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World Fisheries Today

"Management is the only solution"

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"Management is the only solution"

Armin Lindquist
interviewed by S.R. Madhu

In a wide-ranging interview with *Bay of Bengal News,* the FAO's Assistant Director General of Fisheries discusses the most pressing fisheries questions of today, particularly those that concern small-scale fisheries and fisherfolk development.

Seven years ago, the late Jean Carroz, then Assistant Director General of Fisheries, FAO discussed the meaning of the World Fisheries Conference with *Bay of Bengal News.*

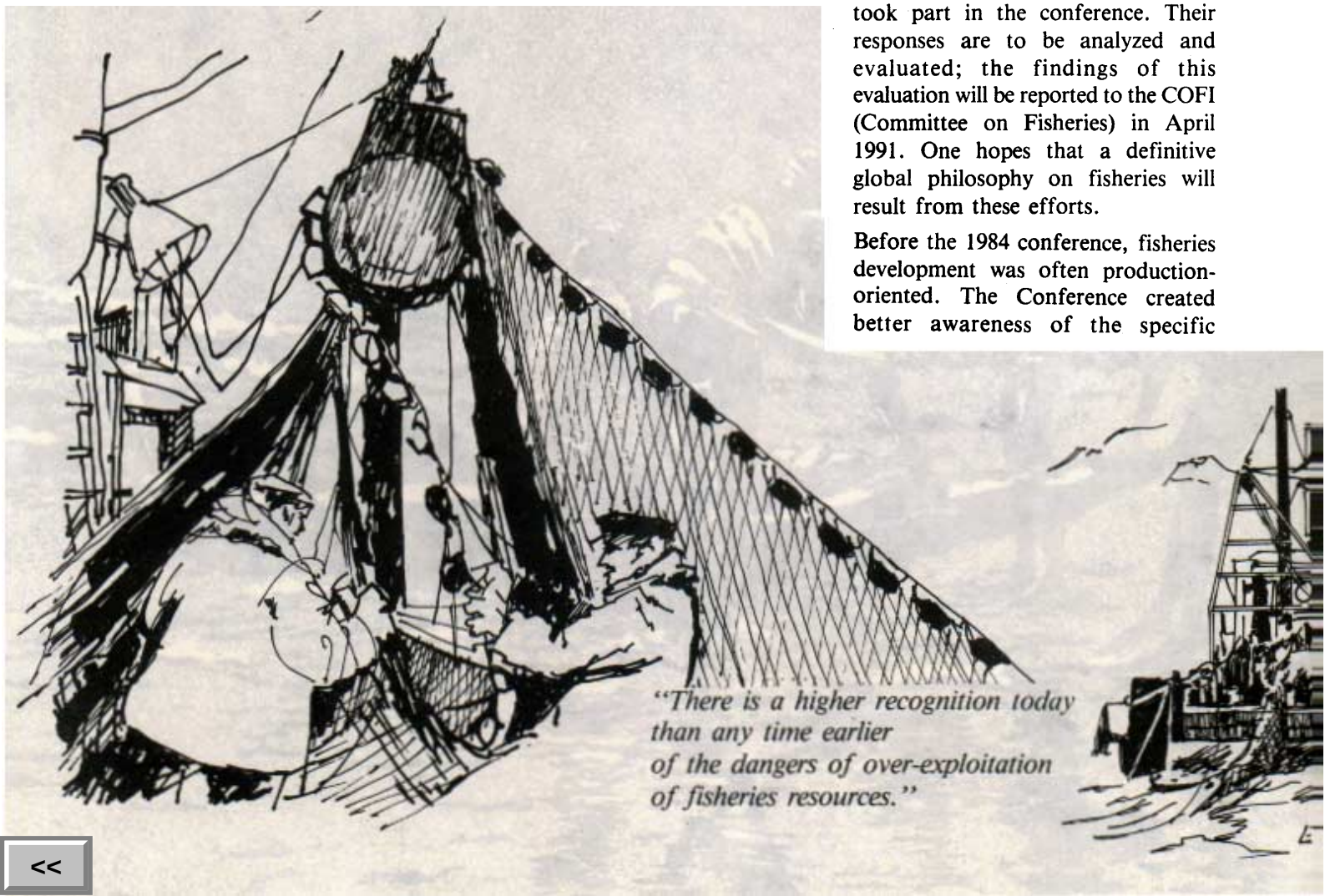
Today Mr Carroz's successor, Dr Armin Lindquist, looks back on the 1984 conference and discusses key issues in world fisheries.

After several years with the National Swedish Board of Fisheries (NSBF), Dr Lindquist joined the FAO in 1981 as Director of the Fishery Resources Division. He became Assistant Director General of the FAO Fisheries Department in 1988, and heads a multi-disciplinary professional staff in Rome and field projects worldwide.

Q : The World Fisheries Conference of 1984 approved of a global strategy for fisheries development and management and also proposed five special action programmes. What's the status of these programmes today? Has there been any follow-up action?

Lindquist : The 1984 conference asked FAO to monitor progress in the implementation of these programmes. Accordingly, a questionnaire has been sent to all member-countries of the FAO, plus countries like the Soviet Union which are not members but took part in the conference. Their responses are to be analyzed and evaluated; the findings of this evaluation will be reported to the COFI (Committee on Fisheries) in April 1991. One hopes that a definitive global philosophy on fisheries will result from these efforts.

Before the 1984 conference, fisheries development was often production-oriented. The Conference created better awareness of the specific



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problems of small-scale fisherfolk communities among decision-makers at the highest level. Small-scale fisheries is now in the mainstream of fisheries development, rather than in the periphery: a development long overdue, and which the Conference perhaps hastened.

Q : Is another global initiative similar to the World Fisheries Conference planned in the near future?

Lindquist : The need now is to strengthen the foundation for global co-operation and national action set up by the 1984 conference, and it is being done. However, there will be conferences on specific issues or themes :

A U N Conference on the Environment is to be held in 1992, reflecting the all-round concern and emphasis on the subject.

— Management of deepwater areas: Management of the high seas will also be the subject of a formal protocol in years to come. This will concentrate on fisheries outside coastal areas.

— Private professional fisheries associations are to hold a "World Fisheries Congress" in Athens in April 1991. FAO will participate.

— A Conference on Nutrition is to be held in 1992. It may chalk out a programme of action on this front.

Q : What do you regard as the most significant trend in fisheries development today, particularly as it affects small-scale fishermen? What lessons does it hold for national planners?

Lindquist : Management of coastal areas is the most important subject. The conditions of coastal fishing are deteriorating, because of uncontrolled fishing, pollution, siltation, mangrove extraction and other causes.

There's higher recognition today than any time earlier about the dangers of over-exploitation of fishery resources. It may not be possible in the future to have or sustain so many coastal fisherfolk populations.

Peru had the world's biggest fishery. A catch of 12 million tons of anchovies in 1970 was down to 2.7 million in 1988. All experts have agreed on the reasons : a combination of overfishing and large oceanographic changes. (But in Japan, the sardine fishery is on the rise. So trends can change.)

The world will in a few years need 20 to 30 million tons of fish more than the present production of 90 million tons. Effective organization and administration are needed for the purpose. Increased production from aquaculture, reduction of wastes and better utilization are essential. Eighty to 90 per cent of shrimp by-catch is discarded. Ways must be found to utilize the by-catch, by more effective handling systems and by producing new products, so that the resource is used and not discarded.

National development in fisheries must be based on the countries' national priorities, but in an internationally coordinated context. Decision-makers must utilize the knowledge of biologists and researchers and get useful inputs from them.

Q : Does the emergence of autonomous organizations like INFOFISH and IPTP change the FAO's role in the area?

Lindquist : INFOFISH is FAO's own brainchild, as is the Network of Aquaculture Centres in Asia (NACA). We are glad that they have become autonomous inter-governmental organizations, and we did everything possible for them to attain this status. We hope that the International Tuna Programme (IPTP) becomes a permanent part of the Indian Ocean Tuna Commission, hopefully to be created very soon. Expertise in tuna management is scarce and member-countries need help.

The members of the European Inland Fisheries Advisory Commission carry out all the work relating to freshwater fish resources and aquaculture in Europe. In some developing countries the expertise is available; in many developing countries, unfortunately not. FAO organizes meetings of regional fishery bodies to facilitate the sharing of views and the exchange of experiences.

Q : There seems to be a change in the philosophy of UNDP on the funding of fisheries projects. It appears to believe that national agencies rather than organizations like FAO should execute these projects. Do you think developing countries can do this effectively?

Lindquist : The FAO's Director General has addressed this point at length, particularly in a recent speech to the UNDP Governing Council. He

Dr. Armin Lindquist.

has stressed the advantages of the U N development system: "its unique multilateral character, its political neutrality, objectivity and non-profit motive, capacity to adjust to government policies and priorities, to mobilize expertise from all parts of the world".

He has pointed out that recipient countries will suffer "if their continued access to the expertise and accumulated experience of agencies were to be endangered."

FAO fully supports government execution as the ultimate modality of project execution. In fact it has actively promoted efforts in this direction. About 400 FAO projects are currently executed by national project coordinators, with FAO providing the necessary technical and managerial support. Hundreds of national expert staff have been trained by FAO in project design and management. But the fixing of an arbitrary date for exclusive government execution is both impractical and unreal.

UN agencies use not merely their own experts, they tap expertise from all over the world, including private firms and NGOs. More can be done in this direction. But it must be borne in mind that UN agencies promote human resource development and self-reliance in recipient countries. A profit-oriented entity would be much less motivated in this respect.

Q : Most governments still seem to accord higher priority to fisheries development rather than fisherfolk development. Whom does FAO perceive as its main target group : is it the governments or the fisherfolk?

Lindquist : At the 1984 World Fisheries Conference, countries agreed

that fisherfolk development is important. Measuring progress merely in terms of fisheries production is not right... The quality of life of people should be taken into account. Both governments and fisherfolk are our target groups, and we must support both.

