

BOBP/REP/68

**Fisheries Extension Services
for Coastal Provinces:
Learnings from a Project in
Ranong, Thailand**



**Fisheries Extension Services for Coastal Provinces
— Learnings from a Project in Ranong, Thailand**

by

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This report describes the process, achievements and learnings of a subproject which set out to develop a model for enabling integrated development in selected fishing communities in the Ranong Province of Thailand. While actually providing the services, it was intended to learn simultaneously about the approaches and methods of fisheries extension services that target small-scale fisherfolk communities in coastal provinces. The subproject was conceptualized late in 1985, towards the end of the first phase of the Bay of Bengal Programme (BOBP), and was to be implemented during the second phase of BOBP which started in 1987. Several preparatory exercises were undertaken during 1985 and 1986 and the implementation of the project initiated late in 1986.

The subproject undertook several activities, including technology transfer in the areas of aquaculture and capture fisheries, it provided credit through revolving funds for various fisheries and nonfisheries activities, it promoted skill development among women in the hope of enhancing their incomes, it facilitated access to health education and healthcare in remote villages, it helped in the provision of nonformal education, and it enabled fishing communities to gain access to community development programmes of the Government. It even helped some of the villages to create some infrastructure. It finally spent time on trying to extract the learnings from its work and on sharing this learning with the Department of Fisheries (DOF).

The Department of Fisheries of Thailand was responsible for the execution of the subproject, and it did so with the cooperation of the government departments responsible for healthcare, non-formal education, cooperatives and community development. The BOBP provided technical assistance, support for some additional staff, training, equipment, credit and monitoring.

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

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Fig. 1 Map of Ranong Province, Thailand, showing extension service activities implemented in target communities during the project (1987-1990).



1. GENESIS

1.1 *The need for an activity*

In late 1984, a successful aquaculture demonstration subproject in Phang Nga Province, southern Thailand, that was supported by the Food and Agriculture Organization's (FAO's) Bay of Bengal Programme (BOBP), came to an end. With two years left in the first phase of BOBP, and discussions already on for a possible second phase, the Department of Fisheries of Thailand (DOF) and BOBP felt that work should begin on formulating subproject ideas for inclusion in the second phase.

The thinking in the DOF was that, given the issues and problems in small-scale fisheries and in fisherfolk communities, two major concerns needed to be addressed. The first was the resource situation in fisheries; fish catches were stagnating and, in some cases, declining, with early warning signs, that the stocks were under stress, already visible. Secondly, with small-scale fisherfolk often living in remote communities and having a relatively lower quality of life than other rural sectors, such fishing communities did not have the needed access to social services like education, healthcare and community development. Out of this thinking emerged DOF's idea of evolving extension and development approaches which would simultaneously address both these crucial felt needs of the community through some form of an integrated project. Supporting this idea was the possibility of a UNDP-sponsored project, under the BOBP umbrella, that would be concerned with the biosocioeconomic aspects of fisheries and which could provide the fisheries management inputs required.

1.2 *The management of small-scale fisheries*

In 1985, the DOF got down to business and mounted a mission to two relatively underdeveloped areas of Thailand, Ranong and Phang Nga, coastal provinces on the Andaman Sea Coast. Out of this mission, a subproject outline emerged and was discussed. BOBP and the DOF concluded that there was need for further appraisal to refine and flesh out the ideas. Late in 1985, a joint DOF-BOBP mission revisited the potential project areas and, out of this, evolved a subproject outline which had as its focus:

- A fisheries management study of a "natural management area", comprising the entire Ranong Province and the northern part of Phang Nga Province. It was hoped that this would evolve into an exercise which could address the concern of stagnating and declining fish catches. And,
- The establishment of fisheries extension services, which would consider provision of credit, offer technology extension in aquaculture and fishing technology, look into the rational utilization of artificial reefs and attempt to provide social and community development inputs leading to integrated development.

1.3 *A shift in emphasis:*

Providing extension services for integrated development

With a subproject outline in hand, the DOF and BOBP went ahead with developing a work plan for 1986 which would be preparatory to the start of the second phase in 1987. The first problem that arose was that there was some uncertainty about the funding of the second phase, particularly in terms of the possibility of a delay in fund availability. The BOBP, keeping this in mind, suggested that preparatory activities be temporarily suspended, but the DOF decided that they would take the chance and go ahead, anticipating that the problem would be resolved during the year. The second problem was that the proposed biosocioeconomics activity to be sponsored by UNDP had also run into problems and it was uncertain if and when it would materialize. Without this project, BOBP itself would not have the staff expertise to support the fisheries management

aspects of the proposed project in Thailand. It was, therefore, agreed early in 1987, at the start of the second phase, that the project in Thailand should restrict itself to developing extension systems that would enable integrated development. With this shift in emphasis, the project was agreed to, with the following immediate objective:

**Development and testing of a model for an improved extension service
to enable integrated fisherfolk development.**

The project had as its target group the small-scale fisherfolk of Ranong Province, Thailand. It was hoped that the learning from the project's attempts at evolving an extension model would give direction to the DOF in developing extension services that could enable the integrated development of coastal fishing communities. The shift in emphasis was, therefore, not only from fisheries management and extension development to extension development for integrated development, but also from establishing an extension system to developing extension models and **learning from the effort.**

2. THE IMPLEMENTATION PROCESS

2.1 Preparation: Getting to know the fisheries and fisherfolk

The first step was to better understand the fisheries and fisherfolk of Ranong Province, **in order** to address their needs and concerns and to encourage them to actively participate in all aspects of the subproject. The staff of the subproject were trained in the conduct of rapid, participatory appraisals and, with the help of specialist staff from the DOF and from the local Community Development Department (CDD), field surveys were undertaken in the 53 coastal communities of the province. These provided the subproject with valuable data about the demographic and socio-economic aspects of the fishing communities, an understanding of the dynamics of the communities and what their priority needs and problems were. In parallel, a study was undertaken of the costs and earnings of all the fishing and fish culture practices of the region, in order to guide the design of activities. Finally, a specific study looked into the priority credit needs of the fisherfolk and the availability of credit to them from formal and traditional sources.

Every activity of the subproject was preceded by a short study to better understand the status of the particular beneficiaries and the context within which the activity was required to perform. At the end of the first year, the DOF, subproject and BOBP staff, armed with the information that had been collected, evolved workplans which were incorporated into the Working Document.

