

BAY OF BENGAL NEWS

A PUBLICATION OF



For Fisheries Development

BAY OF BENGAL PROGRAMME



Danida

ISSUE NO 25
MARCH 1987

SHRIMP CULTURE ON INDIA'S EAST COAST



Shrimp Culture on India's East Coast: Experts Discuss Prospects and Problems

Various issues concerning shrimp culture on India's east coast were discussed by a multi-disciplinary team of fishery scientists and officials at a two-day workshop at the BOBP's office in Madras, December 17-18.

The workshop was held in view of the termination of the BOBP's small-scale fisheries project in December 1986. (A successor project began January 1987). It was believed that before the project came to an end, it should discuss past experiences and future development in cooperation with the government authorities concerned.

The workshop had three broad objectives:

- Review the present status of shrimp culture development on the east coast of India.
- Identify potential for development, major constraints and methods for the transfer of appropriate shrimp culture technology.
- Outline suitable measures to accelerate the development of shrimp farming, particularly in the small-scale sector.

A document entitled "Shrimp Culture on the Bay of Bengal Coast of India — Working Paper Outline" was prepared by BOBP staff as a framework for discussion by workshop participants. The experience of the participants encompassed many aspects of shrimp culture, from research to development and extension. From this diverse group of experts, the following information on the industry's current status and recommendations for future work emerged.

The international environment, marketing and production trends

While Taiwan and other countries have increased their production, there has been no effect yet on prices of Indian shrimp. It was pointed out that the cost of production under extensive culture in India is US\$ 2-3 per kg while in the intensive systems of Taiwan, it is around \$ 7. If the price of prawns drops in the future, a domestic market will probably develop in view of the rising cost of quality fish products. Shrimp farming is likely to remain profitable, but investment costs for small farmers require that 500 to 600 kg per year must be harvested. Controlling the cost of production for small farmers will be increasingly important and the cost of credit must be considered carefully as a major input expense. In the entrepreneurial sector, the limited availability of suitable land will require that pumping be used to increase production to 1 — 1.5 t/ha. Additional inputs of quality feed and sufficient prawn seed will be needed to achieve these targets.

The physical and institutional environment

What is the potential area for shrimp culture on the east coast? From the lively discussion, it was apparent that both physical limitations and regulatory measures have led to revision of previous estimates. It was brought out that any estimate made at this time should be regarded as provisional and probably revised downward. Originally, 1.9 million ha had been considered as suitable nation-wide, but now this has been reduced to 900,000 ha. The CICEF (Central Institute of Coastal Engineering for Fisheries) has deve-

loped criteria for pond site selection and is preparing a manual for general distribution. The criteria concern tidal range, infrastructure availability, salinity, soil chemistry, etc. More micro-level surveys are needed to ascertain with any degree of confidence the real potential for brackishwater aquaculture development, although it was recognised that this would require time. It was suggested that a unit should be set up within CICEF for this purpose.

It was pointed out by several participants that there is increasing pressure to convert saline coastal paddy fields to shrimp culture and this could considerably affect estimates of potential area. Sites formerly classified as salt production zones could also be considered for shrimp farm development.

Mangrove conservation has reduced the amount of area once considered available, and the prospects for development in Chilka Lake have been significantly affected by wildlife conservation policy.

At the institutional level, the influence of land use policy on shrimp aquaculture development was considered to have a strong, often negative influence. On the one hand, shrimp culture is classified as an industrial activity, while most coastal areas are considered as agricultural land. One suggestion was to classify brackishwater lands separately because of the difficulty in re-classifying agricultural land for aquaculture, i.e., non-agricultural use.

The only state which seemed to have a well-functioning land use policy for brackishwater aquaculture is Orissa. Land identified suitable for aquaculture

is categorized as low or high investment, with 75% of the former reserved for the rural poor. Investor-financed developments are allowed a maximum lease of 80 ha for 15 years.

A shore development authority is responsible for ultimate approval of aquaculture projects in Andhra Pradesh. In general, the approval process, particularly for proposals from the private sector, is excessively time consuming.

The Brackishwater Fisheries Development Authority (BFDA) has proved effective in Orissa in stimulating and guiding prawn farming development, and has been recommended for other states. In Orissa, a "cluster development" approach is used by the two BFDAs, each of which has a 14-member committee with the district officer and MPEDA (Marine Products Export Development Authority) representatives as permanent members. Each cluster of ponds is provided with two to four extension agents supervised by an area extension officer. The extension officers are trained through CMFRI (Central Marine Fisheries Research Institute) and MPEDA; it is estimated that one agent is needed for every 250 farmers. Contact farmers are used. One extension worker per 1000 ha is set as a criterion in Andhra Pradesh.

Seed supply

Approximately 10 to 15% of potential wild seed supplies are being tapped. MPEDA is encouraging the exploitation of this prawn seed resource through the establishment of seed banks, of which eight have been set up with a target of 50. In the long term, these seed banks will become nurseries as the hatchery industry develops. About 1000 seed collectors have been trained and given basic equipment, but not all of them can be supplied with the necessary requisites.

However, several participants pointed out that the natural supply is quite variable both in time and abundance and that multiple cropping is not possible if culture depends solely on natural supplies of seed. Land development for brackishwater culture has been intentionally slowed in Andhra Pradesh to assure an adequate seed supply for existing operations. The view of the central government was that reliance on natural seed supplies should be reduced.

Orissa again stood out as having the best managed seed supply for its rural development schemes. Seed prospecting has been carried out since 1979 and the potential production is estimated at 30 million per year with 35 to 40010 of this as *P. monodon*. The present system is operated by the Directorate of Fisheries and is producing 10 million juveniles per year. Collectors, mainly women and children, are trained to identify different species and to separate seed from other organisms in the water so as to reduce damage to the fry of other valuable animals. Each centre supports 50 to 100 collectors. Sales at farmers are supervised by the BFDA. Conflicts with fishermen have arisen in some areas where they feel seed collection threatens their prawn catches.

Hatchery development is supported by MPEDA through subsidies and joint ventures. Two are under way with foreign collaboration and three with CMFRI. So far, the response from the private sector towards hatchery subsidies has been poor. *P. indicus* seed has been hard to sell and in view of marketing problems, multipurpose hatcheries are needed. Low-cost technology developed by CMFRI can assist hatchery developers. However, it was pointed out that any system must have a consistent production and that proper siting is crucial for commercial viability. Technology should be chosen on the basis of reliability rather than

initial cost. MPEDA has been active in coordinating fry supply between different culture areas but transport has been a problem.

Feed

Feed was identified as a major problem in growout operations. It did not appear that commercial technology was available in India for the manufacture of an efficient feed. While interest on the part of farmers in artificial feeds is growing, MPEDA is still subsidizing feed inputs up to 4.5 Rs/kg. BOBP expressed its interest in developing small-scale feed production technology. MPEDA felt that such an approach should be tried, provided the result was an efficient feed available at a reasonable price. The total estimated feed requirement at present is about 30,000 t annually.

CMFRI has developed low cost feeds on a laboratory scale for *P. indicus* which have had a feed conversion ratio of 4:1.

Growout systems

Growout operations in BFDA schemes in Orissa depend on natural feed derived from freshwater snails and mussel. Monthly consumption is about 50 t. A lot of convincing would be necessary to get these farmers to switch to artificial feed.

More efficient pumps need to be introduced, since most ponds will require pumping. Appropriately designed axial flow pumps were recommended, but

Aquaculture should be classified under agriculture, not under industry.



they are not widely available in the country and may have to be imported. Indonesia, Thailand, Japan and U.S. are likely sources.

It was recommended by the Central Government that small-scale development be limited to 1 ha per family and that ponds should be pump-fed unless the tidal range of the site was 3 to 4.5 m. Development costs are estimated at 80,000 to 100,000 Rs/ha.

Several growout systems presently in use on the east coast were discussed in general terms. The unique rain-fed pond culture in Orissa which utilizes soil salinity and nutrient entrapment was described as being well suited to small-scale development. Ponds are small, from 0.12 to 0.7 ha in size and yield an average of 350 kg/ha of *P. monodon*. Yields can be increased by multiple stocking, provided juveniles are available.

The use of saline groundwater in old salt pans or inland areas may also have potential, but more trials need to be undertaken.

BOBP explained its interest in continuing pen culture trials and some of

the problems that had arisen. The system is not yet profitable enough to be considered for extension.

The largest area under brackishwater culture is the rice-cum-fishery of West Bengal. Similar systems are also operated in Kerala, Karnataka and Goa on the west coast. Good possibilities exist for substantially increasing production, but the effect of aquaculture on rice production is controversial.

