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## The Tuna Fishery in India, Maldives and Sri Lanka

by Leslie Joseph

Representatives from three South Asian nations bordering the Bay of Bengal met recently in Colombo to discuss development and management of the tuna resource in their waters. This article examines the outcome of the meeting.

Tunas constitute an important shared migratory stock between India, Maldives and Sri Lanka, and were discussed in Colombo from June 4 to 9 by a "working group" of tuna biologists. The meeting was held under the auspices of BOBP's UNDP-funded project "Marine Fishery Resources Management in the Bay of Bengal" at the office of the National Aquatic Resources Agency (NARA). In the absence of scientific participation from India, its interests were looked after at the meeting by the Indian High Commission in Colombo. Tunas form the main pelagic fish resource in the offshore and oceanic

ranges of the EEZs of these countries which share common boundaries on the western side of the Indian Ocean. Local tuna fisheries in these countries are entirely coastal and small-scale operations, the resources in offshore ranges being exploited until recently only by distant fishing nations like Japan, Korea and Taiwan. It was observed that 70 - 75,000 MT of tuna were produced from the area under consideration in 1982 as against 136,000 MT produced from the Western Indian Ocean. This fact emphasises the importance of the fishery to India, Maldives and Sri Lanka which now have jurisdiction over this area.

The main objectives of this meeting:

- Evaluating available information on the status of the fishery and the resource in the region.
- Identifying limitations in tuna research and development activities.
- Identifying common approaches to the study of tuna in the three countries, enabling better resource assessment — and leading, in turn, to more efficient development and management strategies on a national as well as regional basis.

Available information on tunas in the area, including their biology and fishery, were presented by participants from Maldives and Sri Lanka and also by Dr K Sivasubramaniam, BOBP's Senior Fishery Biologist, who acted as convenor of the meeting. Tuna resources in the area include four widely distributed oceanic species (yellowfin tuna, *T. albacares*; big-eye tuna, *T. obesus*; longtail tuna, *T. tonggol* and skipjack tuna, *K. pelamis*) and five insular species

with localised migrations (eastern little tuna, *E.affinis*; frigate tuna, *A thazard*; bullet tuna, *A. rochei*; dog-tooth tuna, *C. unicolor* and Oriental bonito, *S. orientalis*). Skipjack, yellowfin and big-eye are the species likely to be shared by the three countries.

Tuna fishery is multispecies and multigear in character in the three countries. In Maldives, Minicoy island of India and Sri Lanka the effort is specifically directed towards tuna; but in fisheries off mainland India, tuna generally constitute an incidental catch. The relative importance of various tuna species in the fisheries of the three countries (Table 1) is due to differences in the gears used and in environmental characteristics of the insular areas.

Total tuna production in the Maidives for the 12-year period 1971-1982 ranges from 33,424 MT in 1971 to 24,194 MT in 1982. Production in between shows fluctuations generally within this range except for the lowest annual production of 19,836 MT in 1978. Tuna landings in India show a progression from 3,015 MT in 1970 to 19,332 MT in 1976, with slight declines in 1972 and 1978. An all-time high catch of 26,595 MT has been recorded in 1979. In Sri Lanka, the production of tuna shows a steady annual increase, from 17,254 MT in 1971 to 34,115 MT in 1982. While it is the biggest fishery in Maldives, contributing over 90% of the country's total fish production, tunas are one of the unexploited resources in India, the contribution to total fish production being only 1.9% in 1979. In Sri Lanka, the contribution of tuna to the total fish landings has been in the range of 15 to 20 per cent during the last decade. Tuna production trends in recent years indicate a steady increase in Sri Lanka, fluctuations in Maldives and a decline in India. An examination of the production of deep-swimming tuna by distant nations using longlines in the EEZs of the three countries during the last 10 years showed annual fluctuation, with a peak production of 773 MT of yellowfin and 792 MT of big-eye tuna in 1979.

The ranges exploited for tuna by Maldives and Sri Lanka, and also perhaps by India, were considered

to be about or a little less than 20% of their EEZs. Lack of assessment of the status of tuna fisheries and tuna stocks in the region in recent years, particularly since the enforcement of the new law of the sea, has resulted in a case of "fishing in the dark".

George et al (1977) had estimated a tuna potential of about 110,000 tons in the EEZ off the south-west coast of the Indian mainland and Laccadive-Minicoy islands (Silas and Pillai, 1982). The results of M.S.Y. estimates for skipjack and yellowfin tuna in Maldives gives a relatively better fit with the Schaefer model (Table 2). Since the annual production exceeded the MSY for skipjack tuna only in 1980, it is supposed that the present rate of exploitation is at the optimum level within the presently exploited

range. In spite of an increasing trend in production, the declining catch rates in Sri Lanka may limit the expansion of the fishery within the presently exploited range.

In the absence of potential estimates in the EEZs of Sri Lanka and Maldives, different approaches were made at the meeting to estimate the magnitude of tuna potential available beyond the exploited range. These included use of present yield levels of skipjack and yellowfin tuna, results of exploratory fishing (catching rates) and observations on school size and numbers. The estimates obtained are indicated in Table 3.

Estimates based on number of schools and average school size were taken as biomass value while others were considered as potential yields.

Table 1 : Percentage composition of tuna species caught by India, Maldives and Sri Lanka

| Species      | Maldives | India    |            | Sri Lanka |
|--------------|----------|----------|------------|-----------|
|              |          | Mainland | Laccadives |           |
| T. albacares | 16.6     | +        | 25.3       | 21.0      |
| T.obsesus    | ?        | ?        | 1.5        | 1.0       |
| T.tonggol    | ?        | 0.4      | —          | +         |
| K.pelamis    | 71.5     | 11.0     | 72.5       | 37.0      |
| E.affinis    | 4.3      | 65.4     | +          | 26.0      |
| A.thazard    | 7.5      | 6.7      | +          | 13.5      |
| A.rochei     | ?        |          | ?          | 1.5       |
| G.unicolor   | ++       | +        | ?          | +         |
| S.orientalis | +        | +        | ?          | +         |

(?) Unknown

(+) Caught but not in large quantities

(+ +) Caught in significant quantities but no figures available.

Table 2: MSY estimates for skipjack and yellowfin tuna in the Maldives. (In metric tons)

|          | Skipjack |             | Yellowfin |             |
|----------|----------|-------------|-----------|-------------|
|          | M.S.Y.   | Opt. Effort | M.S.Y.    | Opt. Effort |
| Schaefer | 22,460   | 126,046     | 8,963     | 102,572     |
| Fox      | 19,714   | 131,136     | 5,580     | 101,186     |

Table 3: Estimates of tuna potential beyond the exploited range: Sri Lanka and Maldives. (In metric tons)

| Method of estimate                       | Sri Lanka<br>(EEZ)  | Maldives<br>(only up to 60 miles) |
|------------------------------------------|---------------------|-----------------------------------|
|                                          |                     |                                   |
| (a) Yield per unit area                  | 98,874              | 39,000                            |
| (b) School count and average school size | 56,600<br>(54,720)* | 40,000<br>(45,000)*               |
| (c) Mean catch rate off-shore            | 44,188              | —                                 |

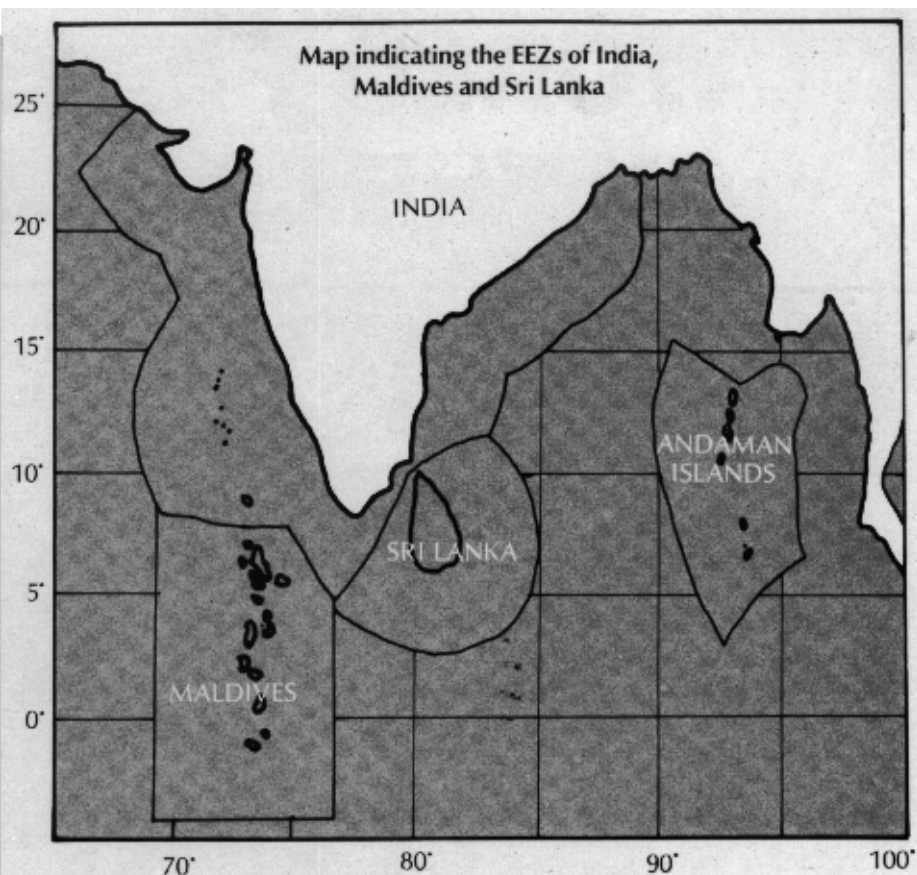
\* Biomass

Yield estimates from biomass values were obtained using Gulland's first approximation of  $P_y = 0.5 (C + MB)$  with  $M$  taken as 0.8 based on an average of  $M$  values obtained for skipjack and yellowfin by Pauly's method. The estimate based on yield per unit area for Sri Lanka was considered to be too high, while the others were reasonable.