2.2 The subproject's strategy

The subproject set out to learn about extension approaches necessary to provide integrated development services to fishing communities in coastal fishing communities. The existing knowledge in this area was minimal. Further, the Provincial Fisheries Office (PFO) of each province faced the problem of having a very small staff, consisting of a few fishery officers at the province headquarters and one or two staff in each district. Obviously, very little learning would have been possible if, in addition to their existing tasks, the PFO staff had to undertake other activities of an innovative nature. Keeping this in mind, the DOF and BOBP decided to establish a separate subproject office with its own staff. While the sustainability of such efforts and organizations beyond the project period is questionable, and this was clearly recognized, it was felt that, in the circumstances prevailing, more activities and, therefore, learning could be generated by a separate effort which could then be used and incorporated into the mainstream of DOF activities. So the subproject set out to do extension and, in the process, to learn from it.

Subproject activities were identified, either based on articulated needs of the community or which had emerged out of the concerns of the DOF or BOBP, who then, in consultation with the fisherfolk, initiated action. The number of staff required, the expertise necessary and the funding were governed by the need and the task rather than what was really feasible in the existing

organizational and policy frame of the DOF. This enabled the subproject to expand the envelope of possibility, as it were, and let the success give direction to what should or could be done by the DOF in the future, and how.

2.3 Organization of the subproject

The subproject organization and office was established in Ranong town, the capital of the province. The DOF deputed several staff to the project for its duration. The subproject was led by two co-team leaders, one in Ranong with a fisheries background and the other from Bangkok with a background in economics. The chief of the Provincial Fisheries Office played a key role in the activities of the subprojects as an adviser. The project also had a fishery biologist and several technician-level staff in different areas of speciality, such as capture fisheries, aquaculture, fish technology and extension. The subproject also had service staff, such as clerical staff, an accountant, drivers and even a boat operator for the work boat. A few staff — for instance, the accountant, clerical staff and communications staff, such as a photographer — were hired by BOBP locally, as the DOF could not provide staff for these activities from their rolls. A concern that existed from the very beginning was the fact that the DOF did not have staff with social science backgrounds, which was felt to be a vital necessity in an extension project that hoped to evolve participatory approaches. The lacuna was filled by hiring a sociologist as a national consultant and, later, stationing in Ranong an anthropologist-Associate Professional Officer from BOBP.

The subproject was guided by a committee of senior DOF officers who met periodically to review the efforts of the subproject and to guide its planning. Having a committee also helped to facilitate communication between the subproject and the various institutions of the DOF whose manpower and expertise were regularly used by the project. Review meetings were held, usually twice a year, and these brought together the DOF committee, BOBP staff and subproject staff. Finally, the annual Advisory Committee Meeting of the BOBP provided a forum to discuss the progress of the subproject and to give it direction. From BOBP headquarters in Madras, the project was supervised and supported by BOBP's professional staff, in general, and the Senior Extension Adviser in particular.

2.4 Extending technologies

Over the years, the subproject undertook a variety of extension activities and these can be broadly classified as:

- Adapting, demonstrating and extending capture fisheries and aquaculture technologies;
- Facilitating credit to fisherfolk;
- Promoting income-generation activities for women in the fishing communities;
- Enabling fisherfolk access to social services provided by other cooperating agencies; and
- Providing support to fisherfolk in the creation of infrastructure.

Appendix I is a chronology of the highlights and milestones of the subproject's activities, from its conceptualization to its termination. Appendix II briefly describes the various extension activities that were undertaken.

Broadly speaking, a pattern emerged:

When an activity was identified, either due to fisherfolk requests or due to suggestions from the DOF and/or BOBP, discussions were held with the community and, in some cases, further studies were undertaken to better understand the problem and its

context. There followed a technology development stage, particularly where a technology had to be adapted to the local ecosystems, and this was more pronounced in the case of aquaculture; where a technology already existed in some other part of the country, video films were used to explain to the fisherfolk the technology and its implications. This was also found to be an excellent way to identify potential fisherfolk and farmers for participation in trials and as beneficiaries. The group was then taken on a study tour to give them a hands-on view of the technology functioning and also to enable them to discuss the technology and its pros and cons with fisherfolk more experienced in the practice. Extension through demonstration followed, often with some credit support. Parallel activities were conducted to mobilise the fisherfolk into groups for credit. A variety of training programmes were held to build up capacity. Finally, the activity was continued over a period of time, under supervision, until the capacity was built up by the fisherfolk to sustain it on their own.

The learning from the extension activities were extracted along the way and are documented in Section 3 of this report.

2.5 Provision of credit

New technologies or changes in existing technologies are always a risk. Fisherfolk therefore need incentives to pick them up and adopt them, even if they are convinced of their benefits. More importantly, and particularly in aquaculture, there is no guarantee that the technology could be adapted to local conditions nor is it always possible to ensure success. The fisherfolk are, in practice, being asked to participate in research and development, a risky business at the best of times. Finally, new technologies need investment. All this brought the subproject to the issue of credit as an extension tool.

The problem with credit was that, due to existing regulations, and partly due to past experiences (some of which were, unfortunately, quite negative), financial institutions flatly refused to provide the Ranong fisherfolk credit without collateral security. The subproject, having failed to persuade the institutions, resorted to setting up village revolving funds.

Fisherfolk groups were formed and loans were dispersed to each group. Loans were then offered by each group to its members. The loans were repaid to the group with nominal to no interest, depending on the circumstances. The fund was then revolved.

The process worked in the sense that repayments were high and the revolving funds were put to good use, but there were failures, often related to poor leadership in the groups, to social conflicts that spilled over, to poor management of the fund and, sometimes, simply because the activity being provided credit was not, of itself, economical, profitable and feasible. Successful running of revolving funds, it was demonstrated, required regular and intensive follow-up and supervision by the project staff.

It was also seen that facilitating viable credit remains a serious problem in the small-scale fisheries sector and more innovative efforts are needed to overcome this basic need.

2.6 Facilitating integrated development

Fisherfolk needs rarely restrict themselves to fisheries, and this poses a particular problem to fishery agencies whose mandate and expertise make it difficult for them to address such needs without, over a period, diluting themselves into a form of rural development agency. Since the objective of the subproject was to provide integrated development services, the subproject chose to try catalytic action rather than build up capacity in a variety of fields. An in-depth study in three communities had identified the needs and priorities and it was felt that efforts should initially concentrate on the activities of the Health Department, the Community Development Department and the Non-formal Education Centre. The subproject soon established cooperation with the three

departments, but the problem was access: fishing communities are often quite remote and boats are needed to reach them. This essentially excludes them from services that their more accessible counterparts in the agrarian sector take for granted.

