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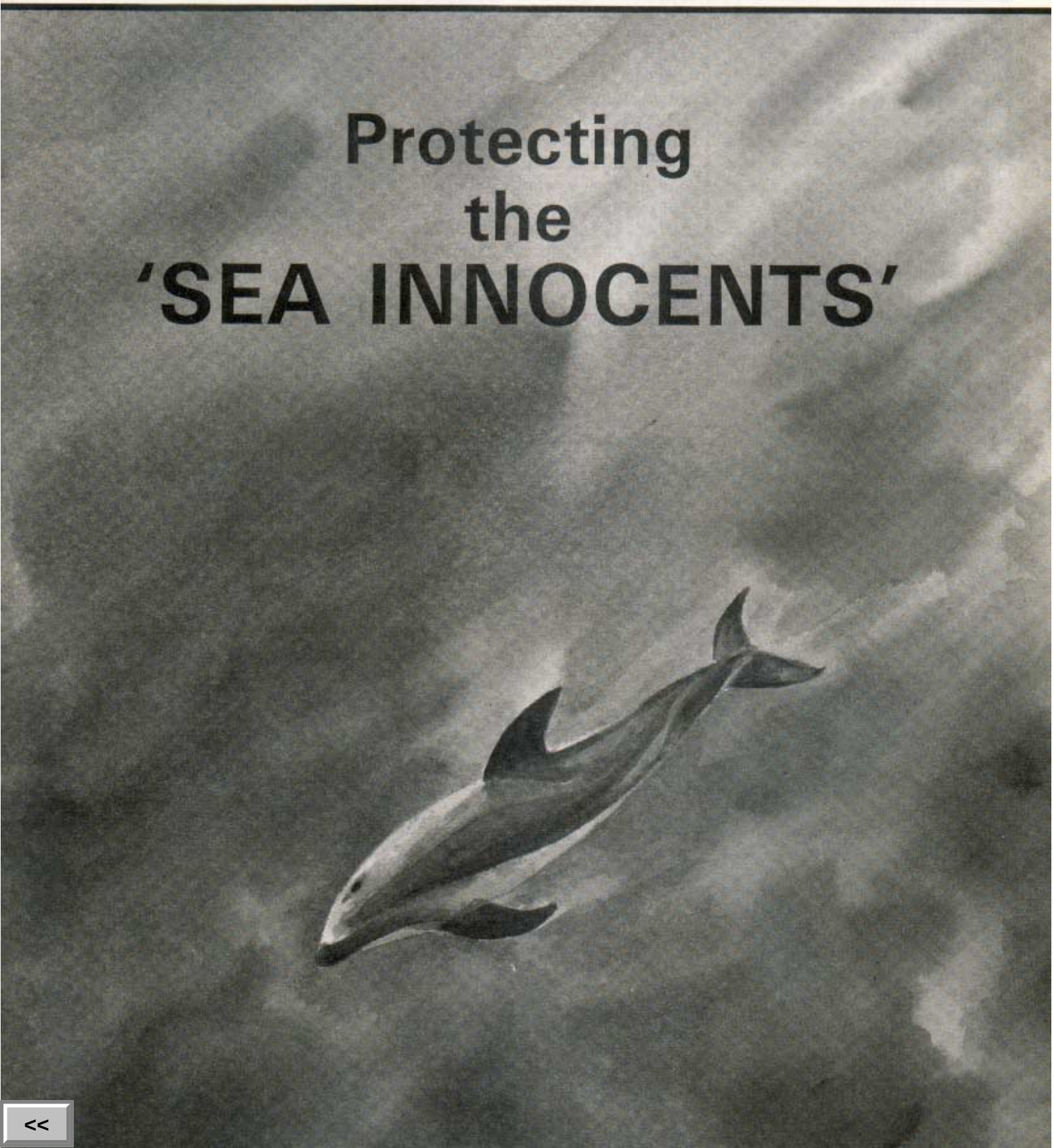
Protecting the 'SEA INNOCENTS'



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A study to protect the 'sea innocents'

by Lisa C Durante

The dolphin, that "most precious mammal", is being heavily fished in many parts of the world. One country, Sri Lanka, has begun a study to save this natural heritage of the seas around the island.

Recent headlines in Sri Lanka newspapers screamed of massacres of 60,000 "sea innocents" a year. This is an overestimation which suffers from "inadequacy of area, seasonal coverages and improper assessment of sighting efforts," says Leslie Joseph, Programme Officer of the Bay of Bengal Programme (BOBP) in Sri Lanka. The National Aquatic Resources Agency (NARA), which has, since *1985,* been studying the problem of small cetacean catches around the island, indicates an annual catch closer to 16,000. Forty per cent are harpooned and sixty per cent drowned, as a result of accidental entanglement in the synthetic drift gillnets being used in fisheries today.

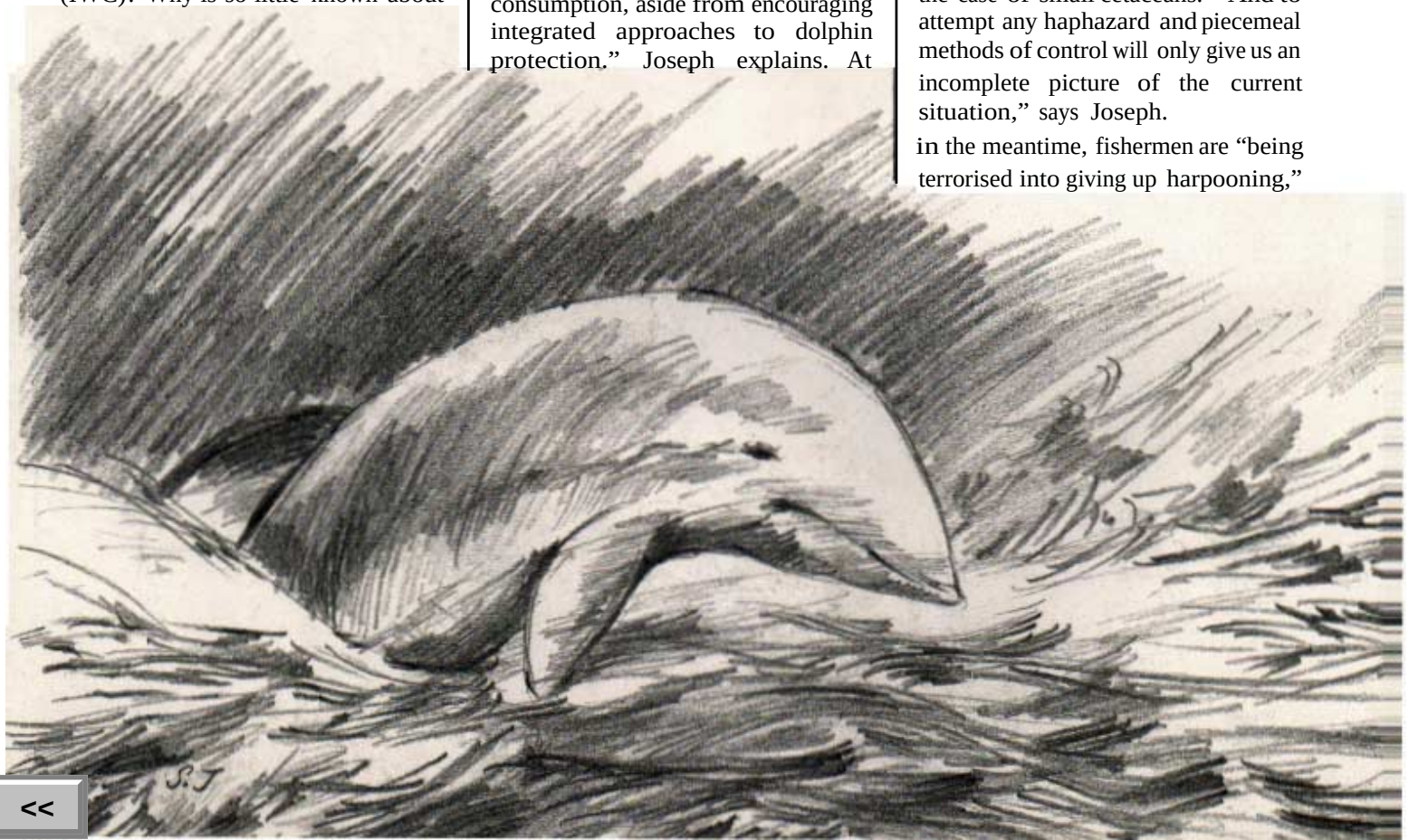
Why does dolphin mortality cause such an international ruckus if their protection is not even shortlisted by the International Whaling Commission (IWC)? Why is so little known about the socio-economic importance of dolphin catches to fisherfolk and the consumer? Why are we unable to gauge attitudes and perceptions of fisherfolk, traders, consumers and non-consumers regarding dolphin capture and utilization? Furthermore, why is dolphin mortality perceived as a threat to the species' existence when neither figures of dolphin population, nor accurate estimates of catches in targeted and non-targeted fisheries, are known? These questions need answering quickly if Sri Lanka is to meet the widespread criticism, some unjustified, that it is at present facing.

Despite a positive increase in public awareness of the plight of the dolphins on the one hand, we are witnessing, on the other, agrowing consumer demand for dolphin meat. "Therefore the need to acquire a holistic understanding of the phenomenon of catching and consumption, aside from encouraging integrated approaches to dolphin protection." Joseph explains. At present there is only "confusion" on the subject, he stresses.

Confusion also reigns in Mirissa, 90 kilometres south of Colombo. This fishing village is a major dolphin catching centre, together with Negombo, north of Colombo, and Dondra in the south. Fishermen here no longer dare to bring harpooned dolphins to the landing sites. They have recently been warned by police officers that they will face Rs 5,000 fines and confiscation of the vehicles used to transport the "illegal" carcasses.

There is, however, no legislation banfling killing, possession or sale of dolphins or small cetaceans, except for the virtually extinct dugong! The 1956 Whaling Ordinance has, perhaps, been incorrectly interpreted by officials to cover other marine mammals, although it has rarely been enforced in the case of small cetaceans. "And to attempt any haphazard and piecemeal methods of control will only give us an incomplete picture of the current situation," says Joseph.

in the meantime, fishermen are "being terrorised into giving up harpooning,"



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How many dolphins does Sri Lanka really catch?

A REPORT


Sri Lanka kills over 60,000 dolphins a year!

Massacre of sea 'innocents'

An artide by **Kalpana** Isaac *in the* Sunday Observer, *Colombo of August 18, 1991, attracted a great deal of attention in fisheries as well as conservation circles world-wide. Some excerpts:*

Sri Lanka is responsible, according to the International Whale Commission, for killing over 60,000 dolphins a year. Sri Lanka is not an IWC member, but its law bans the killing of dolphins.

When synthetic nets replaced cotton nets in the island in the 1950s, dolphins getting caught in these nets and not being able to cut free became a problem. Fishermen have used this as an excuse to catch dolphin and market the 'catch'.

Statistics given by the IWC, however, show that deep-sea trawlers are only responsible for 12,000 dolphin deaths; gillnets and harpooning are responsible for 50,000.

The fishermen go to great lengths to point out that if a dolphin gets caught in a net and is hauled up on deck it dies. Without throwing the carcass away, they just make use of it, they claim. "If the dolphin is still alive when we reach the shore we throw it back in the sea. If it is dead, why shouldn't we make use of it?" they ask.

To the fishermen's complaint that they have no option, environmentalists answer that this does not have to happen. A small metal device on any net, they claim, will keep the dolphins away.

We visited a dolphin *wadiya.* Stacks of dolphin meat were laid out in the sun to dry. Cartloads of dolphin meat were being taken away, and a number of freshly severed dolphin heads were floating in the water nearby. The fishermen see no problem with killing dolphins.

Dolphin is sold in Colombo and Kandy as dugong, or sea pig, which is considered a delicacy. Sometimes it is sold as shark. This is because, traditionally, Sri Lankans do not eat dolphin.

The IWC claims that the Pantropical spotted dolphin, Risso's dolphin, Sinner dolphin and the striped dolphin are all now endangered.

Once called man's best friend, because it is considered more intelligent than the average fish or mammal, the dolphin now faces extinction, as man exploits its commercial value.

AND A RESPONSE

Dr. (Mrs) **Pauline** Dayaratne, *Director, Marine Biological Resources Division, Sri Lanka, responded to this report in these terms:*

'The statement 'Sri Lanka kills over 60,000 dolphins a year' gives the public a wrong impression about the dolphin killings in Sri Lanka. This figure has been taken from one report where there is an overestimation of the dolphin catch in Sri Lanka. There is other published information where the estimates range from 8,200 to 60,000. Hence it is not correct to give publicity to a high figure which is an overestimation. Because of the international interest on the subject, many environmentalists are trying to label Sri Lanka a dolphin killing nation.

As the statistics available about killing of dolphin in Sri Lanka is not accurate, the Ministry of Fisheries and Aquatic Resources through the National Aquatic Agency (NARA) recently initiated a project to study the dolphin catches and its socio-economic impact. This study is funded by FAO/BOBP (Bay. of Bengal Programme) and is executed through NARA.

The statement that Sri Lankan law bans the killing of dolphins is not correct. Killing of whales and dugong are banned by the Wild Life Act, but not the killing of dolphins.

according to one disgruntled fisherman. "Policemen don't even like us to sell dolphin by-catch," he adds, "But we must survive, musn't we, especially during the lean fishing season, when it's hard to make ends meet?" "With *mullah* * we earn between 35 to 70 Rs/kg. Not bad, eh?" another asks. (The current price of mutton, for instance, is 80 Rs/kg in Sri Lanka.)