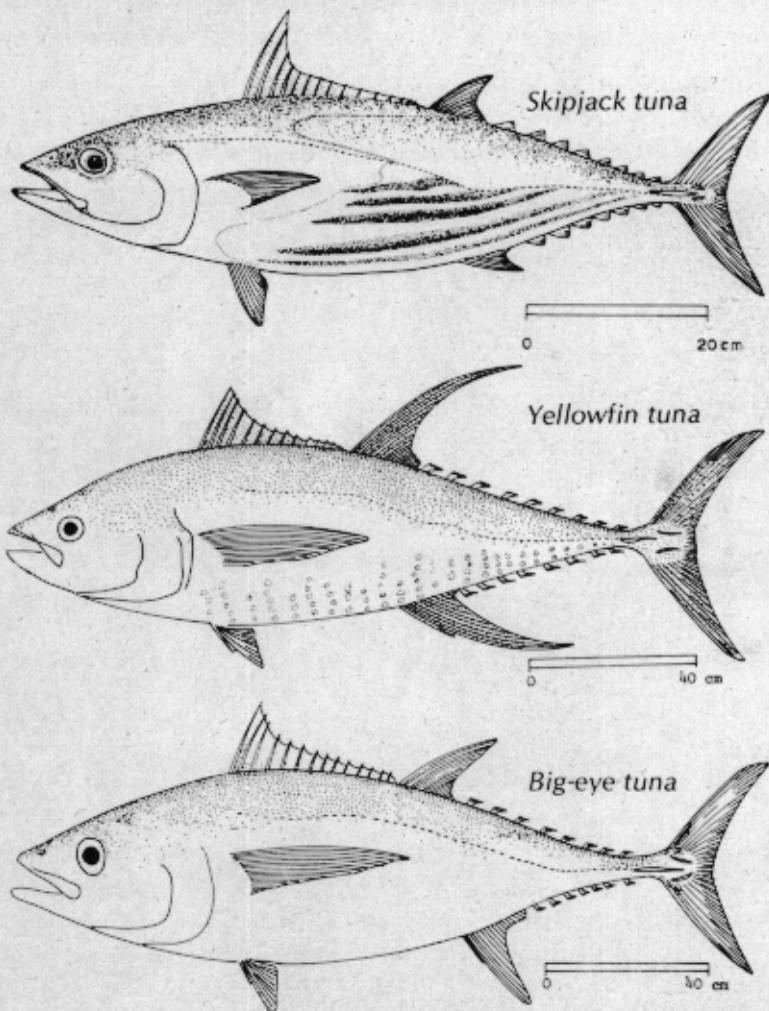
Very little information is available at present on the biology of tunas in this region. Length frequency studies recommenced in Sri Lanka in 1982 after a break of about 10 years. While such data were not available from India, sampling programmes in Maldives began only in 1983. Data from Sri Lanka indicate the possible existence of two annual recruitments for both yellowfin and skipjack tuna. The paucity of biological information is especially evident with regard to maturity and spawning.

The work plan discussed and agreed upon is designed to remedy shortcomings existing in the present work programmes as well as to initiate new activities to fill information gaps. Short-term activities agreed upon include updating of the structural statistics of crafts, gears and operational systems in tuna fisheries and an intensive sampling programme for morphometric and meristic characters to avoid errors in identifying juveniles and to detect possible differences if any. Improvements to the existing sampling programmes discussed include intensified systematic sampling for length-based fish population studies, sampling for sex ratio, gonad index and maturity, standardisation of sampling procedures and methodology from the three countries for compatibility of data. Another important item in the workplan is an exploratory and resources survey of tuna beyond the exploited range. In view of the limited information available on the resources beyond the exploited range, such a survey would determine the feasibility of developing off-shore tuna fisheries in the three participating countries.

**About the Author:** Leslie Joseph, a Sri Lankan delegate to the Colombo tuna meeting, is a research scientist with NARA (National Aquatic Resource Agency, Sri Lanka).



#### THE MAJOR TUNA SPECIES



# WORLD FISHERIES IN THE LIMELIGHT

The FAO World Conference on Fisheries Management and Development, the largest meeting of its kind ever held, concluded a 10-day session in Rome on July 6, 1984. Economist Rolf Willmann (formerly with BOBP, now with the FAO headquarters in Rome) gives his personal impressions of what the conference discussed and what it achieved.

27 June, 1984 witnessed a unique event in fisheries : King Juan Carlos of Spain opened the first World Fisheries Conference in the presence of delegates from 147 countries, many of them headed by ministers responsible for fisheries. In addition to government delegations, the Conference was also attended by delegates from the three liberation movements, by fourteen representatives of the United Nations and its specialized agencies and by observers from 24 international organizations and 29 international non-government organizations.

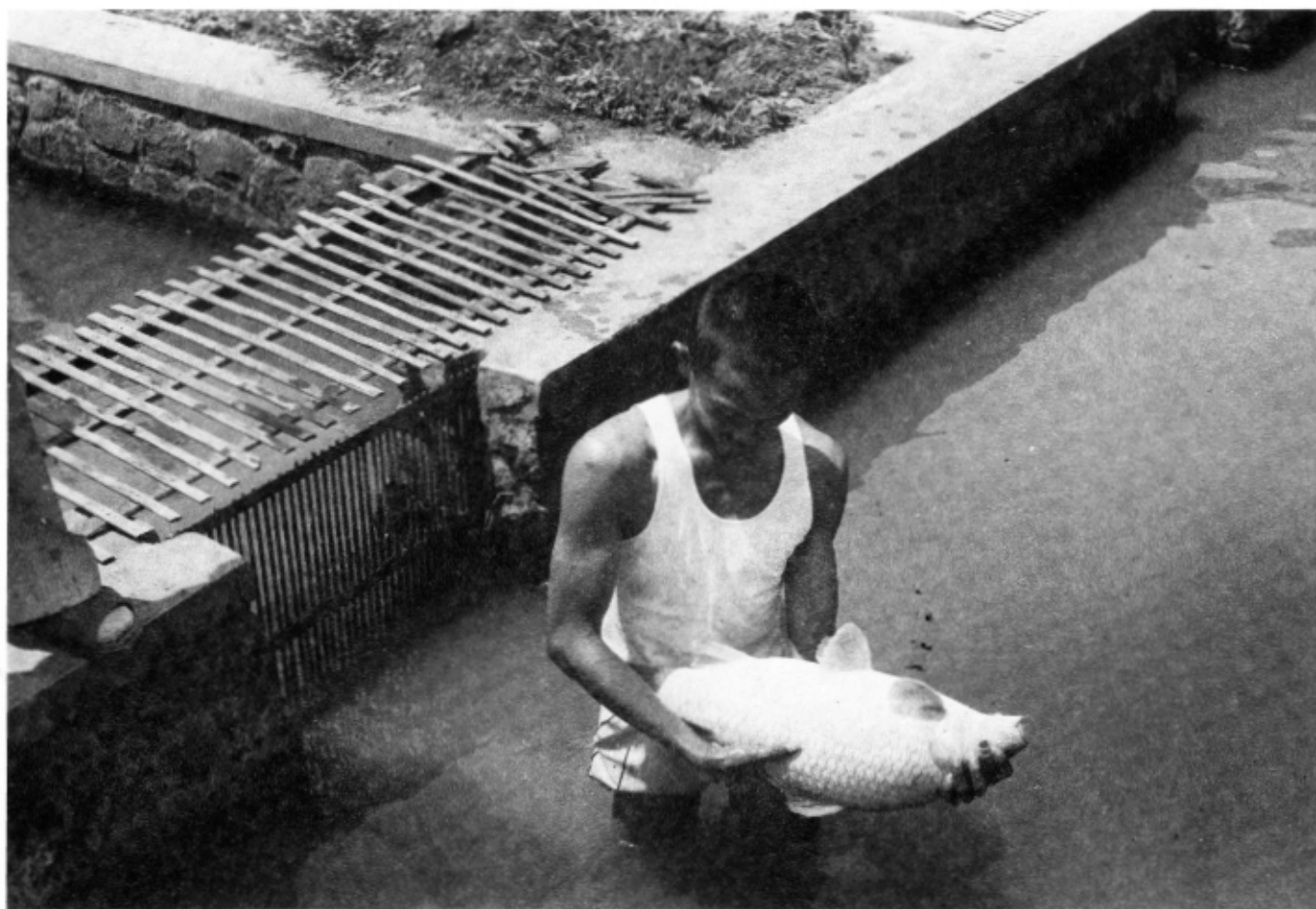


In his opening address, King Carlos emphasized the need to avoid damaging one of mankind's main sources of wealth and, indeed, of life itself and recommended that **suitable** for international cooperation be sought in order to effectively assist the most deprived populations in the world.

The Conference elected Mr Pedro Ojeda Paullada, Secretary of Fisheries of Mexico, as Chairman, who led the almost thousand delegates and observers in a highly skillful and competent manner throughout ten days of hard work, intense discussions

*King Juan Carlos of Spain (above) speaks at the June 27 opening of the FAO World Conference on Fisheries Management and Development in Rome. Below: Mr Edouard Saouma, FAO Director General, speaks. From left: Infanta Elena, King Carlos, Queen Sofia, Infanta Cristina.*





*Aquaculture was one of the major subjects discussed at the conference. Almost 85 per cent of all world aquaculture production comes from countries of the Asia-Pacific region, and FAO experts believe that output can be expanded. Here is a breeder carp in an Indonesian fish farm*

and lots of informal talks in the corridors. In accepting the Chairmanship, he expressed his conviction that the outcome of the Conference would be regarded as one of the most important pages in the history of world fisheries, to the benefit of all men and women, their governments and the worldwide community of fishermen.

The three principal themes before the Conference were summarized by the Director-General of FAO, Mr Edouard Saouma, in his opening statement. The first related to the problems of adjustment to the new regime of the oceans; the second, to that of meeting the challenge of development; the third referred to a better future for fishermen and their families.

After the opening day the Conference proceeded on three parallel lines. In the Plenary Hall the Heads of Delegations delivered their statements; in Commission I, the draft Strategy for Fisheries Management and Development was discussed;

and Commission II reviewed the five associated Programmes of Action dealing with: the planning, management and development of fisheries; the development of small-scale fisheries; aquaculture development; international trade in fish and fishery products; and the promotion of the role of fisheries in alleviating under-nutrition.

For an individual observer, the decision of where to go, into the Plenary, Commission I or II, was not an easy one because in all these sessions one could listen to interesting and creative statements, knowledgeable comment and lively debates. The best strategy was thus to pick out those country statements and subject matters which were of greatest interest to oneself. Having spent over two years in the BOBP, my attention was naturally directed foremost to small-scale fisheries issues and to the statements by heads of delegations from countries of the Bay of Bengal region.

The section of the draft Strategy dealing with the special role and

needs of small-scale fisheries and rural fishing and fish-farming communities, and the associated Programme of Action for the development of small-scale fisheries, were among the least controversial issues. This is because all countries throughout the world, developing and developed, recognize the importance of small-scale fisheries in providing food, employment and income to millions of people. There was a consensus that special attention should be given to the development and management needs of this sector. This fact was most clearly spelled out in Commission II as many delegations from regions which had not been included in the draft Programme of Action of small-scale fisheries development requested the establishment of small-scale fishery development support groups for their regions. Consequently, four additional regional support groups were included in the finally approved Programme of Action, namely for Latin America, Asian inland waters, the Gulfs and the Mediterranean. There was also

## A GLOBAL STRATEGY FOR FISHERIES DEVELOPMENT AND MANAGEMENT

The global strategy approved by the FAO World Conference on Fisheries Management and Development lays down policy principles and guidelines for fishery management and development.