Q : What new measures or initiatives are afoot concerning a better role for women in small-scale fisheries?

Lindquist : The gender issue must be addressed by all, and FAO does it with earnestness. We are committed to ensuring that women's role in fisheries is recognized, their activities supported, their economic and human potential realized. The core group on "Women in fisheries" at the FAO headquarters deals exclusively with the subject. It has produced a booklet of guidelines that is in great demand. It contains 17 checklists to help missions identify or evaluate projects in order to ensure that women's interests and preoccupations are fully taken into account.

Fisherwomen must be encouraged to acquire appropriate knowledge and develop adequate skills. One cannot assume that programmes aimed at men will automatically benefit women. Women should be given direct support, relating to education, literacy, child care, sanitation, nutrition. There should be facilities to ease the burden of domestic chores, improved technologies for preparing and cooking food. There should be more women trainers. Women should have equal legal rights to property and other assets and get equal access to credit. They should take part at all stages of project planning, implementation, monitoring and evaluation.

Q : What are FAO's plans to develop small-scale technologies to replace large-scale technology for fish capture in coastal waters?

Lindquist : We can assist governments who want to replace large-scale technology. This means government action to set apart fishing areas to small-scale fishermen to the exclusion of large-scale operations.

We might advise governments: These nursery grounds must be avoided... You must limit certain areas to passive gears... You must impose a near-shore limit for bigger vessels.

It's for governments to decide that they want small-scale technologies to replace the large scale. We can then advise them on the technologies needed. But we must not give an impression that insistence on simple or "appropriate" technologies is stifling progress.

I must point out that our assistance is not confined to the small-scale sector. We do not oppose other sectors. We recognize that medium-scale fisheries provide jobs and create markets. We aim at preventing conflicts among different sectors.

Q : Could you discuss FAO policy and action on promoting small-scale fishing operations in deep waters and in offshore fishing zones?

Lindquist : Fishermen are being pushed offshore by over-expoitation of near-shore waters. Non-selective techniques have been responsible. Consequently, fishermen have to look further afield but do not have the boats, the tools etc.

The problem is to develop economically viable technologies by which the small-scale fishery can tap deeper waters and offshore fishing zones. This may be a matter of time and trial and error.

Q : What are the FAO's plans to promote fuel-saving in fisheries in view of the current fuel crisis?

Lindquist : Countries should use the most economic means of propulsion,

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not merely in capture fisheries, but also in fish processing and aquaculture. There was a time when big motors were a craze. It's wiser and more economical to use small motors and sails for propulsion and wind energy for electricity.

On fuel-saving policy, some governments have taken the final step, some others have still to do so. Our job is not to say "Thou shalt do this" but to present options. When taking decisions on vessel replacement programmes, governments should consider the energy question.

The FAO has worked in Cochin on propellers and propeller nozzles. Studies have been carried out for India and Mexico on fuel savings. But very often, ideas on fuel saving are not implemented.

In India, millions of dollars can be saved every year in the smaller trawler fleet through prudent energy-saving measures. It is estimated that some $120 million is spent on fuel every year. At least savings of 10 to 20%, certainly upwards of $20 million, can be made through energy-saving measures.

In September 1990, a FAO group concerned with energy optimization in fisheries met in Iceland. In 1991, an expert consultation will produce standards and guidelines for governments to follow. We'll present them to various regional fishery bodies prior to submission to COFI 1993 for voluntary adoption by member states.

Q : Could you give an idea of FAO policy or proposed action on (a) improving safety at sea for small-scale fishermen? (b) developing fish aggregating devices or reef fish technologies for small- scale fishermen; (c) promoting low-cost passive gears such as hook and line?

Lindquist : On improving safety at sea, there is a lot of work going on in co-operation with the IMO. The right equipment to be used by various boats, the measures to be adopted in case of distress, the rules and recommendations for boats of all sizes — all these have been spelled out.

A protocol has been developed on safety of fishing vessels. But the convention is not in force yet, because Japan, China and the U S which account for over 50 per cent of the tonnage are yet to sign it. The 1977 Torremolinos International Convention for the Safety of Fishing Vessels provides a powerful starting point for the protocol.

The UK, US and Netherlands have legislation down to small vessels, on the basis of the Torremolinos convention. This is where the FAO could help, by applying the general principles of intent to smaller vessels.

We are concerned with safety. But we want to do it on an applied basis, so that problems are tackled on an actual rather than a hypothetical basis. To design safety rules for specific vessels or fisheries, we must know the safety network that exists already.

As for FADs, they have been around for some time. They are common techniques, particularly for tuna. We had a special meeting on artificial reefs within the Indian Ocean Fishery Commission from which it became

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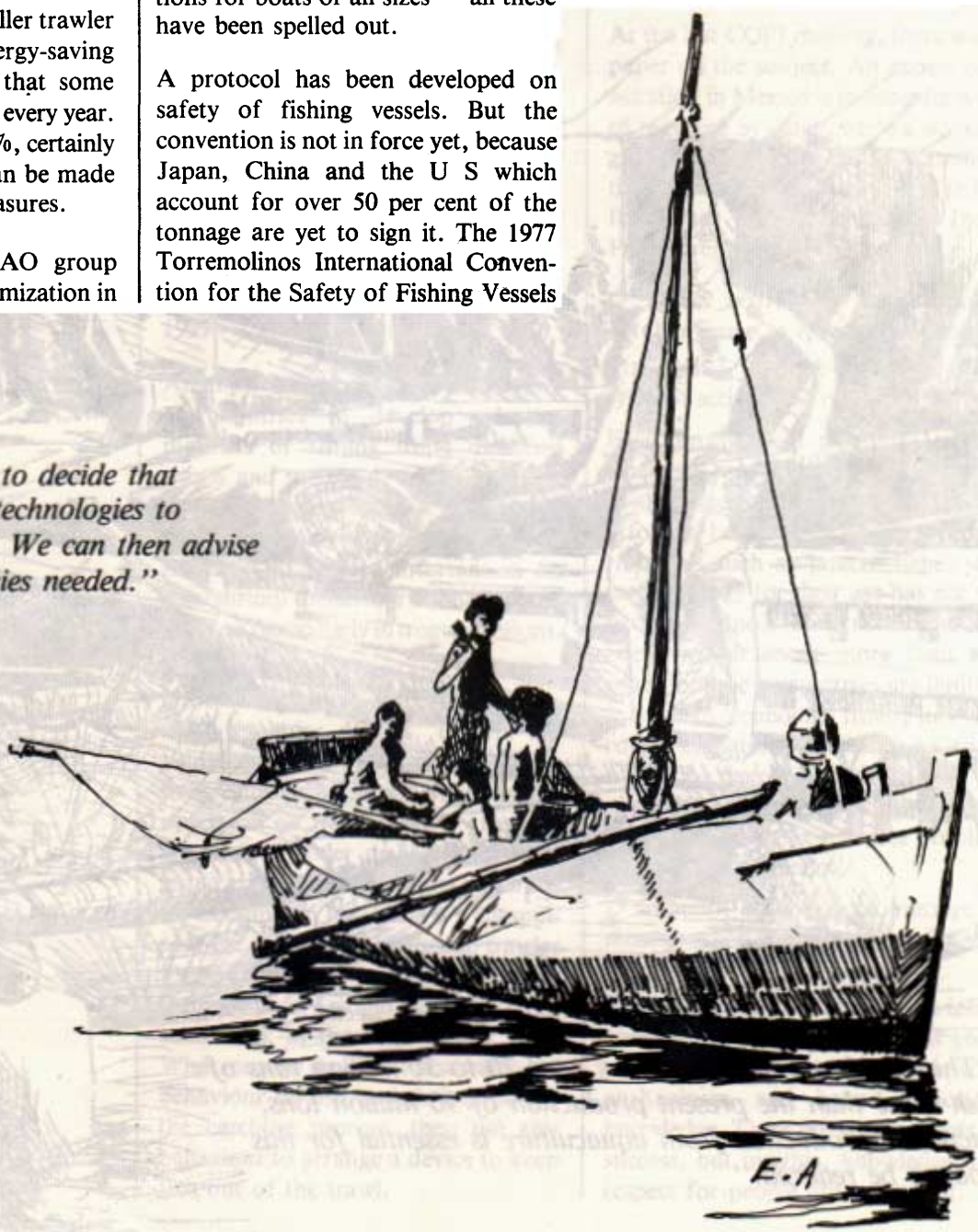

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obvious that gains and losses are not easily estimated from this technique. Who is entitled to fish close to an artificial reef? What fishing gear should be used? These are some questions that arise. We have published a book by a Japanese author on the subject.

At one time it was believed that artificial reefs were the best way to get rid of trawlers, but whether they raise production is still to be established.

Low-cost passive gears such as hook and line — these are a part of our general thinking to introduce economies in fisheries.

Q : Ecologists are concerned about incidents of capture of dolphins. Does FAO have any concerted save-the-dolphin programme?