Yet few fishermen, or coastal residents, in Sri Lanka would even consider eating dolphin meat. Vague explanations about evil spirits, or bad luck befalling anyone who dares sample dolphin flesh, have been traced by the NARA researchers involved in the small cetacean study. The only unrepentant carnivores are the •Mirissa fishermen who consider dolphin liver cooked in chillie sauce a tasty dish to be eaten with rice and other curries!

Inhabitants of the inland tea estates also enjoy fresh dolphin steaks — but without realizing what they are eating. Middlemen fob the mammal off as

* ***A local*** *colloquialism* ***for*** *the* ***dolphin***

muhudu ura (sea pig), a fictitious hybrid similar to the dugong. Dolphin flesh is also dried, at places like Negombo, and transported inland. But whichever way it is marketed, there is widespread ambivalence among consumers as to what exactly they are eating.

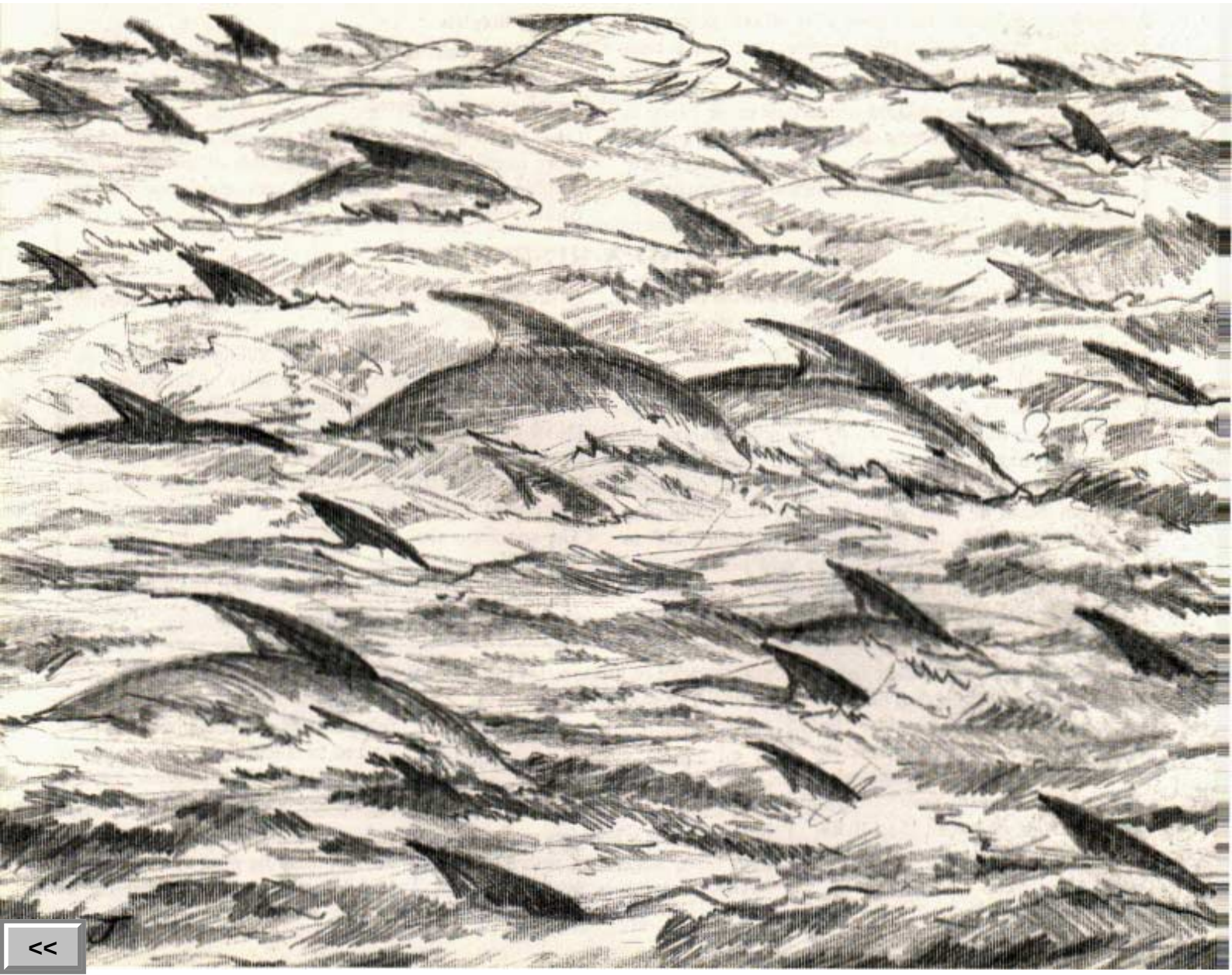
It is in an attempt to quantify "the impact of dolphin catches on the population of these species, and assess the socio-economic importance of these catches on all sectors of society," that BOBP and the Sri Lankan Government, through NARA, have decided to join forces in a one-year study. The aims are also to give direction to future dolphin management and lay the groundwork for an integrated awareness campaign.

The Lanka Market Research Bureau has been subcontracted to examine socio-cultural, economic and consumer perceptions and market related aspects of the dolphin fishery. NARA will continue with its quantitative study and bio-economical data collection. Tissa de Alwis, Managing Director of LMRS, and Nihal de Silva, his Research Director, have taken up this "sensitive study" as a "challenge". de Aiwis claims that "there is a need in Sri Lanka to approach development, conservation and sustainable commercialization as a whole, without being forced down the path of one without the other".

With the aid of seven data collectors stationed at landing sites in different parts of the island – excluding the war-torn northern reaches – and inputs from NARA management and BOBP consultants, several research areas will be covered

1. Data on island-wide dolphin catches over a one-year period – according to species, location, methods of capture and total catch! effort measured through gear and craft.
2. Fisherfolk motivations behind intentional dolphin capture.
3. Absolute and relative quantities of dolphins available in selected fish markets.
4. Costs and earnings analysis of various combinations of fishing craft and gear in the accidental capture of dolphins, and a comparative income study in relation to finfish! shellfish catches.
5. Dolphin meat prices versus fish costs on an utilization basis.
6. Consumer survey examining reasons behind dolphin meat preferences.
7. Sociological perceptions on the capture, utilization, and dolphin consumption among fisherfolk, traders, consumers and officials involved in this sector.

The scope of this study is diverse and ambitious. But such a study is necessary for Sri Lanka to organize its future offshore fisheries expansion schemes and, at the same time, protect this "most precious mammal" and the national dolphin heritage.



SHRIMP BY-CATCH

A problem in the Bay that has as yet found no viable solution

by Barry Blake* and Tim Bostock+

Globally, the shrimp trawler industry is responsible for discarding many thousands of tonnes of by-catch every year. The UK'S Natural Resources Institute (NRI) has been working with the Bay of Bengal Programme to try and find ways of making available for human consumption this potential resource of food fish from the northwest Bay of Bengal.

The wastage begins. After sorting out the shrimp and large fish, the rest gets returned from whence it came.

Over 100,000 t of by-catch are annually thrown back into the sea by the Vishakhapatnam-based fleet trawling for shrimp off the eastern coast of India. A Bay of Bengal Programme (BOBP) Post-Harvest Project study reveals that the freezer trawlers have the capacity to land much more by-catch than the small amount they actually do. But they do not find it worthwhile. However, even if they did use their full capacity, they would only be able to land just a fraction of the total by-catch now discarded. With the only potential solution, collection at sea, unattainable at present, the study raises the question whether hauling in the by-catch can at all be avoided and, thereby, prevent the possible adverse effect on the finfish resource.

The *Bay of Bengal News* a year ago drew attention to the biological aspects of shrimp trawler by-catch. The study of by-catch was undertaken by the ODA-funded component of BOBP and is now able to complement what was stated in that article.

The study began in 1988, when an NRI market economist took a detailed look at the by-catch associated with the shrimp fishery off West Bengal (Gordon, 1990). The consultant cooperated with a Swedish International Development Agency (SIDA)-funded fisheries scientist (K9llberg, 1989) to develop both a pre- and post-

* **National Resources Institute, U.K.**

+ Post-harvest Fisheries Adviser - ODA Project.

harvest picture of the northwest Bay of Bengal fishery. The results were disconcerting. It was estimated that between 100,000 and 130,000 t of by-catch (mostly small fish) are annually thrown back into the sea by the Vishakhapatnam-based trawler fleet. Double-rigged freezer trawlers of 20 m and over, which operate on the Sandheads grounds off West Bengal, are responsible for about 50 per cent of these discards. The remainder is by smaller vessels, ranging from 10-li m mechanized fishing boats to 16-19 m double-rigged trawlers.

This wastage appears, on the surface, to be absurd, taking place as it does adjacent to a country with pressing population problems and increasing demand for food fish. However, Gordon's study described very real constraints operating on the fishery that limit exploitation of this wasted resource. Key among those identified were a combination of technical, financial and 'institutional' constraints. The examples given are representative rather than exhaustive:

TECHNICAL

- limited chill or cold storage capacity, especially on smaller trawlers;
- possibility of heat shock damage to high value shrimp by retention of large volumes of fish; and
- difficulties related to transfer at sea to collector vessels.

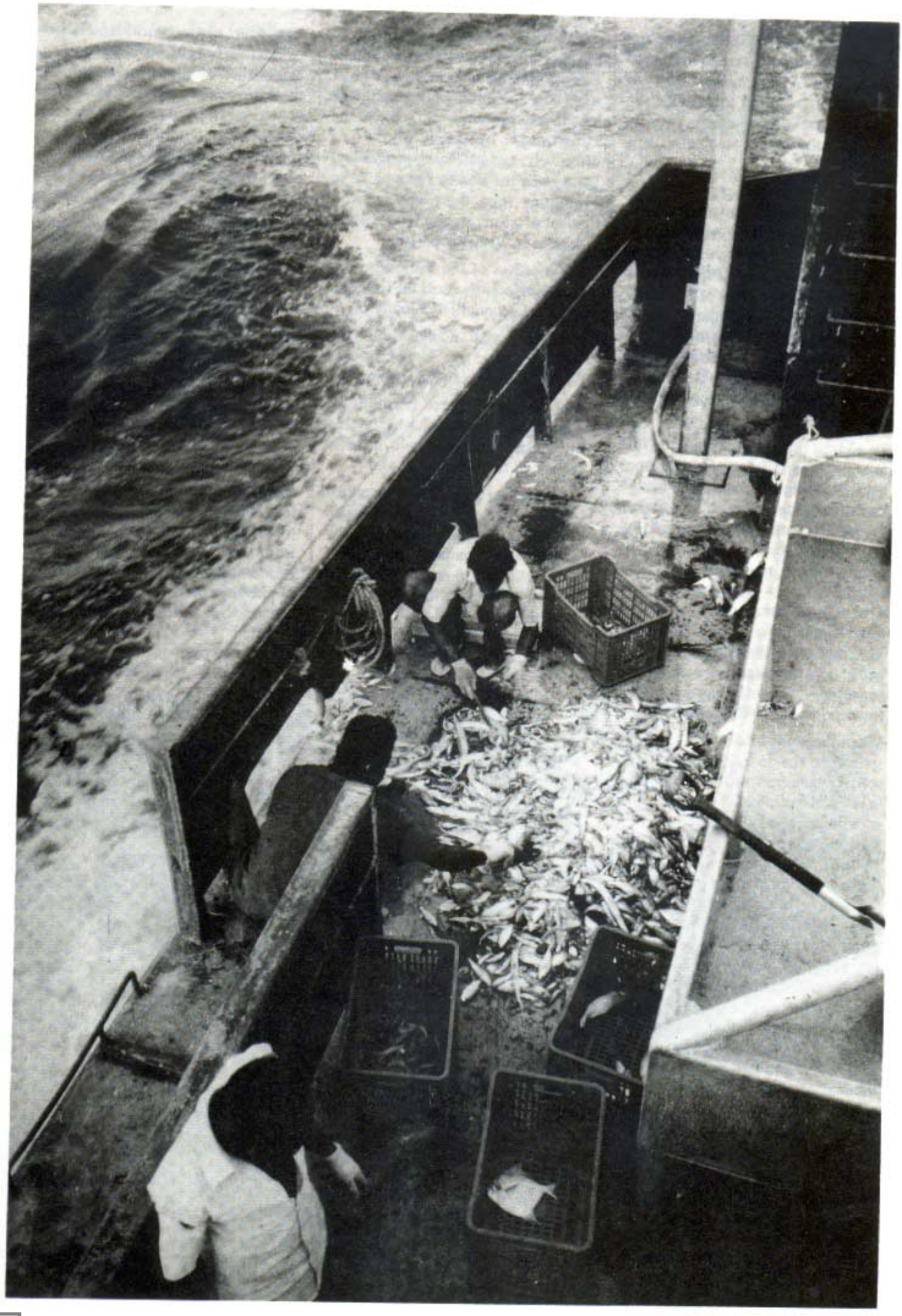
FINANCIAL

- low prices achievable for landed by-catch *vis a vis* shrimp;
- lack of market development for value-added product options; and
- lack of marketing infrastructure (cold chains etc).

INSTITUTIONAL (problems resulting from existing systems)

- Crew's benefit more than owner's from by-catch sale (transactions tend therefore to be time-consuming and favour clandestine activities); and
- trawler operators are entirely motivated by the high returns from shrimp, fearing loss of revenue both from damage to catches through by-catch retention and from illicit transfer of shrimp at sea to collector vessels.