The strategy is meant to enhance the role of fisheries in contributing to national economic, social and nutritional goals; to foster the self-reliance of developing countries to manage and develop their fishery resources; and to increase international cooperation in fisheries management and development.

The Conference also approved of five special action programmes. These programmes covered proposals for the planning, management and development of fisheries; the development of small-scale fisheries; aquaculture; international trade in fish and fishery products; and the promotion of fisheries in alleviating under-nutrition,

By other resolutions, the conference

- requested donors and financial institutions to provide funds for the five action programmes;
- urged greater use of fishery products in international aid programmes;
- asked for greater priority for fishery investment projects, and urged the World Bank and other funding agencies to accord special and favourable attention to projects for investment in fisheries;
- called for international action to combat pollution in the exclusive economic zones of developing countries;
- suggested that an International Year of the Fisherman be instituted;
- called for greater international solidarity for land-locked countries, particularly the African Sahel;
- called for greater technical and economic cooperation among developing countries in fisheries.

unanimous agreement on an integrated and participatory approach to small-scale fisheries development which ensures that the fishing villagers are actively involved in the planning and implementation of projects and programmes. Another highlight of the deliberations of Commission II was the proposal that consideration be given to the proclamation of an International Year of the Fisherman — a proposal that was adopted by the Conference.

The delegates working in Commission I made several valuable amendments to the guidelines and principles of the draft Strategy relating to the special role and needs of small-scale fisheries and rural fishing and fish-farming communities. The commission drew particular attention to the beneficial roles that can be played by cooperatives, village societies and non-government organizations in the planning and implementation of

integrated development programmes and management schemes for small-scale fisheries. At the proposal of the delegation of the Maldives, a special reference was included in the Strategy on the particular role of small-scale fisheries in the economies of island states, where they are often the major sources of employment and foreign exchange earnings — a point which was well taken considering the contribution of small-scale fisheries to the Maldivian economy.

### Problems and needs of small-scale fishing communities

Several other points of the draft Strategy and other Programmes of Action were closely related to the problems and needs of small-scale fishing communities such as, for example, the Programme of Action on the planning, management and development of fisheries. This includes a training component on

the management of coastal and inshore fisheries — an aspect of particular relevance for the small-scale fisheries of the Bay of Bengal region. Similarly, the Programme of Action on aquaculture noted the big contribution that sector can make to the creation of alternative or supplementary sources of income and employment for rural fishing families and to reducing pressure on limited fishery resources.

Another Programme of Action of great importance for small-scale fishing families and poor rural people at large is the one on promoting the role of fisheries in alleviating under-nutrition. It is a well-known fact that artisanal fishermen and their Wives are among the main suppliers of cheap animal protein to the poorer sections of the people in developing countries. Development efforts in fish handling and processing and marketing and distribution, apart from benefiting poorer consumers, will also improve the working and living conditions of women, who play a major role in these areas.

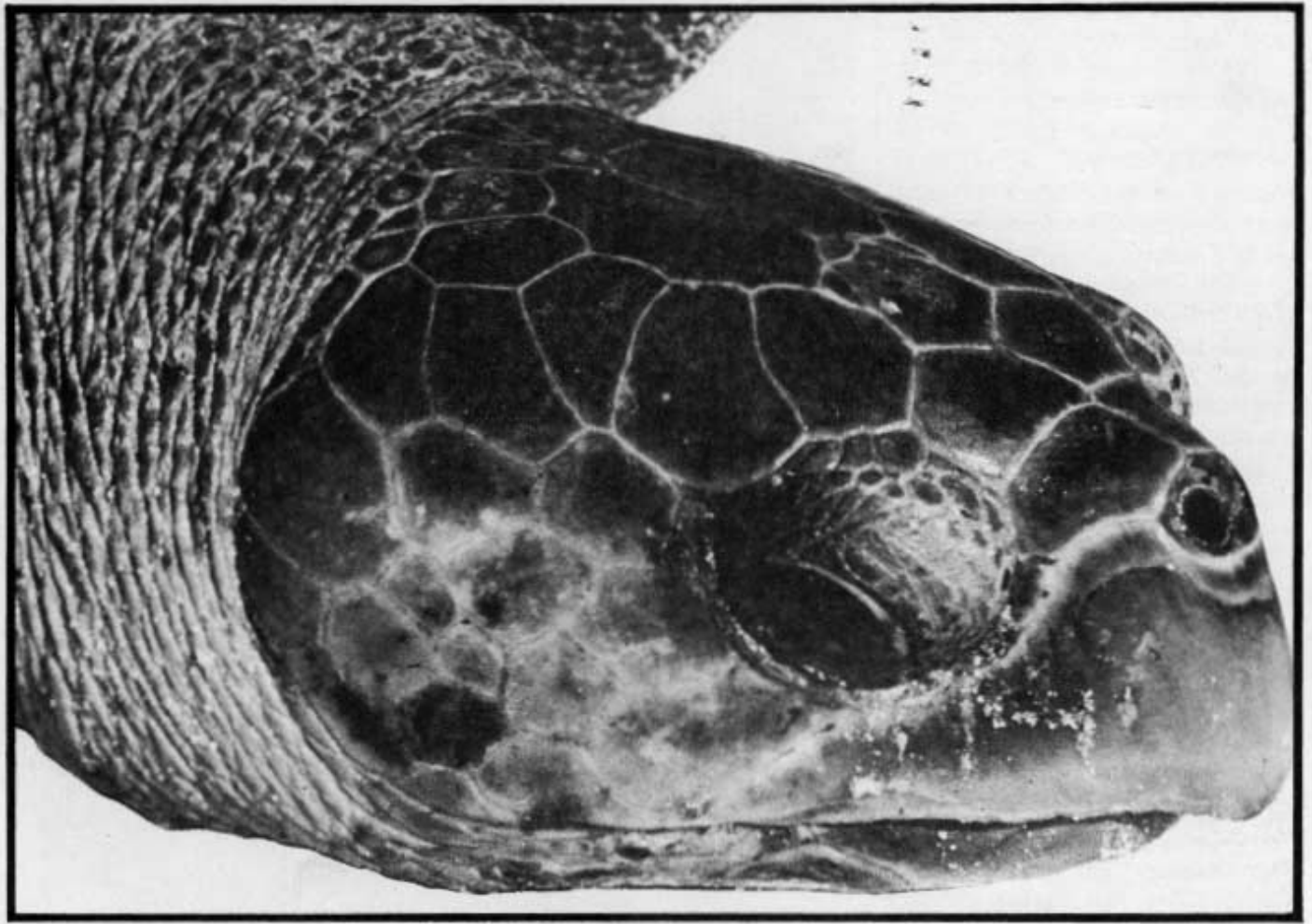
After the two Commissions had finalized their deliberations and submitted their reports to the Plenary, the Conference endorsed by consensus a Strategy for the worldwide development and management of fisheries : in effect, a World Fisheries Charter providing principles and guidelines for the better use of the world's fishery resources. The Conference also approved the five associated Programmes of Action as an integrated framework for future assistance to and cooperation among developing countries. Addressing the closing session, Mr Saouma declared "One can say that this has been an historic event in the world of fisheries.

"This was the first time that nearly all the nations of the world great and small, came together to discuss on such a comprehensive basis the fundamental problems of fisheries as a vital global source of food, employment and income.

"One could say that you have created a World Fisheries Charter, which provides a new orientation to the whole philosophy of fisheries development and an integrated framework for aid in all the fisheries sectors to developing countries".

# PROTECTING TURTLES

Saving the fast-dwindling turtle resource is one of the concerns of fisheries management today. Dr John Frazier of the Smithsonian Institution, U.S.A., a leading expert on turtles, was in the Bay of Bengal region recently. He discusses in this interview ways by which a precious resource is being managed and protected. These include education, regulation, and technology.



*Q: Dr. Frazier, could you outline the nature of your work?*

*A:* I am a Research Associate at the Smithsonian Institution in Washington, D.C. My main efforts, aside from fund raising, are directed at learning more about the biology of marine turtles and the ecosystems in which they occur. Because I am interested in the rational management of natural resources, I also try to help stimulate and coordinate

regional studies on turtles in different areas.

*Q: What is the assignment that brings you to India?*

*A:* I am here in India for a variety of reasons: to present a paper at a symposium ("The biology and conservation of marine turtles in the Indian Ocean" at the centenary symposium of the Bombay Natural History Society); to participate in a workshop on biology and conser-

vation of sea turtles, organized by the Government of India's Department of Environment and the Central Marine Fisheries Research Institute (CMFRI); to look at sea turtle programs in the states of Orissa and Tamil Nadu and discuss present work and future plans with biologists and administrators; to do a preliminary survey of sea turtles in the Maldives, with the Ministry of Fisheries there; to visit Sri Lanka and learn about