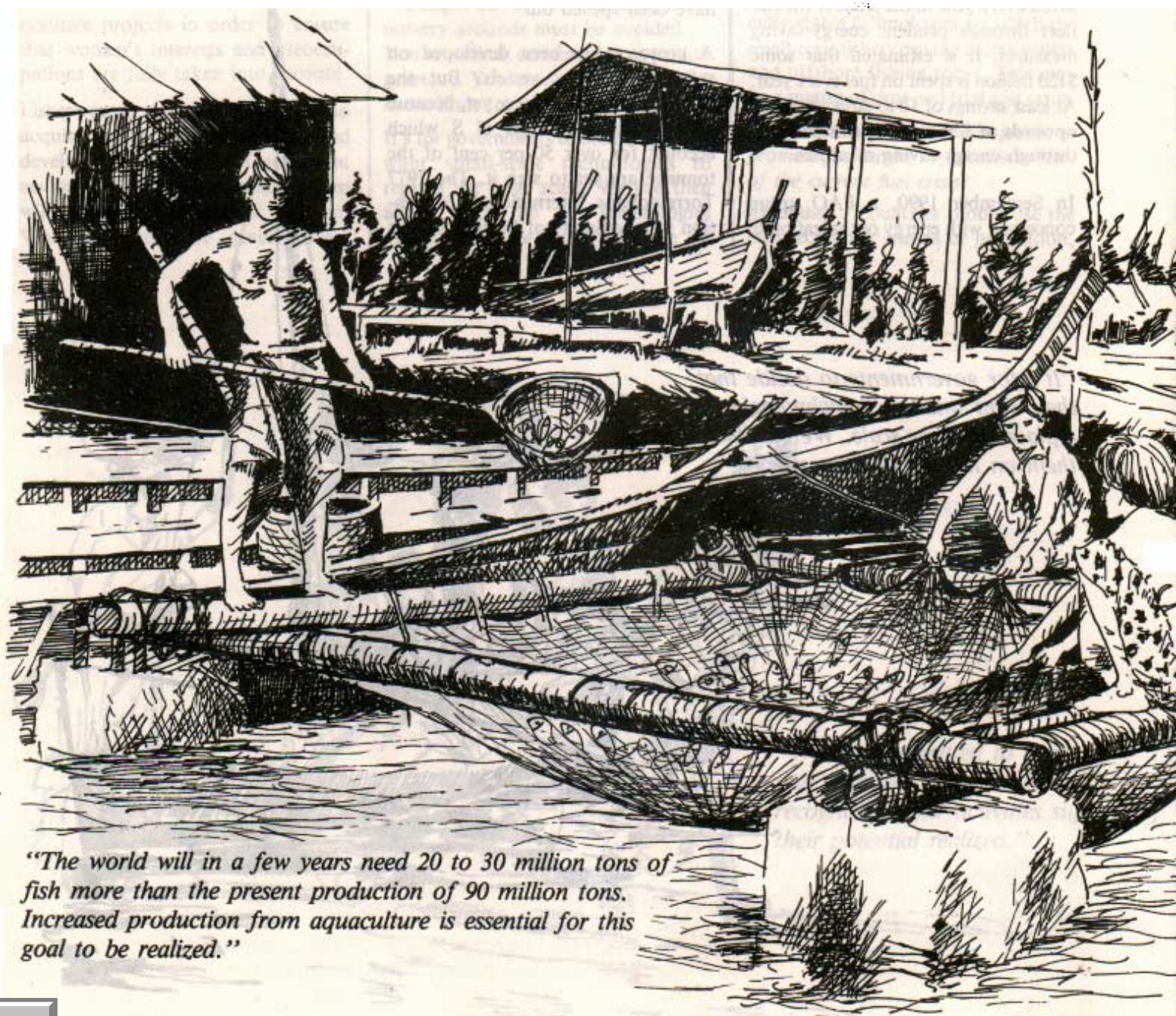
Lindquist : Yes, we are concerned for the dolphin and for other marine mammals such as turtles, and we are trying to prevent their capture. Our view is that tuna catches should generate very little by-catch. The view is widely accepted. The subject has also been discussed at the Committee of the IOFC.

Action should not await information on this issue. In practice, the central management issue is the optimum sustained utilization of the target species of fisheries, and the simultaneous conservation of other components of the ecosystem such as marine mammals and the like. The stability of the system ought to be maintained.

However, we also must not lose sight of the fishermen. They do not like to have "by-catch" which they can't use and therefore would naturally do everything to avoid catching non-target species. We have to help them to avoid this.

Q : What is FAO's immediate action plan on measures to tackle marine pollution? Are any initiatives planned? Do you have any up-to-date study on the subject?

Lindquist : The FAO is concerned about the contamination of food from the seas, rivers and lakes. During the 60s and the '70s, FAO working groups



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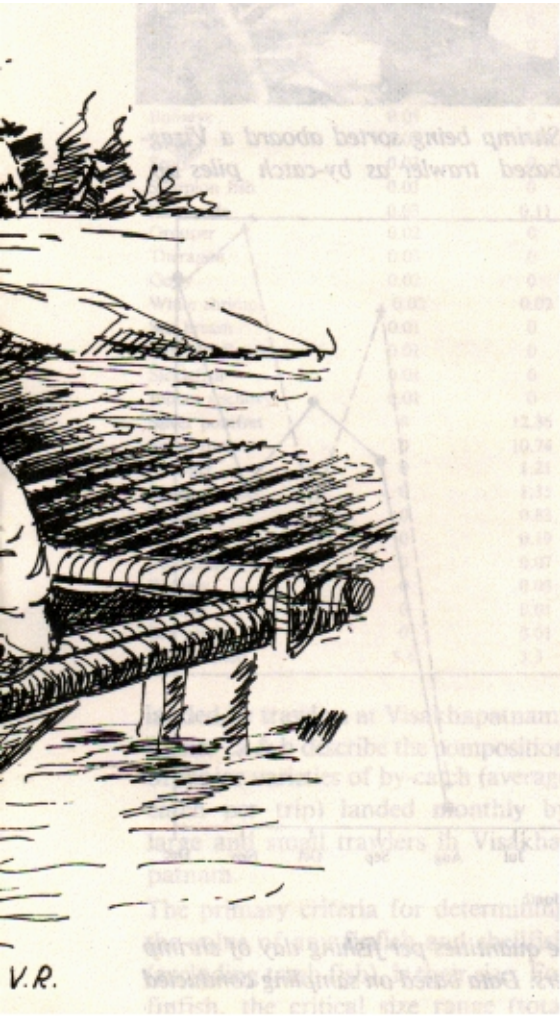
prepared regional reports on the state of aquatic pollution for the Mediterranean, the Southeast Asian Sea and Latin American inland waters.

The United Nations Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) was founded in 1969, and FAO played a major role in preparing various scientific reports on the selection of dumping sites, on the impact of oil on the marine environment, and on thermal discharges.

The UNEP Regional Seas Programme was initiated in 1974, and FAO became involved in its implementation. There's now a long-term pollution monitoring and research programme supported by governments of the region, with technical assistance from the UN system, including the FAO.
From 1987, FAO has been active with a GESAMP working group that deals with several aspects of environmental impact. Some of them are the effects of aquaculture practices on water quality; how aquaculture products — raw shellfish for instance — impinge on human health; how aquaculture intereferes with other uses of the coastal environment such as mangroves, capture fisheries and tourism. Ultimately, the working group will provide guidelines for environmentally sound development of coastal aquaculture. This will allow FAO to promote food production from the sea without encroaching on other legitimate uses of the sea.



FAO is updating the GESAMP report on the impact of oil on the marine environment. The first version, which appeared in 1977, was a best-seller. Six thousand copies were sold out very soon.

Q : What is the FAO policy on better utilization of by-catch from shrimp trawlers?

Lindquist : FAO is active in improving the species selectivity and size selectivity of shrimp trawls. An expert consultation was held on the subject in March 1986, and again in 1988.

Co-operation between Thailand and Denmark followed from the 1986 meeting — which goes to show that such meetings enable more than an exchange of views. It was concluded that a meeting should be held every two years. Another meeting is likely 1991.

Attempts have been made in a number of countries to develop selective methods of fishing using modified trawls and sorting devices. However, although some success has been achieved,notably in temperate regions, the lack of detailed information on fish/shrimp behaviour has hindered progress particularly in tropical regions.

Gear selectivity is very specialized. In USA, shrimp trawls are equipped with turtle excluder devices. Efforts are being made to convert turtle excluders to by-catch excluders. International co-operation on the subject is growing. By-catch excluder devices have been tested in Indonesia, Malaysia and India (in Cochin). In Indonesia it's compulsory for every licensed shrimp trawler to rig a by-catch excluder device in shrimp trawls. I would like to see more such work in the Indo-Pacific area. What must be done is to first watch the behaviour of fish and shrimp during the catching process, then use this behaviour to arrange a device to keep fish out of the trawl.

By-catch is a worldwide problem, but varies from country to country. The by-catch of freezer shrimp trawlers is generally discarded; but by-catch from small, inshore-operating shrimp trawlers which make day trips is mostly landed and used for direct human consumption, often by the fishing communities. Sometimes the by-catch leads to big uses. Sometimes it is landed and sold. So not all by-catch is wasted.

The composition of the by-catch might vary widely. Tropical countries have 60 to 80 varieties (species of fish) in the by-catch, temperate countries have fewer. The Fishery Industry Division at FAO estimate that the ratio of catch to by-catch is 1 : 10. In other words, 10 kg of by-catch is produced for every kg of shrimp catch. There's obviously scope for improving utilization.

At the last COFI meeting, there was a paper on the subject. An expert consultation in Mexico is to consider ways of reducing by-catch, while a working group in the Pacific is also examining the problem. What we would like is a follow-up workshop in the Indo-Pacific region.

Q : What activities or projects does FAO envisage to reduce fish losses?

Lindquist : We are supporting all types of activities to reduce fish losses.

Fish consumption promotes health. There is medical evidence for this. With greater pressure on resources, an effort is being made to tap unused resources such as lantern fishes; the methodology for their use has not yet been developed. The krill fishery has been written about more than any other, but the perspectives are limited. It is a high-technology fishery in a very rough climate. There may be some scope for increasing the catches of squid. In the longer term, however, the only solution to the resource problem is better management.

Q : Finally, what is your message to those engaged in international fisheries development?

Lindquist : To be successful in international development, we need good people out in the field... people with enthusiasm and broad practical knowledge. There are no short-cuts to success, but insights, knowledge and respect for people are important.

