly import technology and know-how from existing feed manufacturers, preferring to establish an indigenous shrimp feed industry using local raw materials. The question of raw materials supply within an expanding shrimp production industry was discussed in *Bay of Bengal News* No. 32 (Wood and Coulter 1989) but it is important to reiterate that certain of the feed components required for shrimp feed production within India are already being fully utilised by the

poultry feed sector. This particularly applies to fish meal.

Within the artisanal shrimp production sector, feeds are required for use in tidal-fed ponds without aeration. Here there is the potential to improve shrimp yields through appropriate stocking, feeding and pond management. Under present culture practices, shrimp yields range from 250 and 600 kg per hectare per crop depending upon the seasonal salinity of estuarine waters, use of supplementary feeding, stocking density etc. Often only one crop per annum is feasible since the monsoon rains may reduce estuarine water salinity to freshwater conditions, and lower water temperatures, thus inhibiting shrimp growth.

*Stocking of trial pond in Kakdwip, West Bengal, with sorted *P. monodon* seed.*



About the authors: John Wood is from the NRI (National Resources Institute), U.K; Janet Brown from the Institute of Aquaculture, University of Sterling, UK.



Grading of harvested P. monodon.

Feeding Trials

Shrimp feed studies, which have been established through the collaborative efforts of the BOBP's Post-Harvest Fisheries Project and the Central Institute for Brackishwater Aquaculture have been initially directed at determining the best form in which feed should be presented to shrimp under the semi-intensive tidal water exchange for semi-intensive culture conditions prevailing in India. Those farmers who are feeding shrimp are supplying feed in the form of a simple "dough ball". Formulations vary from place to place, but dough balls often contain groundnut cake, rice bran, fishmeal or trash fish and cooked cassava as a binder. Some include shrimp heads or cooked buffalo meat or clams or mussels as sources of protein, but none appear to be formulated to meet particular nutrient specifications.

From a practical point of view, dough balls require simple technology to prepare, though the cooking of cassava and meat materials can be time-consuming and energy-inefficient. However, if they were found to be effective means of providing feed to growing shrimps, then opportunities might exist for the manufacture of dough ball mixtures at the rural level using relatively simple grind-and-mix equipment. The fine powder mix could then be mixed with water at the pond or fed on trays. The wet dough ball

should be water-stable and contain a mixture of nutrients which have been shown to support good growth response in shrimp.

An alternative approach is to provide feed in water-stable pellet form as is the practice in intensive shrimp culture. Pellets have the advantage of being in a form which suits the natural particulate feeding activity of shrimp, enabling the shrimp to take the feed to a safe shelter for consumption, rather than consuming feed while resting on a larger dough ball from which feed must be torn or scooped.

From a manufacturing perspective, pelleted feeds require a considerably higher capital investment than a simple grind and mix system, consume a lot of power and need well-trained staff to operate. They are therefore better suited to more centralised industrial enterprises and less to rural operation.

With these points in mind trials were carried out to compare the growth response of tiger shrimp (*P. monodon*) when given feeds of identical formulation in the two forms — dough balls and pellets. In addition we wanted to see the effect of fertiliser supplementation on shrimp growth and also to obtain some indication of the capacity of the natural flora and fauna of tidal water to sustain shrimp growth and survival. Sun-dried poultry manure was used as the fertiliser supplement and water exchange occurred at

fortnightly intervals at new moon and full moon high and low tides (spring tides). The feeding trials were conducted at the CIBA Research Centre at Kakdwip, West Bengal using small research ponds of 0.027 ha. A stocking density of 100,000 *P. monodon* animals per hectare (10 per sq m) was adopted using wild but sorted seed. This is approximately double the stocking density adopted by farmers but was considered to be within the oxygen carrying capacity of the tidal fed ponds. Both pelleted feed and dough balls had a water stability of approximately 1.5-2 hours. All dough balls were fed on 1sq m plastic trays but pellets were fed on both trays and by broadscattering from the pond bunds. Each feeding treatment was fed in two ponds to enable average production to be measured, thus counteracting any possible differences in shrimp response due to the site of the individual pond within the pond complex.