Processing and marketing

Marketing did not appear to present any major problems due to the strong demand for shrimp. But farmers have had difficulties in obtaining a fair price. One proposal was to provide insulated ice storage for farmers or groups of farmers to give them some market leverage. Another suggestion was to provide them with up-to-date price information. The lack of competition in some marketing centres resulted in lower prices. Once again, the BFDA5 in Orissa have shown the way in coordinating harvesting, assisting farmers with weighing, and encouraging competition among buyers. The

BFDA5 are continuously informed of international prices by MPEDA.

Quality control was not perceived as a serious problem overall, although occasional difficulties did arise. Maintaining adequate sanitary standards in peeling sheds was seen as one source of problems, as was the general lack of clean water for washing shrimp. However, the scattered distribution of peeling sheds makes control difficult.

Freezing capacity in all east coast states is more than adequate for the foreseeable future, and the low incidence of rejection of Indian shrimp by importing countries indicates that no major problems need be anticipated from this sector.

The role of foreign assistance

Foreign in any form has played only a limited role so far in the development of shrimp culture. The UNDP provides technical advisors to CICEF for ponds, hatcheries and feed. BOBP has carried out demonstration, training and technical trials in new shrimp culture technology, principally in Andhra Pradesh and Tamil Nadu, in collaboration with state fisheries departments.

It was pointed out that the type of technology to be transferred from overseas should be carefully considered and should include feed formulation/manufacturing and hatchery design, particularly in the area of broodstock maturation and timing of seed supply.

Constraints to shrimp culture development

Seed shortage of *P. monodon* and the lack of good feed were universally regarded as major constraints by workshop participants. Consequently, production in existing units was below optimum, and expansion of the industry will be restricted.

The land use policy of various state governments was cited as inhibiting the expansion of pond culture and hatchery development. User conflicts can also hinder shrimp culture development. Fishermen may feel that their rights of access will be interfered with. Conflicts between agriculture and aquaculture are influencing the improvement of rice-cum-fishery in West Bengal and affecting land use classification.

The fact that aquaculture is classified under industry rather than agriculture

Transport of perishable shrimp seed is often a problem.



denies it various subsidies and access to coastal agricultural lands that could more profitably be used for shrimp farming.

A number of other constraints, on which there was less agreement, were discussed depending on participants' individual experiences and observations. In some cases, both qualitative and quantitative improvement is needed in extension services to shrimp farmers. More effective farmer feedback to research organizations calls for work in developing efficient mechanisms. Practical knowledge about the communities targeted for development projects is lacking.

Lack of infrastructure, particularly roads and electricity, obstructs development in remote areas. Roads are especially important for marketing highly perishable shrimp.

Recommendations

In the light of the above constraints, a number of recommendations were put forth:

- 1 The use of pumps and appropriately designed ponds should be encouraged. Axial flow pumps designed for brackishwater need to be introduced.
- 2 A commercial hatchery industry must be developed, but there was no agreement as to specific technologies that might be employed. While encouraging large industrial houses to set up commercial hatcheries for seed production through foreign collaboration, a low-cost technology to set up mini hatcheries, as is followed in Taiwan with wild broodstockspawners, must be encouraged with proper incentives.
- 3 It is essential to introduce brood stock management into hatchery development programs.
- 4 Technical assistance is required for the commercial production of shrimpfeed. This may be in the form of a joint venture with a foreign company or through technical assistance to the existing feed industry.
- 5 BFDA's have proven effective in Orissa and can serve as a model for other states.
- 6 In-depth socio-economic studies of target communities are needed to form the basis for a deeper involve-

BOBP & COASTAL AQUACULTURE IN INDIA

BOBP pilot work on shrimp culture in India has been regularly featured in *Bay of Bengal News*, (September 1981, September 1982, July 1983, June 1984, September 1984, September, 1985, March 1986, December 1986). Here is a brief Summary.

Appropriate technology and management methods have been devised for the culture of shrimp in pens. This activity started 1982 in the backwaters of Killai, Tamil Nadu. During the first 21 months basic engineering and design aspects were worked out, and practical methods of nursery rearing, pest control and harvesting developed. Since 1985 local fishermen have engaged in culture operations securing training on the job". Profitability is still elusive, mainly because of the high cost of pen walls and the low price obtained for the white prawn *Penaeus indicus*.

The pen wall cost can be drastically reduced by using HDPE instead of nylon. Future culture trials will concentrate on obtaining fewer but larger and more expensive shrimp while maintaining the total production weight. To attain this goal, the culture species has been changed — hatchery-produced tiger prawn, *P. monodon*, is to be stocked. Though management becomes more complicated in consequence, and pen culture might prove impossible without a good commercial feed, the effort is worth

pursuing, particularly because many of the problems encountered seem to be site specific. The work at Killai has been reported in two working papers (BOBP/WP/32, BOBP/WP/35), while another (BOBP/WP/49) is under print.

Shrimp farming in ponds was experimented with in Polekurru Andhra Pradesh. The project aimed at testing different designs and management practices under local circumstances. The three-year project was terminated in 1985 and reported on in BOBP/WP/46. It appeared that pump-fed ponds are more appropriate than tide-fed ponds because of lower investment costs and greater managerial flexibility.

A few other activities have yielded much valuable data. Brackishwater aquaculture in Orissa was surveyed by Ms. N. Munthe as a "minor field study" sponsored by SIDA. And Dr. A. N. Ghosh, BOBP consultant, discussed coastal aquaculture development possibilities in the east coast states.

Ms. L. Piriz carried out another SIDA-sponsored "minor field study" on shrimp feeding at Killai. The survey of shrimp culture practices along the east coast and the December 17-18 workshop which followed it, have been featured in this issue of *Bay of Bengal News*.

— D.R.

ment by recipients in the development process. This will alleviate some of conflicts that are now arising,

- 7 Land allotment procedures must be speeded up particularly for the entrepreneurial sector.
- 8 Aquaculture should be classified as agriculture rather than as industry and treated on par with agriculture. All basic infrastructure facilities such as approach road, drinking water supply, electricity, large protective bunds with sluice gates, supply channels, etc., required in remote coastal areas, should be provided by

the Government as a common facility as is done in agriculture.

- 9 Silviculture can be developed as an alternative use of derelict coastal forest lands.
- 10 Diversified coastal aquaculture should be promoted and may include bivalves and seaweeds.
- 11 Areas suitable for intensive and semi-intensive farming should be identified. Technology for intensive culture can be transferred from Taiwan with the assistance of Taiwanese experts and international development programs such as UNDP.

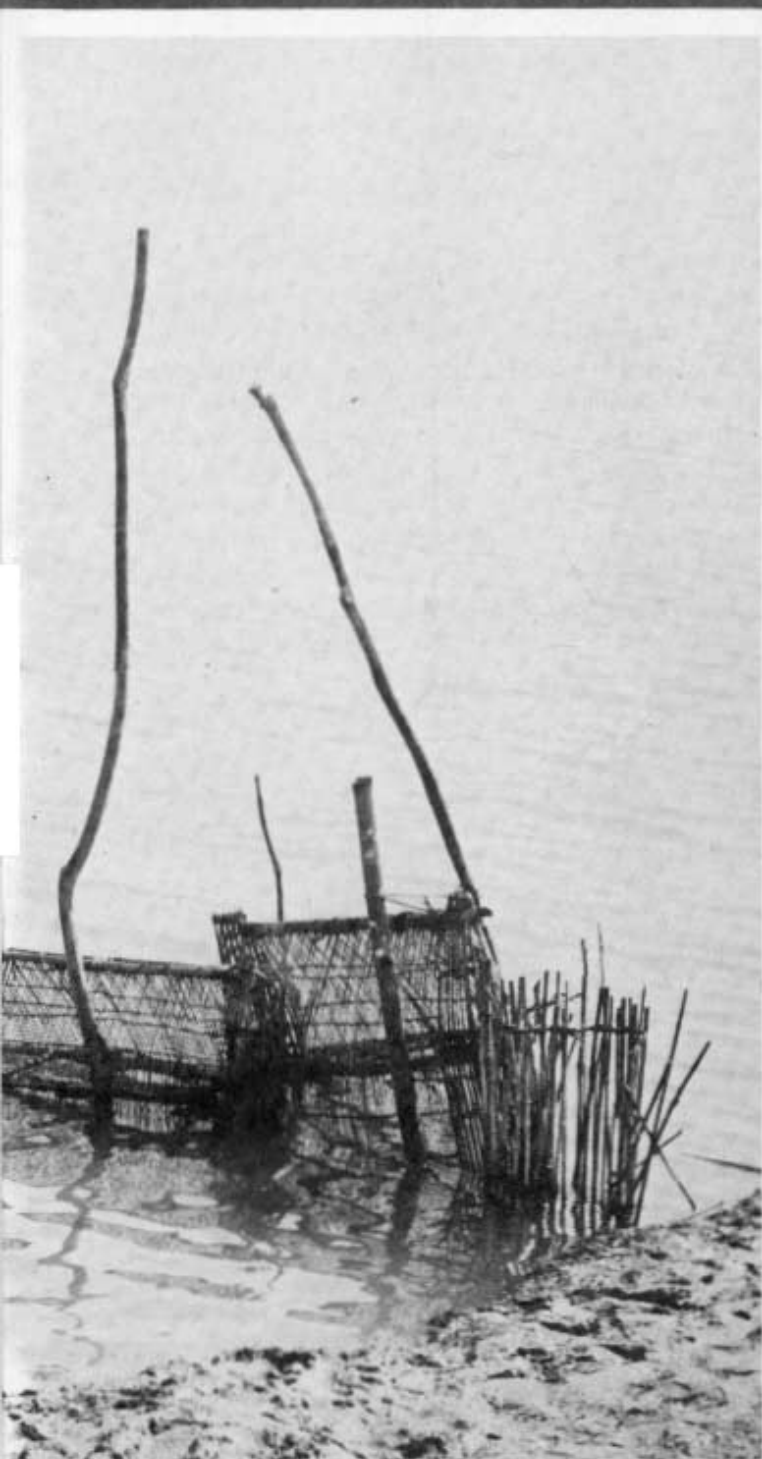
— C.A.