Biological aspects of shrimp trawl by-catch

by K Sivasubramaniam

Shrimp trawler fishermen everywhere throw away a good part of the by-catch (species other than shrimp) — a wasteful practice that causes much concern in this resource-scarce age. BOBP's Senior Fishery Biologist describes some of the biological aspects of by-catch of trawlers operating from Visakhapatnam, India, and discusses the general resource implications that stem from capture and discard of by-catch.

In most fisheries targeted at specific kinds of fish, other species also get caught — an occurrence particularly common in tropical waters. These other species are referred to as "by-catch".

By-catch is usually much greater in quantity and more varied than targeted or wanted species, particularly in the shrimp trawl fisheries of tropical countries. While some of the by-catch — whatever is considered commercially valuable and marketable, the large-sized varieties of popular fish species — is landed ashore for sale along with the shrimp, the remaining by-catch is thrown overboard at sea. It is "discarded".

Discard of by-catch — a fairly universal practice — occurs because trawler owners are interested almost exclusively in high-value export-worthy shrimp. Crew time and facilities on board are directed to careful handling and preservation of shrimp.

The discarded by-catch is of two kinds. The first is fish that cannot be marketed in any form — "trash fish". The second is small sizes of commercially valuable fish.

Among countries around the Bay of Bengal, about 400,000t of by-catches from shrimp trawls are being discarded annually. The BOBP has made some observations about by-catches on India's northeast coast, resulting from the operations of trawlers based in Visakhapatnam.

The shrimp trawl by-catch at Vizag consists of more than 85 species that belong to more than 45 families of finfish and shellfish. Only nine families that include about 12 species may be considered as "trash fish". There are broadly three types of vessels at Vizag that generate by-catch : double-rig trawlers (20-30m long), medium size trawlers (16m) and motorized small trawlers (less than 14 m long). They operate trawls with cod end mesh sizes generally around 40mm, 30 mm and 20-25 mm respectively, and fish in depth ranges of 20-60m, 20-50m and 5-20m respectively. The large and medium sized trawlers have insulated fishholds and refrigeration facilities, whereas the small trawlers carry ice boxes and keep by-catches on the open deck.

The numbers, sizes and quantities of by-catch species caught, landed or discarded differ significantly with the class of vessels. This is illustrated in Table 1 which presents data (sampled in December 1989) about the species composition of by-catch discarded and

Shrimp being sorted aboard a Vizag-based trawler as by-catch piles up.

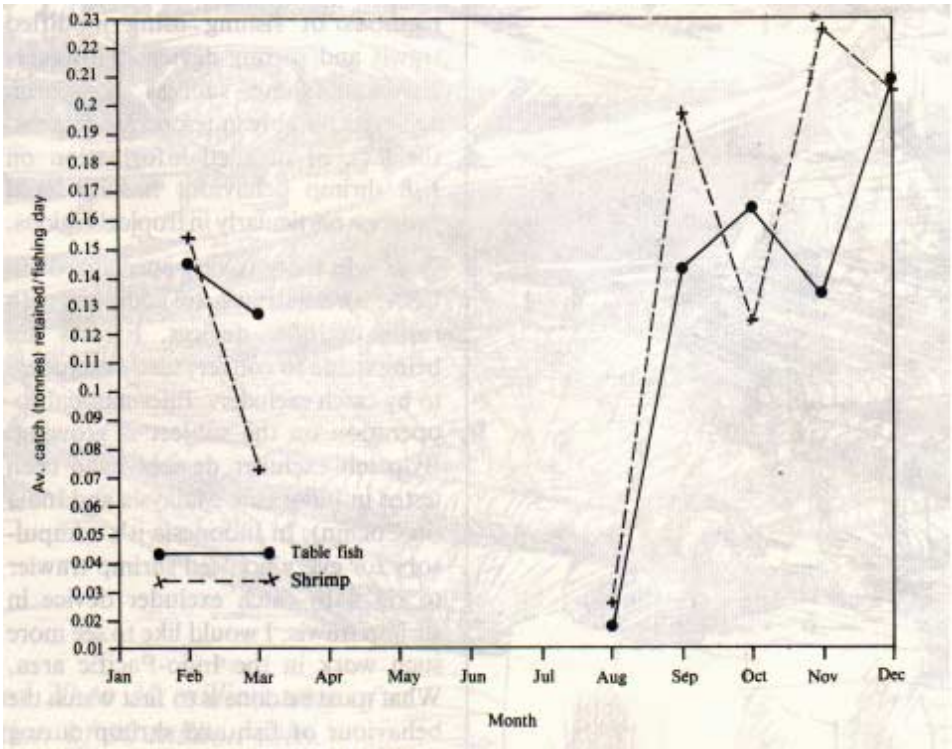


Figure 1. Seasonal variations in the average quantities per fishing day of shrimp and by-catch retained by large shrimp trawlers. Data based on sampling conducted during 1989 at Visakhapatnam, India..

Table 1

By-catch data for big trawlers and mini-trawlers operating from Visakhapatnam, December 1989.

Species	Big trawlers Discarded (%)	Big trawlers Landed (%)	Mini trawlers Landed (%)	Max. size ever recorded for species (cm)	Size range observed during landings at Vizag (cm)
Croakers	21.09	2.87	13.60	15-30	4-25
Brown shrimp	11.24	0.05	0.11	20	4-11
Ribbon fish	10.56	1.70	1.99	60-100	10-68
Tongue sole	10.03	1.51	1.93	25-30	3-6
Sardines	6.42	0	4.11	15	11-13
Kadal shrimp	3.71	0	0	13	6-11
Lizardfish	3.28	0	0	45	8-18
Threadfin bream	3.10	0	0	20-40	6-22
Anchovy	2.90	0	0	16	3-9
Goatfish	2.67	0.04	1.71	22-30	6-15
Kiddi shrimp	1.82	0	0	14	7-10
Silver biddies	1.73	0	0	15	2-8
Sharks	1.70	7.25	3.36	60-200	15-40
Yellow shrimp	1.51	0	0	13	6-11
Threadfins	1.40	5.75	3.20	23-40	10-16
Longfin silver biddies	1.33	0	0	15	3-7
Catfish	1.12	18.06	26.23	60	15-20
Crabs	0.99	0	0	—	1-5
Conger eels	0.97	28.67	23-96	90	20-60
Jacks	0.88	0.01	0	65- 100	5-12
Cuttlefish	0.77	0	0	20-25	3-8
Moray eels	0.76	0	0	140	30-100
False trevally	0.76	0	0	40	4-18
Trevally	0.54	0.01	0	40	8-22
Grenadier anchovy	0.54	0	0	20	2-6
Ponyfish	0.46	0	0	11-20	3-6
Fiddler shrimp	0.34	0	0	10	4-6
Drift fish	0.31	0	0	25	5-10
Puffer fish	0.33	0	0	15	7-12
Rays	0.31	0	0	20-30	10-20
Squilla	0.25	0	0	15	3-10
Flounder	0.19	0	0	50	4-10
Flathead	0.17	0	0	20-80	3-12
Scad	0.16	0	0	30	7-16
Bombay duck	0.14	0	0	40	10-15
Black pomfret	0.09	0.08	0.31	30	10-14
Mackerel	0.06	2.44	0	35	12-19
Bullseye	0.05	0	0	30	10-15
Squid	0.03	0.97	0	15-20	5-12
Seats	0.03	0	0	30	9-14
Scorpion fish	0.03	0	0	15-30	15-19
Barracuda	0.03	0.11	0.36	180	17-22
Grouper	0.02	0	0	60-90	10-15
Therapon	0.03	0	0	30	7-12
Goby	0.02	0	0	16-20	7-10
White shrimp	0.02	0.02	0.02	23	4-10
Sea bream	0.01	0	0	30-80	9-14
Left eye flounder	0.01	0	0	20-25	5-6
Sicklefish	0.01	0	0	25-40	7-9
Indian anchovy	0.01	0	0	15	6-7
Silver pomfret	0	12.36	9.29	20	5-8
Small tuna	0	10.74	2.83	40-60	15-30
Snapper	0	1.21	0.50	30-60	12-18
Large croaker	0	1.35	2.72	70-90	30-35
Perches	0	0.83	1.01	30-60	5-20
Hilsa	0	0.19	0	25	12-14
Moonfish	0	0.07	0	24	8-14
Seabass	0	0.03	0	30-40	7-14
Filefish	0	0.01	0	20-30	2-8
Sea perch	0	0.01	0	30-60	9-18
Unidentified	5.1	3.3	2.74	—	—

landed by trawlers at Visakhapatnam. Tables 2a & b describe the composition of major varieties of by-catch (average catch per trip) landed monthly by large and small trawlers in Visakhapatnam.

The primary criteria for determining the value of any finfish and shellfish (excluding trash fish), is their size. For finfish, the critical size range (total length) is 12-17cm, and for shellfish it is 6-10cm. Fish below these sizes are generally discarded, even if they are penaeid shrimps. The size range of by-catch observed at Vizag was 1-75cm in total length. More than 50% of the individuals of all species in the by-catch samples were immature fish, or fish that had no chance of spawning even once.

The catches of a few trawlers operating off West Bengal between October and December 1989 were examined. The ratio of shrimp to by-catch was 1:14.7 for the large trawler and 1:23 for the small trawler : About 15% of the by-catch of large trawlers, 10% of that from medium-sized trawlers and only about 5% of the small trawler by-catch, were fish larger than 20 cm length. The small trawlers generally tend to bring in their entire by-catch; it is piled up on the deck.

Factors influencing the quantum of by catch in shrimp trawl catches are :

- the number of species of shrimp present in the fishing ground
- the abundance of shrimp species
- the cod end mesh sizes and trawl characteristics
- time of trawling (day or night) and trip duration
- fishing depth and
- intensity of shrimp trawling and the history of the fishery.