It had been hoped to conduct the feeding trial over a full 120 days but unforeseen circumstances including the early onset of the monsoon meant that the trial was determined after only 97 days. (Unfortunately, disruptions to the transport system prevented the delivery of feed for the latter stages of the trial). The results of the feeding trial as given below are therefore for 79 days of feeding plus 14 days of fasting immediately prior to harvest.



Left : Sieving of powdered feed ingredients to remove foreign matter and ensure fineness so that the feed is water-stable. Right : Shrimp feed comes out in pellets from pelleting machine.

The results have been calculated on a per hectare basis to enable a ready comparison with other data.

Results

A number of interesting factors have emerged from the trial

1. Harvest yields of *P. monodon* were the greatest from the ponds fed scattered pellets followed by pellets on trays and dough ball treatments.
2. Survival was the greatest in ponds

fed scattered pellets but there was little difference between the pellets on trays and dough ball treatments in terms of survival.

3. The use of fertiliser appears to boost all four treatments in terms of both survival and yield. In the case of the unfed control group, fertiliser more than doubles the yield and survival.
4. The highest mean yield at 840 kg per hectare was approximately

double typical yields found in artisanal culture in India. This was particularly encouraging as the yield data was not corrected for the lack of feeding during the final 14 days of the trial. Furthermore it represented the yield from only 79 days of growth rather than the more normal 120-day growth period.

We can only speculate as to what might have happened if the shrimps had grown for the desired period, but

SHRIMP PERFORMANCE DATA FROM FEEDING TRIALS, MARCH-JUNE 1990

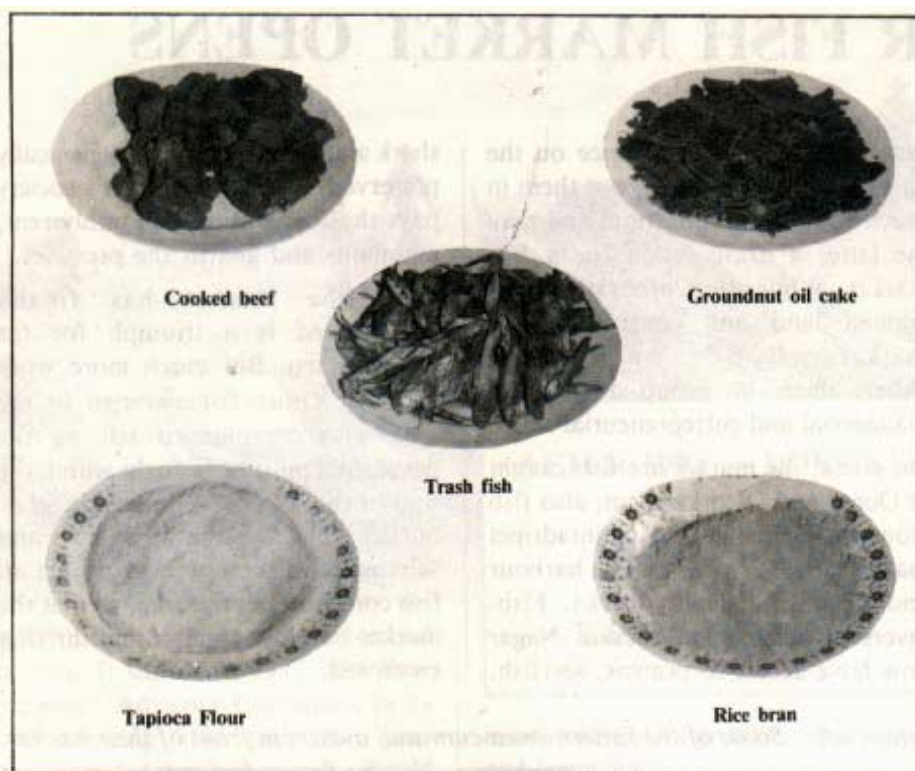
(Data presented as equivalent from 1 ha ponds) (mean of two ponds)