EXTENDING THE SH CULTURE BONANZA INDIA'S RURAL POO

"There are problems — but there is a sense of progress."



RIMP TO R



Shrimp farming requires heavy capital investment in infrastructure — ponds, sluice gates, pumps and access roads. Specialised technical knowledge is required for successful shrimp farming as well. Given these prerequisites, how can the rural poor get involved in this booming new enterprise?

Indeed, in most countries, shrimp farming is controlled by entrepreneurs with access to funds and expertise. While jobs may be generated, they are poorly paid and the workers have no chance of getting a share in the productive capacity of shrimp farms.

Cognizant of these problems and faced with enormous population pressure on coastal resources, the Government of India has reserved significant portions of coastal lands for development that must directly involve the rural poor as participants and eventual owners.

After the government has taken this first step and committed itself to providing the heavy subsidies necessary for such schemes, several projects have evolved which seem to be making significant headway, and which are improving the incomes of landless and impoverished coastal villagers. Recently, BOBP visited several of these projects in Andhra Pradesh and Orissa, while assessing the status and potential for shrimp culture development on the east coast of India.

In this article, we provide glimpses into two of these. The first involves the unique rainfed confined pond culture of shrimp on the northern shore of Chilka lake, Orissa. The second describes a more conventional pump-fed project near Polekurru in Andhra Pradesh.

Several characteristics of these projects stand out and may indicate why they are so promising. First, they are set up to encourage individual and family enterprise. The mistake was not made of trying to impose an artificial non-indigenous form of social organization on the participants. Second, adequate financing was provided for infrastructure through government subsidies, and operating capital is assured through the participation of commercial banks. Third, government agencies (DRDA and BFDA) have a strong commitment to the programmes and are trying to develop an extension service that can respond to the farmer's needs. Granted, there are problems, as the farmers themselves point out, but there is a sense of progress.

C.A.

Confined-Pond Shrimp Farming Near Chilka Lake

by D.J.R. Reyntjens

A success story from Orissa on small-scale shrimp pond culture.

It was around mid-September last year that BOBP staff went to Orissa to prepare for a workshop on shrimp culture potential along the east coast of India. Mr. B. Das (Dy. Director of Fisheries) and Mr. S.K. Mohanty (Chief Executive Officer of Pun's Brackishwater Fisheries Development Agency-BFDA) were our hosts and guides during our stay. Our first visit brought us to the shores of the Chilka lake at Sunamuhin, in Bramagiri block.

Chilka lake is an ecologically important brackishwater lake. About 80,000 people depend on its fisheries. The south of the lake is partly a bird sanctuary where thousands and thousands of migratory birds take refuge and rest from the harsh winter weather in higher latitudes. The south-east monsoon causes the lake level to rise and inundate about 20,000 ha of surrounding low lands. These form an ideal breeding and feeding ground for various fish, shrimp and crab species. All this makes Chilka lake a quite unique and interesting ecosystem.

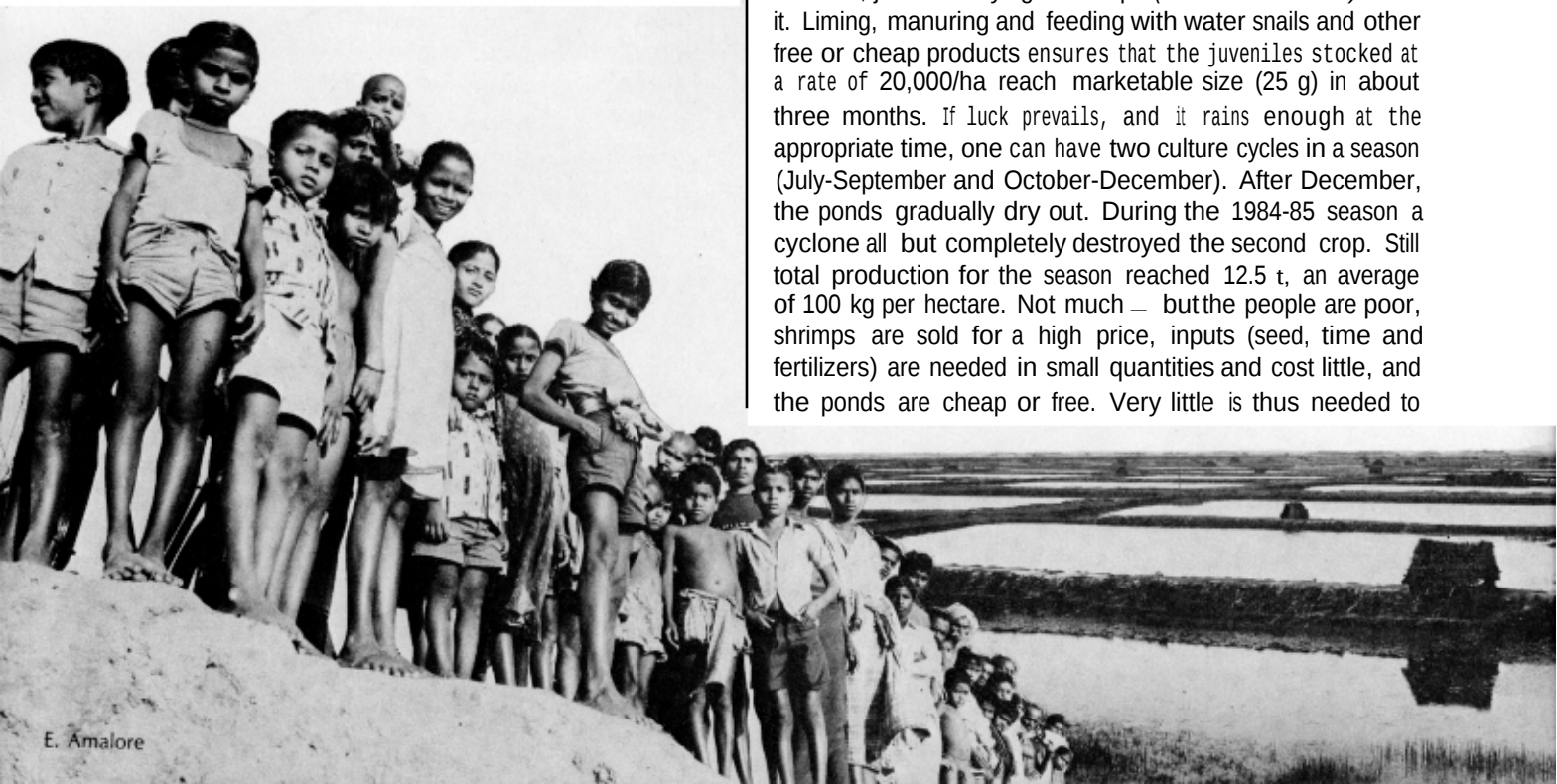
The pond "complexes" erected on the vast, flat expanse of the shore of Chilka lake are an impressive sight with their orderly arrangement of many small ponds. The outer bund which encloses over 140 small pond units, is faced with flat stone to resist wave erosion.

The BFDA has a field centre at Sunamuhin. From there it monitors about 400 shrimp ponds belonging to 370–380 farmers. These are small ponds; together they represent only 125 ha, and the farmers are generally poor people but they take a keen interest in **shrimp**. The children and the elder people feed the shrimps and guard against predation by birds and poaching. At night during the culture season, the whole family comes and camps on the banks of the ponds in temporary shelters. The ponds are usually constructed in clusters. It is as if villages totally move and resettle by what has become an important asset for them.

Is the development of small-scale shrimp culture along the shores of the Chilka lake a success story? It seems so for a variety of reasons of a technical and non-technical character.