On the other hand, the quantity of by-catch retained by a shrimp trawler is influenced by :

- size of the trawler and storage capacity,
- refrigeration facilities, ice boxes on deck
- trip duration
- catch rate of shrimps
- size and commercial value of by-catch species.

Some other observations :

- There are significant seasonal variations in the landings of by-catch.
- The more the shrimp landed, the greater the by-catch landed.
- Daytime trawling is likely to yield more by-catch than trawling at night, since many of the demersal finfish species in the by-catch exhibit the behaviour of diurnal rhythm (they rise to the surface at night, sink to the bottom during the day).
- The number of species caught tends to go down, but average size of fish caught goes up, as fishing depth and cod end mesh size increase.
- When shrimp trawling gets intensive, the catch rate goes down. Trawler operators tend to make up for this in several ways — by catching and landing more of the

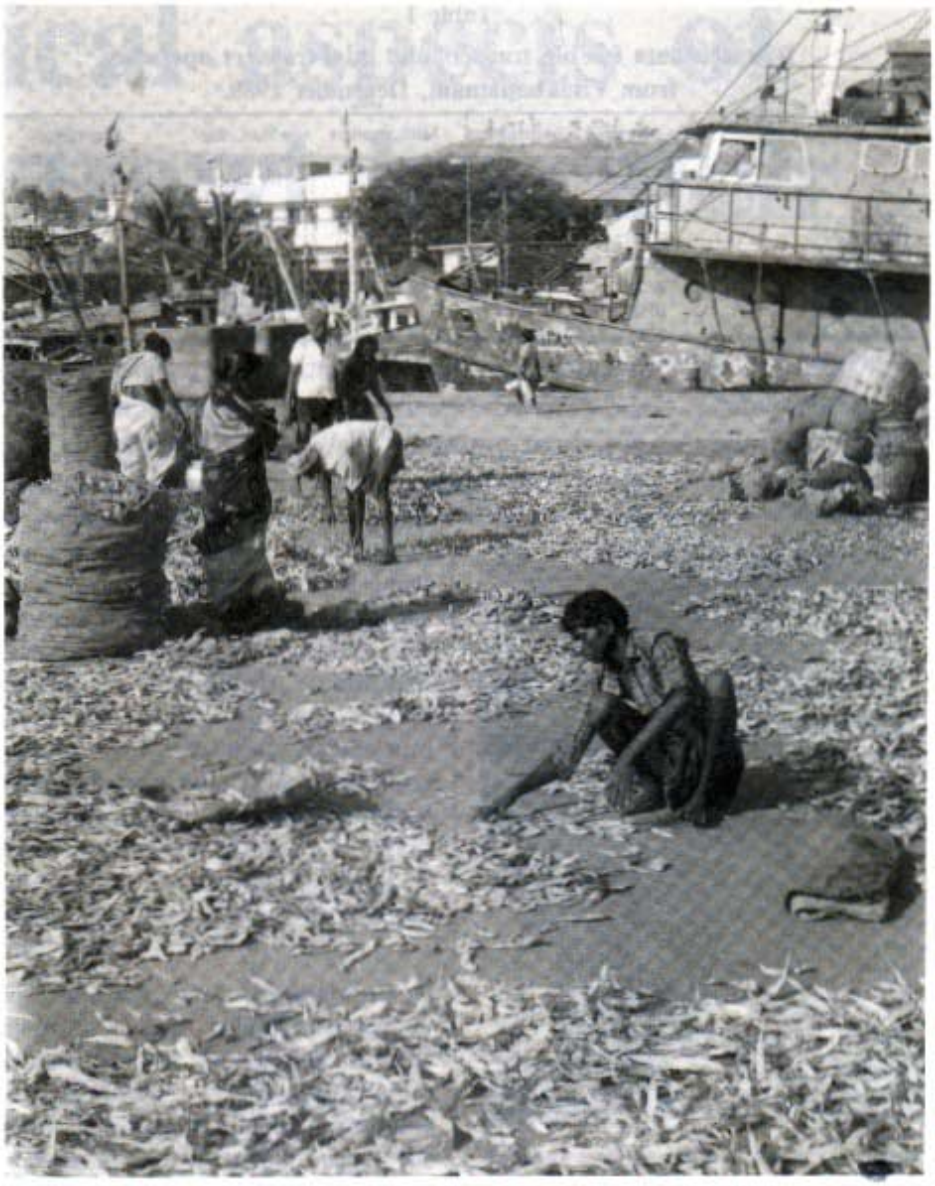
valuable by-catch by trawling more during the day; by fishing even during the lean shrimp season; and by shifting into areas outside the shrimp trawling grounds — as is supposed to be happening with shrimp trawlers in the south-east coast off Madras.

Consider the 100,000-odd tonnes of by-catch *discarded* annually on India's northeast coast. This is a conspicuously high figure in relation to the estimated 250,000 t *produced* by artisanal fisheries in the area. Unfortunately, a majority of the discarded species are those that small-scale fishermen go for. Also of concern is that the by-catch contains a high proportion of immature fish, whose capture affects tomorrow's catches.

The laws of fish population dynamics tell us that the by-catch resulting from shrimp trawl fisheries depletes bigger long-living fish varieties faster than the smaller short-life varieties. No wonder that in the shrimp trawl fishery in many areas of the Asian region, long-living species — such as snappers, groupers, croakers, rays, catfish, goatfish, sharks, threadfin bream, lizard fish and ribbonfish — have declined significantly long before any of the smaller short-living species.

What are the implications of this? There is a restructuring of prey-predator relationships in intensively fished grounds. With large predators falling off in numbers, small preys of edible species increase. Among the species that could increase in abundance are squid and cuttlefish, both of them valuable export species, — a phenomenon reportedly observed in some intensively trawled areas of the Philippines, the Gulf of Thailand and the west coast of Thailand. Result: trawler fishermen, satisfied with catching these exportable species, tend to be unconcerned about the decline in catches of many finfish species which are popular in the domestic market.

On the western side of the Bay of Bengal, there is an urgent need for establishing systematic monitoring surveys to study changes in the catch rates and relative proportions of various fish species caught by shrimp trawls. Such surveys would indicate the impact of present exploitation levels in the shrimp trawl fishery on various fish stocks.



Drying of landed by-catch at Visakhapatnam fishing harbour.

Table 2(a) : Monthly species composition (average catch/trip in kg) of the most abundant finfish by-catch landed by big trawlers in Visakhapatnam

1989	Month								Average	
Species	Feb.	Mar.	Jul.	Aug.	Sep.	Oct	Nov.	Dec.	All year	Total
White Pomfrets	34.3	97.8	101.9	109.7	189.8	318.0	410.6	355.4	202.2	1617.4
Ribbon fish	0.0	14.3	0.0	0.0	58.3	16.5	115.9	19.7	28.1	224.7
Croakers	92.9	96.6	317.3	80.1	40.9	5.3	23.9	94.7	86.5	691.6
Catfish	297.0	381.3	280.3	598.3	480.3	262.5	300.0	123.0	341.0	2727.6
Sharks	112.7	106.0	0.0	153.9	52.6	153.8	110.3	232.8	115.3	922.2
Mackerels	37.1	18.3	32.0	0.0	191.4	81.0	0.0	0.0	41.0	327.9
Threadfins	206.6	731.5	0.0	10.5	0.2	2.2	20.2	47.7	133.3	1050.7
Tuna	248.9	177.2	396.0	0.0	10.1	19.0	14.7	782.7	156.6	1252.5
Miscellaneous	1057.8	1770.1		970.1	1273.2	1717.1	1448.3	2013.1	10645.7	1330.7
Total	2087.3	3393.1	1127.5	1922.6	2296.8	2575.4	2443.9	3669.1		19515.7

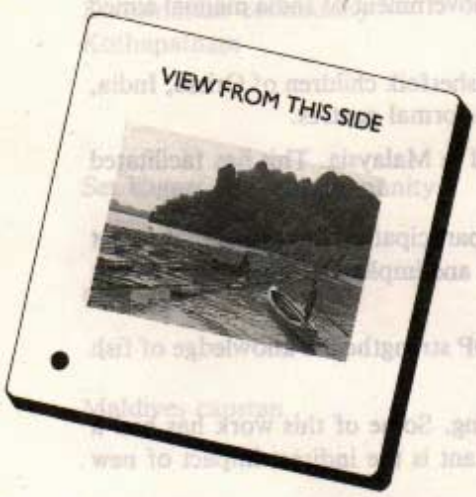
Table 2(b) : Monthly species composition (average catch/trip in kg) of the most abundant finfish by-catch landed by small trawlers in Visakhapatnam

1989	Month							Average	
Species	Mar.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	All year	Total
White Pomfrets	10.0	13.3	31.7	68.6	67.0	17.4	307.0	73.6	515.0
Croakers	50.0	116.0	66.7	31.8	0.0	0.0	194.0	45.5	458.5
Catfish	500.0	78.0	283.3	138.9	84.1	0.0	253.0	191.0	1337.3
Sharks	37.5	0.0	41.7	13.8	13.5	37.8	64.0	29.7	208.3
Eels	187.5	68.4	258.3	109.0	118.0	67.2	386.8	170.8	1195.2
Miscellaneous	1627.5	91.4	525.0	513.8	417.3	549.0	930.5	664.9	4654.5
Total	2412.5	367.1	1206.7	875.9	699.9	671.4	2135.3		8368.8

Script of an audio-visual on BOBP

SMALL-SCALE FISHERFOLK COMMUNITIES IN THE BAY OF BENGAL

We reproduce here the script of a recent audio-visual, which summarizes the BOBP's work over the years in several countries and disciplines.