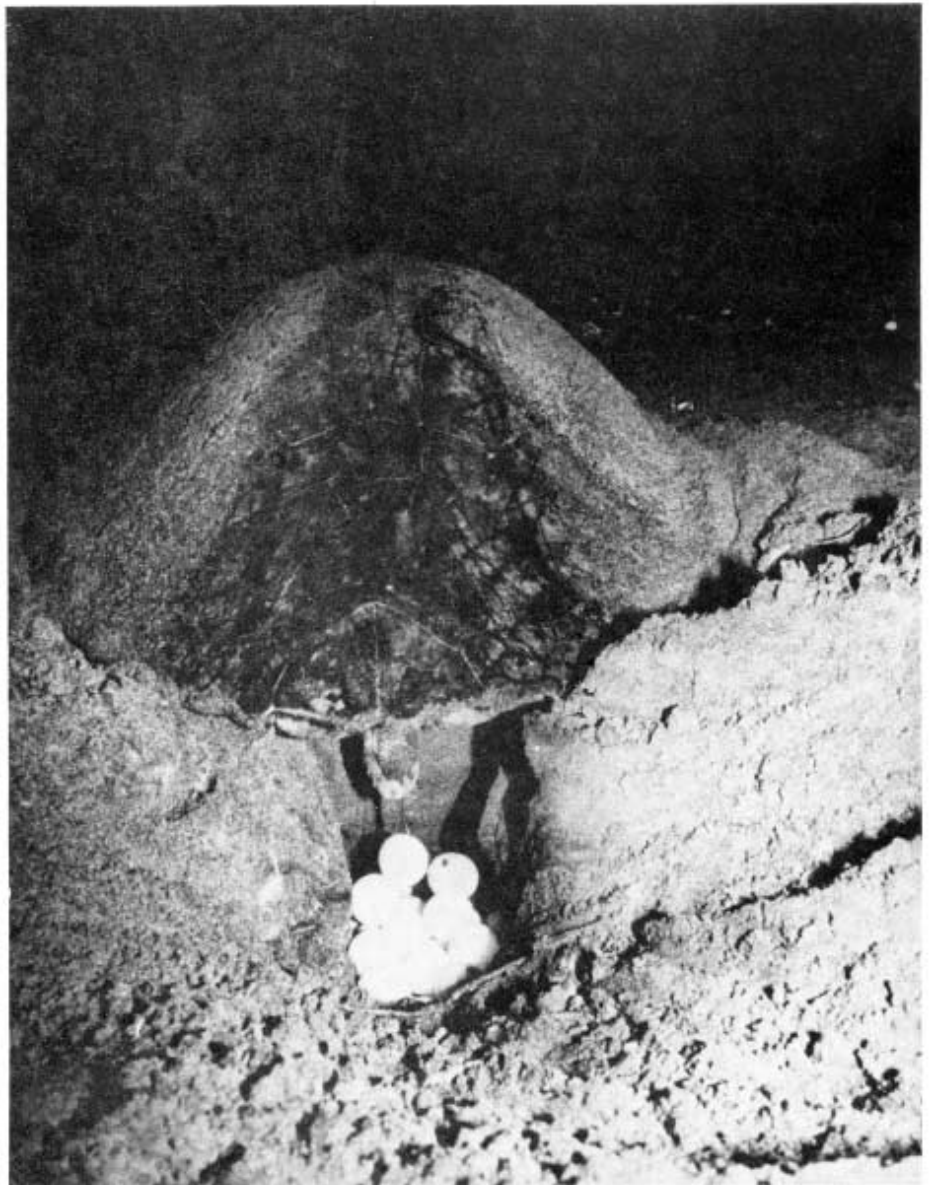
sea turtle studies and plans there; and to stimulate more cooperation in studies and management of turtle populations in the region. At the end of the four-month visit I will go to a workshop on sea turtle ranching in Reunion (an island in the western Indian Ocean near Madagascar).

*Q: Could you briefly describe the most important problems concerning the turtle resource and of current work on managing this resource?*

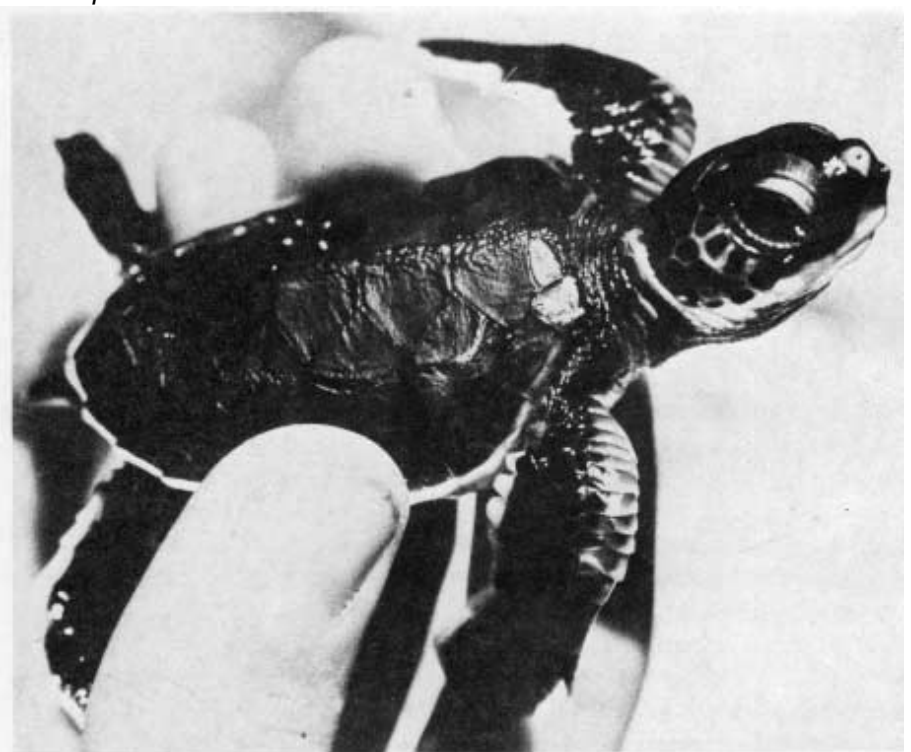
*A:* Marine turtles, like so many marine resources, move over large areas of the ocean. Migrations commonly occur from feeding grounds to breeding grounds that cross 2,000 to 3,000 km. In addition, the life cycle is extremely complicated and protracted. One animal, during the course of its life, must have access to : terrestrial habitats (for the nest), epipelagic habitats (for young turtles), and coastal waters – often including bays and even semi-estuarine conditions (for feeding areas). It may take a turtle 30 to 50 years to reach maturity. This obviously makes the resource liable to mismanagement in a variety of habitats and geographic areas and this can happen anytime within a score of years and be disastrous. Non-cooperation by neighbouring countries and overuse of stocks are also problems. Then there's the fact that marine turtles are a traditional source of protein and oil for coastal people; the eggs and the animals have been exploited since time immemorial. There are long-standing markets for various turtle products. These are not possible problems, they are real problems – for virtually everywhere, turtles have been subjected to sustained commercial exploitation. Their numbers have declined and this has resulted in the destruction of traditional sources of food and livelihood in many countries. Even worse, large areas of critical breeding and feeding habitats have been so modified by exploitation and development that the living areas for the turtle population have dwindled noticeably.

*Q: What is your assessment of the turtle resource in the Bay of Bengal region?*

*A:* There are five species in the region and the greatest problem is that we do not have accurate assess-



*Above : A sea turtle lays its eggs on the beach. Protection at this stage is vital for turtle conservation. Below: A young turtle can be easily contained in the palm of one's hand.*



## Sea turtle conservation in India

More than 30,000 sea turtle eggs (of the Olive Ridley species) laid on the Thanjavur coast of Tamil Nadu during January 1984 were collected by forest guards and research scholars and protected from predators. Most of the eggs hatched several weeks later, and some 25,000 young turtles were released into the sea. In natural conditions only 10 per cent of the turtle eggs would have survived. Thanks to the conservation programme of the Tamil Nadu Forest Department, more than 80 per cent of the turtles survived.

Giving details of the programme, Mr P K Ponnusami, Conservator of Forests, Tiruchi and Mr K R Ramanathan, district forest officer, Thanjavur, said that hundreds of eggs were collected daily in January and laid in 18-inch deep holes exactly as they would be under natural conditions.

Normally, turtle eggs hatch in seven weeks. This time they did not because of the unusually cold weather. Dr Abdul Rahman, Professor of Zoology at the Poondi college, sample-tested the eggs in the pits by dissection: To everyone's relief, embryos were found pulsating

with life, though the growth rate had been slow. Around the 12th week, the first set of eggs hatched. Later, hundreds of young turtles came out.

They were kept in a hatchery for 24 hours, then carried in plastic buckets 20 metres into the sea, and released. Three hatcheries — at Point Calimere, Vizhundamavadi and Vanaman Mahadevi, all on the Thanjavur coast — took part in this project.

The forest department of Orissa has also been active in turtle conservation. Between January and April every year, turtles turn up in hundreds of thousands for mass nesting on the coastline near Cuttack which is a large rookery of Olive Ridley turtles. Till a few years ago, the turtle suffered heavily at the hands of poachers. Now officials and conservationists have joined hands to thwart poachers.

A turtle specialist group formed by the Department of Environment, Government of India, has proposed a marine national park around this rookery.

— Based on a feature in *The Hindu*, Madras.

ments of population sizes or even of distribution of any of these. In the Maldives and Sri Lanka there is no doubt that stocks have been greatly reduced — two species in the former and four in the latter. In India some populations have been reduced (three species) while others still exist in large numbers (one species). Farther east in the Bay of Bengal there is a critical lack of information, but there are indications that exploitation has been heavy and some stocks have been drastically reduced.

*Q: What regulations protect turtles? When were they adopted? Have they been enforced?*

*A:* Most countries in the region have laws that regulate exploitation in one form or another, but enforcement is rarely adequate. There is also an international convention that restricts trade in populations of animals that cannot sustain this form of exploitation (CITES) and some signatories from the region have protected turtles for nearly 10 years. In most instances international trade has been virtually stopped.

*Q: We hear about the development of a "Turtle Excluder Device" that will help trawlers to exclude turtles from their catch and also improve the fishing efficiency of*

*trawlers. Could you elaborate on this?*

*A:* The National Marine Fisheries Service of the USA has developed a gear modification (Turtle Excluder Device or TED) that is relatively inexpensive (about \$ 200) and is efficient in excluding turtles and other by-catch from the cod end of trawl nets. Trials have shown that not only is the quality of high-priced catches (e.g. prawns) better (probably by avoiding the problem of the large by-catch crushing the catch) but fishing efficiency is enhanced. Trials have been carried out in other countries and there is a great interest in the TED here in India.

Incidental capture and drowning of sea turtles is common and covers wanton destruction of breeding animals at the breeding grounds. In the United States, tens of thousands of turtles are caught in trawls each year; in India certainly thousands are caught yearly. Last year the main breeding beach in Orissa, India, looked like a grave yard with a continuous line of 3000 turtles at the strand. Use of the turtle excluder device will reduce the needless destruction of turtle populations.

*Q: In Madras you attended a workshop on turtles. What did the discussions focus on? Did you arrive at any conclusions?*

*A:* The workshop focused on the conservation problems of sea turtles in India and a long list of recommendations was one outcome. The basic conclusions were that various forms of habitat preservation and management are urgently needed, as both breeding and feeding areas are being destroyed. There is a critical need for coordinated basic research. Law enforcement must be made more efficient, and public education programmes are needed.

*Q: What are the most urgent steps which decision-makers in the Bay of Bengal region should take to conserve and multiply the turtle resource?*

*A:* The most urgent but difficult step is the cooperation of all member-countries of the BOBP to assess and manage common stocks of marine turtles. Critical breeding and feeding areas will need to be managed so that the stocks can reproduce. Protective legislation must be enforced to give the protection required. In places where turtle stocks have been truly protected for a sufficient time (e.g. Reunion), the country enjoys the possibility of reaping a large but sustainable harvest of a highly prized food resource. I feel that with the Madras workshop we are a much needed step closer to a workshop on marine turtle management. It is long overdue.