Most participants in the scheme are landless fishermen with few assets, who formerly earned a meagre sustenance from the waters of Chilka lake. Although boat and trap owners were relatively well off, a fish labourer could earn only Rs. 3,500 to 6,000 annually, hardly adequate to meet daily needs and social obligations. The result: indebtedness.

The culture technique is relatively simple — and also cheap, partly because the ponds are small. Rain water fills the ponds, which are dug out in highly saline soils. The water becomes brackish, just the way tiger shrimps (*Penaeus monodon*) want it. Liming, manuring and feeding with water snails and other free or cheap products ensures that the juveniles stocked at a rate of 20,000/ha reach marketable size (25 g) in about three months. If luck prevails, and it rains enough at the appropriate time, one can have two culture cycles in a season (July-September and October-December). After December, the ponds gradually dry out. During the 1984-85 season a cyclone all but completely destroyed the second crop. Still total production for the season reached 12.5 t, an average of 100 kg per hectare. Not much — but the people are poor, shrimps are sold for a high price, inputs (seed, time and fertilizers) are needed in small quantities and cost little, and the ponds are cheap or free. Very little is thus needed to





E. Amallore

An old woman helps prepare feed for her son's shrimp farm.

significantly increase their income. Also, the work hardly interferes with other occupations of the household members. Additionally an average yield marks the occasional big success story; some farmers have been known to harvest many times more, up to 1 t/ha/year.

But technical factors are not sufficient to explain the success of a development scheme. Of equal or maybe even greater importance are government land policy and the role played by the Fisheries Department and the BFDA. Government policy reserves public land found suitable for this rain-fed culture system around the lake to the local residents. This eliminates competition from wealthy outsiders. There are also several schemes financed by the centre or the state or both, which make it possible for selected beneficiaries to start with this new activity. The Fisheries Department organizes the collection, transport and sale of juveniles for stocking. By setting a fixed price at the beginning of each season, it protects the smaller farmers. The BFDAs, which are a creation of the Directorate of Fisheries, execute or monitor the different development schemes, provide extension services, organize the supply of inputs at reasonable prices and coordinate the harvesting, assisting the farmers with weighing and encouraging competition amongst buyers to ensure a fair remuneration.

Problems do exist. Jano (traditional extensive pen culture) operators are known to have opposed pond construction,

which has generated conflicts over particular areas. Also, the communities expect everyone to profit eventually from the new activity — a goal that may be difficult to realize. There are ecological reasons for not converting too much of the lowlands into ponds. They protect adjacent agricultural land from floods and are breeding grounds for juvenile fish and shrimp.

Much work remains to be done on increasing the yields through better pond management, multiple stocking and better feeds. Progressive farmers have demonstrated possibilities for improvement, but it is important to make the culture techniques more reliable. The farmers find it difficult to save money and a bad year might severely affect them. As the ponds are confined and water exchange is excluded, there is a need to define safe levels of operation — so that there is no risk of excessive water pollution during the culture, and the pond soil regenerates itself between the culture cycles. There might be a role here for BOBP or other development agencies and projects.

It will be difficult to replicate this unique culture system in places with a different combination of rainfall pattern and soil salinity and texture, but at the workshop on shrimp culture potential it was generally agreed that the institutional set-up (the BFDAs) which made this development possible has proven effective and could serve as a model for other

A bird's eye-view of the 400 shrimp ponds at Chilka lake, Orissa, owned by 370 farmers covering 125 ha. The BFDA set-up behind this project is a possible model for other states of India. At left, children of the community flock to greet visitors.



states. The project also shows that it is possible to involve the rural poor in shrimp farming, given commitment by both government and the rural poor themselves.

Innovator in action

Mr. P.K. Panda owns four hectares of reclaimed land adjacent to Chilka lake. The top soil has been sufficiently desalinated to allow the cultivation of resistant paddy varieties, but yields are poor, rarely reaching 1 t/ha/year. In 1983 he saw the BFDA constructing small ponds just across the road in Chilka lake, and observed the first shrimp culture trials in Sunamuhin. Mr. Panda needed no further demonstration. In 1984 he took a bank loan of Rs. 20,000, had his first pond dug out and started culturing shrimps with the help and advice of the BFDA extension staff.

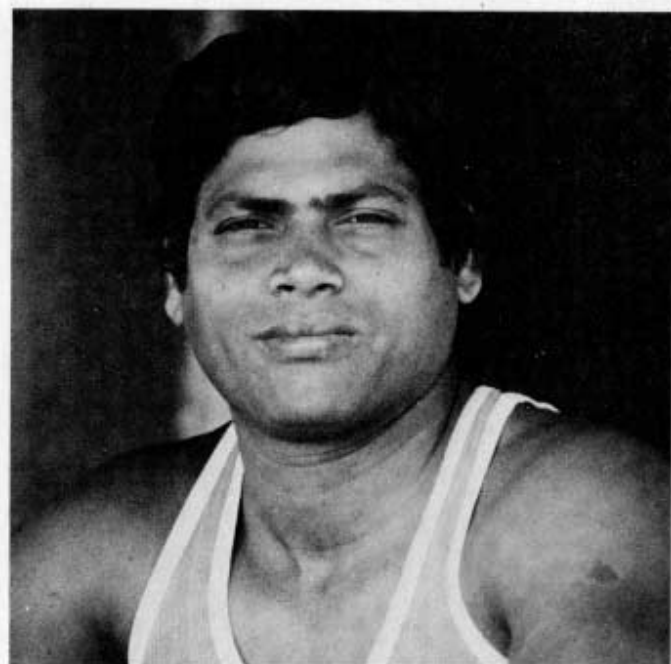
When we met him in September last year he had every reason to be proud, and he had acquired a new motorcycle. The bank loan had been fully repaid. In the 1985-86 season his four ponds covering 0.7 ha had yielded 750 kg of marketable size prawns which he was able to sell for Rs. 62,000. This represents a production of 1071 kg/ha. A fifth pond was nearly completed and three labourers were helping him with work on his prawn farm.

Mr. Panda is also an innovator, constantly improving his farm management. The shells of the snails and mussels fed to the prawns are burnt and made into lime to be used in ponds. A nitrogen-fixing shrub growing on the banks fertilizes the soil and the pond water.

This season, he has been experimenting with staggered harvesting and stocking: this should further increase the yield. He also plans to buy a pump to lengthen the culture season and harvest even more.

It is amazing how some people innovate and succeed in what for them is a totally new activity. Mr. P.K. Panda is such a person; his experience is a great incentive for other farmers, and they value his opinion. But success did not come easy. He worked hard, and took risks few dare to.

Innovative shrimp farmer P.K. Parida.