Above: Small-scale intermediaries, like these 'barrow boys', transport the small miscellaneous frozen fish from the trawlers to local auctions. On right: Sorting the catch aboard a large trawler – shrimp and the better quality fish are frozen, the 'trash' shovelled back into the sea. And below, a rare and hazardous liaision: opportunistic bartering of victuals and other items during the fishing operation is neither a feasible nor acceptable option at present.



One thing was very clear from the studies carried out – much of the by-catch was far from being 'trash', a term commonly used to describe the by-catch; in fact, a significant proportion of good quality table fish was discarded at sea.

BOBP's Post-Harvest Project examined the constraints and sought ways of counteracting them in order to make more by-catch fish available foi human consumption in a form acceptable to consumers. Years of experience from similar fisheries around the world has clearly demonstrated that producing novel fish products, such as frozen minces – which to the prospective consumer are not recognizable as fish, was not the answer.

To address the technical issues, BOBP arranged for an NRIprdcessing technologist to provide assistance in the implementation of a pilot project designed to promote landing of by-catch from freezer trawlers. The resultant raw material was to be utilized both by local women's fish processing groups and by the burgeoning interstate fresh fish trade. To understand the rationale of this work it is necessary to understand something of how the existing freezer trawlers deal with their catches.

When the net is hauled and the catch spills onto the deck, it is immediately sorted by the crew with clear priorities in mind. Recovery of the shrimp is first consideration; secondary to this is the selection and retention of large, high value fish. During the early part of the voyage, it is most likely that all other components of the catch will simply be thrown back into the sea. This includes genuine trash which cannot be utilized (for example, seaweed, molluscs, non-penaeid crustaceans and small, inedible fish) and also smaller (but often larger than 15 cm), low-value specimens of fish, like croaker *(Sciaenidae),* catfish and jack *(Carangidae).* Only towards the end of a voyage, when available storage space is easier to predict, is any attempt made to retain this 'small miscellaneous' by-catch.

When the vessels return to port, the primary catch of shrimp is marketed by the trawler operators. The fish may, on the other hand, be sold by the crew to small-scale traders, who send them directly to Calcutta's wholesale market. Under current practice, it is not possible for a trader to buy only one portion of the fish catch. Both categories, large high value and small miscellaneous, must be bought. This system has combined with some of the constraints outlined above to effectively exclude local processors, particularly the women's groups, from benefitting from the relatively small amount of freezer trawler by-catch that is landed in Vishakhapatnam.

The objectives of the Project's work were, therefore, to assess the technical and social economic feasibility of:

- making small miscellaneous by-catch from the large trawlers available to local processors;
- providing improved methods of salting and drying fish which would stimulate demand and increase revenue from by-catch; and
- establishing marketing of increased volumes of fresh-frozen by-catch which would stimulate, by example, demand from local traders and, thereby, encourage freezer trawlers to land more of the by-catch.

In support of this work, the Project, over an eight-month period, established pilot processing and marketing trials backed by a data collection system to gather information on the fish landed by the freezer trawler fleet in Vishakhapatnam. This also provided information on the constraints which vessels might face in landing more by-catch.

The key aim of the study was to involve groups already marketing fresh fish and processing dried fish. Active women members of the fishing communities of Thimmapuram and Uppada (dried fish) and Kotha Jalaripetta (fresh fish) were consulted. Although there was participation in improved processing trials using drying racks and modified brine vats, it proved difficult to persuade women's groups to participate financially in the utilization of by-catch. It was generally felt that the initial purchase price was too high when compared with traditional sources from smaller trawlers. Subsequent marketing trials of the improved dried product conducted by BOBP (see Table 1)

Below and on right: Womenplay the major role in purchasing, sorting, processing and marketing of the by-catch, especially from the smaller trawlers.

suggested this was true, although procedural factors, in both processing and marketing, may have had a negative influence *(e.g.* selling in mixed batches, which is against normal practice). Moreover, an assumption-by the Project that an improved product would attract high retail prices and, thereby, offset the capital investment required, was not borne out in practice.

Table 1
Results of dried fish processing and marketing trials

Procurement and unloading cost of fish/kg	Rs 4.00
Salt cost/kg of fish	Re 0.50
Transport costs to processing community/kg	Re 0.80
Labour cost/kg	Re 1.00
TOTAL COST	Rs 6.30
Yield of dried fish: 45 per cent.	
Cost of'dried fish/kg	Rs 14.00

Average prices/kg received from 13 **shipments**

1. Nallapalli	Rs 6.47	10. Kakinada	Rs 4.00
2. Nallapalli	**Rs** 5.82	11. Hyderabad	Rs 4.50
3. Thadepalligudam	Rs 8.00	12. Vizag	Rs 1.50
4. Madras	Rs 6.82	13. Madras+	Rs 15.00
5. Hyderabad	Rs 6.28		
6. Madras	Rs 5.83		
7. Vijayawada	Rs 10.43		
8. Vijayawada	Rs 7.00	+(Tamil Nadu Fisheries	
9. Kakinada	Rs 4.00	Development Corporation)	

Note: Dried fish was marketed in small mixed batches, which is not typical, and would have had a negative effect on prices received. Batch 13 is clearly not typical of prices received from private traders. Batches 9-11 were sold for fish meal, and Batch 12 was auctioned locally in Vishakhapatnam. Processors consider the raw material costs of by-catch obtained from freezer trawlers unacceptably high. By-catch purchased from small trawlers making daily fishing trips is cheaper.

Source: ODA Post-harvest Project (compiled by Blake. and Gordon, 1991).

Results from fresh-frozen fish marketing trials of small miscellaneous by-catch (see Table 2) were similarly disappointing, with the high price of purchase from the trawlers *(3.25* Rs/kg) combined with low market price being key factors in the failure to achieve profitability. While it is recognized that acumen, opportunism and a degree of guile on the part of the small-scale trader would give them a distinct commercial advantage over results obtained by the Project, there are other factors which combine to limit the potential feasibility of increasing the utilization of this category of by-catch.

Principal amongst these is the fact that the few local traders who are already involved in- this activity are, contractually obliged to purchase mixed loads of by-catch fish, comprising both high-value table fish (retained throughout the voyage) and small miscellaneous fish (targeted by the Project). These are then marketed on an aggregate basis, with the small fish generally being used to make up

Table 2

Summary of results obtained from trial marketing of fresh/frozen small miacetuaneous fish to several locations In India either by train or truck between November 1990 and March 1991

Market	Number of consign-ments	Total procured (kg)	Cost (Rs/kg)	Un-loading costs (ks/kg)	Local transp. (Rs/kg)	Ice & packing (ks/kg)	Trans-port to market (ks/kg)	Drip loss (kg, 4% of total proc.)	Total marketed (kg)	Market expenses (ks/kg)	Total short weight (kg)	Total sold & paid (kg)	Price rec'd (ks/kg)	Commi-ssion (ks/kg sold)	Total expendi-ture (/kg sold)	Margin (price minus expendi-tare)
Bhilai by train	15	1,339	3.25	0.65	0.29	1.51	0.70	54	1.285	0.54	64	1,221	6.33	0.32	7.91	-1.57
Calcutta by train	15	2,353	3.25	0.65	0.30	2.14	1.29	94	2,259	0.20	113	2,146	5.41	0.27	8.85	-3.44
Calcutta by truck	15	53,840	3.25	0.65	0.10	0.20	1.33	2.154	51,686	0.14	2,584	49,102	6.15	0.31	6.53	-0.38
Delhi **by train**	2	153		0.65	0.30	1.83	2.75	6	147	0.97	7	140	6.44	0.33	10.96	-4.52
Hyderabad by train	10	1,565	3.25	0.65	0.33	1.63	1.02	63	1,502	0.50	75	1,427	3.09	0.16	8.22	-5.13
Madras by train	9	1,148	3.25	0.65	0.30	1.71	1.13	46	1,102	0.06	55	1,047	2.11	0.11	7.89	-5.78
Sealdah **by train**	4	615	3.25	0.65	0.30	1.99	1.34	25	590	0.42	30	561	5.86	0.29	8.99	-3.13
Warangal by train	9	693	3.23	0.65	0.31	1.68	0.87	28	663	0.00	33	632	6.02	0.30	7.71	-1.69
All **consignments Total (kg)**		61,706						2,468	59,237		2,962	56,275				
Average costs and **price (Rs/kg)**			3.25	0.65	0.28	1.59	1.30			0.35			5.18	0.26	8.38	
Overall average net margin (Ri/kg)																-3.20

Source: **ODA** Post-harvest Project **data.**

Notes: I. For each destination, all cost and **price datg** are **averages of several consignments (fish cost** and unloading charges **were however constant throughout).**

2. Data presented are actual **figures obtained ass result ofProject gctivities** and **may not necessarily** reflect**actual market** conditions. **Somecaution is therefore advised in their interpretation.**

truck loads. The low profitability on the latter is then offset by the greater profitability on the higher value, giving, an overall net margin sufficient to attract these traders. Landing more of the small miscellaneous varieties would, however, only serve to further depress the existing meagre margins available to the trader. The only options to stimulate increased demand by the trade are, therefore, to achieve either an increase in market price or a decrease in the quayside price. Although there is certainly good demand for the small miscellaneous fish varieties, the market price is inflexibly low because they are primarily destined for consumption by the poor.

The resultant conclusion is enigmatic and apparently irresolvable. The trawler survey (see Table 3) clearly shows that all freezer trawlers return to port with significant excess storage capacity; the type and size of the small miscellaneous fish (see Table 4) which are landed illustrates that, during the course of a single trip, many of the early discards are likely to be excellent food fish: India is a country which welcomes and has a high demand for fish protein; many other countries make much more use of by-catch. What then are the problems which thwart efforts to utilize this resource from the Bay of Bengal?

With little prospect of increasing market price (other than by long-term identification and promotion of new market niches), the main stumbling block would appear to be the quayside price asked by the trawlers. Could this realistically be reduced?

The answers are various, simple in theory and yet complex in terms of implementation and finance. Perhaps the greatest single problem is geogra-t phical. In Ecuador, where by-catch is fully utilized, small fish playing a crucial role in fish marketing amongst the Andean rural population, the shrimp trawlers operate within easy reach of the coast. Small, fast, outboard powered canoes go out to the trawlers, help to sort the catch and take away the by-catch. The cost of the fish is thus kept to a minimum. Could this be one solution for the Bay fishery? Unfortunately, the Sandheads grounds are up to 50 miles off the coast of West

Table 3

Excess storage capacity of freezer trawlers on return to port.

Total trawler cold storage capacity (t)	EXCESS CAPACITY ON LANDING			No. of boats surveyed
	Range (t)	Mean (t)	As total capacity	
7	-	-	29	1
8	-	-	38	1
10	-	-	20	1
12	-	3	25	2
13	-	-	38	1
15	2-6	4	24	5
16	3-5	4	25	2
20	0-12	6	30	8
25	0-20	6	23	23
30	0-13	6	19	9
33	9-15	13	40	4
34	14-18	17	49	4
35	0-23	11	32	39
36	4-13	8	23	3
38	-	-	37	1
40	0-30	15	38	23
50	15-30	22	43	3
57	-	-	53	1
60	15-36	28	47	10
				143

Source: ODA Post-harvest Project (compiled by Blake and Gordon, 1991).

Table 4

Average percentage composition **of** fish landings November '90 to March '**91.**

Category of by-catch & group	Avg.quayside price (Rs/Kg) (Nov 90-Mar 91	Approx. (cm/O.L)	Percentage of landings
Small Miscellaneous fish			
Clupeids		11-30	24-30
Sciaenids		11-30	18-25
Catfishes		31	10-16
Carangids		11-30	5- 8
Scombroides		11-20	4- 5
Nemipterids		11-20	2- 5
Sharks		>21	4-5
Lizardfish		>21	3-4
Chirocentrus	2.50 to 5.00	21	2- 4
Barracuda		21	2- 4
Psenes		<10-20	1-3
Polynemus		21-30	2- 5
Ribbon fishes		31	2- 4
Solefish		21-30	2- 3
Others			3
High value fish **(March only) (Average)**			
Pomfrets	20.00	21-30	15-25
Eels	7.75	31	16-25
Perches	7.50	31	4- 6
Cods	4.00	>31	4-6
Polynemus	11.00	40.00 to 20.00 31	2-10
Skates	7.13	31	4
Sharks	4.50	31	5- 7
Sciaenids	6.00	>31	3- 4
Flat fishes	5.00	21-30	2- 3
Tunas	4.00	21-30+	15-33
Others		—	3- 4

Source: ODA Post-harvest Fisheries Project (compiled by Blake and Gordon, 1991).

Bengal and it is simply not possible for small artisanal craft to go out to the fleet. Moreover, the highly capitalized structure of that part of the Bay trawler fleet which has the spare cold store capacity, simply fmds the option of landing more low-value by-catch fish financially unattractive.

An alternative solution is being tested in Mozambique where DANIDA and ODA are jointly involved in a project to supply collector vessels (DANIDA) to go out to the trawlers, return the by-catch to shore and process it effectively (ODA). Could this strategy be applied in the Bay? The main constraints to such an initiative would be

- the attitude of trawler owners, who fear that vessels going alongside their ships will provide an opportunity for illegal transfer of high value shrimp;
- the technical problems of transferring by-catch at sea; and
- the question of the size of a collection vessel and the facilities it would require to land by-catch in an acceptable condition.