The subproject offered the three departments their boat and offered to ferry their personnel across, provided the departments agreed to provide their services. It worked, but sustaining such activities over a period posed a second issue: departments have their own plans and budgets and what the subproject was asking them to do was something additional. For some time the subproject offered to provide some budget inputs and this again worked, but, in the long run, the solution was seen to be to persuade the concerned departments to incorporate such efforts into their subsequent workplans and budgets. In which case provision of transport would alone prove sufficient incentive. What makes such cooperation workable? In the final analysis, it turned out that such efforts depended almost totally on the social skills of the team leader and his ability to work with, and persuade, his counterparts to go the extra distance.

2.7 Worrying about the other half Women's development

Women form roughly fifty per cent of the fishing community and no serious effort at development can or should ignore this half. Women's needs were primarily restricted to income-generation and healthcare and family planning access. Barring the odd fish-based production of paste or sauce, most income activities turned out to be outside the mandate of the DOF. The approach was to work in cooperation with the CDD and the Health Department in a catalytic way, while at the same time mobilizing the women into groups and providing them credit and training.

Earlier in the subproject period, UNFPA (the United Nations Population Fund) had expressed interest in supporting a women's activity through BOBP and detailed appraisals and project formulations were undertaken with the participation of the women. This was paid for by a project preparation grant from the UNFPA. Unfortunately, due to fund shortages, UNFPA could not fund the main phase of the activity that had been formulated. The aspirations and the expectations of the women had been raised by the preparatory work, and the DOF and BOBP did not want to let them down. It was decided to go ahead, albeit on a lesser scale, using BOBP funds.

Two women extension staff were hired and the work got underway. The healthcare access and health and family planning education were well received and much appreciated. Training was simultaneously provided in a variety of production and service skills and new activities were started. See Appendix II for details. Incomes did go up, but in a tangential sense. The families were consuming many of the products and services themselves, at lower cost and often at a higher level of product/service quality, and, thus, saving on expenditure. Where the markets were outside the communities the problems were:

- To produce enough to meet demand schedules,
- To benefit from economies of scale in marketing, and
- To meet quality and design standards often set by well-established competitors

2.8 Extracting and sharing the learning of the subproject

As the project progressed, and particularly towards the end, extracting the learning began to take on importance, as this was what the DOF was most interested in. Two approaches were tried. Subproject staff sat together and developed, for each activity, detailed chronologies which were then analyzed to consider why decisions were made in a particular way and how. This gave a good picture of the project process and of the issues and factors that either aided or hindered the project. It also raised administrative, organizational, policy and human resource development issues which provided valuable insights. Secondly, university faculty were brought in to appraise each activity in detail and extract the learning. A combination of the two formed the basis for a series of

workshops, first with middle- and junior-level DOF staff and then with policy-makers and senior staff, wherein the learning was discussed, especially focussing on how some of the learning could be incorporated into the mainstream of the DOF.

The effort was not without its problems. Self-criticism, reflection and learning from faults and successes are not common features in government agencies and it took a long time and considerable social skills to sustain the process and prevent it from turning into finger-pointing or, worse, a defensive exercise.

The proof of the success was that the DOF documented the process and the learning into guidelines which are now distributed to all staff of the department concerned with coastal fisheries and fisherfolk development activities. Several staff remarked that, the learning aside, the very act of sitting together occasionally and thinking through, and reflecting on, actions is a very valuable exercise.

3. LEARNINGS

EXTENSION OF TECHNOLOGY

In aquaculture extension, it was found that, even when a technology was functioning well in some other part of the country or region, a lot of time was needed to be spent on developmental (and, occasionally, even research) work to tune the technology into the local environment. This raised several issues: extension services often do not have research staff amongst them and to succeed would need improved linkages between research and extension staff and a good system of technical backstopping. Of course, it could be asked whether, given the amount of research and development necessary, such efforts should be the responsibility of extension services in the first place. And, what are the implications to extension success when a technology, which, for all practical purposes, is not ready, is extended?

Aquaculture extension faced problems of poor site selection, nonavailability of inputs like feed and seed, and even the possibility of creating a resource crisis when destructive methods of fishing were resorted to, to meet seed and feed needs. This would suggest that, even before extension, careful surveys, keeping in mind the ecosystem needs of the particular species, should be undertaken to identify proper sites, the availability of seed and feed, the resource implications of acquiring these and the environmental impact of the proposed culture systems.

In capture fisheries extension, there have been two major learnings. First, there is a need to think of the resources and what the new technology could do to it, before starting. And, second, the appropriateness of the technology should be considered, keeping in mind the lifestyles and present fishing practices of the fisherfolk. Minor refinements, increased efficiency, conservation of particular raw materials used in fishing gear may sound extremely important to scientists, but may not appeal to the fisherfolk who, in the final analysis, have to adopt the technology.

METHODS OF TECHNOLOGY EXTENSION

The subproject's learning was that the best way to help fisherfolk to learn a method and decide on adopting it is by letting the target group or individual actually work on it in demonstrations in the conditions and locations where the technology is ultimately meant to be used.

But how do fisherfolk make up their mind whether it is worth the time, cost and bother to even participate in a demonstration or a technology trial? Video programmes of similar efforts elsewhere turned out to be a good promotion, and a whetting, device. But what really seemed to work were study tours by fisherfolk to other areas where they could see for themselves technologies in action and discuss the pros and cons with fellow fisherfolk who had accepted these technologies.

CREDIT

Who is going to pay for the technology and how? In almost every extension activity this question has haunted the project. There seems to be no substitute to the practice that fisherfolk, **to begin with**, need some sort of an incentive, be it free materials or a cash grant, to justify the risk of moving into the unknown. The Ranong project, however, learnt that the longer the incentives lasted and the larger they were, the more problems the extension effort faced. In other words, subsidies and incentives beyond a certain point not only affect the success of extension, but may also work directly against the very objectives the effort set out to reach.

In providing credit to help the fisherfolk to take up technologies, the problems were far more serious. No institutional source of credit at reasonable terms (which also did not require collateral security) was available. The project solved the problem by developing group-based revolving funds. They worked quite well provided:

- The groups were well formed and cohesive;
- The leadership was legitimate and good;
- The follow-up and monitoring of the activity was rigorous and frequent;
- The technology or activity being financed was successful and actually made money; and
- There were markets for the products and services generated.