Shrimp Culture Bonanza and the Rural Poor

Pumpfed ponds at Polekurru, Andhra Pradesh

by Charles Angell

How the landless poor can become

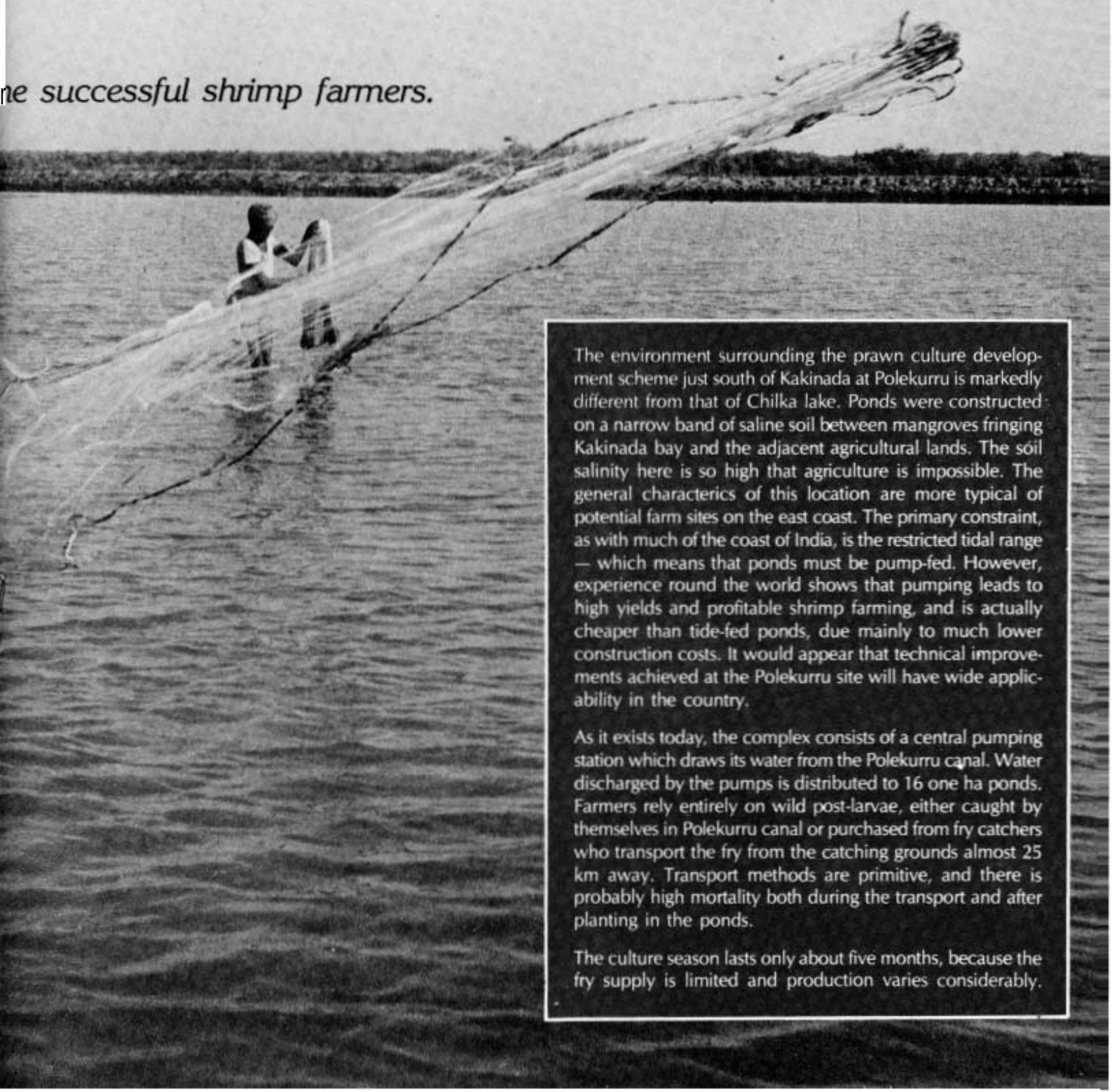


*Harvesting on at one of the 16 DRDA shrimp ponds
at Polekurru near Kakinada, Andhra Pradesh.*

nd culture

esh

ne successful shrimp farmers.



The environment surrounding the prawn culture development scheme just south of Kakinada at Polekurru is markedly different from that of Chilka lake. Ponds were constructed on a narrow band of saline soil between mangroves fringing Kakinada bay and the adjacent agricultural lands. The soil salinity here is so high that agriculture is impossible. The general characteristics of this location are more typical of potential farm sites on the east coast. The primary constraint, as with much of the coast of India, is the restricted tidal range — which means that ponds must be pump-fed. However, experience round the world shows that pumping leads to high yields and profitable shrimp farming, and is actually cheaper than tide-fed ponds, due mainly to much lower construction costs. It would appear that technical improvements achieved at the Polekurru site will have wide applicability in the country.

As it exists today, the complex consists of a central pumping station which draws its water from the Polekurru canal. Water discharged by the pumps is distributed to 16 one ha ponds. Farmers rely entirely on wild post-larvae, either caught by themselves in Polekurru canal or purchased from fry catchers who transport the fry from the catching grounds almost 25 km away. Transport methods are primitive, and there is probably high mortality both during the transport and after planting in the ponds.

The culture season lasts only about five months, because the fry supply is limited and production varies considerably.

A few of the farmers did very poorly; but the average was around 110 kg per ha of 20 to 25 g tiger prawns, while the minimum was 10 kg (nothing was harvested in those that failed) and the maximum 320 kg. Some of the farmers had difficulties getting feed. In view of the fact that well-stocked pump-fed ponds can produce about one ton of prawns in a similar period of time, one can see there is considerable potential for improvement. Good nursery techniques, and above all an efficient prawn feed, need to be introduced.

The need for heavy subsidies from the government, both state and national, is understandable in view of the depressed condition of the target group. The 16 ha complex at Polekurru costs about Rs. 50,000 per ha, which includes the pumping station. In addition, the DRDA will provide up to Rs. 3,600 subsidy per participant towards operating costs, but the remainder must be obtained from commercial banks.

The participants in the scheme are chosen by lots, and after joining they are helped to obtain loans and repay them. They also get technical advice from the DRDA and the local fisheries extension officer. Of the 16 members of the scheme, 11 have successfully produced shrimp crops and have punctually repaid their working loans to Andhra Bank and State Bank of India.

We interviewed three successful farmers from the scheme. Viswanathapalli Ranganayakulu, Sannappu Sai Baba and Pemmadi Dharma Rao are all from the surrounding area. Before the DRDA farms came up, they used to fish in local inshore waters, collect prawn fry and serve as agricultural labourers. They described their experiences thus:

Mr. Ranganayakulu makes about Rs. 20 per day from fishing with a variety of simple gear in Polekurru area creeks. Catches have been falling, and he decided to try prawn farming. Although he has not made any money yet, he can see the potential, and he is hopeful of turning a profit to help support his family of six.

Mr. Sai Baba has done somewhat better. Like the other farmers, he got trained in prawn farming through the DRDA, and also took a course at the CIFE farm in Kakinada. Mr. Baba used to collect shrimp fry, and earn Rs. 30 to 40 a day during the season.

Otherwise he had to do field work. In this first year at shrimp farming he grossed Rs. 4,500 and after repaying his loan made a profit of Rs. 1,000. His wife helps out with the shrimp farm, and Mr. Baba is convinced he can significantly improve his income from the farm. His main concern is that the DRDA should improve the water management of the complex through increased pumping capacity, as he feels the present installation is inadequate to serve all 16 ponds.

Mr. Rao was given his pond in 1985 and has embarked on shrimp culture with much enthusiasm. In his first year he grossed Rs. 8,500 for a profit of Rs. 5,000. He has a large family to support, 10 in all, but his four brothers lend a hand at the pond. Mr. Rao has already taken a loan from State Bank of India to buy a small diesel pump to improve water management. The wisdom of his initiative was proven when he was able to fully repay the loan after the first pump-assisted harvest. Mr. Rao has found that he can continue his accustomed occupation of creek fishing concurrently with his prawn farming activities.



Successful farmers at the DRDA project — Mr. V. Ranganayakulu (top), Mr. S. Sal Baba (centre), and Mr. P. Dharma Rao (above) who made a profit of Rs. 5000 in his first year.

People's participation in fisheries projects : The NGO viewpoint

Some of India's NGOs (non-government organizations) active in fisheries met at BOBP recently to discuss people's participation. The ideas and strategies that emerged are summarized here.

As part of the one-year SIDA-sponsored project on "People's Participation" (please see *Bay of Bengal News*, December 1986), BOBP held a meeting with some NGO workers in India at Madras, December 5-6, 1986. They represented two national and three regional fisheries unions and seven NGOs of Tamil Nadu, Kerala, Karnataka and Goa.

The participants were Matany Saldanha from Goa; J. Lucas from Nagercoil; Fr. Thomas Kocherry of the National Fishermen's Forum, Cochin; Fr. Sebastian John of FCDP, Quilon; Satish Babu of SIFFS, Trivandrum; T.R. Thankappan Achari and A.J. Vijayan of PCO, Trivandrum; K. Subramaniam, President of National Union of Fishermen, Madras; Felix Sugirtharaj of the Association for the 'Rural Poor, Madras; and V. Muthuvel of the Bay of Bengal Fishermen's Union, Madras. Desmond A. D'Abreo of the Development Education Service, Mangalore and Rathindra Nath Roy, BOBP consultant, served as facilitators.

There was no agenda for the meeting. Participants began by discussing their own involvement with fisherfolk development and their understanding of the predicament of fisherfolk. Out of this emerged a perspective which set the tone for the rest of the discussions. Some salient perceptions:

- NGOs should begin by just being with fisherfolk and sharing their life. This identification will enable NGOs to be catalysts and motivators. NGOs should join the fisherfolk in their struggles and hardships.
- People's participation must begin with a search for fisherfolk's needs and problems. NGOs must help fisherfolk see these problems, analyse them, place them in the socio-economic context and help seek out solutions.
- NGOs should train a motivated leadership among the fisherfolk.



"People's organizations in the villages must be strengthened."

- NGOs must help the people realize that their problems have a regional and even national context and should therefore be addressed at all levels. Unless fisherfolk and NGOs consider the entire political economy of fishing, they cannot even begin to grasp what is happening at the local level.
- Fisherfolk organizations must be concerned also about other groups in society. Their understanding must have a broader perspective.
- During the process of awareness-building among fisherfolk, popular communication tools, such as songs and the folk media, should be used.
- While working at the grassroots level and organizing fishing communities, it is essential that some NGOs work at higher levels of the socio-economic and political system in support of fishermen. They must lobby with parliaments and courts to get laws and judgements passed in favour of fishing communities.

Groups of participants then discussed specific questions: What is understood by participation? What are the obstacles to participation? What are the strategies necessary for participation?

What is the role of technology concerning participation?