Visuals (Slides or sketches)	*Audio (Voice and sound effects)*
Fisherfolk community shots	Fisherfolk song.
"Small-scale fisherfolk communities in the Bay of Bengal" (Text super- imposed on fisherfolk community slide).	Fisherfolk song continues.
Bay of Bengal coast.	The Bay of Bengal laps the shores of several countries of south and southeast Asia. Scattered along the coasts are numerous fishing communities, with a total fisherfolk population exceeding five million.
Depressed fisherfolk communities.	These fisherfolk communities often suffer from poor incomes and low living standards.
Fishing community slide, BOBP logo.	In an effort to help governments to improve the living conditions of these fishing communities, the BOBP or the Bay of Bengal Programme for Fisheries Development was launched in 1979. Its methodology : catalytic impact.
Typical BOBP activity slide; happy fisherfolk.	Pilot activities are carried out in one or more fishing villages or provinces. These seek to demonstrate new ideas, technologies or methodologies. Successes achieved are applied on a wider scale by member-governments.
Logos of BOBP agencies.	The BOBP is a co-operative multi-agency effort. It brings together several international agencies — FAO, SIDA, DANIDA, UNDP, ODA, AGFUND and UNFPA.

Visuals (Slides or sketches)	*Audio (Voice and sound effects)*
Successful BOBP activity.	Several significant activities were carried out during BOBP's first phase, which ended in 1986. We'll mention just a few examples.
Scenic Phang Nga bay, finfish cages	Let us begin with aquaculture. Finfish cage culture spread to all provinces of southern Thailand, after demonstration in half a dozen villages of Phang Nga province.
Boats at APFC boatyard, catches in Puri.	In fishing technology, beachcraft developed by BOBP, now fishing mainly in Orissa and Andhra Pradesh in India, have raised the incomes of fisherfolk and of women fish vendors. They have also improved access to untapped resources, generated jobs and upgraded skills and technologies.
Driftnets, set bagnets, longlines.	Can traditional fishing gears be made more efficient or cost-effective? Experiments in India, Sri Lanka and Bangladesh have provided valuable answers, some positive, others negative.
SRL-15	The offshore fishery in Sri Lanka was given a fillip through development of small-sized multi-day boats.
Women — IND, SRL, BGD	In extension, there were major trend-setting sub-projects on fisherwomen, in India, Sri Lanka and Bangladesh, either to raise their incomes or improve their awareness and activism.
Orissa fisherfolk, with boat given on loan	How can small-scale fisherfolk get bank credit? This was demonstrated by a project in Orissa, India, that benefited a few thousand fisherfolk families.
NFE manuals and GOI manual	Non-formal education materials prepared for Tamil Nadu fisherfolk in India generated demand worldwide, and inspired a Government of India manual aimed at rural populations.
Children at Orissa NFE centres	A unique package of booklets developed for fisherfolk children of Orissa, India, was used by children and teachers in 40 non-formal centres.
Malaysian cockle	The knowledge base on cockles was expanded in Malaysia. This has facilitated management measures.
Fisherfolk groups	A comprehensive one-year study on people's participation has urged that target groups should be actively involved in planning and implementing projects meant to help them.
Close-ups of tuna, mackerel or hilsa or of tuna catches	A four-year resources project funded by UNDP strengthened knowledge of fish stocks and the capabilities of officials.
Happy fisherfolk	Thus BOBP's past work has been wide-ranging. Some of this work has had a direct impact on fisherfolk. But more important is the indirect impact of new technologies, skills or mechanisms.

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Visuals (Slides or sketches)	*Audio (Voice and sound effects)*
Fisherfolk community	The second phase of BOBP began in 1987, with a stronger orientation than before on fisherfolk communities.
Ranong activities	In Thailand, oyster, mussel and shrimp are being cultured in fishing villages of Ranong province. Health care, non-formal education and women's activities have been taken up in co-operation with other government departments. The aim is to provide integrated extension services to fishing villages.
Radio programme	In Sri Lanka, fisherfolk listen every day to radio programmes aimed exclusively at them. There is a special programme on Sundays.
Langkat extension	Can fisherfolk operate and manage small enterprises? Training is being imparted to them and to fisheries officials in Langkat district, Indonesia.
Fisherfolk communities in Bangladesh and Maldives	In Bangladesh and the Maldives, a new fisheries extension service is being set up that will identify fisherfolk problems and respond to their needs.
Women	Improving the role, status and incomes of fisherwomen has always been a high priority with BOBP. A project funded by the UNFPA supports such activities. It also tests whether government departments can carry out such activities for special target groups.
Besant Nagar market	A fish market for fisherwomen of Besant Nagar, Madras, India, initiated and designed by BOBP and built by the Corporation of Madras, may turn out to be an excellent income-generating activity. Training and advisory services were provided to the fisherwomen by BOBP.
Kattumaram community — Kothapatnam	An integrated approach to fisherfolk community development was demonstrated by a one-year study of kattumaram communities in Kothapatnam, Andhra Pradesh, India. It covered biological, economic and sociological aspects, and identified income-generation areas that merit further study. An example is intensive trials of certain fishing gears.
Set bagnet fishing community	Likewise, a multi-disciplinary study is being conducted of the set bagnet fishing communities in Bangladesh. Other fishing gears that compete or interact with set bagnets for the same resource are also being studied.
Canoes SRL, INS	In the area of fishing technology, BOBP is developing and demonstrating new canoes in Sri Lanka and Indonesia, which may be more cost-effective than traditional canoes and other new craft.
Maldives capstan	A capstan to haul traditional dhonis ashore has been successfully demonstrated in the Maldives. The Ministry of Fisheries and Agriculture is arranging to introduce such capstans in a number of villages.
Aquaculture	In aquaculture, BOBP has focused during the second phase on simple technologies accessible to small-scale fisherfolk, which do not call for major inputs of seed, feed or management.

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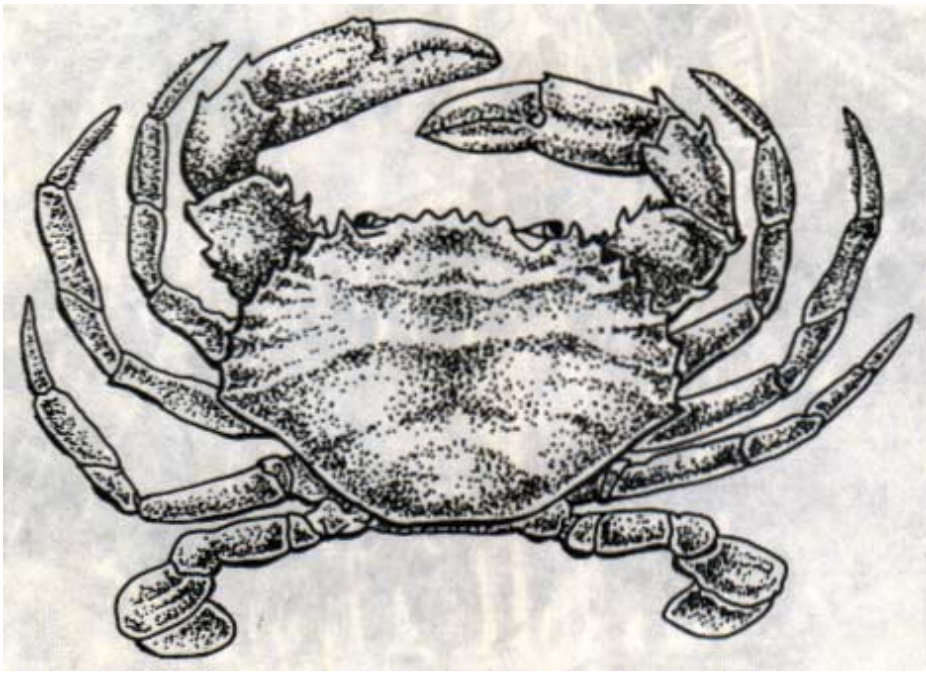
Visuals (Slides or sketches)	*Audio (Voice and sound effects)*
Oyster farming, Malaysia	For example, small-scale oyster farming is being introduced in peninsular Malaysia to improve the incomes of coastal fisherfolk households.
Prawn seed collectors, nursery construction	In West Bengal, India, BOBP is improving the collection techniques of traditional prawn seed collectors. Nurseries are also being constructed to grow out the seed to profitable size. Training and demonstration — including a freshwater prawn hatchery — are being organized in Bangladesh to meet the demand for prawn seed there.
Seaweed, Mandapam; Newsletter cover	Can small-scale fisherfolk farm seaweed? Following some success in Malaysia, seaweed farming was attempted in Mandapam, India, but the experience was negative. One of the main problems was that growing seaweed was gobbled up by predators. An international seminar on gracilaria convened by BOBP advanced knowledge on many aspects of the subject but offered no solutions.
Ice with Navas	Several post-harvest activities were introduced during the second phase. It was shown that traditional Navas of Andhra Pradesh, India, can get better prices for seerfish by icing them, using an insulated fish box. The use of this box has been promoted effectively in coastal districts of Andhra Pradesh.
Shrimp feed	Shrimp culture in India is largely dependent on imported and expensive feed. Trials are now going on in collaboration with both government and private manufacturers to develop locally an effective low-cost shrimp feed. Initial results are encouraging for small-scale shrimp farmers.
Permanent ice box	Three types of post-harvest technology are being transferred through several NGOs in Kanyakumari district, India. A permanent 1.5 ton capacity on-shore ice box to improve the quality and price of landed fish has proved effective.
Anchovies	The quality of dried anchovies is being improved through the use of simple low-cost drying racks, so that they can be exported to Sri Lanka, which was once a regular buyer of anchovies from India.
Women with improved fish containers	A hundred women fish vendors are trying out a new prototype fish container, which is more hygienic, more cost-effective and more comfortable than traditional fish baskets.
Map; Bay of Bengal	As BOBP nears the end of its second phase, member-countries are making plans for a third phase starting 1993.
Resources	In view of rising concern in member-countries over resources, this phase will be management-oriented. It will stress methods and strategies by which small-scale fisherfolk can rationally utilize resources available to them.
Hook and line	To be specific, trials will be carried out with fish aggregating devices, with passive fishing gears such as hook-and-line, and perhaps with artificial reefs.
Tuna and sharks	Fishing methods will be tried out in offshore waters to tap under-exploited resources such as rainbow runners, flying fish, tunas, sharks and deep-water demersals.
Fisherfolk groups	In extension, means and methods of communication with fisherfolk will be developed. Fisherfolk will be helped to organize themselves to address their own problems and needs. Materials will be prepared to train trainers, NGOs and fisherfolk.
Post-harvest activities	Post-harvest activities will focus on earning more from less. Use of ice will be promoted. Reduction of losses, better utilization of trash fish, control of insect infestation — these will be some of the areas to be addressed.
Mussels and oysters	Aquaculture work will focus on techniques within the reach of small-scale fisherfolk. Examples : Culture of non-conventional species such as mussels and oysters; and polyculture of fish and shrimp.
Coastline	Governments are increasingly concerned about protecting and improving their coastal environment. All BOBP activities will address these concerns.
Mood slides	Summing up, BOBP work on various fronts generates hope and ideas so that tomorrow may dawn brighter for small-scale fisherfolk.
	Wave sounds and fisherfolk song