A lot of provisos, but there is no question that the method actually works. The problem is that, in addition to various other tasks, this requires the extension service to also be bankers. And fisheries agencies often find it very difficult, if not impossible, to undertake and sustain such an effort.

WORKING WITH GROUPS

There is a strong feeling in development circles that poor and disadvantaged people can do more for themselves by organizing themselves and using their collective strengths. By and large, **true**, but it does seem to differ considerably from society to society. In cultures where there is experience of, and support for, collective action, groups are often quite successful, but the project in Ranong found that most fisherfolk communities it dealt with preferred to work individually or as a family. Groups were successful in the running of revolving funds, for example, but even there they needed enormous inputs from the extension staff to keep them together and functioning well.

INCOME-GENERATION FOR WOMEN

At the request of the women, several types of income-generation activities were promoted through skill training, credit inputs and even assistance in marketing. They worked, but while several of the enterprises produced products for the household's own consumption, thus causing some savings along the way, the amount of income generated was less than what had been hoped for. Several reasons emerged for this. Marketing ones, as listed below, were the most predominant:

- The production levels of microenterprises are often too small to justify a serious marketing effort;
- It is very difficult for small village-based enterprises to compete with the quality of products from the more organized sectors; and
- Enterprises often face managerial problems which the extension service personnel find difficult to deal with, as they rarely have the required expertise in enterprise management.

PROVISION OF INTEGRATED DEVELOPMENT SERVICES

The needs of fisherfolk, more often than not, go beyond fisheries. And in Ranong, the project had quite some success in facilitating fisherfolk's access to services, like healthcare, nonformal education and community development, by playing a catalytic role and persuading other government agencies. It is possible for a fishery agency to do this without itself slowly becoming a rural development agency. But, and there is always a but, it requires good interpersonal relations between the leaders and staff of the cooperating agencies — and that is something an activity cannot take for granted. Every agency has its own agenda and budget, and that is its priority; doing what someone else wants it to do would often require setting aside its own tasks or injecting funds to meet increased demand for services which are not sustainable over a period of time.

WHAT IS FISHERIES EXTENSION?

The felt and actual needs of fisherfolk often go beyond the mandates of fishery agencies. Healthcare, education, community development, water supply, even road access, may have far greater priorities than fishery-related problems. So what should fishery agencies do, particularly keeping in mind the fact that, given the remoteness of some fishing villages, they may often be the only agency physically reaching the community? Should they transform themselves into rural development agencies and build up expertise, capacity and budgets, or should they take on a catalytic role and facilitate the involvement of other government agencies whose mandate it is to handle these areas? It really depends on the agency, the situation it confronts and its mandate, but in Ranong the learning was that the second option, while not perfect, is definitely more feasible than the first.

Even assuming that fishery agencies decided to focus almost exclusively on fisheries, there arose in Ranong a host of new demands. And they were as varied as communicating with fisherfolk using various media, providing credit support, helping fisherfolk to improve their enterprise management skills, promoting and enabling product and market development, and enabling participatory fisheries resource management, all of which require skills, approaches and methods which are often new to fishery agencies. It is quite obvious that in order to do justice to the fisheries extension needs of the future, extension services will have to develop and transform themselves considerably.

But how do we do all this? What kind of manpower, with what kind of training, would fishery agencies and extension services need to answer these new challenges? How would agencies have to organize themselves and their work? How could agencies become more responsive to the needs of fisheries and fisherfolk, in constantly changing situations? These and several other underlying questions came up time and again in Ranong and the subproject really did not have the time or the capacity to answer them. But the learnings have come up with signposts to guide the journey, as it were.

4. SUSTAINABILITY BEYOND BOBP AND CONCLUSIONS

The subproject set out to develop and test a model for an improved extension service that would enable integrated fisherfolk development. While the strategy of the project was to evolve the learning by undertaking various extension activities, its central objective was to **learn** and **not** create a province-level extension service. With this clearly in mind, both the Department of Fisheries and BOBP set up and staffed the subproject at a level far above that of the traditional fisheries agency set-up at the provincial level. This was done to facilitate a large number of extension activities from which learnings could be derived. So the sustainability of the subproject per se beyond BOBP's involvement and support was not a concern. However, at the end of the day, the question remained: "What has the subproject achieved and left behind?" or, to put it more bluntly, "Have the learnings of the project made a difference?"

As the subproject was drawing to a close, and the learnings were being extracted and documented, the Department of Fisheries felt that the learnings of the Ranong effort would be of use to its officers serving in coastal provinces. It suggested that the subproject, in cooperation with the DOF

and others, organise a series of training workshops wherein the objectives, process and learnings of the Ranong effort could be discussed by DOF staff. Three workshops brought together all the junior- and middle-level DOF staff of the coastal provinces, and the interest shown by those attending the workshops was such that the DOF suggested that the subproject staff document the learnings, in the context of the processes used. develop guidelines for fisheries extension in coastal provinces, and get it published.

Early in 1993, the DOF, with support from BOBP, organised a two-day workshop for senior- and policy-level DOF staff to discuss the objectives, approaches and methods, and the manpower and organisational aspects of fisheries extension services in coastal provinces, in the context of

the long-term fisheries development plan of the DOF, and

the learnings from BOBP's Ranong subproject.

Several important issues emerged during the workshops, and given the seniority of the participants and their direct involvement in policy-making, it was felt that the conclusions and consensus that evolved could well be the precursors of actual policy. A key decision at the workshop was that the guidelines developed and published by the subproject should be used both for training and as a manual by DOF extension staff in coastal provinces. The workshop concluded that the Ranong subproject was not replicable in its entirety, but that the learnings of the subproject would help the DOF by giving direction to its efforts in developing fisheries and fisherfolk in the coastal provinces of Thailand. That is a fair conclusion of the impact that the subproject has and will, perhaps, have.



Typical fishing village in Ranong Province

APPENDIX I

Project chronology

1984 BOBP-supported aquaculture demonstration project in Phang Nga Province comes to an end. In anticipation of the second phase of BOBP, discussions are held to identify new project ideas for implementation.

1985

2nd quarter DOF sends a project formulation mission to Ranong and Phang Nga (North) Provinces.

3rd quarter DOF prepares outline project proposal based on findings and recommendations of project-formulation mission. It is agreed that the DOF and BOBP will mount a joint mission to refine the proposal.