While the technical questions could almost certainly be resolved and the economic and financial issues could be defined, they are irrelevant without support from trawler owners for the concept of a collection scheme. This is a particularly difficult issue if such a scheme were to be aimed at putting good quality fish within the reach of the poorer sectors of the community rather than for more lucrative export or the middle class national markets.

The other suggestions normally made in relation to utilization of by-catch involve some form of processing, either to produce fish meal or silage, or to develop value-added products, such as fish mince. The former implies a level of investment, perhaps for on-board handling, which seems unlikely to be attractive to owners, given the sale value of the products. The second, with the implications of relatively high capital investment, requires active development of a new middle-income market and of a marketing infrastructure, including cold chains, to handle the relatively perishable products. Neither option seems immediately realistic or appropriate to the Bay fishery.

Perhaps it is necessary to stand back even further and look at the nature and evolution of the fishery. Smaller mechanized vessels tend to make shorter trips and land most of their by-catch. It is this cheaper source of raw material that the processors of Thimmapuram use for their fish meal and dried fish products. These women are simply not interested in paying more than twice the price for better quality fish from freezer trawlers as they are well aware that consumers are equally disinclined to pay more. It is, in this sense, regrettable that the shrimp industry has had to develop as a long distance activity with voyage durations of a month or more.

All these findings indicate that no solution to utilizing the by-catch is on the horizon. We must, therefore, face the reality indicated in December 1990's *Bay of Bengal News* article. If the by-catch fish cannot be utilized, why should they be caught at all? There is currently no concrete published analysis which proves that the Bay shrimp trawlers have had a significant detrimental effect on the demersal finfish fishery. However, the composition of the catches is not exclusively small species and contains many fish below the age at first maturity. It follows that, aside from the sheer wastage of a protein resource, there exists the unproved possibility that the shrimp industry is adversely affecting catches of finfish by other fishermen. Given this possibility exists, and that the current benefit from the by-catch is mininial, should the fishery consider modification of gear — for example, use of excluder devices to reduce the proportion of fish in the shrimp catches — or further promote the use of passive gear, such as trammelnets?

The utilization of by-catch is a moral issue by no means restricted to India, but the questions raised internationally are certainly of direct relevance to the Bay of Bengal fishery. One thing is clear, the by-catch debate will not simply go away just because we have so far been unable to identify a viable solution.

Motorizing the *chandis*

by Claude Fernando and A. Kashem

Upgrading a traditional craft in Bangladesh has increased incomes, but will the process continue?

A BOBP pilot project in Bangladesh that grew into a more ambitious project from 1986 has gone a long way towards improving the lot of several fisherfolk who had for years used that traditional craft of the Sundarbans coast, the *chandi* boat. Motorization of this craft has enabled these fishermen to double their landings and incomes, But it has also raised two issues. : Will the project be able to sustain itself and how long will the resource last?

The genesis of this project was in December 1979 when the Bay of Bengal Programme (BOBP) carried out a survey of all the traditional boats in Bangladesh that fished for *hilsa* in the estuarine areas of the country. The aim was to find out which of them was best suited for motorization using small, low-powered diesel engines. The objective of motorization was to increase the time available for fishing and, thus, render fishing operations more productive and profitable for the fisherfolk. The *chandi* was selected by

The *chandi* boat

The *chandi* is one of the most widely used traditional fishing boats in Bangladesh. A round bilge, carvel planked, open boat with a high sheer aft, it is usually built with a timber called *Sundari* and, occasionally, with *Jarul* or *Gurjan.* The shell is constructed by stapling individually shaped planks, after which the framing is nailed into position. The boat is decked with split bamboo, and a thatched bamboo shelter is fixed slightly forward of amidships.

The boat is narrow and keel-less and is equipped with a large steering oar. It is propelled by oar and sail. The square sail that is usually used, however, permits only downward sailing and the craft is, thus, built essentially for rowing. It carries a,crew of between 7 and 15 and is mainly used in *hilsa* gilinetting.

Chandi boats vary in length from *1O-15m,* have a breadth of between 1.4 to l.8m and depth of im.

The chandi, *one of the traditional fishing boats of Bangladesh.*

the study and a BOBP pilot project to motorize the *chandis* commenced in 1980.

The pilot project, which lasted till 1982, was mplemented in Bhola in the then district of Barisal. Initially, two *chandi* boats were motorized with long-tail drive 9 HP engines and they were tested side by side with two non-motorized boats. Except for the engine, all the other parameters, such as crew size, fishing gear used etc. were identical. The trials proved conclusively that fish landings and incomes of motorized *chandi* boats would be more than double the landings and incomes of non-motorized *chandi* boats.

The trials also indicated that motorization is highly profitable to the boat-owner and to the crew members. The comparative cost and earning statement based on the trials show

A fisherman takes a closer look at an engine installed in a chandi.

	Traditional *chandi* boat	Motorized *chandi* boat
EARNINGS		
Catch p.a. (kg)	6,300	13,200
Value of catch (TK) (@ 16 TK/kg)	100,800	211,200
INVESTMENT - (TK)		
Craft	45,000	50,000
Engine	–	45,000
Nets	50,320	50,320
Total investment	**95,320**	*145,320*
OPERATING COSTS (TK)		
Fuel (TK)	–	*14,500*
Food (TK 10/day/month)	27,600	27,600
Crew Share		
(a) (Gross Earnings - Food) x 50%	**36,600**	–
(b) (Gross Earnings - Food - Fuel) x 6/16	–	**63,400**
Gear Replacement	12,500	12,500
Hull Repairs	4,500	5,000
Engine Repairs	–	5,000
Total	**81,280**	**128,080**
DEPRECIATION		
Hull (10 yrs)	4,500	5,000
Engine (7 yrs)	–	**6,430**
	4,500	4,500
Total cost	**85,780**	**139,510**
NET INCOME	**15,020**	**71,690**
Rate of return on investment	**16°lo**	**49%**
Internal Rate of Return	**16%**	**57%**

The main advantages of the motorized *chandi* boats as compared with the non-motorized boats were found to be:

(i) Better access to remote but rich fishing grounds that were relatively unexploited because adverse currents, winds and distance **made them inaccessible to** non-motorized boats.

(ii) Greater comfort for the crew and shorter travel time, leading to better utilization of actual fishing time.

(iii) Higher prices for the fish in view of better quality and quicker delivery on shore.

In view of the successes achieved over this trial period, BOBP arranged for four more *chandis* to be fitted with the same 9 HP long-tall engines. An important parallel development was that, with the availability of small engines imported **for** agricultural purposes, **the** motorization **of** *chandis* also gradually ihcreased in the Upazillas of Daulatkhan and Charfesson.

Based on this experience, BOBP assisted in the formulation of an ambitious project which **envisaged the** introduction of 250 motorized *chandLr.* **However,** this project failed **to materi**alize and, in 1986, a scaled down project considered motorizing fifty *chandi* boats. **DANIDA** agreed to fund this project. The objective, besides those stated already, was **tO** clearly

Installing an engine in a chandi *boat.*

demonstrate to the banks that motorized *chandi* boats were truly credit-worthy. Pending formal approval, BOBP proceeded with the motorization of twenty boats from its own resources.

Phase One

In the first phase of the project, Kubota long-tailed engines of 10.5 HP were used. To ensure proper installation, operation and maintenance of their engines, BOBP appointed a technical field supervisor and an assistant field officer in the project area. In addition to providing technical back-up services, which included training of crew, the field officers also monitored the project. The loans were given by BOBP directly to the fishermen and recovered by BOBP's field supervisor. The most interesting feature of the project is that the loan recovery was as high as 90 per cent.

A summary of the loan recoveries in Phase One is given below :

		Loan due (TK)	*Amount repaid (TK)*	*Per cent repayment*
Batch I (10 units motorized)	Engine	200,000	188,750	94•37*
	Nets	48,000	45,600	95.00*
Batch II (4 units non-motorized)	Nets	38,400	38,400	100.00
Batch III (10 units motorized)	Engines	197,500	l58,750**	80.38
	Nets	48,000	48,000	100.00
		531,900	479,500	90.15

* The slight under-recovery of loans in Batch I was due to an engine and nets being stolen.

** The balance outstanding was later settled.

Four of the borrowers repaid their loans in full before the loan maturity date.

Thus, Phase One of the motorization project was an unqualified success in terms of loan recovery, demonstration of the credit-worthiness of *chandi* boats, the beneficial impact motorization had on the incomes of the crew, the good prospects it held for the improvement of the catch rate and the profits that accrued to the boat operators.

Phase Two

The second phase of the project, now called the DANIpA *Qiandi* Boat Motorization Project, was funded by DANIDA and included motorizing 53 *chandi* boats, equipping them with fishing gear, and training operators and crew in the proper operation and maintenance of engines. In view of requests made by other Upazillas in the vicinity, the project was extended to Charfesson (Daulatkhan). Five hundred fishermen (including 53 boat-owners and 480 crew) will benefit from this project. At the end of October 1991, 32 engines had been issued and installed on the boats.

To select beneficiaries the following criteria were used by a Committee nominated by the Director of Fisheries:

- Permanent residents of the Upazillas of Daulatkhan and Charfesson.
- Owner of a *chandi* boat of 30-40 LOA range (preferably a single boat-owner).
- A full-time fisherman.

The Selection Committee includes the District Fisheries Officer (asChairman), the representative of the local Krishi Bank, two representatives of the fisheries society, representatives of BOBP and DANIDA, and the Upazilla Fishery Officer (as Secretary).

The training programme is one of the most important components of the project. Trailiing is to be provided to 250 persons *i.e.* five for every boat motorized. The operator/crew training is phased over three days (instead of four days as planned) and the trajnees are paid a cash allowance, partly to compensate for income lost from fishing. Another important technical input provided is the twice-a-year engine service during the first two years of the project. The service is a comprehensive one and includes a general check-up and adjustment of the engine, a change of lubricating oil, a change of oil and oil filter, and cleaning of the oil tank.

The pEoject also provides for continuous monitoring of the craft to enable a comprehensive economic/financial assessment to be made at the end of the project. The engines and fishing gear are provided to the beneficiaries on loans to be repaid on monthly instalments. The Beneficiary Selection Committee decides on the quantum of the down payment (equity) of the beneficiary. The loan for the engine is to be repaid in 16 equal monthly instalments, with a grace period of four months, two months at the beginning and two months at the end,while the loan for the nets is to be paid over eight equal monthly instalments. The BOBP field supervisor, as well as the Upazilla Fishery Officers, are responsible for the recovery of loans.

The project, thus, involves the participation of a multiplicity of agencies, ranging from the Department of Fisheries, DANIDA, Upazillas, fisherfolk organizations, the Krishi Bank and the fisherfolk themselves. One of the important elements in the implementation of the project is the Project Management Committee, which normally meets once in two months. This is a forum at which the fisherfolk can express their problems (and complaints too) without fear or favour. This open dialogue has prevented the usual behind-the-curtain activities which do much damage to the reputation of such projects, hurt the morale of the beneficiaries and the credibility of the project managers.

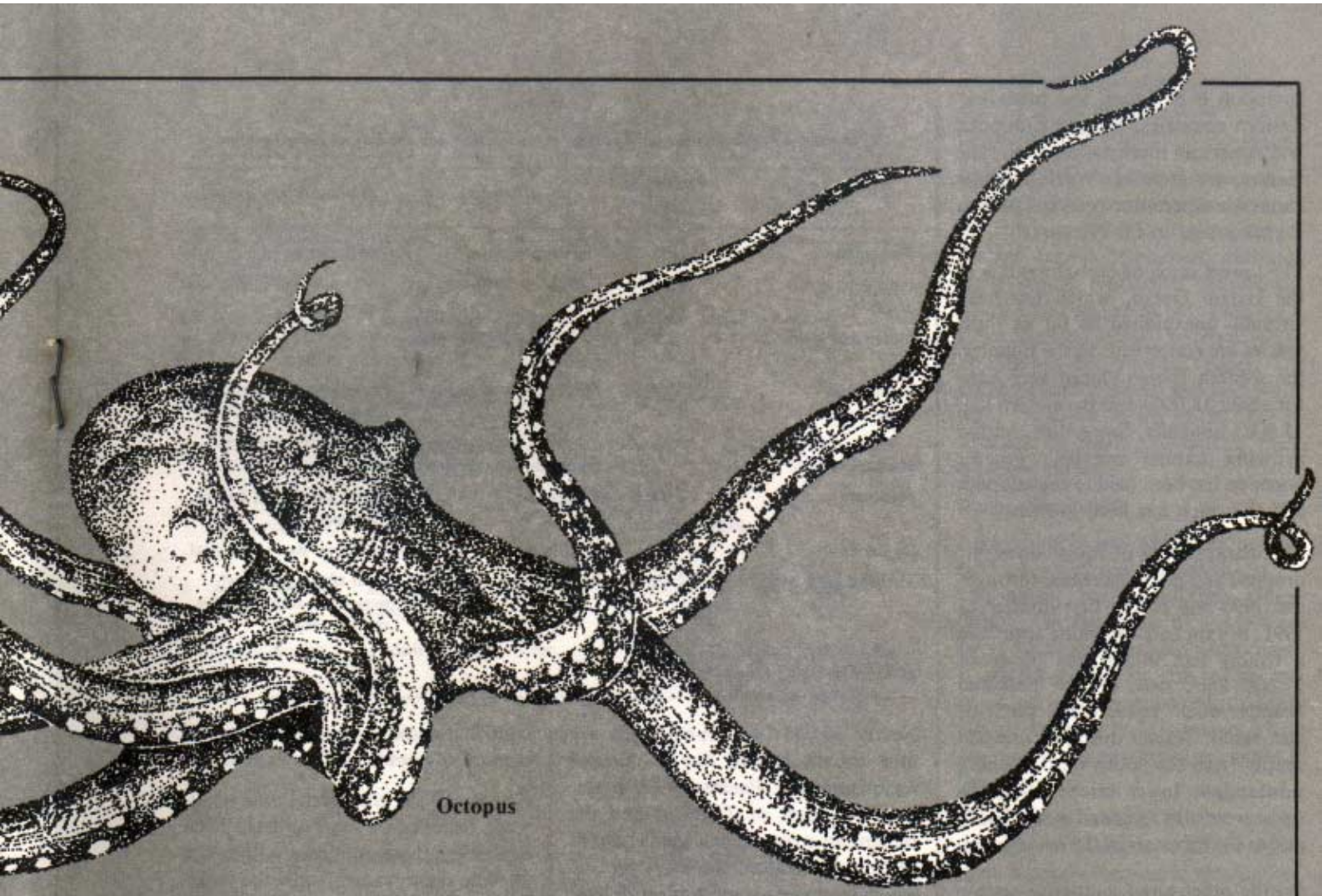
The Future

The *chandi* boat motorization project has recorded several achievements, as can be seen above, but the fact is that much of this success has been due to the continued intervention of BOBP in a multiplicity of roles – as innovator, demonstrator, trainer, motivator, funding agent (along with DANIDA) etc. But the day that BOBP and DANIDA have to withdraw from these activities is not far off. What will then happen? How will the project be sustained? This question must be considered from now. So too must the question of how many boats should be motorized. Too many could, in the long run, cause a strain on the fisheries resource.