Seminar on mud crab "fattening"



The mud crab, *Scylla serrata,* is one of the most impressive denizens of the mangrove forests of tropical Asia. Its massive claws designed for crushing mollusks yield a delectable treat for even the most discerning seafood gourmet. Aficionados are particularly fond of the rich-tasting brilliant orange or red eggs contained within the bodies of gravid female crabs.

The quality of the mud, mangrove or green crab as it is variously referred to, has spawned a growing regional trade, thanks to the mud crab's ability to remain alive out of water for several days. The crab can be readily air freighted from India, Bangladesh and Sri Lanka to market centers in Malaysia and Singapore. Transport within Malaysia and Thailand present no problems.

The preference for gravid female mud crabs stimulated the ingenuity of fisherfolk around the Bay of Bengal region who found that adult immature female crabs held in enclosures and fed trash fish will become gravid. An egg-bearing gravid female fetches three times the price of an immature animal of the same size!

In our travels around the region, we have noticed a concurrent increase in the trade in immature crabs to supply the crab "fattening" business. In some cases there appears to be a decline in the size of specimens, perhaps indicating overfishing. There is little available published data on the status of mud crab resources in the BOBP member countries.

Beyond mere holding operations to produce gravid females, there has long been interest in crab culture, including hatchery and nursery production. We have heard that Taiwanese fishermen catch wild fry which are used to stock nursery ponds. Hatchery production is reportedly successful in Taiwan and experimental work has been done or is on-going in Malaysia and the Philippines.

But what is the current status of the industry and what are its prospects for the future? To find out BOBP is proposing a seminar to be held sometime in July 1991 if the subject generates enough interest. A circular has been sent out to many of our readers requesting information of any nature, including personal experiences, results of research, insights from the business community — anything that will bring to light the current status of the industry. Readers who haven't yet received our circular may please mail any information they have to Charles Angell, Sr.Aquaculturist, BOBP, C/o FAO, P O Box 5039, New Market, Dhaka 1205, Bangladesh. You can fax your comments to 880-2-813446.

Regional Workshop on Bio-economics

A 10-day regional workshop on bio-economics was held early October in Penang, Malaysia. It was organized jointly by the BOBP and the Fishery Resources and Planning and Policy Division of the FAO Headquarters. The objectives of the workshop were to :

1. Explain how fisheries assessment could benefit from bio-economic approaches
2. Discuss bio-economic and bio-socio-economic models presently in existence, and the biological and economic parameters required to use these models
3. Demonstrate the BEAM IV package program developed for bio-economic analysis by FAO and use this package for simulation analysis, with data from Malaysia
4. Prepare a detailed workplan for bio-economic case studies identified at the first regional meeting, in May 1990, by Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. However, the workplan for Malaysia was not prepared during this session because Malaysian participants were busy with the BEAM IV package simulation exercise.

There were eleven participants from the six participating countries — Bangladesh (1), Indonesia (2), Malaysia (2), Maldives (2), Sri Lanka (2) and Thailand (2). In addition, five observers from the Fisheries Research Institute, Malaysia and four observers from the Asian Fisheries Social Science Research Network attended.

New Directions in Sri Lankan Fisheries

by Claude Fernando

What are the highlights of Sri Lanka's new five-year development plan for fisheries (1990 - 1994)? It will emphasize management, allot a central role to co-operatives in stimulating fisherfolk development, promote credit rather than subsidies, develop the offshore fishery and rely on the private sector for infrastructure development and inland fisheries.

The island state of Sri Lanka has a coastline of 1561 km and an Exclusive Economic Zone of 230,000 km. There are also fresh water bodies covering an area of 262,500 ha of which 162,500 ha are large, medium and small water bodies and 100,000 ha are seasonal water bodies which can be used for inland fisheries and aquaculture. An additional resource is 120,000 ha of lagoons, mangrove swamps and salt marshes in which coastal aquaculture can be carried out.

The fisheries sector of Sri Lanka plays a significant role in the island's economy for several reasons. It :

— contributes 65% of the animal protein consumed in the country.

— provides full time employment to around 96,000 persons and part-time employment to a further 15,000.

— brings in substantial earnings of foreign exchange through exports.

The more important features of the fisheries sector are as follows :

— It remains essentially an artisanal fishery with 13,000 of the 28,000 fishing craft being non-motorized, and 16,400 being traditional craft.

In 1989 the contribution of the coastal fishery to total marine fish production was 95%.

— It is predominantly a small-scale fishery, the craft being owned by individuals or family units and a few by co-operative societies. Fishing companies are a mere handful.

— Marine fishing has been concentrated within the narrow continental shelf; development of offshore fishing is a very recent phenomenon, yet in its formative years.

— Inland fishing is carried out in large and medium water bodies using non-motorized craft.

Aquaculture is a new activity introduced and developed over the past decade. (Since 1990 August, State patronage to inland fisheries and aquaculture has been withdrawn - however there is no impediment to these activities being done by the private sector).

Sri Lanka has formulated a Five Year Development Plan for fisheries (1990 - 1994). (See box for plan objectives and targets).

Highlights of the plan :

1. *Management measures :* Unlike previous development plans which were almost exclusively production-oriented, this Plan lays considerable emphasis on management. Taking due cognizance of resource limitations which have become clear in certain areas, the Plan chalks out certain strategies to ensure better management of resources. These include the promotion of methods other than pelagic gill netting (e.g. bottom set nets, bottom longlining, trap fishing), development of small fish aggregation devices, educating the fisherfolk on the need to conserve and manage the renewable fish resource, improved monitoring of fish landings and stocks etc.
2. *Cooperatives :* The Plan accords a central role to the development of fisherfolk communities and their

organizations. As the manifesto of the government party states, the fishing family will be placed at the centre of its own development process. The role of the state will be to support them to overcome constraints. The Plan relies on village-level fishermen's co-operatives as one of the main engines for fisherfolk community development. In this task, co-operative societies are expected to :

— Actively participate in the planning of fisheries activities in the village.

— Galvanize the fisherfolk community into action and articulate their needs and problems.

— Organize economic activities for the benefits of the community - marketing of produce, procurement and supply of inputs; and undertake income and employment generating activities.

— Act as the trustee for state assistance to the members, undertake the receipt of financial assistance such as credit and where necessary take responsibility for repayment.

— Build sufficient capital reserves within the country by inculcating savings habits among the fisherfolk and their families.

3. *Women :* A special role has been assigned to women of fisher families, and action has been planned to enhance the role of women particularly in fish production, marketing, family income supplementation, savings and the prudent management of family funds. In this regard a project funded by UNFPA and executed by the BOBP/FAO will be implemented under which 700 families in 10 fishing villages will be involved. Special programmes will also be implemented in collaboration with the Fisheries Cooperative Federation of Sri Lanka and the Sri Lanka Women's Bureau.

4. *Coastal fishing :* A special concern of the Developlment Plan is the need to improve the efficiency of coastal fishing operations. Some of the strategies being followed are use of fuel-efficient engines and improved canoes.

5. *Credit :* In the past, there was heavy reliance on government subsidies in the issue of craft, engines and gear. The Plan sees the need to de-emphasize the need for subsidies and instead rely on credit. To ensure this, a project is now under implementation to design and implement a non-subsidized credit scheme for small-scale fishing and other activities in fishing villages. It will take into consideration the actual credit needs of the fisherfolk, the most appropriate conditions relating to fisheries credit, effective marketing of credit, improved communications and mutual understanding between banks and fisherfolk and better monitoring and supervision. The BOBP is assisting the Ministry of Fisheries and banks in preparing this project.

6. *Offshore fishing :* One of the important strategies of the Plan is to develop the offshore fishery in order to contribute 50,000 tons of fish or 18% of the total marine fish production by 1994. In addition to harnessing presently unexploited fish resources in the outer areas of the EEZ, this will also relieve the existing heavy pressure on coastal fish resources. The Plan aims at attaining this goal through a qualitative improvement of offshore fishing craft, training, technical assistance for efficient operation and maintenance of craft, and fiscal and other incentives to companies or cooperatives undertaking offshore fishing. Wherever necessary, joint ventures or other forms of collaboration will be permitted, subject to national interest.

7. *Research, training and extension :* Essential services such as research, training and extension necessary to support the industry are also to be improved through a reorganization of the agencies concerned. The Plan identifies and prioritizes the immediate requirements of the fisherfolk in regard to research that NARA should undertake. The extension services are to be strengthened and upgraded through training and motivation while formal training programmes are to be revamped to make them more useful and effective.