4th quarter DOF-BOBP mission to Ranong and Phang Nga Provinces. BOBP and DOF agree that the project should focus on (a) fisheries management study of a natural management area (Ranong and northern Phang Nga Provinces), and (b) establishment of extension services that would cover credit, experimental work in aquaculture, fishing technology and artificial reefs.

1986

1st quarter On the basis of the findings and recommendations of the December '85 mission, a new project outline is developed. Workplan for preparatory work in 1986 is also developed. Implementation temporarily suspended, pending confirmation of funding for BOBP's second phase.

2nd quarter The DOF, however, begins preparatory work. Discussions held with ICLARM for possible cooperation in fisheries management study. The DOF undertakes review of existing institutional credit facilities in Ranong Province. The department mounts a mission to Ranong to appraise needs and prospects for improved fish processing, coastal aquaculture, extension and fishing technology inputs.

3rd quarter Working Document prepared for proposed project.

4th quarter Workshop on extension held in Ranong to discuss proposal for an extension system developed by a BOBP Consultant. Workshop on credit held in Ranong to discuss results and findings of a mini-survey undertaken by the DOF on credit needs and availability. Workshops have participation of fisherfolk representatives, DOF, Departments of Primary Education and Community Development, Chulalongkorn University faculty, BOBP staff and representatives of four local banks. BOBP Fishing Technologist visits Ranong to assess possibilities in improvement of fishing technology and prepares proposal for extension of fishing technology.

1987

1st quarter Start of second phase of BOBP

The expected UNDP-supported bioeconomics project is delayed. Consequently, given the staff and resource shortages in BOBP, the resource management aspects of the subproject is deleted and focus is now on **extension systems development**. ACM endorses subproject for implementation.

The DOF appoints Team Leader and staff. Office established in Ranong. Preparatory activities begin. Preliminary costs and earnings study of fishing units undertaken to facilitate formulation of credit programme. Village-level socioeconomics and needs survey initiated.

- 2nd quarter* Training programme (three days) on Extension Approaches and Orientation for all staff associated with the subproject. Training programme (three days) to orient staff of Community Development Department on fisheries development. Team Leader, Co-Team Leader (Economist) and Provincial Fishery Officer participate in BOBP's Regional Consultation on People's Participation, held in Bangalore, India, and study BOBP extension activities in India and Sri Lanka. Activity to introduce new crab traps initiated with training of fisherfolk. Activity to introduce culture of oysters (*Crassostrea* sp.) initiated with study tour to Surat Thani by potential participants.
- 3rd quarter* Staff identify new activities, such as crab fattening, cage culture of finfish and squid fishing using traps, and begin techno-economic appraisals.
- 4th quarter* Surveys of 53 villages finalized, resulting in detailed socioeconomic and needs profiles. Costs and earnings study finalized. Costs and earnings of oyster culture using cement pole cultch in Surat Thani initiated.

1988

- 1st quarter* Oyster spat shortages lead to procurement of spat from other provinces and hatcheries. Attempts at local spat-collection. After techno-economic appraisals, cage culture of finfish and squid fishing, using traps, are dropped as potential activities. It was decided that BOBP would appoint an Associate Professional Officer (Sociologist) and a National Consultant Sociologist to the subproject to strengthen the extension aspects of the effort.
- 2nd quarter* Training programmes for women in **cooking**, fish-processing and other activities initiated and arrangements made for further training to be undertaken at regular intervals.
- 3rd quarter* Oyster spat-collection trials terminated and reported on. Effort continues with purchased spat. Detailed problems/needs analysis undertaken in selected villages to develop credit programmes and findings are submitted to local banks. A workshop held for squid fisherfolk to understand their needs and problems. National Sociologist appointed to staff of subproject.
- 4th quarter* Mid-Term Evaluation of subproject. Three-person team reviews subproject and submits report.

On the basis of three-village study, detailed plans are drawn up in cooperation with the Community Development Department, Non-formal Education Department and Health Department for activities to be sponsored by the subproject in 1989.

Video films used to promote cage culture of shrimp. Study tour of fisherfolk delayed due to heavy rains. National Sociologist leaves subproject for further study. APO joins subproject in Ranong

1989

- 1st quarter* To overcome difficulties in providing institutional credit to fisherfolk, subproject sets up revolving fund, based on repayments of loans to fisherfolk. To facilitate cooperation between agencies involved in subproject, a committee made up of heads of agencies is set up under the chairmanship of the Governor of the Province.

Cage culture of shrimp initiated with a study tour of fisherfolk to regions where the activity is prevalent. CDD provides training to women in improved management of retail stores, manufacture, storage and quality control of shrimp paste, and in the production of quality fish sauce.

2nd quarter Based on recommendations of the Mid-Term Evaluation, a national Consultant undertakes orientation and training in extension methods and participatory approaches for staff of subproject and PFO.

Subproject staff undertake a study of crab trap extension to better understand the revival of the activity after its earlier failure.

A survey is undertaken to appraise the living conditions and needs of the 'Sea Gypsies', a nomadic, indigent community in the province.

3rd quarter A study tour is undertaken by 13 members drawn from the subproject, PFO and DOF to five southern provinces of Thailand to study small-scale fisheries development efforts and to visit research centres associated with fisheries.

Two staff of subproject are sponsored to attend SEAFDEC training in extension.

4th quarter An activity to introduce green mussel culture is initiated through training, technical inputs and supply of spat. Local attempts to lure spat initiated.

Subproject in cooperation with CDD/Health Department/Non-formal Education Centre initiates activities to enable these organizations to provide their services to remote fishing villages. Transport assistance and fund support are provided the three departments for these activities.

Subproject staff undertake internal workshop to reflect on activities to date and come up with approaches to improve the extension effort.

1990

1st quarter Extension activities continue. Crab fattening activity faces a resource crisis due to shortage of small crabs to be fattened.

2nd quarter A study trip for six staff from the DOF and the subproject is undertaken to Malaysia, to visit oyster culture activities of BOBP and the DOF, Malaysia. As a part of the visit, two of the participants receive training at FRI, Penang, in identification of oyster larvae.

A study trip for 11 staff from the DOF, subproject and cooperating agencies in Ranong is undertaken to North Sumatera, Indonesia, and Kedah State, in Malaysia, to visit fisheries extension efforts of BOBP, the DOF, Malaysia, and the DGF, Indonesia.

The subproject staff hold a two-day workshop on extension methodology using two faculty members of Silaparakom University as resource persons.

National Consultant Sociologist rejoins project after completion of post-graduate programme.