# glimpses into BOBP projects

## Rs. 65 lakhs credit for Orissa fisherfolk

The pilot credit scheme for Orissa fisherfolk initiated last year by BOBP (see *Bay of Bengal News*, March 1984) has received a big boost. On July 23, 1984 the National Bank for Agriculture and Rural Development (NABARD) sanctioned Rs. 55 lakhs (5.5 million) for the scheme, thus ensuring its continuation into 1985-86.

Under the scheme, which meets the varied credit requirements of artisanal fisherfolk, more than 300 marine fisherfolk households from 16 villages in Orissa's four coastal districts have already received goods worth about Rs. 11 lakhs.

The NABARD amount of Rs. 55 lakhs is meant to refinance nine banks (State Bank of India, Balasore Gramya Bank, Cuttack Gramya Bank, Rushikulja Gramya Bank, Canara Bank, United Commercial Bank, United Bank of India, Bank of India and Andhra Bank), 24 branches of which are participating in the BOBP pilot credit scheme.

The NABARD refinance, which will take the form of a low-interest loan to commercial and rural banks, constitutes approximately 85% of the total outlay of a Rs. 65 lakh credit project for artisanal marine fisherfolk. For the remaining 15%, sum of

Rs. 6.2 lakhs (about 10%) will be given as financial assistance by the Banks without refinance; while the balance of Rs. 3.2 lakhs (about 5%) will be contributed by the fisherfolk as down payment.

Districtwise, assistance to fisherfolk under the Rs. 65 lakh credit project is as follows: Balasore Rs. 14.4 lakhs; Cuttack Rs. 10 lakhs; Puri Rs. 10.2 lakhs; Ganjam Rs. 26.4 lakhs. Five types of fishing boats and eight types of fishing gear will be financed under the project.

Before the NABARD refinance was finalized and sanctioned at its head office in Bhubaneswar, it was discussed at a meeting on June 19, 1984, which was convened by the Additional Secretary of Finance, Government of Orissa, and attended by representatives of the finance department and the participating banks. The outline of the NABARD refinance proposal had been prepared at a BOBP seminar held in Bhubaneswar during April 1984 which also reviewed past loan disbursements for fisherfolk under the BOBP pilot credit scheme.

### Training course on pen culture of shrimp at Killai

Previous issues of *Bay of Bengal News* (see July 1983) described the BOBP-assisted pen culture project for shrimp

at Killai near Chidambaram. On the basis of the project's experience, an eight-day training course was held from July 9 at Killai for 16 fisheries officials and scientists from Tamil Nadu, Andhra Pradesh and Kerala. It was inaugurated by the Tamil Nadu Minister for Fisheries, Mr K Kalaimani.

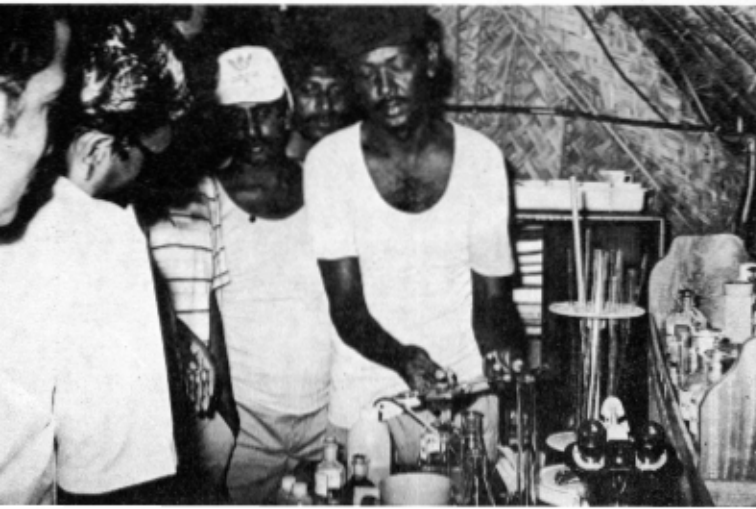
Nearly three-fourths of the participants were in the age group 20 to 30; most of them had had previous experience with aquaculture or extension.

Before the course began, participants were sent a set of 23 background papers. This enabled the course organizers to keep theory to a minimum during course time — and concentrate on demonstration (by the project staff) and learning by doing (on the part of the participants). Mr Vicmr Chandra Bose, team leader of the Killai project, and his colleagues I Nallu Chinnappan and C Rajappan, showed the trainees by personal example how to prepare pen walls and erect pens; how to collect and sort the seed; how to remove pests; how to construct nursery cages; how to prepare feed for stocked fry; how to check and mend pens and how to harvest cultured shrimp. The Veddars (the local hand-pickers engaged by the project) showed how large-sized catfish can be removed by hand and by spear.

Discussions were held every evening with the help of slides, charts and blackboard presentations; the trainees, who began work every day at 8 a.m. remained on their feet till 8 p.m. — "a bed-to-bed programme" as they grimly put it.

There were two lectures — one on the socio-economic feasibility of pen culture of shrimp by sociologist

Left: Killai project team leader Victor Chandra Bose tells course participants about laboratory analysis. Right: Learning by doing — participants get into the water to erect pens, remove predators etc.



Rathindranath Roy; another on extension by BOBP's extension training specialist Hans Dorresteijn. Both talks aroused vigorous discussion.

On the last day of the course, participants divided themselves into four groups of four each to evaluate the course on the basis of various criteria such as the strength of the course content, the methodology, the educational aids used, etc. Everyone agreed about the value of the

practical experience gained, even if some of the lessons applied only to Killai. Topics that deserved more attention in their opinion were removal of pests and predators, the occurrence of diseases in shrimp, environmental pollution. They also felt that similar courses should be organized for fisherfolk. A unanimous gripe was about the tight schedule that didn't permit even a visit to the Chidambaram temple nearby.

made engines; whether a new type of sailcraft can be developed to replace traditional dugout canoes; whether motorisation can improve the efficiency of small-mesh gill-nets; and whether a new type of engine-cum-sail beachcraft can be developed to operate 1 large-mesh driftnets.

4. BOBP/WP/26: *Commercial Evaluation of IND-13 Beachcraft at Uppada, Andhra Pradesh.*

IND-13 is one of the early beachcraft developed by BOBP for Andhra Pradesh and this paper describes how this craft fared in comparison with the traditional Nava during fishing trials conducted in Uppada, Andhra Pradesh, from November 1980 to March 1982. Three units of IND-13 and three local Navas took part in the trials, both types of craft being equipped with the same type and quantity of fishing gear.

5. BOBP/REP/17: *Report of Investigations to Improve the Kattumaram of India's East Coast.*

This paper describes the various efforts made BOBP to improve the performance of kattumarams, the traditional fishing craft of India's east coast. Though a wide spectrum of possibilities was investigated, and several experts consulted, no prospects for economic improvement emerged. Centuries of evolution have apparently led to a craft that is next to perfect, considering the environmental technical and economic constraints within which it operates. Financial and policy measures — such as supply of credit for gear, and of kattumarams logs at moderate prices — may be the only means of improving the economic performance of the kattumaram fishery, the paper concludes.

6. BOBP/REP/18: *Motorization of Country Craft, Bangladesh.*

This paper discusses a pilot project to motorize the traditional Hilsa-fishing Chandi boats of Bangladesh with small low-powered long-tail diesel engines. Under the project, two motorized Chandi boats and two traditional Chandis engaged in fishing trials for 13 months from December 1980 near Bhola Island in Barisal district. The conclusion is that motorization is highly profitable for the investor and quite remunerative for the crew.

## ABSTRACTS OF BOBP PUBLICATIONS



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

1. BOBP/WP/28: *Fishing trials with Small-Mesh Driftnets in Bangladesh*, by C Pajot and T K Das.

As part of the BOBP's efforts to improve the traditional fishing gears of Bangladesh, experiments were conducted during 1981-82 with small-to-medium mesh driftnets, which account for about a third of the total marine catch of Bangladesh. Comparative fishing trials were conducted with nets of mesh sizes ranging from 100 mm to 120 mm. There was a clear indication from the trials that smaller-mesh nets obtain bigger catches.

2. BOBP/WP/19: *Report of the Eighth Meeting of the Advisory*

*Committee; Dhaka, Bangladesh, 16-19 January 1984.*

This document reports on the BOBP's most recent Advisory Committee meeting, held early 1984 in Dhaka. It includes a summary of progress made by the project in 1983, the fifth year of operation, and also presents suggestions for a BOBP beyond 1985.

3. BOBP/WP/25: *Fishing Craft Development in Kerala: Evaluation Report* by O. Gulbrandsen.

This paper results from experiments conducted in Kerala for two years from 1981. The project was meant to clarify the technical and economic implications of various development alternatives concerning fishing craft in Kerala, thus giving the Kerala Government the information required for investment decisions.