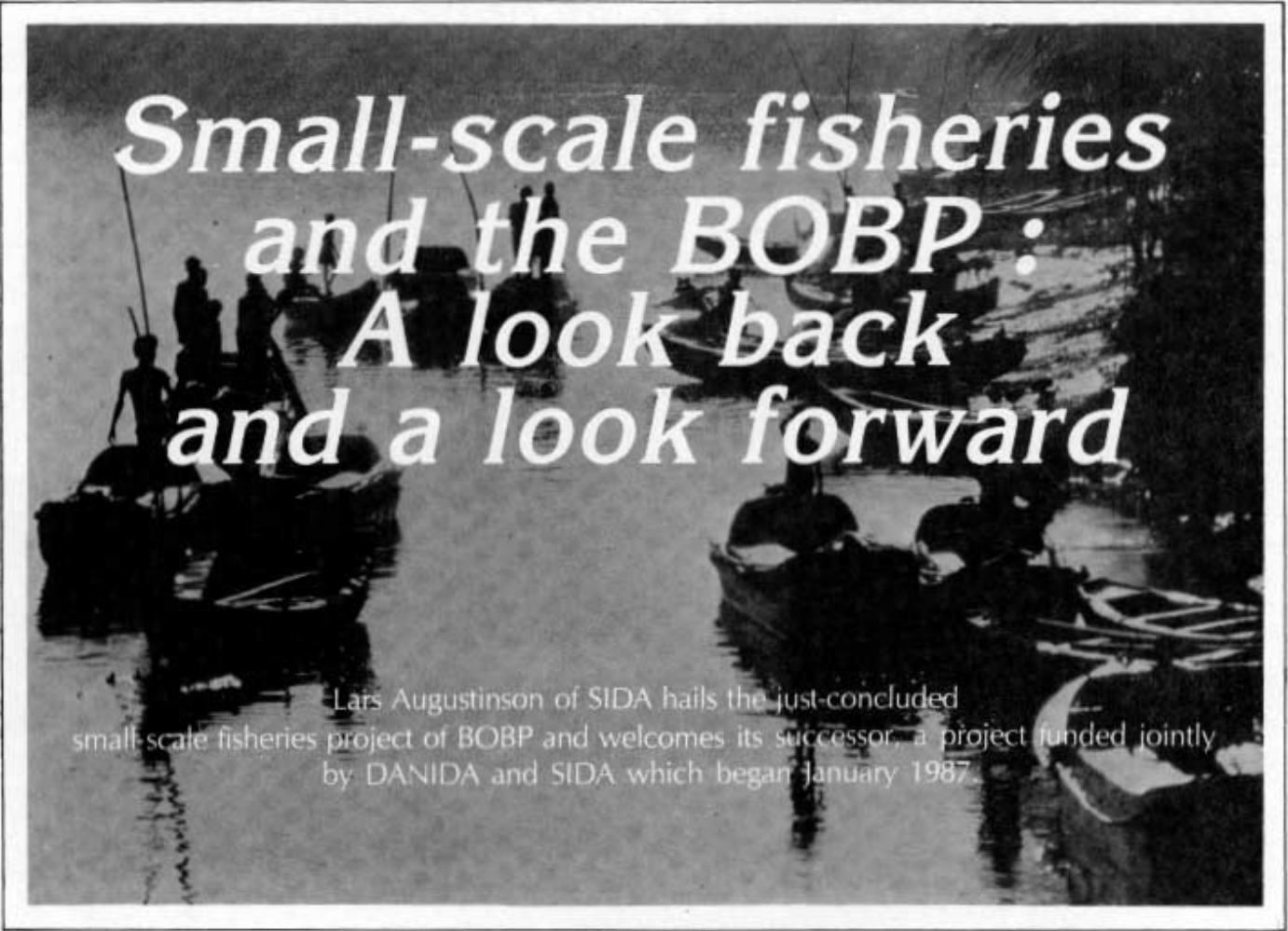
On the nature of participation, participants felt that it should not be seen in terms of people taking part in an agency's efforts, but the other way round. Decision-making should be decentralized so that the people are not just active partners in development but primary agents in implementing, managing, monitoring and evaluating the development process.

What are the obstacles to people's participation? Some spring from the people themselves — obligations to middlemen and moneylenders; factions within the fishing community; constant migration of fishermen; eviction of fishermen in favour of industry; political interference; caste panchayats; failure of earlier projects.

Some obstacles lie in the development agencies — their belief that they alone know what is right; competition or lack of coordination among different agencies; lack of communication tools; co-optation of NGOs by the government; the drive to attain targets; alien thought patterns; confusion about priorities and about the relevance of a project.

Some of the approaches suggested to overcome these obstacles: The agency

(Continued on page. 20)



Small-scale fisheries and the BOBP : A look back and a look forward

Lars Augustinsson of SIDA hails the just-concluded small-scale fisheries project of BOBP and welcomes its successor, a project funded jointly by DANIDA and SIDA which began January 1987.

On the basis of Sweden's objectives for assistance to developing countries, discussions were held early in the 1970s on technical cooperation in the fisheries sector. The fisherfolk belonged at that time, as now, to the poorest in society. Development through industrialized fishery had failed. Was it possible to reach the small-scale fisherman directly through increased production and more equal distribution of income?

Dr. Anmin Lindquist, from the National Swedish Board of Fisheries — now Assistant Director General a.i. of the FAO Fisheries Department — was assigned by SIDA to look into the fishery sector and to make recommendations for a Swedish approach to development assistance. For various reasons his choice was the Bay of Bengal area; Sri Lanka, India and Bangladesh had direct, bilateral cooperation with Sweden. In view of SIDA's limited experience and resources, FAO was recommended as a partner to SIDA in its approach.

FAQ welcomed the idea. Harry Winsor and Jan Olof Traung from FAO, along with others, took part in a 1973 workshop in Sweden, where a project idea was formulated. The idea was to work out a regional project in close collaboration with representatives from countries bordering the Bay of Bengal.

During April - May 1974, a mission from FAQ and SIDA visited the area, and together with representatives from the above countries formulated a project proposal. The idea was to include social aspects in a technical project to improve the standard of living of small-scale fisherfolk in the region. The regional project was to assist member-countries in national development.

The main objectives of Swedish development assistance still hold good although new problem areas in development have surfaced over the years. Strengthening the status of women, and achieving harmony between growth and environment, are problem areas that have recently come to the forefront. The flexible approach adopted by SIDA made it possible to include such concerns in the programme later.

A major constraint in donor strategy soon came to light. The prevailing strategy was that a development project should not last more than 3-5 years. In BOBP's case, the process of idea formulation took two years; thereafter the plan of operation took four or five years to work out, and the project proper took off in 1979. Of course this practice did not conform with the strategy! During the 1970s, the earlier concept of development underwent a shift. It came to be looked upon as a continuing process, not as a limited project activity.

BOBP has contributed to the change in Swedish policy. On the other hand, BOBP too has adapted itself to the changed environment.

The flexible programme approach has apparently worked well with regard to member-countries, FAQ and SIDA.

Conditions for an effective project

To be effective, any organization requires an enterprising set-up, managerial ability and financial resources for implementation.

Organizationally, BOBP formed part of the Indian Ocean Programme directed by the Indian Ocean Fisheries Commission (IOFC). The member-countries of the BOBP — Sri Lanka,

India, Bangladesh, Malaysia and Thailand — were all members of IOFC. In 1981, IOFC established the Bay of Bengal Committee (BOBC), which was intended to coordinate fisheries development activities in the Bay of Bengal area — including those of the BOBP. SIDA supported the idea of such a committee, which might open the door to new members. Because of FAQ regulations, BOBC could not unfortunately be allotted the necessary secretariat. It is now a challenging task during the new project period to evolve a solution that will give member-countries full management power.

In the original project plan, fishing craft technology, fishing gear, fishery resources, fish utilization and community development were identified as problem areas suitable for field activities. In 1976 an advisory committee was established with representatives from the member countries, FAQ and SIDA, with the task of guiding the intended project. SIDA felt that the committee should function as a board and meet once a year, with the power to recommend/decide on re-orientation of the programme concept if new needs demanded it. In the new BOBP project just concluded, fish utilization has been excluded, while coastal aquaculture finds a prominent place. This indicates active involvement by representatives of member-countries in the committee. SIDA appreciates this flexibility in the project's organizational scope and priorities.

A good enterprise needs an effective management and capable staff. One reason the project has functioned as intended is the true involvement of staff following well worked-out routines. SIDA has found the budgeting, recording and reporting system most efficient and would like to have this system followed in other projects.

It wasn't possible for the donor to assure financial resources for long-term development. During the project period 1979-86, funding problems were constantly discussed but only partly solved. The member countries contribute considerably to national activities but depend on external support for a regional delivery mechanism. Now donors were approached. DANIDA responded positively and expressed interest in a new project. Still, the funds available were too limited to allow an extension. SIDA noted that the results attained by the project might be jettisoned unless project work continued; it therefore contributed to a new project. Together with DANIDA, the necessary external funds have been secured upto 1991. If during this period — as now is indicated — it is proved that "the enterprise" functions usefully, the countries concerned must devise a funding system for the future. This is another challenge.