3rd quarter Extension activities continue and several fisherfolk training programmes are conducted. A two-person team from the Silaparakom University begins an effort to extract the learnings from the project.

4th quarter Silaparakorn University team presents its preliminary findings. It is decided to continue the effort into 1991.

1991

1st quarter Consultants from Silaparakorn University continue their efforts to extract the learning from the project.

A study of the resource situation of mud crabs is initiated to look into the lowered availability.

2nd quarter Silaparakorn University findings received. Team Leader of Subproject and National Sociologist visit BOBP in Madras for discussions regarding the findings of the Silaparakorn University team.

3rd quarter Infrastructure development in selected villages is initiated, with subproject funds aiding participatory efforts of fisherfolk.

4th quarter With the end of the subproject scheduled for 1992, efforts are begun to hand over responsibilities of subproject activities to fisherfolk who will receive guidance and support of cooperating agencies in Ranong.

1992

1st quarter Extension and training activities continue. Preparations begin for a series of workshops which will transfer the learnings of the subproject to staff of the DOF.

2nd quarter Winding down of activities begins, with the end of project planned for the third quarter of 1992.

Reporting of the activity gets underway. Hand-over of activities to fisherfolk and cooperating agencies begins.

148 middle-level DOF staff are trained during three four-day workshops on the experiences and learnings of the subproject. At the request of the DOF, it is agreed that the experiences and learnings of the subproject be documented in Thai, the document be published as guidelines for fisheries extension in the coastal provinces of Thailand and distributed to concerned DOF staff.

Mud crab resource study completed and submitted to the DOF and BOBP.

3rd quarter Subproject is officially closed after all activities are handed over. Guidelines are under preparation by the Team Leader.

4th quarter At the request of the DOF, BOBP organizes a one-week consultancy input by an international consultant to assist the DOF in planning a radio programme for fisherfolk.

1993

1st quarter Senior DOF officers' workshop held by the DOF to share the learnings of the subproject. Guidelines for fisheries extension in the coastal provinces of Thailand is published and officially released.

APPENDIX II

Summary description of extension activities

The subproject undertook a variety of extension activities over the years in 33 villages (see Table I). These can be broadly classified as:

- Adapting, demonstrating and extending capture fisheries and aquaculture technologies;
- Facilitating credit to fisherfolk;

Table 1. Extension service activities which were implemented in the target communities (villages) of the project during 1987-1990

Activities	Oyster culture <i>Luring -</i>	Small oyster culture	Crab fattening	Fish cage culture	Shrimp cage culture	Green mussel	Crab trap	Squid trap	Nutrition	Special development	Petrol fund	Handicraft	Total activities
KRA BURI													
Bang Yai Lang			2										2
Hua Thanon			2										2
Bang Kung							2						2
Bang Bon							2						3
KAPOE													
Bang Hin													
Lean Por Ta	2*			2	2								6
Cha Khli		1		2	1	2	2		1				9
Bang Man	1*		2	2	2		1		2				10
Lean Nao							2			6			8
Km. 70	2+1 *												5
Na Phru													
Kor Kiang	2*			3		2	2						10
Nua			2				2	6					10
Phukhao Thong			2										2
Kiong Kluai									3				3
Chi Mi			2										3
Kopoe Canal							2						4
Sam Nak	2						2						4
Bang Ben							2						2
Aow Khoei	3												4
MUANG													
Khlong Khong		1							2		1	2	6
Kachadphai													
Nok Ngang		1											
Huai Pling		1											
Sai Daeng	2 *		2										5
Hin Dat	2					1			3				6
Kor Lao	2			3			3			6			14
Hin Chang						1	1		2	1		2	7
Kor Sin Hai									2	6		2	11
KhaoNangHong	4+1 *	1										1	8
LA UN													
Khao Fa Chi	2*												4
Phrutarol						1			2				4
No. of activities	15 + 11 *	5	17	15	8	9	25	6	18	19	2	7	157

Promoting income-generation activities for women;

Enabling fisherfolk access to social services provided by other cooperating agencies;
and

— Provision of infrastructure

Extending technology

In the area of capture fisheries, the subproject worked on crab traps and squid traps. A type of collapsible, metal crab trap was introduced which lasted longer, had improved catch rates and reduced the time that fisherfolk had to spend watching the traditional traps. The technology was successful and was accepted after a few failures. The only concern was the resource situation of mud crabs, as the average size of the crabs caught was small. The squid traps developed by the project reduced the quantity of expensive rattan used in its building, but never caught on with fisherfolk who had already invested heavily in traditional traps. Both these exercises resulted in activities focussing on resource management and awareness-building amongst fisherfolk to enable them to better manage their crab and squid resources in a sustainable way. The resource study of the mud crabs of Ranong added to the knowledge of the species.



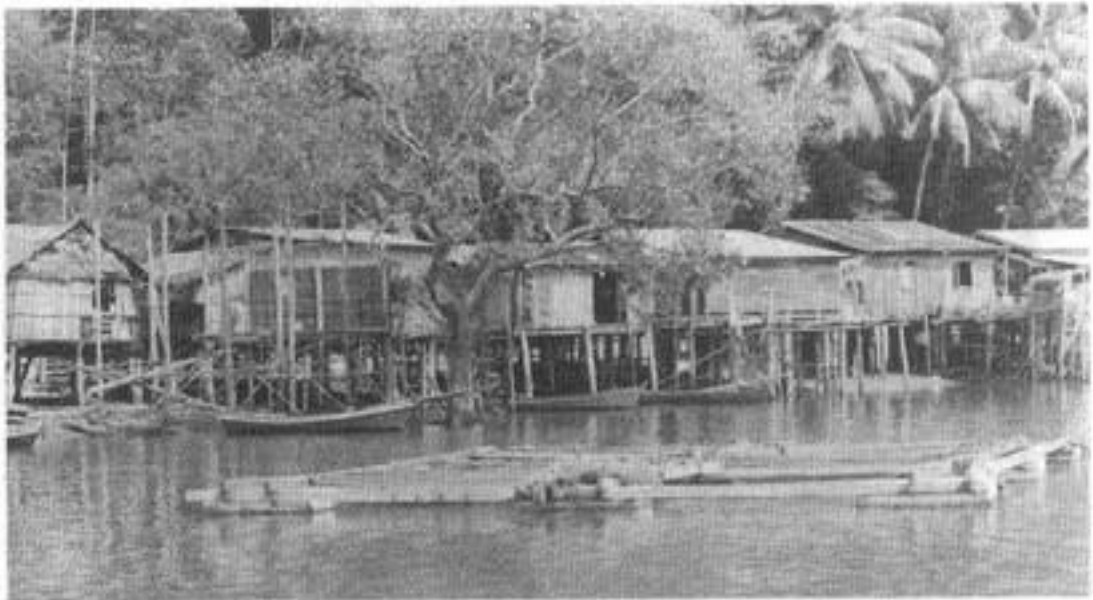
Fishing boat setting out with squid traps