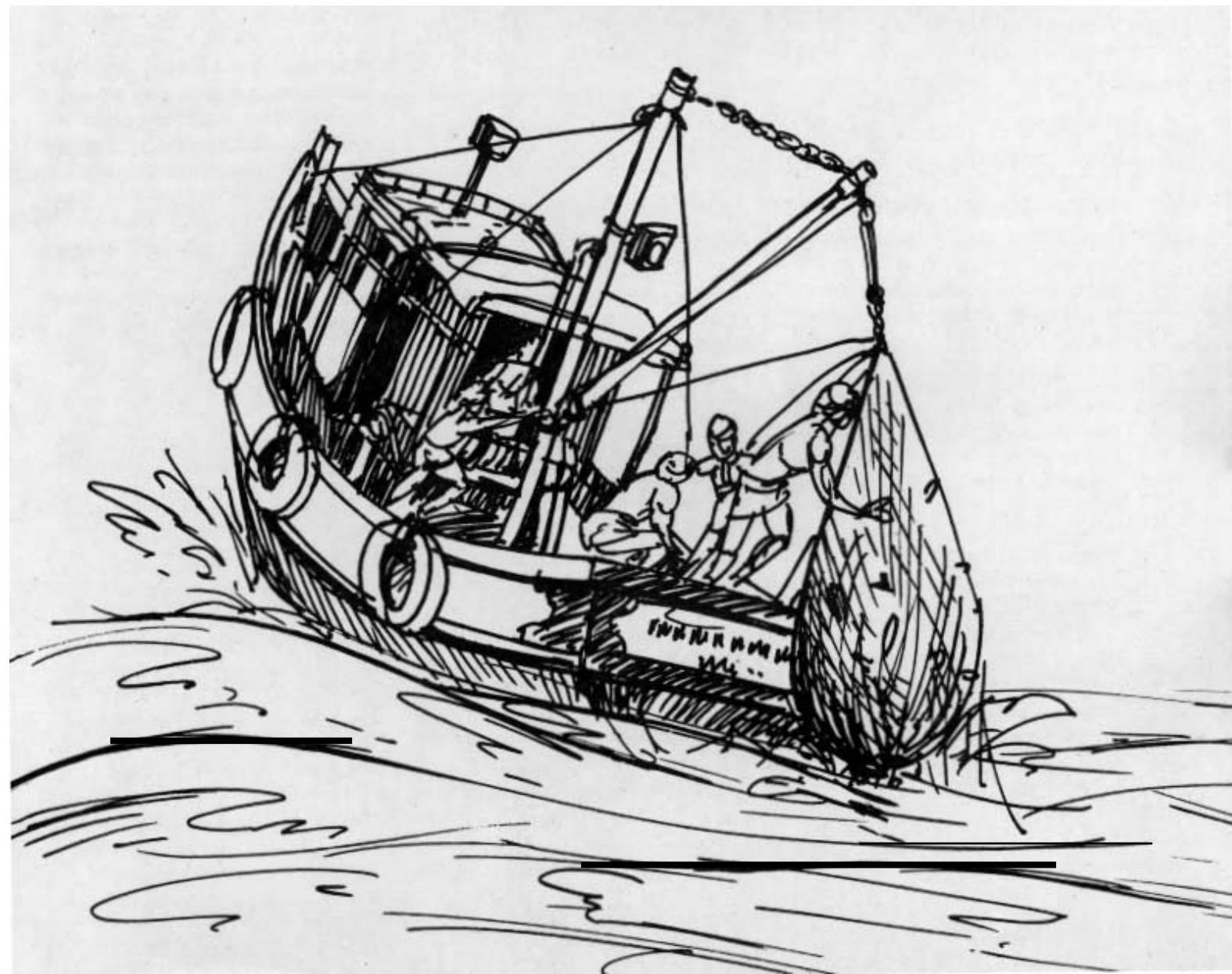
Specifically, the project examined whether the performance of Thanguvala canoes can be improved by motorising them with locally

# Improved Trawling

## Techniques in Palk Bay and Gulf of Mannar: Have they affected fishery resources?

by Dr B T Antony Raja

Popularized in India by the Bay of Bengal Programme, high-opening bottom trawls have attracted wide notice. Early this year BOBP conducted an impact study on the biological effects of this technology. The article on these pages reports the study's findings — that there is no immediate need for management measures.



"A seasonal bonanza for Palk Bay fishermen" proclaimed *Bay of Bengal News* in its cover story of March 1983. "Pair trawling strikes good grounds for white pomfret in the Palk Bay, Tamil Nadu" was the heading of a popular article from the CMFRI (Central Marine Fisheries Research Institute). There were features and illustrated reports in several other Indian dailies and magazines.

The stir created in the press and fishing industry on the introduction of improved trawling techniques such as high-opening bottom trawls (HOBT) by the Bay of Bengal Programme (BOBP) was followed by a note of caution expressed by the Indian delegate at the Bay of Bengal Committee (BOBC) meeting held at Covelong (Madras, India) about a year ago to the effect that uncontrolled expansion of the technique might lead to an over-exploitation of certain near-shore resources and might harm the artisanal sector.

"There is no need for such an apprehension. For one thing, there is no likelihood of uncontrolled expansion of the new trawling techniques because of limitations to the entry, such as high initial capital investment, uncertain economics and statutory regulations. Secondly, the evidence available does not indicate any serious threat to the resources exploited or exploitable by the other gears nor is there any serious competition for any of the resources, except perhaps one (*Thyrssa*) which is exploited by the artisanal fishermen and by the shrimp trawlers". This is the major outcome of an impact study conducted by the BOBP. The study goes on to show that the economics of HOBT operations, especially pair trawling, depend on the availability of pomfrets or cat-



*The high-opening fish-cum-shrimp trawls — designed for use when the shrimp season was past its peak — caught both shrimp and fish.*

fishes. Only those operators who are financially sound and capable of absorbing initial, possibly recurring losses, may continue to stay, anticipating occasional bumper crops from shoals of pomfrets or catfishes.

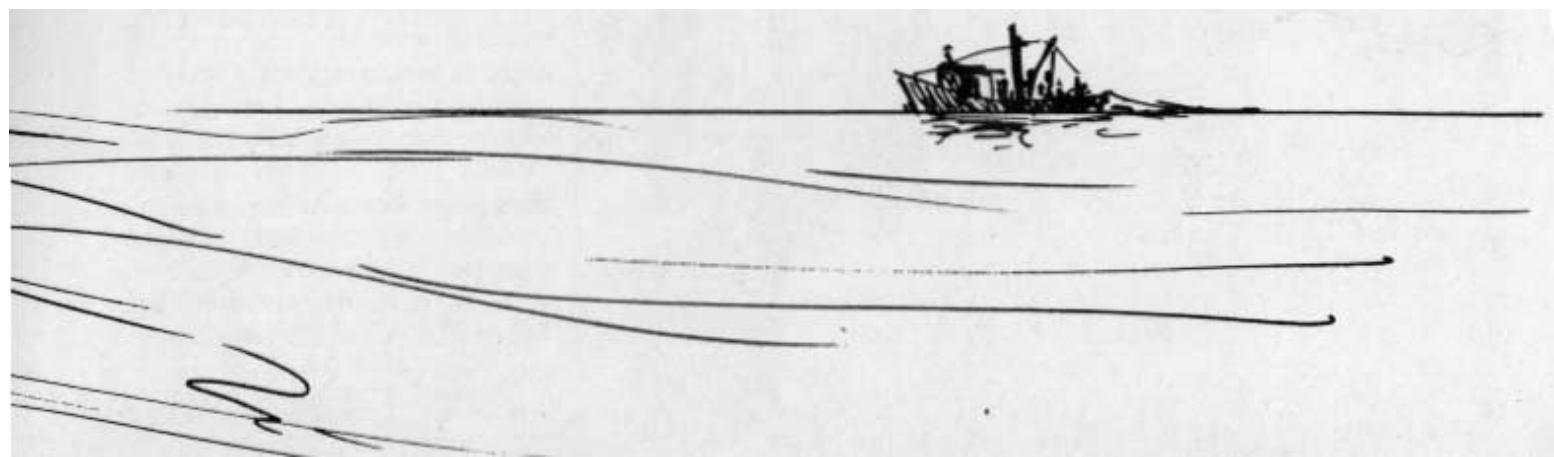
It may be recalled that the BOBP's small-scale fisheries project conducted some trials with HOBT separately with two boats (pair trawling) and one boat in the Palk Bay and Gulf of Mannar. Besides, a fish-cum-shrimp trawl (FST) and mid-water trawl (MWT) were also tried. Witnessing these trials, some enterprising operators of small shrimp trawlers in the region were quick to sense the better economic returns of the improved trawling techniques during the lean season for prawns and ventured on commercial scale operations in 1981-82. Their success stories not only induced more operators of the area but also encouraged the operators of

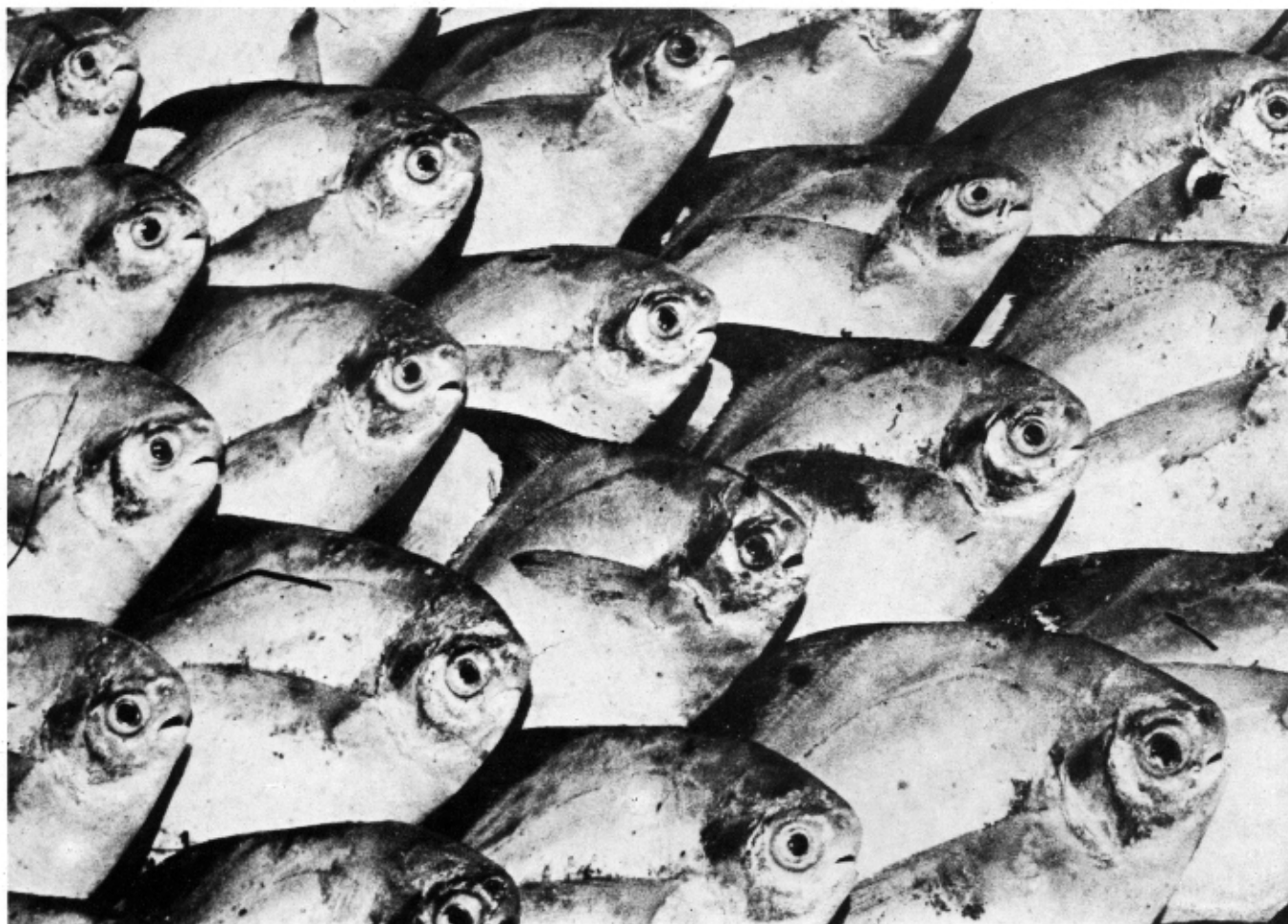
Nagapattinam and Madras in Tamil Nadu. From this southern-most state of India, the news caught the fancy of the mechanised boat owners of the northern-most state, Gujarat, where commercial operations have commenced early this year. It is learnt that some of the other coastal states are also interested to have the technology demonstrated and developed in their respective areas.