Treatment	100 survival	Pond yields calculated as kg/ha		% Crop <i>P.monodon</i>	Apparent Feed Conversion Ratios (kg feed/kg live wt gain)		
		Total biomass kg/ha	<i>P.monodon</i> kg/ha		A	B	C
Control	17.5	153	53	34.5	—	—	—
C+ Fert.	38.0	302	125	41.4	—	—	—
Doughball. T	47.0	600	396	66.0	5.9	3.9	3.9
D'ball. T + F	60.0	784	494	63.0	4.3	2.8	2.7
Pellets. Scat	68.0	939	746	81.4	3.7	3.0	3.0
Pell. Scat. +F	77.0	1106	841	76.0	3.6	2.8	2.8
Pell. T	55.0	1012	597	59.0	4.5	2.7	2.4
Pell. T+F	58.0	883	688	77.9	5.2	3.6	3.3

Notes: T = feed presented on tray F = fertiliser added to pond

FCR data A Assuming all feed was consumed by *P. monodon* B = Assuming feed consumption by total biomass

C = Assuming feed consumed by *P. monodon* was in proportion to the % of monodon in the harvest.



Ingredients of dough-ball feed used by Andhra Pradesh shrimp farmer.

there were clear signs of a potential harvest of an equivalent of more than 1 tonne per hectare from a single crop. The apparent low yield response of shrimp fed the doughball feed was disappointing but this was noticeably related to the low survival level of shrimp on this diet. Since both feeds were of identical formulation, shrimp survival was distinctly related to the physical form of the diet.

However, from the shrimp farmer's perspective, the bottom line with all shrimp feed development is not necessarily the price of feed per kg, but what is the cost of feed per kg of shrimp reared. In this respect it is important that the cost of feed consumed by extraneous shrimp and fish of low value within the ponds may be greater than the financial return on their sale.

It is not always possible to equate the results of shrimp or fish yields from small ponds to those of farm scale, so to obtain a more realistic result of potential yields from artisanal culture we have started larger pond trials (ponds of 0.65 ha) in collaboration with the Directorate of Fisheries, Andhra Pradesh. In these trials we are investigating the response of shrimp fed dough balls or pellets using the same feed formulation as at Kakdwip. We are also comparing the outcome to the growth response of shrimp fed a locally formulated, lower-nutrient quality and lower-cost feed which numerous farmers in Andhra Pradesh have been using for some time.

The economic implications of our initial feeding trials will be evaluated in the light of the farm-scale trials in Andhra Pradesh and will be reported by BOBP at a future date.

However, the conclusion of these preliminary studies appears to be that feed in dough ball form is less desirable than feed in pellet form for maintaining high shrimp survival and growth. Further work by research bodies and the private sector is therefore needed to find suitable formulations and pelleting technology, suited to Indian raw materials, for preparing nutritionally efficient and financially acceptable shrimp feeds.

ABSTRACTS OF BOBP PUBLICATIONS

Small-scale fisherfolk and the BOBP
A 20-page illustrated colour brochure that describes the aims, the methodology, the activities and achievements of the BOBP.

BOBP/REP/44 – Report of the Fourteenth Meeting of the Advisory Committee.

This paper records the recommendations of BOBP'S 14th Advisory Committee meeting held in Medan, Indonesia, early 1990. It also contains a summary of work done in 1989.

BOBP/WP/61 – Development of outrigger canoes in Sri Lanka

This paper discusses the role of outrigger canoes, traditional and modern, in Sri Lanka's fishery and their future in the context of the availability of

boatbuilding materials. It also discusses the aims and design features of new canoes developed and demonstrated recently in Sri Lanka with BOBP assistance, and the performance of these canoes during trials in Negombo and Dodanduwa in southern Sri Lanka. The paper makes some suggestions for future development.

BOBP/WP/62 – Silviculture project in Sunderbans, West Bengal: A summary report of BOBP's assistance by Charles Angell and James Muir

This paper discusses BOBP's assistance for a SIDA-supported silviculture project carried out in West Bengal. The assistance was in the form of four consultancy assignments carried out between end 1986 and early 1988. They

related to advice on improving aquaculture production in the silvipisciculture units; providing suitable cost-effective sluice designs and guidelines for water management concerning sluice operations; a socio-economic study to identify mechanisms for people's participation in silvipisciculture; and assistance in evaluating the project's outcome and making recommendations for the future.