*Fisherman laying
a new crab trap*

In aquaculture, the subproject worked on oysters (*Crassostrea* and *Saccostrea* sp.), crab fattening, fish cage culture, shrimp cage culture and green mussel culture, all of which were introduced in the Ranong area from successful efforts elsewhere in Thailand. The subproject overcame the problems in grow-out of oyster (*Crassostrea*) by developing siting protocols which avoided areas where salinity fluctuated due to freshwater drainage. Spat-luring trials were conducted to identify and collect local spat. The number of spat collected did not justify expansion of the technology; and hatchery-bred spat turned out too expensive

The problem with oyster (*Saccostrea*) was that in spite of good spat availability and easy acceptance of culture technology, the market demand was too seasonal and not enough to justify expansion. Cage culture of shrimp caught on well, but was discarded by fisherfolk because of a drop in shrimp prices. Crab fattening failed and, in any case, was something the subproject decided to withdraw from since there was concern about the sustainability of the effort, given the status of the crab resource. Fish cage culture was already prevalent and needed no extension. However, the subproject focussed on enabling fisherfolk to handle disease problems and on building awareness about fisheries resource management, as both seed-collection and feed-collection are potentially destructive to the estuarine ecosystems. Green mussel culture did not take off primarily due to nonavailability of local spat in required numbers



Cage culture of finfish



*Luring oyster spat
with old motorcycle
tyres for culture*

Credit for fisherfolk

Finding no sources of institutional credit (without collateral), the subproject resorted to setting up village-based revolving funds. They functioned well, although the sustainability of such schemes without continuous supervision remains to be ascertained.



Petrol distribution shop run by a fisherfolk group



Petrol sale at shop set up by a fisherfolk group

Income-generation for women

Women in selected fishing communities were provided skill training, management training, credit support and assistance in marketing to enable them to set up microenterprises and, thereby, enhance their incomes. The activities included fish preservation, fish-based products, sewing and crochet, macrame, hair-styling, running village stores and batik production. The skill training was successful and incomes did go up, though a part of it was due to reduced expenditure from consuming their own products instead of getting them from the open market. The main problem was the ability to maintain quality and to produce enough to compete successfully in urban markets.



Women making fish sauce



Batik production by women: turning art into money

Access to social services

With the cooperation of the Health Department, the Community Development Department and the Non-Formal Education Centre, the subproject facilitated the provision of social services to remote fishing villages with quite some success. It showed that with catalytic action it is possible to provide integrated development services to communities.



Providing healthcare access in remote fishing villages

Infrastructure development

At the request of fisherfolk the subproject enabled several participatory efforts by village communities to develop infrastructure to both facilitate enterprise and improve the quality of life. The project invested in building materials, while the fisherfolk invested labour to build roads, water tanks, jetties, guard houses for aquaculture and drinking water systems.

APPENDIX III

Training inputs

Over the project duration, several thousand person-days of training was provided by the subproject. The main beneficiaries of the training effort were fisherfolk, women in fishing communities, some schoolchildren, the staff of the subproject, other DOF staff, and staff from cooperating agencies such as the Health Department, Community Development Department and the Non-formal Education Centre. Training was provided using the expertise of the DOF, faculty of Chulalongkorn and Silaparakorn Universities and staff of cooperating agencies, and through study tours.

The training provided to fisherfolk included:

- Fabrication and use of collapsible crab traps;
- Fabrication and use of low-cost squid traps;
- The needs for, benefits of and methods of fisheries management;
- Siting methods, spat location and luring, culture practices and marketing of oysters (*Crussostrea* and *Sacrostrea*) and green mussels;
- Cage culture of shrimp and fish;
- Crab fattening practices;
- Disease management in fish cage culture;
- Market development and management;
- Management of microenterprises;
- Savings and credit management;
- Management of revolving funds;
- Group formation and group management; and
- Leadership.

Women in fishing communities were provided training in:

- Nutritive and low-cost cooking practices;
- Production of fish sauce, fish paste and shrimp paste;
- Quality control of fish/shrimp-based production;
- Macrame;
- Hair-styling;
- Sewing and crochet;
- Batik production;
- Market development and management;
- Management of microenterprises;
- Savings and credit management;
- Management of revolving funds;
- Group formation and management;
- Leadership; and
- Healthcare and family planning.

Subproject staff and selected DOF staff were provided training in:

- Conducting rapid rural appraisals;
- Extension methodology;
- Participatory approaches to development;
- Various capture fisheries and aquaculture technologies;
- Fisheries management;
- Enterprise management;
- Extension management; and
- Process documentation and extraction of learnings.

Staff of cooperating agencies (CDD, NFEC and Health Dept.) were provided training in:

- Fisheries development;
- Fisherfolk community development; and
- Extension methods.

Selected subproject, DOF and cooperating agencies' staff were given opportunities to study and observe extension practices and aquaculture practices through study tours to other provinces of Thailand and to North Sumatera, Indonesia, Kedah and Penang, Malaysia, and India. Several fisherfolk groups and groups of women were sent out on study tours to different parts of Thailand to enable **them** to see in practice technologies which were being extended to them and also to learn directly from other fisherfolk and women.

Finally, the Learnings of the project in extension approaches to integrated fisheries and fisherfolk development in coastal provinces were shared through workshops with over two hundred policy-, senior- and middle-level staff of the DOF, Thailand. Out of the subproject's efforts, a document emerged which has been published by the DOF and is now routinely distributed to all staff concerned with fisheries and fisherfolk development in the coastal provinces of Thailand.