Popularity apart, the FAO, appreciating the concern voiced by the Indian delegate at the BOBC meeting, launched immediately an impact study on the social, economic and biological effects arising out of introduction of this technology. It was conducted by Mr John Kurien and Dr B T Antony Raja. This article is based on the latter's report of the biological consequences.

#### **The present status**

In Palk Bay, the 25 units recorded an average of slightly over one tonne





*The high-opening bottom trawls netted good catches of pomfret early in 1982. Pomfrets appear to have been insufficiently tapped by conventional fishing techniques, says the author.*

per each operation during the first season. The major portion of the catch was shared by silver pomfrets (30%) and rainbow sardine (30%) while croakers (18%) and catfishes (9%) were the other important contributors. These results signalled for more entry in 1983, when the number

of units nearly doubled. But the quantity of pomfrets was reduced to about half of the previous season with occasional bumper catches of fishes. However, this year, the earlier enthusiasm was absent. The main reasons are:

- continuance of prawn fishery.

- apprehension arising out of seizure of six Indian boats by Sri Lankan navy.
- reluctance among owners for joint effort with identical boats.
- absence of knowledgeable fishing technologists in the area for advice/guidance.

*Ezhumalai, a net-maker engaged by BOBP, assisted private operators of Tuticorin and Rameswaram in rigging the high-opening bottom trawls.*



At Tuticorin (Gulf of Mannar), the fish-cum-shrimp trawl (FST) found a more favourable response than the HOBT. There are about 50-60 FST and 20 HOBT but at the time of the impact study only about one half of the former and 6-7 of the latter were in operation. This was again due mainly to the continuance of prawn fishery and the reluctance of operators to switch over. From the trend of monthly catch compositions, it would appear that after introduction of the new trawling techniques during late 1981, the catches of the mechanised sector from November to March-April have considerably improved. A major contribution to the increased catches appears to have come from the *Thyrssa* resource with occasional

good catches of pomfrets and catfishes. (The *thyrssa* is a small anchovy-like fish, known locally as *Kola*.) On an annual basis also from 1981 to 1983, catches from both the mechanised and non-mechanised artisanal sectors have improved, and there is no indication that the catches of the artisanal sector have been affected, except perhaps in the case of *Thyrssa*.

#### **Opposition from fishermen**

The fishermen of traditional non-mechanised boats are, as expected, opposed to the operation of HOB.T. Their main grievances are:

- HOB.T operations adversely affect the migration of fish to the near-shore waters and, in turn their catch
- the bulk catches of HOB.T depress the prices for their produce, the market being common for both
- mechanised boats cause damage to their gill/drift nets.

From the impact study there is no evidence for the first grievance, the only possible exception being the *Thyrssa* in the Tuticorin area. There is some justification for the second complaint, but it is applicable only on the rare days of bumper catches because the marketing set-up is such that it has equipped itself adequately for lifting the normal HOB.T catches.

The third complaint cannot be attributed to the HOB.T for the reason that the HOB.T boats sail out during the early hours of the morning and return late in the evening, the fishing hours being strictly confined to day time, whereas the gill netters operate during the night. However, another ramification of this grievance – that the gill netting time of the artisanal fishermen is reduced because they haul their nets earlier than usual, to prevent damage by mechanised boats – has some substance.

#### **No threat to the resources, no serious competition**

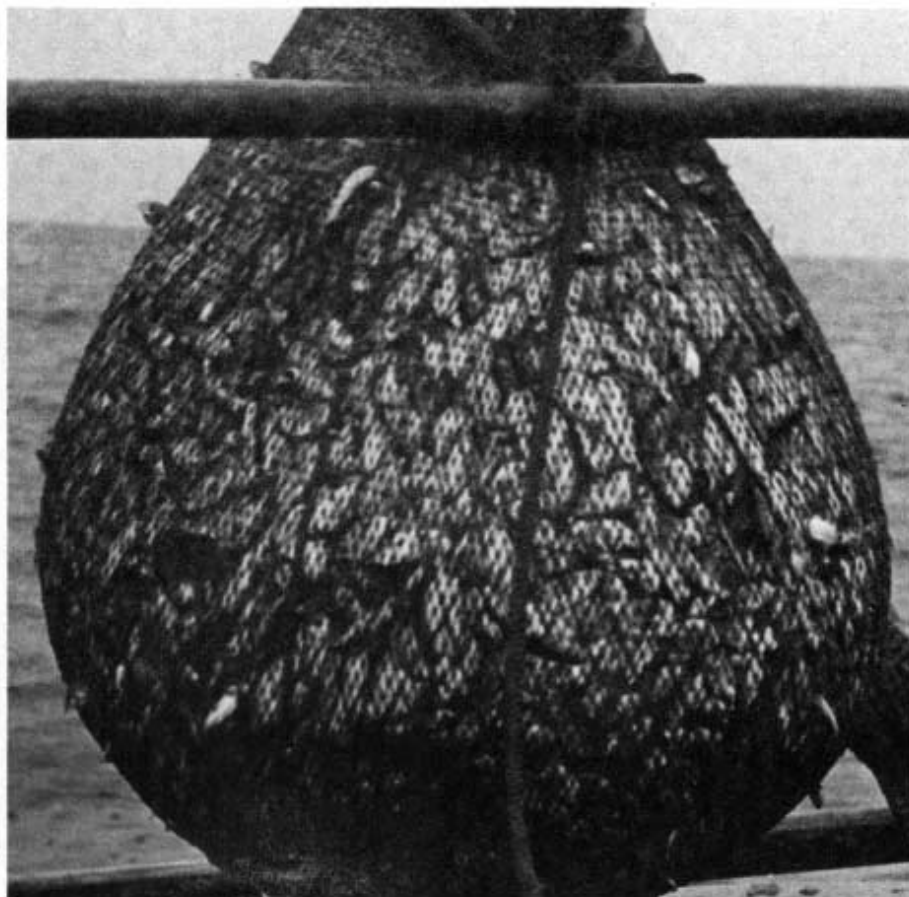
Let us take a look at the varieties and sectors exploited by different interests. The shrimp trawlers exploit the bottom-dwelling varieties, principally the prawns, silver bellies and to some extent croakers. The non-mechanised gill netters take largely the upper layer of pelagic fishes. The HOB.T, on the other hand,

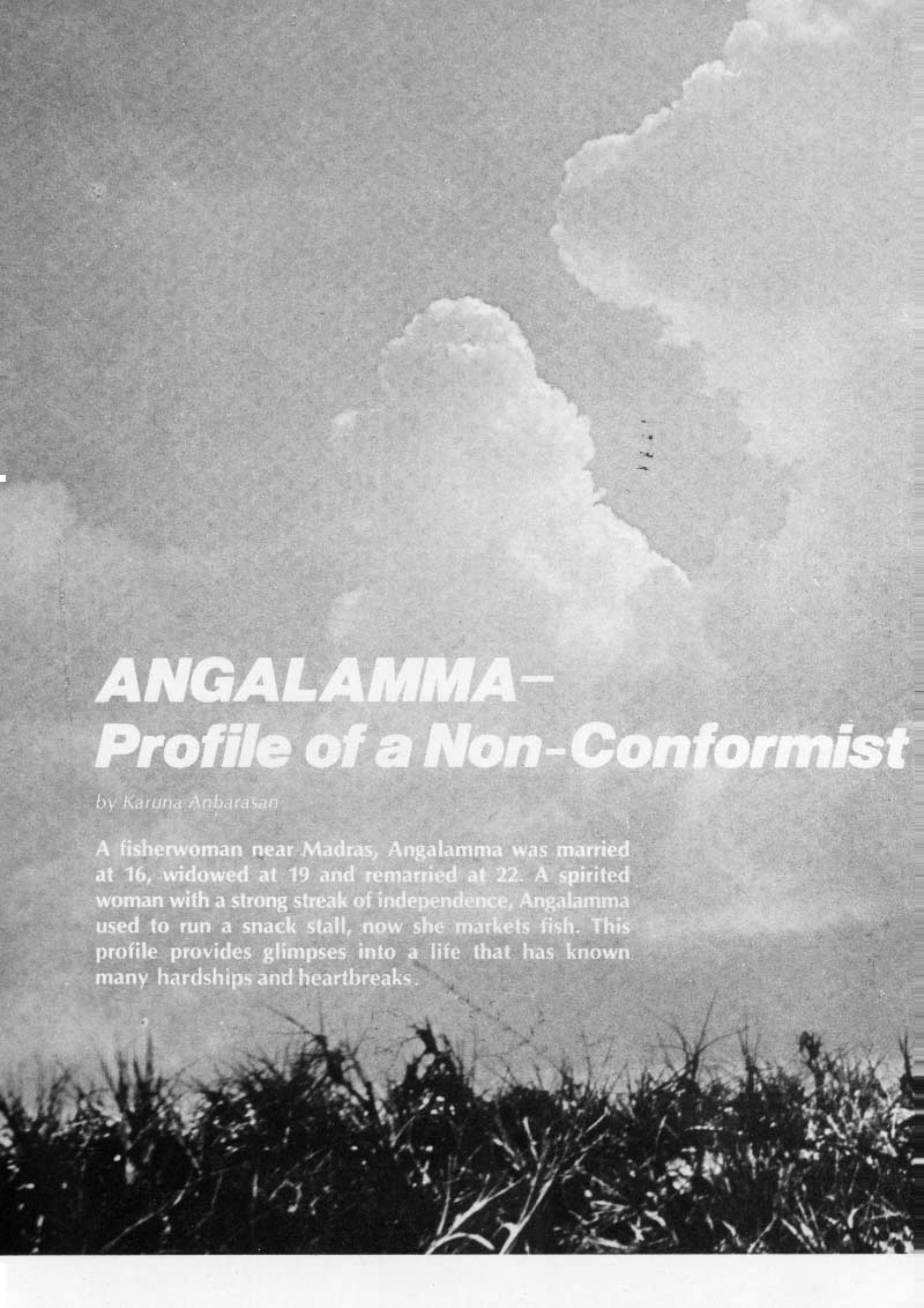
exploits more of the lower columnar fishes, which are generally under-exploited. The pomfrets, catfishes, croakers and silver bellies are the important components in the HOB.T catches of both Palk Bay and Gulf of Mannar; the rainbow sardine and llisha in the Palk Bay and the *Thyrssa* in the Gulf of Mannar are found to be other important constituents. (One cannot rule out the possibility of mis-identification in respect of llisha and *Thyrssa* in this area). Of these, the croakers, *Thyrssa* and silver bellies are also exploited by the shrimp traders; *Thyrssa* and catfishes are taken by the non-mechanised gill netters. Pomfrets and catfishes of both the water areas and rainbow sardine of Palk Bay appear to have been under-exploited by the existing fishing techniques before introduction of HOB.T. For croakers there is no serious competition from the non-mechanised sector. Thus from the resources point of view there does not seem to be any serious threat to the resources exploited by the other gear because of the new trends nor there is any serious competition between the sectors for any of the resource, with the possible exception of *Thyrssa*.