8. *Infrastructure :* One of the important features of the Plan is the change in policy concerning infrastructure. Within the Plan period, a number of small anchorages, mooring points and jetties will be developed while large harbours will not be undertaken. In keeping with the government's overall policy, the Plan accords to the private sector a greater role in developing the fisheries infrastructure — such as ice plants, workshops etc. With a view to ensuring better services to the industry, some of the activities of the two corporations will be rationalized, under which some of the commercially oriented infrastructure services will be handed over to the private sector.

9. *Inland fisheries :* It is the current government policy that inland fisheries and aquaculture will not receive any direct assistance or patronage from the government. The development of this sub- sector will be left to the private sector and NGOs. The role of the state in this sub-sector will be purely regulatory.

OBJECTIVES AND TARGETS OF THE PLAN

Objectives :

— Increase the production of fish in order to improve the nutritional status of the people of Sri Lanka.

— Promote the rational and optimum exploitation of Sri Lanka's fisheries and aquatic resources based on the applications of modern science and technology

— Support the national programme for alleviation of poverty by increasing the incomes and the standards of living of all those dependent on fisheries and fisheries-related activities.

— Increase employment opportunities through fisheries and fisheries-related activities.

— Increase foreign exchange earnings through export of fisheries and aquatic products

Targets

To achieve these objectives the Plan lays down a series of targets, the more important of which are as follows :

1. Marine fish production to be increased from the 1989 level of 157,411 tons to 222,746 (an increase of 42%).
2. Introduction of 2,030 traditional non-motorized craft and 1,920 motorized (both inboard and outboard) craft.
3. Issue of 1,250 outboard motors and 175 inboard engines for replacement.
4. Establishment of 850 village-level fisheries co-operative societies with a membership of 85,000 and a capital base of Rs.134 million by 1994.
5. Creation of 20,000 additional jobs in marine fisheries and 14,000 jobs in other activities.
6. Increase foreign exchange earnings from marine product exports upto Rs. 2,409 million in 1994. This is an increase of 192% over the 1988 figure of Rs. 825 million.

LEARNING BY DOING: EX

Text by Rathin R

What can 11 UFOs (Upazila Fishery Officers) and two NGOs do to answer fisherfolk needs and learn about how to do extension? Well, quite a lot, going by the 33 project ideas presented at a recent workshop in Bangladesh.

A year of training and field work — first to learn about the community and its needs, then to choose the most important problems and to understand them, and finally to sit down with the community to plan activities to address those needs — resulted in this crop of 33 mini-project ideas relating to the BOBP-supported fisheries extension projects in the coastal districts of Borguna and Patuakhali.

BOBP and the Directorate of Fisheries, Bangladesh in discussion with the staff, agreed to 18 of the projects which will be initiated early in January 1991. The projects, broadly speaking, fall into six categories : Aquaculture (7); Post harvest fisheries (2); Credit for boat and net repair (1); Social forestry (2); Health and nutrition education (4); and Poultry rearing (2). They tell us some interesting facts about fisherfolk needs in coastal Bangladesh and about the capabilities of DOF officers to address the needs.

First about fisherfolk needs. With capture fisheries in the estuaries and the bay being the predominant contributor to incomes, it was surprising that technology and the access to the means of enhancing production did not appear amongst the projects. Or perhaps not so surprising, since the fisherfolk and the staff had identified overfishing and declining catches as a major concern. The future of fisheries obviously lies offshore (with the associated higher costs and a new way of life) and on-shore. With low catches, the need of fisherfolk to organize and have access to credit to undertake marketing on their own, thus avoiding exploitative middlemen, was one obvious choice. The other was to gain credit access to undertake processing (of salted Hilsa) to add value particularly during the high season when Hilsa is abundant and cheap.

TENSION IN BANGLADESH

Photographs by E. Amalore

The wetland ecology with literally thousands of inland water bodies, the ready market for fresh water finfish and prawns, and some traditional familiarity with aquaculture resulted in seven aquaculture projects — for carps, tilapia (Nilotica), carp-cum- prawn, tilapia-cum-vegetable gardening and for nurseries to provide fingerlings for the culture. Planting trees in household land for food, fodder and fuel was proposed as a project option in two areas.

Improved poultry rearing, with improved breeds to increase egg and meat production and better veterinary support to reduce mortality, were chosen as a project option in two areas.

Poor access to health care and malnutrition, widespread as it is, can be addressed partly through health and nutrition education. This should be combined with food production and access to primary preventive care. Such efforts in combination with other activities were proposed in as many as four areas.

Lastly, credit for boat and net repair make it possible for poor fisherfolk to maintain and use their craft and gear to earn their living, without depending on credit from the money lender at crippling rates of interest.

It is worth noting that the fisherfolk already engage in one form or the other in most of the project activities except perhaps the finer points of aquaculture and health and nutrition; so the main input of the proposed projects is credit at a cost lower than that available from middlemen and money lenders. Fisherfolk, it may be pointed out, have absolutely no access to institutional credit.

Let's consider the other side of the coin. Throughout the training, fishery officers expressed concern about their own lack of technical fisheries knowledge. (Often, the main focus of Government officers has been the allocation and disbursement of funds. "Money at the right time and place solves problems"). The one technology they are at least a

little familiar and comfortable with is fresh water aquaculture. Perhaps this explains the lack of technical extension projects in subjects other than aquaculture. With better technical capabilities, the staff may have been able to identify more problems and propose activities to address them. BOBP hopes through orientation workshops to improve the technical awareness of the officers.

What we have is a very positive step of projects being jointly created by fisherfolk and by the junior-most officers of DOF, at the very cutting edge of the department, and, the effort is, to say the least, impressive. But the real test will be in the implementation. Will their technical capability and the backstopping they receive suffice to make the projects function? Will they be able to mobilize the fisherfolk and manage the activities, particularly the loan funds? Will the managerial culture of the DOF and the Uppazilla Parishads allow these officers to function with the required freedom and creativity? All this and more, about how to do extension, we hope to learn in the next year or two of work.

A variety of extension activities has been proposed to help fisherfolk communities in Bangladesh, photographed here at work and leisure.

Fisheries Management in China

FAO fisheries economist Rolf Willmann, recently in China, records his impressions.

The training course I helped conduct was on fisheries management theory and practices. The 36 trainees were primarily directors (or equivalent) from the bureaux of fisheries management that exist in the various provinces of China (many of them as big as or bigger than an average European country). Their primary tasks include the preparation and enforcement of fishery laws and regulations. The course content was not tailor - made to the needs of the students; but their responses during the course evaluation indicated that they learnt things which will be useful to their work.

During the course and a couple of short field excursions, we learned that the Chinese have introduced a range of partly novel measures in recent years. These include the allocation of a total horsepower quota for each province; a ban on construction of fishing boats by all public and private enterprises without prior approval; licensing and freezing of the numbers of vessels; the imposition of a range of "resource protection fees" which reportedly tax away about 10% of the gross revenue (special fees are charged for high-value species such as shrimp; here the amount of tax is proportional to the horse power of the engine); closed areas and seasons; ban on trawling in certain areas (e.g. Bohai Sea); mesh size regulations etc. The enforcement of these regulations appears to be taken very seriously, at least going by the comments we heard from fishermen and from the captain of a large unarmed patrol vessel (40 m; about 1000 hp) used in the Yellow Sea; also from the fact that the Chinese enforcement staff numbers about 20,000 and the total horse power of patrol vessels is more than 100,000 hp.

While these figures are very impressive, there is little doubt that the Government has a hard time containing further exploitation of marine resources. The pressure is extremely high, primarily because with economic liberalization real fish prices have increased steeply and fishermen are now reported to earn two, three and even more times more money than agricultural and industrial labourers. Incidentally, the small-scale fisherman who invited us for dinner probably has a higher annual income than the professor from the Fishery University of Shanghai.

Government reports say there is an influx of agricultural labourers (and capital) into the fisheries sector, and it's probably difficult to stop it. This is perhaps the prime reason for introducing fishing fees (i.e. equalizing incomes), management objectives apart. However, the fees could be far too low to act as a disincentive to additional inflows of capital and labour. A part of the fee is at present utilized to enhance stocking programmes (for example the release of millions of post-larvae shrimp in the Bohai Sea) and to finance some of the enforcement equipment.

The bureaux of fishery management is also in charge of water protection, combating pollution and preserving fishery resources. Theoretically, the enforcement staff can sue companies in court, leading to their shut-down. In actual fact I doubt the power of the fishery administration, especially when broader industrialization objectives are at stake. There is little doubt that many coastal waters along the Chinese coast are heavily polluted. The fishery itself is not free from blame because intensive shrimp culture along the coasts of the Bohai and Yellow seas has apparently enhanced the occurrence of red tides.

Many international aspects of the new Law of the Sea have not yet been tackled by the Chinese government. China has not yet declared the 200-mile EEZ (Exclusive Economic Zone), probably to avoid undue conflict with neighbouring countries; the zoning problems are formidable in the Yellow, East and South China Seas.

An interesting feature is the dramatic growth of inland fishery production in China. We (FAO staff) hypothesize that because all inland fisheries come under the direction of the bureaux of fishery management (since 1979), the property rights aspects have been effectively dealt with; this has given an impetus to improved management and culture fisheries. On the other hand, in marine waters, the clear lead role of the bureaux of fishery management is absent, and there is a constant struggle with the other tier of the Chinese fishery administration, the aquatic products development bureaux, which follows the "agricultural development model" — i.e. more inputs mean higher production — a devastating concept if applied to today's overexploited fisheries.

New BOBP publication — People's participation in fisherfolk development

This 182-page book, just out, discusses the meaning and significance of people's participation in fisherfolk development, and analyzes the activities and findings of a one-year subproject carried out by BOBP during 1986-87. The subproject, funded by the National Swedish Board of Fisheries, encompassed a variety of activities, climaxed by a multi-disciplinary consultation held in May 1987. The book has been published by Affiliated East-West Press (P) Ltd. and is priced at Rs. 90.

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