Below: Practical and theoretical training of motorized chandi *boat crews.*

Cuttlefish

Squi



Octopus

The Cephalopod in the Bay

by K Sivasubramaniam

Cephalopods — squid, cuttlefish and octopus — are much in demand in the Far Eastern countries. These molluscs account for about two per cent (around 1 - 1.5 million) of the total world marine catch. Japan is the world's largest cephalopod producer and user, catching about 50 per cent of the world total. The Republic of Korea and China are other large producers. Cephalopod production has also been increasing in Spain, Argentina and New Zealand.

About 75 per cent of the world-wide cephalopod catch is squid and the balance is divided between cuttlefish and octopus. Nearly 75 per cent of this catch is marketed frozen or fresh for human consumption, while about 20 per cent is cured or canned. Around 70 per cent of the total world con-

Squid

sumption is in Japan and other Far Eastern countries, but the European and American markets, especially the former, are growing. World requirements are expected to be over 2 million tonnes a year in the Nineties.*

The lowest catch of cephalopods is in the Indian Ocean, which has been virtually unexploited as far as these species are concerned. In the Eighties, the western Indian Ocean accounted for about 18,000 t and the eastern half 13,500t annually. Since then, with a growing export market, greater attention has been paid to cephalopods and the catch has been growing.

The world supply of squid, however, dropped and prices increased throughout 1990 and in the first quarter of 1991. Britain and Argentina approved a fishing ban in an area of about 77,000 km^2, east of the Falkland Islands, which reduced the catch of illex-squid. Besides this drop in squid supply from the south-west Atlantic, substantially lower catches of loligo squid were also recorded in Thailand, due to the increases in the cost of fuel.

On the other hand, cuttlefish supply and demand were steady in 1990 and prices stable. But octopus continued to be in short-supply, as in the, previous five years, resulting in ever-increasing prices of this variety in Japan. The prices for octopus are, however, likely to decline because of increase in catches in the eastern Central Atlantic in recent months.

The prevailing international market prices (July 1991) are as follows: Cuttlefish *(Sepia spp)* 1.60-4.40 $/kg; Squid *(Loligo spp)* 1.60-7.80 $/kg, *(Illex spp) 1.00-3.50* $/kg; and octopus *(Octopus spp)* 2. 1O-5.60$/kg, depending on the sizes of each species.

British Antarctic Survey scientists are helping with research on squid species such as *Illex argentinus* and *Loligo gabi* found off the Falklands. Peru has allowed Korea to catch squid in their fishing zone, but levied extra charges since 1991 to raise funds to fight cholera (FAO 1991).'

* All data in the preceding paragraphs pertains **to** the late 70s and early 80s, according to *FAO Species Catalogue: Vol. 3 Cep#taiopods of the World* **(UNDP-FAO,** 1984) and *ADB/FAO INFOFISH Market Studies Vol. 4: The International Market for CephaJopods* **by M.** Hatta **(1983).**

TABLE 1

Production of cephalopods (squid, cuttlefish and octopus) in the **Bay of** Bengal region.

Country	*Production (appx)*	*Source*	*Primary fishing methods*
Bangladesh	2,000 t	Guestimate	Trawl, setbagnet
India (east coast)	5,265 t	CMFRI,— 1986 statistics	Trawl, shoreseine, boatseine, handlines bagnet.
Indonesia (Sumatera)	250 t	FAO fish statistics, 1986	Danishseine, purseseine, traps, pushnet
P. Malaysia (west coast)	l6,300t	SEAFDEC statistics 1987	Purseseine, trawl, other seines, trap, bagnet, hook and line
Maldives	?	No production recorded	None
Myanmar	3,000 t	Guestimate	Trawl, shoreseine, bagnet, boatseine
Sri Lanka	300 t	Guestimate	Scoopnet, shoreseine trawl.
Thailand (west coast)	12,220 t	SEAFDEC statistics 1987	Otter trawl, pair-trawl, purseseine, traps, pushnet, castnet, liftnet
Total (appx.)	39,335		

Nearly 40,000 t of cephalopods are now caught in the Bay of Bengal region annually. Peninsular Malaysia, the west coast of Thailand and the Indian east coast account for *85* percent of this production, the most part of which comprises squid and cuttlefish. With resources estimated to be substantial, cephalopod fishing is expected to grow substantially in this region during the next four years, if a fishery aimed at this species is developed. India alone is aiming at over 40,000 t catch a year, much of it in the Bay of Bengal region.

All species of squid and cuttlefish are used for domestic consumption, or export, by all the countries in the Bay of Bengal region. Octopus, however, is consumed in only some of these countries. Traditional and small-scale fishing methods, such as scoopnets, liftnets, castnets, pushnets, stakenets, bagnets, beachseines, boatseines, other seines, traps and hook-and-lines, are used to catch squid and cuttlefish in the region. In the last couple of decades, modern and large-scale methods, such as' trawlnets and purseseines, have been contributing more significantly to the capture of these shellfish varieties.

Almost all the traditional and small-scale fisheries in the Bay have been exploiting these molluscs within the 30/40m depth range, while the large-scale purseseine and trawl fisheries cover up to about 70m depth range.

The contribution by the large-and small-scale fisheries of the three major producers of cephalopods irt the region are given in the table below.

The total production of these shellfish in any of these countries is heavily dependent on the size of the large-scale purseseine and/or its trawl fisheries. Indonesia also showed an annual production of over bOOt for Sumatera, before trawling was banned in 1980. Sri Lankan cephalopod catches are also low due to significant reduction of the trawl fishery off the northwest, north and northeast coasts.

The proportion of squid caught is significantly more than cuttlefish in the region, reflecting world trends. India alone has a predominance of cuttlefish (60 per cent); the Indian squid catch is

Country	Large-scale	Small-scale
India (east coast)	*57°lo(Trawl)*	43% *(Shoreseine, boatseine, handline, bagnet)*
P. Malaysia (west coast)	98.2% *(Trawl and P.seine)*	1.8%*(Other seines, hook-and-line, bagnet)*
Thailand (west coast)'	96.6% *(Trawl and P.seine)*	3.4%*(Pushnet, castnet, lifinet, traps)*

TABLE 2

Species of squid, cuttlefish and octopus in the Bay of Bengal

Scientific name	Common name	(Mantle length) Max. Size	Depth distribution	Geographical distribution
CUTTLEFISH				
1. *Sepia pharaonis*	Pharaoh's cuttlefish	43 cm (largest cuttlefish)	40-1 lOm	**BOB and outside**
2. *Sepia aculeata*	Needle cuttlefish	23 cm	0-60m	**BOB**
3. *Sepia esculenta/ elliptica*	Golden cuttlefish	13 cm	0-lOOm	Occurrence recorded for N. China Sea but listed in India
4. *Sepia phrashadi*	Hooded cuttlefish	14 cm	O-4Om	**BOB**
5. Sepia latimanus	Broad club cuttlefish	50 cm	O-30m	BOB and elsewhere
6. *Sepia trygontna*	**Trident cuttlefish**	**5 cm**	**35-415m**	**Occurrence recorded for** Gulf of Aden and Red Sea but listed in India also
7. *Sepia inermis*	Spineless cuttlefish	12.5 cm	O-40m	**BOB**
SQUID				
1. *Loligo duvaucelli*	Indian squid	29 cm	30-hOrn	BOB
2. *Loligo ujii*	**Little squid**	**13 cm**	0-lOOm	Recorded for N.Pacific, but listed in India also
3. *Onychoteuthis banksii* *	*Common clubhook squid*	30 cm	O-200m	Worldwide oceanic
4. *Sepioteuthis lessoniana* *	Bigfin reef squid	36 cm	upto 1000m	BOB offshore and oceanic
5. *Symplectoteuthis oualaniensis* *	**Purpleback** flying squid	**35 cm**	**upto** 1000m	**BOB**
6. *Ommastrephes bartami* *	Neon flying squid	50 cm	upto 1500m	BOB

* Typical deeiwater oceanic species,

OCTOPUS	Common name	Max. total length	Depth	Distribution
1. *Octopus aegina*	Sandbird octopus	10 cm	0-lOOm	**BOB**
2. *Octopus cyaneus*	Big blue octopus	120 cm	"	1.0
3. *Octopus globosus*	**Globe octopus**	**25 cm**	"	Sri Lanka, India
4. *Octopus macropus*	**White spotted** octopus	**120 cm**	"	BOB
5. *Octopus membrañaceus*	**Webfoot octopus**	**30 cm**	"	**BOB**
6. *Octopus vulgarii*	**Common octopus**	**120 cm**		**BOB**
7. *Octopus indicus*	Old woman octopus	60 cm	050m	BOB

only 40 per cent of the production, against the 80 per cent or so recorded by the main producers in the region.

Pharaoh's cuttlefish and Indian squid are two of the commonest species of cuttlefish and squid in the Bay of Bengal region. *Common clubhook squid,* bigfin reef squid, purpleback flying squid and neon flying squid are more common in deep waters offshore and among the oceanic ranges. The development of dipnet and mid-water traps for squid fishing in the Gulf of Thailand is mainly to exploit these offshore species.

Production trends

Between 1976 and 1987, the production of squid and cuttlefish on the continental shelf (<100m) almost doubled in the cases of P.Malaysia (west coast) and Thailand (west coast). It almost trebled on the Indian east coast, particularly in the state of Tamil Nadu. But very little is known about the potential cephalopod resources in the region.

Production trends in the major cephalopod fishing areas of the region show a steady increase in production, though changes in fishing effort and catch rates are not known. On the one hand, this may indicate a healthy state of the exploited stock. On the other, the probability of an increase in the bio-mass of these shortlived cephalopods, resulting from a decline in the predation of cephalopod eggs due to depletion of predators and competitors fished out by intensive trawling, have been demonstrated in many areas, including the west coast of Thailand (Caddy 1983)2. Catches of catfish, snapper, threadfin and lizardfish, which were abundant off the Andaman Sea coast of Thailand, were replaced by squid from the 1970s and the squid catch rate increased rapidly from 1.2 kg/hf in 1965 to 7.1 kg/hr in 1975 (Anonymous 1975)3. It is not very clear whether the growing demand or the biological interaction is contributing to the rate of increase in annual production.

Potential for development

Based on the hypothesis that the potential harvest of cuttlefish and squid could be ten-fold the production level prevailing in the early. part of Eighties (Chikuni, 1983)4, the sustainable yield was considered to be

TABLE 3

Annual production of cephalopods in India, Malaysia, Thailand, Indonesia and distant nations In the Bay of Bengal.

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Indla* (east coast)												
West Bengal	0		0	4		6	18		7	8	NA	NA
Orissa	0		14	98		195	119		107	107		
Andhra Pradesh	408		523	470		595	519		553	619		
Tamil Nadu	1375		1903	1472		3238	3877		4442	4490		
Pondicherry	62		50	40		84	121		43	39		
	1845		2490	2084		4118	4654		5152	5263		
Malaysia** (west coast, P. Malaysia)												
Cuttlefish					1947	1740	2175				**4231**	**2918**
Squid					6680	7147	7094				11842	10890
Octopus					347	413	216				244	209
					8974	9300	9485				16317	14017
Thailand*** (west coast)												
Cuttlefish	4328	4425	3051	3526	3067	3637	4842	8576	6750	6500	4692	
Squid	5045	4882	3985	4094	4243	4001	4695	6649	5175	6052	7094	
Octopus	-	-	-	44	162	47	122	211	135	1028	431	
	9373	9307	7036	7664	7472	7685	9659	15436	12060	13580	12217	
Indonesia* (Sumatera)**												
Cutttlefish	118	125	114	107	—	**86**	—	Il	20	25		
Squid	955	1131	891	915	1069	1097	432	378	200	200		
Octopus	6	4	7	4	I	4	4	16	10	25		
	1079	1260	1012	1026	1070	1187	436	405	230	250		
Distant nations (Area 57) ***												
Japan		46	3178	4278	101	—	—	—	**118**	—		
USSR	889	45	—	—	—	—	—	—	—	—		
Korea		—	—		—	—	—	425	1904	222		
	889	91	3178	4278	101			425	2022	222		
PRODUCTION ESTIMATES EASTERN INDIAN OCEAN						21137	22250	30120	27777	32529	433306	48767

* CMFRI Information Service publication 1977 **to 1989**

** Fisheries Statistics Bulletin, Malaysia, 1981, 1982, 1983, 1987 & 1988 FAO Fish **Production** Statistics 1977 **to 1987**

50-100,000 t, if the ratio of catch to potential ranges between 0.20 and 0.10. Silas (1985)[5] made the following estimates for the EEZ on the east coast of India:

	Potential harvest (1990)	**Potential harvest** (2000)
Neritic (0-200m)	25,000 t	50,000 t
Oceanic	2,500 t	25-50,000 t

Silas' estimate of potential harvest by **the year** 2000 is very close to the lower limit of Chikuni's estimates for the whole Bay of Bengal region and is very close to the present estimated level of production in the whole region.