The HOB.T, is, no doubt, a highly efficient gear. Operated with two boats, its trawling efficiency is increased; if there are shoals around, the resultant catch would certainly be a bounty. But considering the high investment required (Rs. 7000 for the net & one) in what is otherwise a small-scale sector; the capacity and the tenacity required to withstand occasional losses; the need for total understanding between partners, both operators as well as boat owners; and the events in the past three seasons (a sudden spurt in the activity of the new technique followed by a lull); it is certain that there will be no uncontrolled expansion of the new fishing techniques introduced in the region. In fact, as of today, it is doubtful whether there will be any expansion at all.

With the escalating energy and other running costs and the statutory regulations introduced under the Tamil Nadu Marine Fishing Regulations Act, there is an all-round depression in the mechanised sector witnessed by transfer or disposal of assets. There is no great enthusiasm for expansion. Such being the case, there appears to be no immediate need for management measures.

*The high-opening bottom trawls occasionally yielded bumper catches like this.*





# **ANGALAMMA— Profile of a Non-Conformist**

*by Karuna Anbarasan*

A fisherwoman near Madras, Angamma was married at 16, widowed at 19 and remarried at 22. A spirited woman with a strong streak of independence, Angamma used to run a snack stall, now she markets fish. This profile provides glimpses into a life that has known many hardships and heartbreaks.



Angamma is well known in the Panaiyurkuppam coastal village not far away from Madras. For five days every week she walks three miles to the Harijan colony in the nearby Sholinganallur village, carrying a head-load (six to eight kg) of fish, and after selling the fish walks back home. This arduous routine is essential so that her family gets at least its regular meagre income.

About 37 years old, Angamma hails from a fishing village (Thennadu) near Pondicherry. She was one of 14 children, of whom only four survived. Her mother was a non-conformist who not only left her husband since she was forced into marriage, but also eventually married another person with whom she had fallen in love. This streak of non-conformity is discernible in Angamma as well.

Angamma married at the age of 16 and became a widow at 19. Her husband was a hard-working fisherman and she had no complaints about him. But she was ill-treated by his relatives during the first two years because she did not conceive; they threatened that her husband would have to remarry. To her immense relief a child was born during the third year. But tragedy struck — her husband died after an attack of jaundice.

As is the usual custom, Angamma returned to her mother's home after the death of her husband. It is during this phase that Angamma's non-conformist streak manifested itself. Rather than depend upon her brothers,

she struck out on her own by setting up a snack stall. She was naturally adept at this job and had soon established herself to the extent of netting five rupees a day. With this earning she was able to arrange for her younger sister's marriage. But her independence irked her brothers who coaxed her to re-marry.

The brothers told her : 'We cannot take responsibility for you. You are still young and have money of your own. Men will use you and you might fall into their trap. This will bring a bad name to the family. So it is our duty to get you married.'

Angamma did not agree but the brothers were very insistent and she re-married at the age of 22. Her husband was the 35-year-old Perumal, a native of her village. Angamma started living separately with her second husband and soon cut off all links with her brothers — mainly because they had forced her into this marriage against her will.

Perumal was a coolie fisherman. He worked for a net owner who had



*Above : Angamma buys fish at an auction shed in Panaiyurkuppam, then carries it by headload and boat to Sholinganallur village for sale. If she invests Rs. 35 on a single day, she makes a profit of Rs. 6. Below and facing page : Attending to two of her six children — four boys and two girls.*





sons now go fishing with this net owner, but their meagre earnings are not enough to repay the family's debts. This forced Angamma into selling fish.

Angamma did not want to start a snack stall again mainly because she thought her children would eat up all the snacks. After some initial hesitation, she was persuaded by two women from the Harijan colony of Sholinganallur to start selling fish in that village. Angamma's day starts at half past five in the morning. (Her sons go out fishing earlier.) By 7.30 a.m. she is at the sea shore to find out how good the catch for the day is. She then goes to the auction shed and waits till the last few kilograms of fish arrive; only then does she bid or not bid) in the auction. She usually buys between six and eight kg of fish. Her daily investment is of the order of Rs. 35 to Rs. 50.

By 2 p.m. she is on her way to Sholinganallur with her headload of fish. Perumal accompanies her and helps her cross a river en route. This enables her to avoid about a mile of

walking each way. Angamma spreads her fish under a tree, and her regular customers buy what they want. Some pay her by the week, some by the month and some buy only when they earn. Most of the days she earns about Rs. 6 if she invests Rs. 35. On some days she loses money — but she dries the unsold fish and sells it another day.

Thus does Angamma's life go on. At home, her sons, her husband and she herself arrive jointly at decisions. Though Perumal does not earn, he still has a position by virtue of his being the male head of the family. In the village, however, Angamma has no voice because she is a woman. Having been in Panaiyur for just three years, she is not yet eligible for a government house. And Perumal's reputation for irresponsibility does not help either.

Despite her economically active role in her family and all her toil and effort, Angamma's public role and importance are limited. This is as it always has been. It is perhaps time for change.

lent him Rs. 2,000 when Perumal's father had fallen ill. While other fishermen could go fishing with whoever they wished, Perumal had to work for this particular net owner because of his indebtedness. For Perumal, Angamma bore six children — four boys and two girls.

Perumal evinced a lot of interest in local politics. Perhaps inevitably, he got entangled in a fight between his party and another. Fearing retaliation, Angamma brought away her family from Thennadu to Madras — and later to Panaiyur, when she found Madras too expensive. But before leaving Thennadu, the family had to repay Rs. 2,000 to the net owner. Angamma borrowed the amount from distant relatives at the exorbitant interest rate of 10 per cent a month.

After settling in Panaiyur, Perumal borrowed Rs. 2,000 from another net-owner by promising to work for him. This enabled Angamma to repay her loan. So far so good. But Perumal became irregular in his working habits and started drinking rather heavily. It once again fell upon Angamma, with the help of two sons, this time, to shoulder the family's burdens. Her

### BOBP STUDY ON TAMIL NADU FISHERWOMEN

The profile of Angamma on these pages is taken from a study conducted for BOBP by Ms Karuna Anbarasan, a social worker. The study focuses on three fishing villages of Chingleput district in Tamil Nadu and seeks to determine the factors that influence the role and status of fisherwomen. These factors (introduction of the money economy, urbanization, improved technology, ownership of assets, tradition and socio-cultural milieu) are discussed in brief on page 20.

During the course of the one-year study, Karuna reviewed existing literature; did a basic survey of adult women in the three villages, plus a sample survey, spread over 45 days, that covered one-tenth of all fisherwomen above the age of 13; and conducted in-depth interviews over a period of six months with nine selected fisherwomen. Living for 10 days in each village, she held group discussions with both men and women in the villages. Karuna was assisted in the study by nine investigators drawn from the three villages. "The study owes a lot to them", she says.

It is hoped that the study will give BOBP, and the Tamil Nadu Fisherwomen's Extension Service (TNFWES) the information and the insights needed to assess ways and means of improving the socio-economic life of fisherwomen.

The BOBP and the TNFWES are already engaged in many pilot activities — particularly in the areas of credit, education and training — to improve the status of women. (See *Bay of Bengal News*, September 1983).

# FACTORS THAT INFLUENCE THE ROLE AND STATUS OF FISHERWOMEN

## Summary of findings of a recent BOBP study

These factors can be grouped under two heads — those that are relevant to fisherwomen as a group; and those that are applicable to individual fisherwomen.

FISHERWOMEN AS A GROUP are assigned a high or low status on the basis of the following factors

- the prevailing economy and technology
- ownership of assets
- tradition and socio-cultural factors

### The prevailing economy and technology

— *The introduction of the money economy.* When the subsistence economy was in vogue, fisherwomen bartered fish for paddy, vegetables, clothes and other essential articles. With the disappearance of the barter system, fisherwomen could no longer obtain their essential family needs through sale of fish. This attenuated their economic role in the family.

— *Urbanization* led to greater demand for fish in towns and city markets. The cycle traders who bought fish in the villages and had access to distant towns and city markets started playing an important role in fish marketing. Fisherwomen engaged in fish marketing could not offer as high a price as the cycle traders could.

— *Improved technology* (like nylon nets and the introduction of nylon net fabrication machines) directly influenced the role and status of fisherwomen. Nylon nets netted bigger catches that could not be handled by fisherwomen. This was especially true of the prawn trade. Fisherwomen started losing out to big traders who transported prawn in large refrigerated vans for sorting and export. And the nylon net fabrication

machines displaced fisherwomen from the traditional activity of net-making.

### Ownership of assets

The tasks of the fisherwomen depend also on the economic position of their families, which in turn is strongly influenced by its ownership of production assets.

The fisherwoman from a family without any productive assets has to help earn or augment the family income. She engages in actual marketing of fish — sometimes by carrying a headload of fish and walking to distant inland villages. The fisherwoman from a family that owns a variety of nets and kattumarams, however, is not usually directly involved in fish marketing. She hires women to carry headloads of fish; she travels to town and city markets where she supervises the women selling fish.

In brief, tasks that entail labour are assigned a low status in the village. But indirect involvement in fish marketing, which calls only for handling money and supervising the hired workers, is accorded a high status in the village. Within the family, however,

both types of women enjoy a better status, because of their role as income-earners in the family.

Tradition & socio-cultural factors greatly influence the role and status of fisherwomen. The myth of man's inborn superiority over woman is reinforced by sex-based division of labour. Norms pertaining to family and marriage also assign a low status to women. The process of socialization keeps a check on the younger generation so that they conform to roles prescribed by the community. Religion is invoked to rationalize and sanctify tradition.

Cultural norms also prohibit women from taking part in decision-making in the village. Politics and decision-making are considered the domain of men. The non-participation of women in decision-making at the village level is sought to be justified on intellectual and educational grounds — women are supposed to be deficient in both.

The status of INDIVIDUAL FISHERWOMEN is determined by their employment position, age, marital status and educational level. These assign a superior or inferior position to a specific fisherwoman.

It should be noted that these factors generally interplay with factors that influence fisherwomen as a group in finally determining the status of a fisherwoman in the village.