BOBP/INF/10 – Bibliography on Gracilaria – production and utilization in the Bay of Bengal

This bibliography was prepared for a seminar on Gracilaria, held October 1989 in Songkhla, Thailand. It deals with the biology, resources, culture, processing and marketing of *Gracilaria* spp.

BESANT NAGAR FISH MARKET OPENS

The doughty fisherwomen of Besant Nagar have finally fulfilled their dream; their fish market was declared open on August 22 in the presence of two Tamil Nadu ministers. A society of fisherwomen (known as the Oorur Olcotkuppam Meenava Mahalir Munnetra Manram) will administer the Rs. 4.5 lakhs 80-stall market.

Earlier issues of *Bay of Bengal News* (September 1989 and March 1988) described the fish marketing problems of Besant Nagar fisherwomen and the gradual evolution of an exclusive market to solve these problems. To summarize, BOBP encouraged self-

examination and self-reliance on the part of the fisherwomen, put them in touch with the Corporation, and gave the latter a draft design for a fish market. While the Corporation sanctioned land and constructed the market, BOBP trained the fisherwomen in group formation, managerial and entrepreneurial skills.

On sale at the market are fish caught at Oorur and Olcotkuppam, also fish from the Saidapet and Chintadripet markets, the Royapuram fish harbour and from Chingleput district. Fish-lovers in and around Besant Nagar now have access to prawns, seerfish,

shark and crabs, fresh and hygienically preserved. The fisherwomen's society pays the Corporation a monthly rent, maintains and guards the premises.

That the market has finally materialized is a triumph for the fisherwomen. But much more work remains. Other fisherwomen in the area who continue to sell on the pavements must be brought within the fold of the society. A combination of quality control, business acumen and salesmanship is essential to attract all fish consumers in the area, so that the market becomes a viable and thriving enterprise.

Fish on sale at the Besant Nagar market. Bottom left : Some of the fisherwomen-cum-stall owners in front of their market.





AFTER 1992 — BOBP'S

THIRD PHASE

TAKES SHAPE

BOBP's second phase comes to an end in 1992. It started in 1987. The Programme's Advisory Committee in its 14th Meeting held early this year recommended that high priority should be given to preparing a proposal for the third phase of the Programme. The committee also suggested that this should be a participatory effort involving all member countries and potential donors. The work started in June and is nearing completion. The outcome, a "final" third phase proposal, will be presented to the 15th Meeting of the Advisory Committee in January 1991.

What does the proposal contain? In general, the third phase is envisaged as "management" oriented. The first phase was "production" oriented and the second is "extension" oriented. The proposal has also a stronger element of institution-building than the earlier phases. Environmental protection is a major challenge of the 90's, and the programme will deal with certain aspects of this.

The largest component of the programme is to tackle coastal fisheries development and management. It will be technical, biological and socio-economic in scope: it will cover traditional and non-traditional small-scale marine capture fisheries including resources aggregation and enhancement. The aim is sustained production.

Another important component, more so than in the past, is Post-Harvest Fisheries. Given the limitations of production and of the options for increasing production, better utilization of existing production to reduce

losses and add value takes on urgency and immediacy.

The third major component is aquaculture, primarily in brackish-waters. There is still a lot to do in technical development; the work is envisaged as a direct continuance of BOBP's previous work.

The two remaining components consist of Development Support Services and Extension Support. Under the first, project proposals will be generated, studies conducted, development and management schemes for small-scale fisherfolk communities taken up. An important responsibility is to assist member governments to expand or extend successful BOBP work in technology and methodology development. Extension Support will primarily deal with communication techniques with and among fisherfolk, and with people-oriented extension methodologies and participatory approaches. Both these components, while being important in themselves, are seen as support elements to the three major disciplines discussed earlier.

The third phase is scheduled to start in 1993 and go on for at least five years. Estimated budget: US \$ 3-3.5 million per year.

The third phase proposal follows from three meetings organized by the BOBP between June and September. Throughout the process, the programme was assisted by the Secretary of the Bay of Bengal Committee, who is the FAO Regional Officer in Bangkok.