The biomass in the Indian Ocean, for the most common type of oceanic squid (purpleback flying squid) in the Bay of Bengal, is considered to be around 2 million tonnes. Considering the fast growth and short life span of

such squid, the potential catch is likely to be at least equal to the biomass (Garcia and Majkowski, 1990)[6] Even if five per cent of this biomass is distributed in the Bay of Bengal, the potential will then be 100,000 t.

Bhatiya *et a!* (1979)[7] estimated an MSY of l0,290t for the cephalopods on the west coast of Thailand. The present level of production here is already over 60 per cent of ttie estimated MSY. Chikuni's upper limit would encourage expansion of the cephalopod production by at least 100 per cent.

There is growing evidence from many areas of the world that the development of large fisheries for cephalopods can occur in areas where heavy fishing in the past has reduced stock sizes of marine fish species. Further increase in production may be undertaken, but collection of appropriate data should also be commenced in order to carry out proper assessments of interaction and changes in abundance.

Therefore development of the squid and cuttlefish fishery should be along these lines

- Improving existing small-scale fishing methods for squid and cuttlefish resources presently exploited, if found necessary in some countries; and
- Feasibility trials being conducted in the Bay of Bengal region to determine whether the small-scale fishery c'ould be introduced! expanded in the offshore range to exploit deep water squid and cuttlefish resources.

FOOT NOTES

[1] FAO (1991) Globefish — *Highlights No 1/91, 2/91 and 07/91.* FAO, Rome,

[2] Caddy, J.F. (1983) — *The Cephalopods; Factors relevant to their population and to the assessment and management of stocks.* Advances in Assessment of World Cephalopod Resources; FAO Fish Tech. Pap. 231 pp 416-452.

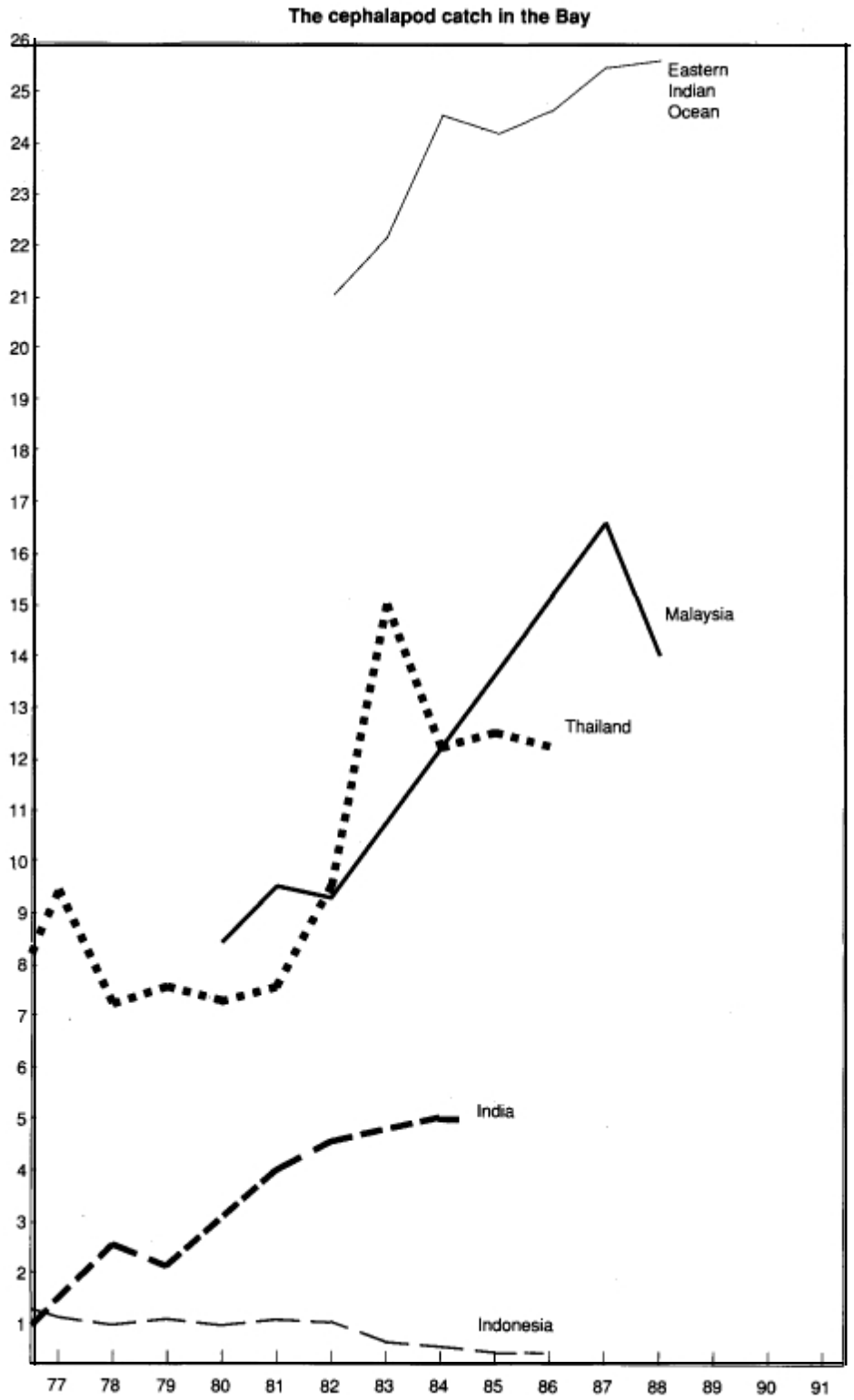
[3] Anonymous *(1975)—Results of the Ftshing and Oceanographic Surveys in the Bay of Bengal and Andaman Sea.* **Expi. Fish. Div., Spi. Pubi. No SR 027,** Dept, of Fish, Thailand.

[4] Chikuni, S (1983) — *Cephalopod resources in the Indo-Pacjflc Region.* **FAO** Fish. Tech. **Pap. 231, pp** 264-305.

[5] Silas, EJ (Edit) (1985) — *Cephalopods; bionomics, fisheries and resources of the EEZ of India.* **CMFRI, Bull, No. 37,** Cochin, India.

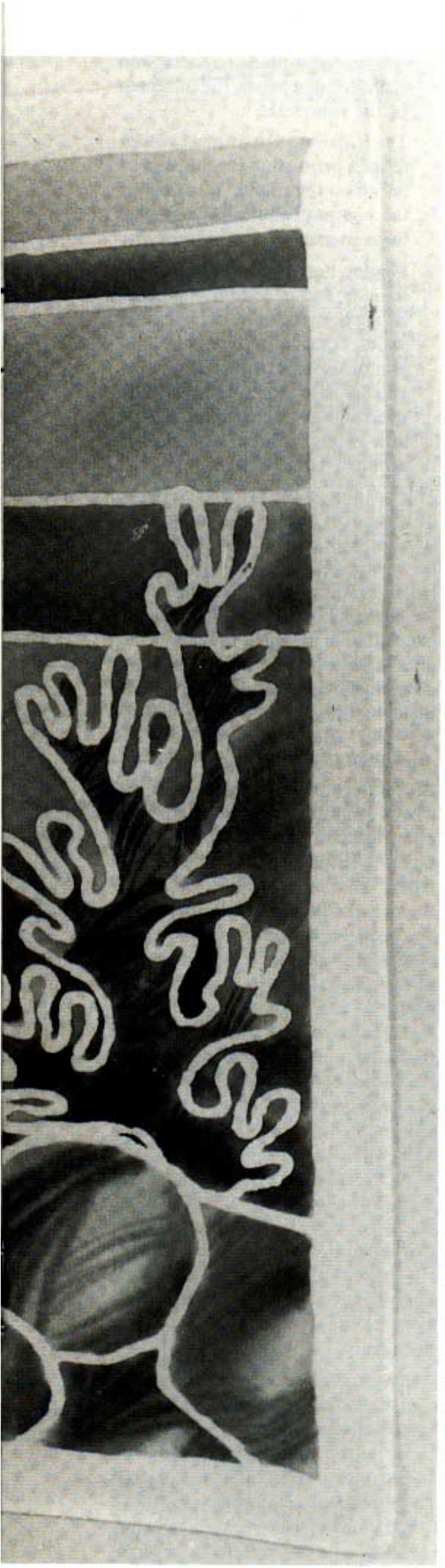
[6] Garcia, SM and **J. Majkowski** (1990) — *State of High Seas Resources : 24th Annual Conference of the Law of the Sea Institute.* Tokyo, July 24-27 1990.

Bhatiya, U *et a!* (1979) — *Marine Fisheries in Andaman Sea: Report on Results of Seminar of Mar. Fish Dev. Project.* **Tech. Report Mar.** Fish Div. (Thailand).



References

1. Anonymous (1980-1989) — *Annual Report of the Fishery Survey India.* Bombay, India.
2. Anonymous (1979-1989) — *Cephalopods.* CMFRI Tech. and Ext. Series, Cochin, India.
3. Anonymous (1981-1988) — *Annual Fisheries Statistics.* Dept. of Fisheries, Ministry of Agriculture, Malaysia.
4. Anonymous (1988) — *Fisheries Survey of India, Bulletin. No. 18;* Ministry of Agriculture, India.
5. FAO (1977-1988) — *Yearbook of Fishery Statistics — Catches and landings.* FAO, Rome
6. FAO (1979-1983) — *Cruise Reports of the Survey and Exploratory Fishing Project in Burma* (BUR!77!003). FAO, Rome.
7. Weera Pokapunt (?) — *Study on demersaljirh resources in Andaman Sea* (Manuscript). pp *35-61.*



THE BATIKS OF RANONG

And food processing too to help improve the quality of life

by R N Roy and H Kristensen

What possible role could beautiful batik scarves have in a small-scale fisheries extension project? If you are a woman in a fishing community in the Ranong area of Thailand, working with the Bay of Bengal Programme-supported extension project of the Department of Fisheries, it could be a way of earning extra income for your family.

For any project targeting the entire fisherfolk community, activities for. women is not a new development. From the second year of this project, back in 1988, women's participation has been promoted, particularlyain the fields of income-generation, awareness-building through education, and improved and better access to health services.

These days, things are taking a colourful turn with groups of young women in the villages of Hin Chang and Khadjadphai busy learning the intricate old technique of dyeing and decorating fabrics (called batik), well known in Malaysia and Indonesia but also practised in Thailand.

Thus far, the trainees have learned to produce smaller pieces of batik, such as handkerchiefs and scarves, which they sell in the local markets at a reasonable profit. However, as their skills improve, they will start making clothing, batikwear items being quite popular among the Thais as well as the many tourists visiting the country. Given the demand, marketing, usually a major hurdle in handicraft production, will, it is hoped, not be a problem for the women of Ranong.

An initial training course of ten days provided by specialists from the Division of Handicraft Promotion, Ministry of Industry, Bangkok, showed the women the basics of the technique. However, it takes quite some time and practise to achieve results of sufficiently high quality to make the products marketable. Therefore, training is being continued with four 2-day sessions a month being conducted by two consultants appointed by the project, Ms Supaporn Aninbon and Ms Pornpen Lerspatanapong.

Why handicrafts? A clear need of the women, as expressed by them, is for additional incomes, as most households face severe problems making ends meet, especially during the season when fish catches are low. Handicrafts are a preferred option not only because women already practise several of them and have the traditional skills associated with them, but also because the raw materials necessary are often locally available. More importantly, handicrafts lend themselves to being done in bits and pieces at irregular intervals, whenever women can spare the time. A common myth which the project has debunked is that women have long periods of idle and leisure time.

Surprisingly, women from communities where handicrafts are already a way of generating additional incomes, although on a limited scale, had very few ideas of.. potential handicrafts, and these naturally were those that they were already familiar with and for which earnings and marketing possibilities had already been found to be not particularly good.

Batik was an eminently suitable business decision, because many an activity has, previously, gone down the drain by trying to introduce exotic handicrafts with no local tradition to fall back upon and with no readily accessible markets.

A needs analysis carried out in 1990, in connection with the preparation of

Young women in the Ranong area working on producing batiks.

an UNFPA-supported activity targeted exclusively at women, reconfirmed what the project hacY learned about income-generation needs and the role that handicrafts could play. The project used the opportunity to get the two consultants working on women's activities to go deeper into the area and to look for opportunities and ideas for income-generation activities — keeping in mind the resource and time constraints of the women and also some of the general problems encountered by the project in enabling groups of women to mobilize savings, establish group credit and manage their enterprises. The ideas that have emerged and been put into the field also follow the rationale that reduction in expenses in a way also betters and adds to household incomes.