The BQBP's objective is to improve the standard of living of small-scale fishermen and their families. The project area is too vast for the target group to be reached directly. Experimental field activities are taken up with the intention of communicating the results to advisers, consultants, teachers, etc. These results are aimed at catalyzing large-scale development. Funds for the implementation of national projects have to be mobilized, which means that BOBP will have to assist member countries identify bottlenecks in development, prepare project plans and find channels for implementation as regards institutions, individuals and funds.

The work plan follows a pattern of five steps, not necessarily in the order stated

- Problem identification
- Work plan formulation
- Research and development (pilot activities, tests, trials)
- Formulation of national projects and programmes
- Implementation of formulated projects/programmes.

During the late 1970s and later, SIDA's experience in rural development showed that it is necessary to involve the target group from the very beginning of a project if effective results are to be attained. However, the right techniques, methods and strategies have to be developed. The type of techniques, as well as the different environments of the project region, call for a flexible approach. In 1986 the BOBP accepted a project proposal from SIDA to identify and develop issues which would lead to the formulation of methods and organizational strategies for people's participation in preparing and implementing integrated fisheries projects. The project will end with a technical consultation, and a report which hopefully will spell out a strategy for development among small-scale fisherfolk.

BOBP's achievements and failures

Review missions that scrutinized BQBP work in 1982 and 1985 confirmed that "BOBP is an unusually well managed project" and that it has "contributed greatly by sharpening the focus on salient points of those policies and programmes."

Many of the projects are of a technical nature, but there is increasing interest in societal implications of BOBP work and in its social aspects. SIDA has noted in particular the attention paid to the role of women in society.

A positive result from technical work can produce a negative impact on certain groups in society. Statistically, the review missions have taken into account different types of impact — positive, negligible and uncertain — from project activities.

It is not necessary to present the BOBP's project findings in this article, as they have been regularly reported in *Bay of Bengal News*. Many of the projects have high potential for future impact, as the 1982 mission report put it. One good example is the high-opening bottom trawl developed for shrimp trawlers of Tamil Nadu. But it may be questioned whether the positive effects of this activity benefit the small-scale fisherman. A negative project result, on the other hand, may ensure that such projects are not taken up in future — and that is a positive outcome for the fisherman.

SIDA believes that the results of BOBP work are of undoubted value, whether positive or negative. But in an integrated development project, the process of experimentation is worthwhile by itself. How the process unfolds during the new project and what response it evolves from member-countries is a challenge worth studying.

Finally, project results are disseminated through training, extension, workshops, etc. The *Bay of Bengal News* and the BQBP's technical reports and working papers make it easy for everyone to follow the project.

Member-Governments' response to the BOBP

During the first phase, there were five member-countries. Maldives and Indonesia have now joined the project. The member-countries will help implement national projects and also make cash contributions. These positive actions can be crowned with success only if the BOBP is utilized amply by member-countries in national activities. When the new project ends in 1991, we will learn more about the response to BQBP.

Fishery Resources Research in the Bay of Bengal : A factsheet on Thailand

Demersal surveys were common in the past; more attention is now paid than before to pelagic resources surveys. Exploratory fishing for pelagics, egg and larval surveys has been intensified in recent years. Tagging of mackerels is also conducted regularly. Maniculate of seabass, groupers, mussels, shrimps and cockles is being actively investigated and promoted along the coastline.

The Phuket Marine Fisheries Station is actively conducting sampling for catch



and effort and biological data on selected fisheries, in addition to catch statistics collected by the statistics subdivision of the Fisheries Department. Management measures have been introduced to regulate the fishery on the juvenile of mackerels. The Phuket Marine Biological Centre also makes a valuable contribution to the study of marine resources on this coast. Suitable research vessels are available for resource surveys and exploratory fishing.

Table 1 — Resources Surveys and Exploratory Fishing

Period	Vessel	Type of Survey	Limitations	Remarks
1963	Anton Bruun	Trawl	Small number of hauls, numerous coral outcroppings, and report rather general.	Poor catch rates (1-19 kg/h). Trawl operations on continental shelf and slope
1973-onwards (Except 1977, 78, 80 & 81)	Pramong 3 Pramong 10	Bottom trawl Tuna pole and line Fish eggs and larval surveys	90 m	Monitoring trawl survey
1975-onwards (Except 1978, 79)	Research No. 2	Trawl, gillnet, longline, trips etc.	90 m	Exploratory fishing. Intensive exploration for tunas to be undertaken
July 1980	Dr. Fridtjof Nansen	Acoustic, trawling — bottom and pelagic	20 m	Only one survey — limited seasonal coverage.
November 1981	Nagasaki Maru	Mixed gear	100 m	Only one survey (under Thai-Japan joint survey project)
Feb-July 1985	Research No. 2	Fish eggs and larval surveys	Limited areas and seasons of coverage	Survey proposed to be expanded in later years

Table 2 — Statistics : Review of Present System for Marine Fisheries

Institute	System Used	Collection of basic data	Processing Place	Species	Effort/Data	Publications/Remarks
Fisheries Statistics Section, Fisheries Economics & Planning Division	Frame survey Neyman's optimum allocation of sample	70 field enumerators and supervisors Provisional fisheries officers	Locally, by hand processing and final processing in Bangkok. Data processing computerized recently.	63 economically important species or species groups, also by type of gear, area province & month	Available for 10 major gears with separation by size category of vessels,	Annual fisheries statistics. Daily record of price of important species at the Bangkok fish market. Marine fisheries statistics based on sample survey (annual bulletin); Fisheries record of Thailand (annual bulletin); Statistics of fisheries (annual bulletin)

Institute	System Used	Collection of basic data	Processing Place	Species	Effort/Data	Publications/Remarks
Ministry of Agriculture & Cooperatives	Landing place survey Fishing vessel survey Log book survey export data 10-year census	Fisheries management office staff				Monthly record of fish landed at Bangkok fish market. The landing place survey (annual bulletin). Thai fishing vessels statistics (annual bulletin)
Phuket Marine Fisheries Station	Systematic random stratifical sampling on major fisheries	Biologists and samplers collecting catch effort and biological data from selected fisheries	At the marine station, using microcomputer	About 10 species	Available	Occasional technical reports

Table 3 — Marine Fishery Resources Research Facilities

National Institute	Location	Type of Research	Biologists	Gear	Acoustics	Coverage' of key areas	Research	Publications/ Research
Phuket Marine Fisheries Station, Department of Fisheries	Phuket	Monitoring trawl survey since 1971 Sampling survey for biological study Small-scale fisheries survey Artificial reefs Stock assessment Fishing gear development Mackerel tagging experiments Fish eggs and larval survey Mariculture and sea farming	Director 1 Biologists 9 Technicians 4 Support Staff 74	1		Descrlttion of existing fisheries Resources surveys Fisheries statistics incomplete Sampling of commercially important species Environmental studies Fishing gear studies and development Stock assessment Detailed biological studies and experiments	Pramong 3 (65 GRT 21m) Pramong 10 (100 GRT 24m)	Occasional technical reports
Phuket Marine Biological Centre	Phuket	EcOlogical surveys, pollution study, marine aquarium Marine animal taxonomy	Director 1 Scientists 13 Technicians 6 Support staff 46	7		Environmental studies Detailed biological studies, experiments, etc., partly	Pramong 8 (48GT 18m)	Occasional research bulletin. Centre established by bilateral agreement between governments of Thailand & Denmark
Exploratory Fishing Division, Department of Fisheries	Samutpra-karn	Exploratory fishing & resources survey Fishery oceanographic survey	Director 1, Techn. 4 Scientists 12 Biologists 11 Technicians 5			Resources surveys Sampling of commercially important species Environmental studies Fishing gear studies and Development	Fisheries Research No. 2 (388 GT 45m)	Regular paper on the results from the surveys

glimpses into BOBP projects

Tuna and reef fishery resource projects in Sri Lanka and Maldives



The BOBP is to help implement three fishery resources projects in Sri Lanka and Maldives. Two of these relate to offshore tuna resources in both countries; the third to reef fishery in the Maldives.

The tuna projects will investigate the abundance of tuna in the offshore waters of Sri Lanka and Maldives, their capture by small-to-medium-size craft in the 25-100 mile range of the EEZ of the two countries. Exploratory and demonstration fishing will be done for a year, using driftnets, pelagic drift longlines and trolling lines. In Sri Lanka, the Ministry of Fisheries and NARA will provide a 34 ft. boat for fishing trials. In the Maldives, the Ministry will make available its long-range vessel LORAN. The BOBP will provide the services of a fishing technologist and a fishery biologist, and fishing gears and equipment as needed.