The first meeting, in which all member countries — plus Myanmar as a potential future member — participated, was held in Madras in June. That meeting reviewed the BOBP's past experiences, analyzed the needs and priorities of member countries, and considered the work and functions of other fisheries organizations in the region. On the basis of this, the scope of the third phase was defined.

The first meeting also elected two representatives, India and Malaysia, to develop a programme proposal. This was done in a second meeting with India and Malaysia held in July.

The third meeting was a consultation between the representatives of BOBP countries and potential donors. The third phase proposal was presented and discussed. The views of the donors were obtained and subsequently incorporated into the proposal.

The third phase is thus taking shape, and a clearer picture may emerge January next, when the BOBP Advisory Committee meets in Colombo.

BOBP: New Telephone Numbers

Readers of *Bay of Bengal News* may please note our new telephone numbers in Madras

836294	836188	836179
836096	836387	836102

Our new fax number is : 044-836102

Our telex number
remains unchanged.

BY-CATCH FROM SHRIMP TRAWLING

Shrimp trawlers in the tropics target penaeid shrimps of various types — tiger, brown, white, banana, etc. In the course of their operation, large quantities of non-targeted species (by-catch) are caught in the trawls. This by-catch constitutes as much as 85-950% of the catch, depending on the area and the degree of exploitation. The by-catch is not well utilized; most of it is dumped overboard by the large shrimp trawlers.

The waste of large quantities of shrimp by-catch has been an issue on the agenda of fisheries scientists, technologists and developmentalists for decades, ever since shrimp trawling became a lucrative business. Those most directly concerned are the processing technologists who have sought to find ways of improving the utilization of by-catch. The fishing technologists and biologists have examined methods of reducing the amount of by-catch caught by the trawlers.

A recent BOBP study centered on the northeast coast of India indicates that as much as 100,000 tonnes of by-catch is discarded at sea every year. This figure appears to be especially high, when considered in relation to the total small-scale sector landings in that area of about 250,000 tonnes.

The reasons for dumping the by-catch are mainly economic. It simply doesn't pay to land it. By-catch value in absolute terms is low, and in comparison with the "golden" shrimps, virtually negligible. Several attempts have been made in different parts of the world to make use of the by-catch by upgrading its value. There have been few successes.

But is the unsuccessful utilization of by-catch a blessing? The pilot study in the upper Bay of Bengal also indicates that more than half of the by-catch, in terms of weight

could be immature fish of high-value commercial species that are being or could be exploited by small-scale fisherfolk.

Promoting better utilization of by-catches from existing trawlers is tempting, and there are noble, emotional and even logical justifications for it. In the long run, however, it might be counterproductive — since better utilization will make the operations more economic, and thus more intensive or durable to the detriment of fishery resources at large. This scenario has already been played out in small-scale day-boat trawling, where the cod end mesh sizes have become so small (10 mm) that everything on the ocean bottom is collected. Trash fish is used for fish meal and also as manure, and shells are used for making lime. Small trawlers covering a limited depth range in the shrimp ground operate almost like dredgers, wreaking havoc on the ecology of the deep.

The rational long term approach to the problem of by-catches is to reduce them. In theory, this can be done by regulating mesh sizes or seasons and areas of fishing. In practice, however, the only way to prevent trawling from endangering the long-term sustainability of coastal fisheries is perhaps to prohibit it. This may sound a drastic measure to many, but it can be done. Indonesia did it many years ago, and other countries are contemplating it too. The sooner it happens, the better for the environment and for small-scale fisherfolk.

LARS O ENGVALL



Bay of Bengal News is a quarterly publication of the Bay of Bengal Programme (BOBP), a regional fisheries programme which covers seven countries around the Bay of Bengal — Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka, Thailand. The Programme plays a catalytic and consultative role : it develops, demonstrates and promotes new techniques, technologies or ideas to help improve the conditions of small-scale fisherfolk communities in member-countries. The BOBP is sponsored by the governments of Denmark, Sweden and the United Kingdom, by member-governments in the Bay of Bengal region, and also by UNFPA (United Nations Population Fund) and AGFUND (Arab Gulf Fund for United Nations Development Organizations). The main executing agency is the FAO (Food and Agriculture Organization of the United Nations).