Some of the activities that have been taken up by the women include sewing of clothes, with training assistance from the Non-formal Education Center, and knitting, crochet and macrame, with training and design inputs from the project consultants. The interesting fact is that the women are generating items which they use themselves (except in the case of batiks) and only sell what they do not use.

The consultants have also received training in making handbags and other decorative and useful items from a type of straw that grows wild in the region. Given time and opportunity, their skill with these crafts may also be transferred to the women in the future.

A fishery. extension service is naturally more interested in promoting fishery-related activities — even with women. Women, however, have their own ideas of what to do and what not to do.

In Ranong, the involvement of women in what might be broadly described as fishing is very limited. A few women, particularly from the very poor households, are involved in catch fishery. However, when it comes to aquaculture, especially the collection from the wild culture of oysters, a lot more women are involved. -They also take part in fish and shrimp cage culture activities and in the fabrication of fishing gear, all of which enables them to carry the dual responsibility of bread earning and household chores, without too many interruptions.

It is, however, in food (or, rather, fish) processing that women really come into their own. The project in Ranong has, over the years, been involved in trying to improve the quality of, and earnings from, traditional processed food such as fish sauce, shrimp paste, fish and prawn crackers, oven-dried fish and shrimp, and oyster sauce. Unfortunately, several of these activities did not really raise incomes to any extent worth talking about. Some of these activities, such as fish sauce, shrimp paste and oven-dried fish and shrimp, have been shown to be economically feasible and even enjoy a good and well-paying market demand. However, other factors have set constraints. These include

- Diminishing fish resources, which make it increasingly difficult for women to get regular supplies of raw materials for the processing enterprises. The quest for raw materials also sometimes brings them into conflict with fish traders, who claim for themselves the full catch of the fisherfolk!
- The Highways Department, which refused permission for shops to be set up on their land. Yet stalls by the highway would have enabled these women to optimize profits.
- Finding time to participate in the training and in collective production to achieve larger, more feasible scales. Organizing women into groups also faces difficulties, as the villages are socio-economically speaking very hierarchical, having little or no tradition of collective action.

This has forced the project to change its focus. The training in food processing has been continued, not so much for income-generation purposes alone, but to produce more nutritious food for household consumption. Training has also been extended to school children and teachers, in the hope of catching them early, as it were, in the hope that they will grow into productive and equal members of their communities.

All earnings and no health makes for a poor quality of life. Confronted with poor sanitary conditions and low access to healthcare services in remote fishing communities, the project in Ranong also decided to respond to the needs of the women and children in particular, even if it meant moving out of their areas of work — particularly fishing — and working closely with the Health Department of the Province, facilitating, in the process, their work, with funds for drugs and supplies and by providing transport to remote villages often accessible only by boat. The project has, thus, supported visits of mobile health teams to three remote islands to carry out regular health checks, immunization camps, mQther and child care, family planning, malaria eradication, building of sanitary latrines and even training of the traditional midwives and village health volunteers.

Much has been learnt about the important role women play in fishing communities, their needs and how best to work with them and for them. It is hoped that this learning will eüable them to be helped in some small way in the future to improve their situation through their own efforts.

Lending a hand in lending to the fisherfolk

by A. Atapattu and D. Attanayake

A Pilot Fisherfolk Credit Project formulated by the Ministry of Fisheries and Aquatic Resources (MFAR) and the banks in Sri Lanka is now ready for implementation in the island. Its outcome could well determine the future of fisherfolk credit in the country. But whatever the ultimate results of it will be, in respect of the amounts. disbursed, the amounts recovered and the number of fisherfolk assisted, there is not the slightest doubt that the project has already had a highly beneficial impact on the fisheries sector in the island.

A friendlier and more helpful working atmosphere has been created among the fisherfolk, bankers and fisheries officials, and greater mutual understanding has been generated. In addition, the project has been a rewarding experience for MFAR as well as for the several outside agencies, both government and non-government, who have been involved in implementing the various activities connected with the project. These agencies are now more likely to take initiatives on their own in helping with fisherfolk credit, and this will undoubtedly enhance the sustainability of fisheries credit activities. That, in turn, can only improve the lot of the island's fisherfolk to whom easy credit on easier terms is essential.

Work on formulating the Fisherfolk Credit Project began in July 1988, following a request by MFAR to BOBP for assistance in developing and implementing a Fisherfolk Credit Scheme which did not rely on government subsidies. Sri Lanka's objectives in requesting such assistance were to demonstrate a comprehensive range of banldng services to the fisherfolk, improve fisherfolk earnings from fisheries and other related or unrelated economic activities in fishing communities, and promote financial management in fishing households through better utilization of funds, savings etc.

MFAR's request was made at a time when credit to support fisheries and fisherfolk activities had reached a low ebb. The credibility of fisherfolk as borrowers had been damaged by the fact that vast sums. of money which had been lent under the Fisheries Self-Employment Credit Scheme, were found to be "irrecoverable". The BOBP entered the credit scene in Sri Lanka with the experience of having implemented credit schemes in similar situations, most notably in Orissa, India.

Sri Lankan fisherfolk have traditionally relied on the informal sector for their requirements of credit. In recent times, though, the nature and extent of this reliance has undergone considerable change, though the informal sector still remains important. According to the socio-economic survey initiated in 1989

Credit is needed for boats such as these.

as a prelude to the implementation of the project, out of the fishing households which borrowed funds, as many as 70 per cent had borrowed from non-institutional sources.

Upto 1978, the institutional credit requirements of the island's fisherfolk had been met exclusively by the Department of Fisheries. However, from 1978, the responsibility of lending to the fisherfolk had devolved on the State-owned commercial banks. This change of policy was prompted by the failure of Government to recover much money lent for fisheries and having to write off this large sum as 'bad debts'.

Between 1979 and 1989 several fisheries credit schemes were implemented by the banks, *viz.* Fisheries Self Employment Bank Financing Scheme, the Cyclone Rehabilftation Scheme, Madel Fishery Loan Scheme, Co-operative Loan Scheme and the credit schemes connected with the ADB Fisheries Projects (I) and (II). An important feature of all these schemes was that they relied heavily on Government subsidies. However, the Government subsidy has had to be curtailed over the years, whereupon some commercial banks started credit schemes without relying on government subsidies.

Furthermore, there were inbuilt inadequacies in the institutional credit schemes. The credit requirements were not properly assessed and, as a result, the loans disbursed were insufficient. For instance, loans were given to purchase capital items, such as boats, but working capital costs were not met. Under these circumstances, the fishermen-borrowers had to seek informal credit from middlemen at very high interest rates and, as a rule, repayment of the latter took precedence over the former.

In 1989, with the establishment of village-level Fisheries Cooperative Societies, a new credit scheme was launched. This scheme includes two loan components, namely, loans to purchase boats, engines and gear, and loans to cooperatives for re-lending to members to start income-generating activities.

MFAR, however, felt there was need for a still more liberal, broader-based credit project that would not only supplement the existing ones but also play a more meaningful role in improving the attitude of all concerned to credit. The need, it was felt, was to educate as well as to reach out to the less advantaged amongst the target group.

Making dried fish is an occupation that needs cash for purchase of fresh fish.

In response to Government's request based on such perceptions, BOBP assisted in the formulation of a Pilot Credit Project, which is now to be implemented in the districts of Puttalam, Galle and Matara. Other important outputs of this project have been the training of bank and ministry officials, a socio-economic survey and a series of connected studies conducted in the preliminary phase of the project to ascertain credit requirements and related matters.

The Fisherfolk Credit Scheme was drawn up by an inter-agency committee which comprised the representatives of the Ministry of Fisheries and Aquatic Resources, the Bank of Ceylon, the People's Bank and the Central Bank. This scheme is more broad-based than any past or existing fisherfolk credit scheme in relation to the types of activities to be financed. It is also focussed on the poorer sections of the fisheries sector and seeks to assist, in particular, the women and the youth. It has also been made sufficiently flexible to ensure simplicity and timeliness, which are two of the basic requirements of any scheme for small-scale borrowers such as fisherfolk.

The total amount of credit planned to be disbursed over the pilot phase is Rs.218 million. The Bank of Ceylon, People's Bank and three Regional Rural Development Banks (RRDB) are participating in the Scheme through 16 branches, 16 branches and 11 branches respectively. The RRDBs are, however, involved in only loans upto SLRs.20,000/-.

Based on the information from several studies, the totality of the genuine credit needs of the fisherfolk has been included in the Scheme. Loans will be disbursed for the following:

(i) Fishing activities, ranging from fishing conducted without the use of craft to multiday offshore fishing;

(ii) Fishing related activities, such as drying, curing and sale of fish such supportive activities as the sale of inputs, and the manufacture and repair of craft;

(iii) A series of small-scale, land-based economic activities not necessarily related to fisheries; and

(iv) Consumption, debt redemption and purchase/enhancement of assets.

In order to ensure greater flexibility in implementation, the beneficiaries' eligibility requirements have, under this Scheme, been kept as broad as possible. It is intended to accommo-

Coir manufacturers need credit to buy raw materials.

date as many less-advantaged persops/ groups as possible, with the Scheme concentrating on members of fisher families or residents of fishing villages. Those with special skills and experience, as well as those who genuinely attempt to make a financial commitment towards economic activities, will be given preference. Women and youth will also be given special consideration. Husbands and wives jointly applying for loans and prospective borrowers who make efforts to save will be others preferred.

Significant and noteworthy aspects, in regard to the terms and conditions of lending, are

(i) Loans will be granted upto 75 per cent of the project cost. (The maximum amount proposed to be lent for consumption and debt redemption will, however, be Rs. 7000, while in the case of acquisition and value-enhancement of assets, it will be Rs. *15,000.)*

(ii) Cost of family labour will also be considered in the calculation of 25 per cent equity in the case of small-scale projects.

(iii) Security and collateral requirements have been kept at a minimum. (The personal guarantees of other fisherfolk in the village or the guarantee of an office-bearer of the village cooperative society which maintains a satisfactory record with the bank have been made acceptable.)

(iv) The repayment period for income-generating activities will extend upto a maximum of ten years, depending on the loan amount/cash flow period of the project In the case of other loans the repayment period will be 24 months. Interest will vary from 18 to 21 per cent.

(v) Loans upto Rs. 25,000 will be considered on the basis of a very short and simple application form. Procedures have also been simplified and streamlined to ensure expeditious processing of applications.

One of the, most important components of the Scheme is credit supervision and monitoring, which had been weak in earlier schemes and, hence, a contributory cause of the very poor recoveries. Several innovative features have been added to improve the recovery of loans. Some of these are the use of village-level agencies and groups such as co-operative societies, the use of incentives/inducements for borrowers, and such special arrangements as the close link-up with savings schemes, matching repayments with seasonality of activities, field collection of instalments, and the use of village volunteers.

Savings mobilization is an important adjunct of the scheme and family members, particularly women and school children, will be induced to participate. Formation of savings clubs, the use of competitions; campaigns at village festivals etc. and more effective publicity through audio-visual means etc. are envisaged.

The unfamiliarity of the bank personnel with the fisheries sector, particularly at the branch level, coupled with the multiplicity of the activities they are called upon to handle has been identified as a constraint which impedes the successful implementation of fisheries credit schemes. A Training Programme to rectify this weakness has commenced and this will extend to about 200 bank officers and fisheries officials. The target groups will be the personnel of branch offices and the field workers of the banks in the project area. The officials who will help monitor and supervise the scheme will also be given appropriate orientation.

A carefully drawn up, four-tiered Orientation, Training and Extension Programme has already been launched to cover all the sectors involved in the credit project, *viz.*

(i) The senior decision-making officers, such as the Departmental Directors of Central Bank, Deputy General Managers and Assistant General Managers of the Bank of Ceylon and the People's Bank, Chairmen of the three District RRDBs, Director, Deputy Director and Assistant Director of the Department of Fisheries and the representatives of NGOs.

(ii) Managers of branches of the three banks and the Senior Fisheries Officers in the three districts.

(iii) Staff handling fisheries credit and the field officers of the branches of the three banks, Fisheries Inspectors and representatives of Fisheries Co-operative Societies.

(iv) Borrower fisherfolk and representatives of village based organizations.

Every effort, it will be seen, is being made to ensure that the officials of the lending agencies and the co-ordinating organizations, as well as the borrowers, will have a clear understanding of their collective responsibilities prior to the implementation of the project. Success or failure, thereafter, will be in the hands of the people themselves.

glimpses into BOBP projects

Ms Saniah comes to town

A housewife from a remote rural fishing community in Asia presenting a paper at a gathering of government officers? There'd be raised eyebrows, to say the least. But that is exactly what Ms Saniah did in ,Medan, North Sumatera, earlier this year. She had been invited by the Regional Office of Agriculture of the Province of North Sumatera to present her experiences of working with (and leading) a women's group enterprise rearing goats in the village of Pulau Kampai in Langkat District. The regional office, impressed by the performance of the group and especially with the process which led to it, was interested in spreading the idea to other agencies. That was when Ms Saniah came in.

We should go back to Pulau Kampai to find out what led to Ms Saniah coming to town. The Provincial Fisheries Service (PFS), with support from the Bay of Bengal Programme (BOBP), has been working in some villages of Langkat District since 1988, hoping to increase the incomes of fisher communities by promoting and supporting group enterprises. Ms Saniah leads a women's group with 24 members in the village of Pulau Kampai.