Sri Lanka and Maldives each produce 35,000 tonnes of tuna per annum (17 per cent of Sri Lanka's and 90 per cent of the Maldives' fish production). In both countries, the tuna resource is said to be fully exploited inshore; offshore resources are believed to be available but there is no data. The two projects will help obtain the data on the basis of which the resource can be systematically tapped.

The tuna projects result from TCP (technical cooperation programme) agreements between the FAO and the two countries, with BOBP providing technical assistance on behalf of the FAO.

On reef fishing in the Maldives, a two-year UNDP-funded pilot project was launched August 1986 by the Maldives Fisheries Department. Known as Reef Fish Research and Resources Survey, the project seeks to determine the abundance of reef stocks, the most suitable reef fishing gear to tap them

and the possibilities for development and export.

Resource surveys will be confined initially to the area in and around Male atoll. Experimental fishing data can be compared with existing data on reef fish capture. The survey may later be extended to an adjacent atoll.

The survey programme will consist of experimental fishing with different gears, particularly handlining with hooks and traps (horizontal and vertical longlining will also be considered); sampling of catch; and detailed monitoring of the catch and effort of private companies. BOBP will provide the services of a Senior Fishery Biologist, an Associate Professional Officer and a Senior Fishing Technologist.

The reef fishery project is part of the Maldives' drive to probe and assess its fish stocks and tap under-utilized resources. The fisheries sector (21,000 fishermen, total catch 55,100t) is the mainstay of the Maldives economy and accounts for a third of the country's national income.

Flood havoc at Satkhira farm

The progress of the BOBP-supported shrimp culture demonstration project at Satkhira, Bangladesh, from 1982 to 1985 has been critically analysed in BOBP/REP/35. In the second half of 1986, project staff were optimistic about a good crop because of the high survival rate of cultured shrimp. Harvesting was delayed to facilitate growth to a more profitable size. But nature willed otherwise. A deluge hit the area late September. Five days of

ceaseless rain inundated the complex, damaged the peripheral dykes, sluice gates and guard sheds, dumped silt on to the intake and feeder canals, and cut off communications.

The havoc wrought by the rains has since been mended. Since the project was due to be terminated, the farm with its facilities intact was handed over to the Directorate of Fisheries Bangladesh, for use as a demonstration and training centre.

When the Satkhira farm got flooded ... the guard shed under water.



ABSTRACTS OF BOBP PUBLICATIONS



Hefty catch from high-opening bottom trawls in Tuticorin, Tamil Nadu.

Printed below are abstracts of BOBP publications out in recent weeks:

BOBP/REP/37: *High-Opening Bottom Trawling in Tamil Nadu, Gujarat and Orissa: A Summary of Effort and Impact.* B.T. Antony Raja. Madras, India, February 1987.

Between 1980 and 1985, various types of high-opening bottom trawls were demonstrated in Tamil Nadu, Orissa and Gujarat — in the first two states by BOBP, in the third by CIFNET, Cochin, to which BOBP had transferred the technology. This paper summarizes the results, and the impact on fishery resources. It is based on socio-economic and biological studies conducted in 1984 and 1986, and on discussions with fishermen, fish merchants, boat owners and officials.

The paper says that the new techniques have proven popular in all three states and have substantially increased fish production in Gujarat. It strongly recommends mesh-size regulation — a minimum cod-end mesh-size of 40 mm for all the trawls — to prevent over-exploitation and destruction of juveniles. State governments have been urged to monitor the use of the new types of trawls and ensure that they promote the intended objectives — to relieve fishing pressure on prawn resources and use prawn trawlers idle

during the off-season to tap unexploited food fish.

BOBP/WP/54: *Experiences with Fish Aggregating Devices in Sri Lanka.* K.T. Weerasooriya. Madras, India, January 1987.

This paper discusses the rationale, conduct, problems faced and the results of BOBP's experiments with FADs (fish aggregating devices) in Sri Lanka from 1982/83 to 1985/86. Half a dozen locally built FAD types (4 truck tyre, 2 truck tyre, payao-type

bamboo raft, twin-stack bamboo raft, log raft) were deployed off several locations on the west coast. Frequent FAD losses, usually man-made (on account of collision with craft or theft) were a major problem. As for the results, the bamboo payao type was the most effective of the six FADs. Though the FADs failed to attract tuna and tuna-like fish (which they do elsewhere), they unveiled a potential fishery for dolphinfish, which accounted for more than 80 per cent of the catches.

The paper suggests that the FADs should be made stronger, at higher cost if necessary; their operation should be monitored and backed by an effective extension service. Assistance and cooperation from fishermen — in constructing the FADs, guarding them and monitoring the catches — will lower costs and improve FAD survival, and thereby increase fish aggregation and catches.

BOBP/REPI3S: *Brackishwater Shrimp Culture Demonstration in Bangladesh.* M. Karim. Madras, India, December 1986.

This paper discusses the work of the BOBP-assisted shrimp culture demonstration project in Satkhira, Khulna district, from 1982 to 1985. The project complex consisted of 11 experimental ponds, an agro-aquaculture field, laboratory and office facilities on a 20 ha site south of Satkhira town. During three years of culture, several techniques were evolved, revised and tested. The project seems to have had a positive impact on the productivity of local farmers through better culture

Pond-draining by pumpset at the Satkhira farm.



practices — such as selective stocking of ponds, pest removal, fertilization and nursery rearing.

The project farm's total yield in 1985, the first year of planned culture, was 5.5 tonnes — a low figure in relation to the efforts put in. While the reasons for this cannot be pinned down, the

paper says that large-scale siltation perhaps affected the quality of water; the frequent fungal infections on shrimp also reflected a deterioration in water quality. The paper's observations and findings should be of interest to planners and aquaculturists in Bangladesh.

Orissa fisherfolk kids score again in examinations



Enthusiastic Orissa fisherfolk children outside a non-formal primary center.

More than 900 fisherfolk children from Orissa's 40 non-formal education centres — 500 from Class II, 400 from Class I — wrote examinations in August 1986. Standard test materials prepared by the NCERT (National Council of Educational Research and Training), New Delhi, were used for the exams. The average marks: about 65% in language, 82% in environmental studies and 80% in arithmetic. Interestingly enough, the average was about the same in the August 1985 examinations. Students from Ganjam district topped in all three subjects (language, environmental studies, arithmetic) of Class II. Honours were more evenly divided among Balasore, Cuttack, Puri and Ganjam for Class I students.

Says Namita Ray, BOBP consultant: "The examinations and the kids' performance have strengthened fisherfolk's faith in the NFE system. The community realizes, that these centres may put their kids on par with those in regular school. Further, while the examinations were on, inspectors and teachers from the Teachers' Training Institutes visited the villages. The authorities' concern for the children impressed the community.

"Finally, the examinations helped to check how far the NFE curriculum prepared by BQBP and the teaching methods at NFE centres were effective".

The December 1985 and December 1984 issues of *Bay of Bengal News* have described the project's work in detail. In cooperation with state and central authorities, BOBP helped prepare three packages of booklets for fisherfolk kids in the four coastal districts of Orissa. The first package (36 booklets) teaches basic letters, words, numbers. The second package focusses on socio-cultural and socio-economic aspects, the third package (31 booklets) deals with oceanography. Forty non-formal centres were set up on a pilot basis, each attended by 25-30 children. Frequent seminars were held to review the material and to train the NFE centre teachers. So far, some 100 booklets have been prepared and printed.

The BQBP's direct role in the NFE pilot project ended late 1986, but it may assist in expanding the project to cover fisherfolk children from all of coastal Orissa if a proposal to this effect materializes.

People's participation in fisheries projects: the NGO viewpoint

(Continued from page 13)

should have at least one representative living in the village, identifying with the people and winning their confidence; appropriate communication media should be used; networking among agencies should be established.

The meeting concluded with a discussion of strategies and policies for participatory development. Some of the ideas that emerged:

- There must be a basic analysis of the socio-political and cultural situation, followed by dialogue and discussion to decide on broad programmes with a people's participation structure.
- Committed team workers and local leaders sensitive to the community's problems and aspirations must be selected.
- People's organizations in the villages should be created or strengthened. They should be managed by elected or nominated representatives of the people.
- If the agency aims to identify with fisherfolk, it should adopt a simple lifestyle. The organizational culture should be consistent with the objectives.
- The project should interact with scientists and with knowledgeable people including those from the fishing community.
- The community should be encouraged to participate in the programme by contributing labour and money, and by taking part in planning and monitoring.

In the final analysis, it was felt that participation was really an attitudinal stance and an approach based on belief rather than on something that could be achieved through cut and dried methods and techniques. The NGO meeting was a definite contribution to the May 5-9 consultation on people's participation to be organized by BOBP. It was hoped that the meeting would also lead to a close working relationship between BOBP and NGOs active with fisherfolk.