The story of Ms Saniah's achievements begins with group formation in 1990 and its members learning to think, work and resolve problems together. Then, groups began to set aside savings to build up some capital. Next came the task of assessing their capability to run a business and selecting what to do. Keeping in mind their skills, the time availability and the market. demand, the women decided that rearing goats would make sense. The Project staff helped them to undertake a detailed feasibility study which convinced them that, indeed, their hunch that rearing goats could earn them a reasonable profit was true.

Early in 1991 the group was ready to start. But they had a problem. Not enough money. Their savings, though substantial, fell short of what was needed. The Project came up with a grant which the group could use as a revolving fund. Then things began to happen. Goats were procured and divided up amongst subgroups. Shelters were built. Responsibilities for grazing and looking after the animals were allocated. In time, the kids began to arrive and were reared and sold.

Things of course were not as simple as that. The Provincial Animal Husbandry Service has been very helpful in resolving several technical problems and giving the women ideas on better culture practices. Some mishaps occurred — they lost some goats after the animals had eaten grass that had been sprayed with pesticide; a few

Goat-rearing in Pulau Kampai to increase the income of fisherfolk.

Ms. Saniah narrates the experience of Pulau Kampai.

complicated multiple deliveries resuked in the loss of a few kids. But the economics is looking up.

The group, having realized its solidarity and strength, has diversified. From its savings, which it regularly puts into the bank irrespective of earnings, it has been giving short-term loans to members for the purchase of household goods and appliances. This nets them an additional profit – from the interest and from the savings made from buying household goods in quantity. The group also occasionally ventures into the production of prawn crackers and other prepared food items which it then sells to members and other households. This is especially popular during festivals.

In business, it is the bottom line that needs to be worried about. The group started with savings of Rp. 300,000* It received a 'loan' of Rp.2,763,000 in May 1991. Its savings and repayments at Rp.48,000 a month have already added up to Rp.268,000 and its revenue from the sale of six goats, the household goods sale scheme and from prepared foods is Rp.492,000 to date. The future looks good. Provided the group can hang together and keep up the good work.

Ms Saniah explained this and more, with pride, to the government officials at the workshop and answered numerous questions too.

What have we learnt from all this? That group enterprises can and do work and that can be a way to enhance incomes,

Provided – and there are always qualifying clauses – the group is well formed and works and performs well together in a business that 'needs' group work;

Provided, the leadership is good and can guide the group;

Provided, a viable business is selected that utilizes the skills of the group without overpowering its members with complexity;

Provided, resources exist to sustain the activity;

Provided, a market exists for the products;

Provided, technical knowledge and inputs can be made available when needed. And, finally,

Provided, credit is available at reasonable rates and the group is able to manage its enterprise well.

A lot of PROVIDEDS, but a success like Ms Saniah and her group from Pulau Kampai suggests that extension services, if well trained, supported AND motivated can help rural folk to take a step towards betterment of their economy.

In coming to town, Ms Saniah and the women were in some respects signalling that they had arrived and are on their way. What else can we do but wish them luck and prosperity?

R.R.

* Rp. 1000 = US $ 0.51.

DO THE AIRWAVES HELP FISHERFOLK?

Fisheries radio is not new. Many countries have long used it to disseminate fisheries information. But can fisheries radio be put to better use? Does it have a better future as an adjunct to extension? Should it be considered a tool of fisheries extension and fisherfolk development rather than as a fount of fisheries information? Is it meant for fishermen out at sea, especially now that new craft enable even small-scale fisherfolk to go further out, or is it meant for the fishing community as a whole, to be listened to in their homes in coastal villages? These and many other questions were the focus of a regional workshop sponsored by the Bay of Bengal Programme and held in Colombo, Sri Lanka, from August 27th to 29th, 1991.

Former BBC agricultural broadcaster Michael Pickstock delivered the Keynote address at the workshop. Pickstock, who now heads World Radio for Environment and Natural Resources and who specializes in the training of personnel in development and agricultural broadcast programming, presented the participants with an overview of rural radio, highlighting the strengths and weaknesses of broadcasting aimed particularly at fisherfolk. Such broadcasting, he emphasized, is an integral part of EXTENSION activity, though it in no way replaces the extension officer; rather, it extends and supplements the extension worker's work and it is, therefore, essential for both radio and extension worker to work closely together on several aspects of the programming.

Pickstock's address is now available in tape. Any organization interested in copies of this tape may contact

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Tackling pollution in time

The new SIDA-supported project of the Bay of Bengal Programme, aimed at discovering the effect pollution has on the fisheries of the Bay, has found "surprisingly favourable conditions" along the eastern coasts of the Bay according to Staffan Holmgren, whà is in charge. Preliminary assessments of the environmental situation in Thailand, Malaysia and Indonesia have shown that it is the South China Sea coasts of these countries that have been more seriously affected.

Such alarming signs as red tide, oxygen depletion and fish kills have all occurred along the eastern coasts of these countries. An outbreak of paralytic shellfish poisoning, PSP, was reported in May 1983 in the estuary of the River Pranbury in the Gulf of Thailand. This was connected with an extensive algal bloom. Red tide has caused shrimp kills in the southeast coast of Malaysia in 1991. And north of Java and along the southeastern coast of Sumatera, algal blooms have been reported in 1990 and 1991.

These early warning signals of an ongoing deterioration of the coastal environment have alerted the authorities and fairly effective monitoring programmes are now being implemented along the west coasts of Thailand and Malaysia. They provide information about the environmental status and enable remedial action to be taken in time.

In Sumatera, however, no monitoring of the marine environment has been arranged as yet and there appears to be risk of damage occurring along the northeastern coast which can seriously affect fisheries before action is taken.

A case of fish kill was recently reported in southern Sumatera near a tapioca flour mill. Water analyses showed surprisingly high values of potassium cyanide, KCN (100 - 150 ppm). Cassava contains cyanide that has to be removed to make it edible. Tapioca mills are common along the coasts of the Bay of Bengal and it is therefore possible that their discharges could cause substantial damage to fisheries. No documentation on the impact on fisheries of wastes from tapioca mills is, however, available.

A striking phenomenon along the western coasts of these countries is the vast areas of turbid waters. This is caused by silt from the rivers after heavy rains. Some of this is due to natural origin, but the outflow of silt has increased exponentially during the last decade due to bad land management. The decrease of primary production, because of reduced light penetration, must have a considerable impact on fisheries. A study in Thailand has shown that the turbid water from one tin mining vessel caused reduced primary production *(10-50* per cent of the values in unaffected sea) in an area of about 5 square kilometres (Limpsaichol. P. and Parnong, S., in a Research Bulletin from PMBC, 1984).

Examples of poor land management causing erosion and loss of valuable soil for agriculture. Such erosion causes turbid water and affects the marine environment and causes losses to the fisheries.

CORRECTION

The captions for the varieties of beche de mer seen on page 3, *Bay of Bengal News,* Issue No. 43 were inadvertently printed in the opposite sequence. They should read, from top to bottom, as follows *S. chloronotus* (Greenfish), *A. mauritiana* (Surf redfish), *H. atra* (Lollyfish), *T. ananas* (Prickly redfish), *M. nobiis* (White teatfish) and *M. axiologa* (Elephant trunkfish).

The discharge of untreated sewage into rivers and into the sea from cities and muncipalities and of organic wastes from piggeries, rubber factories and oil palm mills etc,have, on the other hand, an opposite effect. They fertilize the water and promote primary production. They should, therefore, be beneficial to fisheries, but the problem is that, usually, only low value fish are favoured and that, eventually, very negative effects may occur: oxygen depletion, red tide etc.

The impact on fisheries from the combined effect of these two environmental changes – the decrease of primary production because of reduced light and the increased production because of fertilization – should be' studied. The study should also include assessments of the effects on fisheries of changes in land management, sewage treatment etc.

Old tyres, new homes for oysters

Old tyres are being used in Malaysia as new homes for oysters. Such homes for oysters have been developed by the Department of Fisheries, Malaysia, in Sg. Merchang and Kuala Setitu Lagoon.

The use of old tyres for oyster culture is not new. Tyres have been widely used in the Phil'ippines and Thailand, among other countries.

Disused tyres are often left lying unattended in garages or backyards where they are potential sites for breeding mosquitoes. Now there's use for them; they are useful substrata for colonies of oyster.

The State Department of Fisheries, Terengganu, started its first oyster project in 1988 using 350 tyres. This project was carried out with the technical support from the Bay of Bengal Programme (BOBP) and the Fisheries Research Institute. To date, more than 20,000 discarded and factory rejected motorcycle tyres have been used for oyster culture.

A survey conducted in 1989 by the Marine Resource Centre at P. Kambing has identified more than 50,000m^2 area in the Sg. Merchang area as suitable for bottom culture of oysters. These potential culture areas have been utilized by more than 20 local fishermen for fishing oyster, shrimp, fish and cockle.

Two main species of oysters have been cultured. They are *Saccostrea cucullata* and *Crassostrea iredalei.* The latter is about. 10-15 per cent of the catch in Merchang and 35-50 per cent in Setitu.

To construct a culture unit for oysters, four tyres of the same size are tied together into a pyramid-shaped module. A long line is used to place each module on the lagoon bottom.

About three months after installation, almost all the tyre surfaces are covered with oyster spat that thrive in the lagoon. As many as 400 spat may attach to one tyre. Some spat are separated for grow-out by cementing them on polyethylene net. Each tyre in the module can produce about a kilogram of shucked oyster meat after 6 months of culture. The ex-farm price of the shucked meat is 5.30 M$/kg.

Through the support of BOBP and the International Development Research Council of Canada, oyster culture research has been carried out by the Department of Fisheries and the Science University of Malaysia, and much has been discovered about the biology and culture of oysters. Local fishermen have also reported harvesting more oysters since the introduction of oyster culture trials in Sg. Merchang, Terengganu. However, considerable amount of work has still to be carried out before small oyster culture can be considered a consistently successful activity.

AHMAD ALI,.
Field Biologist, BOBP

Old tyres are tied together in a pyramidal module and lowered into the lagoon bottom where, in three months, they become covered with oyster spat.

Technical Cooperation Among Developing Countries

Technical Cooperation among Developing Countries (TCDC) is a concept that the Bay of Bengal Programme (BOBP) has assiduously encouraged almost from its inception. Between 1979 and 1990, BOBP has implemented 51 activities of a TCDC nature. A Consultation on Fisheries Planning held in Madras July this year, with all the BOBP's regional members participating, not only urged BOBP to continue to promote and suppop TCDC, but it also suggested an updated list of potential activities/areas in which member countries could help each other, with BOBP playing the role of promoter, facilitator and clearing house.

The updated list of suggested TCDC activities/areas includes

- Ten in marine capture fisheries (trammelnet fishing, commercial exploration of demersal resources, chilled sea water system, pole-and-line fishing using FADS, traditional squid fishing, multiday boats, offshore gillnetting, demersal fishing methods, squid fishing and purse-seining);
- Seven in aquaculture (cage culture of sea bass, cockle culture, backyard hatcheries, cage culture of shrimp, oyster, clam and mussel culture, finfish culture and crab ranching);
- Five in 'fisheries related activities (demersal fishing methods, boatbuilding techniques (FRP) and strip-plankrd ORCs, shrimp feed formulation, pole-line hook manufacture);
- Two in post-harvest technology (Maldive fish, and handling/ processing of fish); and
- Two in extension and training (extension and communication media and systems, and fishery education and manpower development skills).

Thailand and Malaysia, for obvious reasons, continue to be the countries with the best potential to host the bulk of these activities. But it is noteworthy that every country has something to 'offer'.

TCDC, widely recognized as an effective instrument of transfer of knowledge, skills, experience and technologies, is by no means a new concept. There are numerous instances of developing countries exchanging their technology and knowledge in a mutually useful way. However, it was at the United Nations Conference on Technical Cooperation in Developing Countries, held in 1976 in Buenos Aires, that TCDC came to be adopted by the United Nations system as a part of its regular operations.

It was, therefore, not surprising that a regional development programme like BOBP showed a special interest in promoting TCDC activities within its region. The large number of activities of a 'TCDC nature' that have been implemented by BOBP to date, in response to requests by the member countries, may be broadly categorized as follows

- Demonstration of fishing methods of one country in another by bringing in experienced fishermen;
- Exposure of nationals of one country to certain methods of fishing and aquaculture practised in another country through study tours;

Making prototypes of craft, boats and gear developed in one country available to another;

Facilitation of the participation of personnel from other countries to National Consultations/Workshops in one country; and

Providing the services of qfficials of one country to undertake technological activities in another country.

However, it is noteworthy that almost all of these resulted from the initiatives as well as the intervention of the BOBP with very little initiative on the part of the donor and recipient countries. It was agreed at the Madras Consultation that the member countries should, as far as possible, negotiate with other member countries and make the necessary arrangements to implement TCDCs on a bilateral basis. It was also recommended that implementation arrangements should kept as flexible as possible, including countries outside the BOBP region as well, to enable an expansion of TCDC activities.

The updated 'TCDC List' is now with the member countries and it is to be seen to what extent they will interact with one another, in the spirit of regional cooperation and good neighbourliness, and on the principle of reciprocity, to give effect to TCDC. Their fisheries administrations will have to take active initiatives by making use of existing bilateral arrangements and protocols and of such regional organizations as SAARC and ASEAN if TCDCs are to be implemented expeditiously and smoothly. BOBP stands ready to provide back up funding and logistic support for positive initiatives from member countries.

BAY OF BENGAL NEWS

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