APPENDIX IV

Documentation related to the subproject

1. Working documents

- Project Outline: Management of Small-scale Fisheries in Ranong, Thailand.* (1985). BOBP, Madras, India.
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2. Reports

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3. Published material

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- ENGVALL, L.O. (1988). Two steps forward, one step backward: BOBP's extension activities in Ranong Province, Thailand. *Buy of Bengal News*, Issue No. 30. BOBP, Madras.
- HANVIVATANAKIT, P. (1988). Oyster culture in Ranong — Surat Thani offers a model. *Buy of Bengal News*, Issue No. 30. BOBP, Madras.
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4. Video film

Extension Services in Ranong. (18 1/2 min.) VHS Format,

APPENDIX V

Equipment supplied

The following equipment was supplied by the Bay of Bengal Programme to the Department of Fisheries for the implementation of the subproject:

	Nos.
1. Toyota 2WD - Double cab pickup truck	1
2. Toyota 4WD - Double cab pickup truck	1
3. Toyota 3.5ton truck	1
4. FRP Work boat	1
5. Briggs & Stratton 16 hp engine for boat	1
6. Panasonic facsimile machine	1
7. Philips handheld transreceiver	1
8. Philips base station transreceiver	1
9. ACER personal computers with UPS	3
10. Epson printers	2
11. Kawachi airconditioner 20000 Btu	1
12. Nikon camera with accessories	1
13. Philips colour TV 20"	1
14. Philips video cassette player	1

PUBLICATIONS OF THE BAY OF BENGAL PROGRAMME (BOBP)

The BOBP brings out the following types of publications:

Reports (BOBP/REP/...) which describe and analyze completed activities such as seminars, annual meetings of BOBP's Advisory Committee, and subprojects in member-countries for which BOBP inputs have ended.

Working Papers (BOBP/WP/...) which are progress reports that discuss the findings of ongoing work.

Manuals and Guides (BOBP/MAG/...) which are instructional documents for specific audiences.

Information Documents (BOBP/INF/...) which are bibliographies and descriptive documents on the fisheries of member-countries in the region.

Newsletters (*Bay of Bengal News*) which are issued quarterly and which contain illustrated articles and features in nontechnical style on BOBP work and related subjects.

Other publications which include books and other miscellaneous reports.

Those marked with an asterisk (*) are out of stock but photocopies can be supplied.

Reports (BOBP/REP/...)

32. *Bank Credit for Artisanal Marine Fisherfolk of Orissa, India.* U. Tietze. (Madras, 1987.)
33. *Nonformal Primary Education Children of Marine Fisherfolk in Orissa, India.* U. Tietze, N. Ray. (Madras, 1987.)
34. *The Coastal Set Bagnet Fishery of Bangladesh — Fishing Trials and investigations.* S. E. Akerman. (Madras, 1986.)
35. *Brackishwater Shrimp Culture Demonstration in Bangladesh.* M. Karim. (Madras, 1986.)
36. *Hilsa Investigations in Bangladesh.* (Colombo, 1987.)
37. *High-Opening Bottom Trawling in Tamil Nadu, Gujarat and Orissa, India A Survey of Effort and Impact.* (Madras, 1987.)
38. *Report of the Eleventh Meeting of the Advisory Committee, Bangkok, Thailand, 26-28 March, 1987.* (Madras, 1987.)
39. *Investigations on the Mackerel and Scad Resources of the Malacca Straits.* (Colombo, 1987.)
40. *Tuna in the Andaman Sea.* (Colombo, 1987.)
41. *Studies of the Tuna Resource in the EEZs of Sri Lanka and Maldives.* (Colombo, 1988.)
42. *Report of the Twelfth Meeting of the Advisory Committee. Bhubaneswar, India, 12-15 January 1988.* (Madras, 1988.)
43. *Report of the Thirteenth Meeting of the Advisory Committee. Penang, Malaysia, 26-28 January 1988.* (Madras, 1989.)
44. *Report of the Fourteenth Meeting of the Advisory Committee. Medan, Indonesia, 22-25 January, 1990* (Madras, 1990.)
45. *Gracilaria Production and Utilization in the Bay of Bengal Region; Report of a seminar held in Songkhla, Thailand, 23-27 October 1989.* (Madras, 1990.)
46. *Exploratory Fishing for Large Pelagic Species in the Maldives.* R.C. Anderson, A. Waheed, (Madras, 1990.)
47. *Exploratory Fishing for Large Pelagic Species in Sri Lanka.* R. Maldeniya, S. L. Suraweera. (Madras, 1991.)
48. *Report of the Fifteenth Meeting of the Advisory Committee. Colombo, Sri Lanka, 28-30 January 1991.* (Madras, 1991.)
49. *Introduction of New Small Fishing Craft in Kerala, India.* O. Gulbrandsen and M. R. Anderson. (Madras, 1992.)
50. *Report of the Sixteenth Meeting of the Advisory Committee. Phuket, Thailand, 20-23 January 1992.* (Madras, 1992.)
51. *Report of the Seminar on the Mud Crab Culture and Trade in the Bay of Bengal Region, November 5-8, Surat Thani, Thailand.* Ed by C.A. Angell. (Madras, 1992.)
52. *Feeds for Artisanal Shrimp Culture in India Their development and evaluation.* J. F. Wood et al. (Madras, 1992.)
53. *A Radio Programme for Fisherfolk in Sri Lanka.* R. N. Roy. (Madras, 1992.)
54. *Developing and introducing a Beachland Craft on the East Coast of India.* V. L. C. Pietersz. (Madras, 1993.)
55. *A Sri Lanka Credit Project to Provide Banking Services to Fisherfolk.* C. Fernando, D. Attanayake. (Madras, 1992.)
56. *A Study on Dolphin Catches in Sri Lanka.* L. Joseph. (Madras, 1993.)
57. *Introduction of New Outrigger Canoes in Indonesia.* G. Pajot, O. Gulbrandsen. (Madras, 1993.)
58. *Report of the Seventeenth Meeting of the Advisory Committee Dhaka, Bangladesh, 6-8 April 1993.* (Madras, 1993.)
59. *Report on Development of Canoes in Sri Lanka.* G. Pajot, O. Gulbrandsen. (Madras, 1993.)
60. *Improving Fisherfolk Incomes through Group Formation and Enterprise Development in Indonesia.* R. N. Roy. (Madras, 1993.)
61. *Small Offshore Fishing Boats in Sri Lanka.* G. Pajot. (Madras, 1993.)
62. *Fisheries Extension in the Maldives.* A. M. H. Heelas. (Madras, 1994.)
63. *Small-scale Oyster Culture on the West Coast of Peninsular Malaysia.* D. Nair, R. Hall, C. Angell. (Madras, 1993.)
64. *Chandi Boat Motorization Projects and Their Impacts.* R. Hall, A. Kassem. (Madras, 1994.)
65. *Learning by Doing in Bangladesh: Extension systems development for coastal and estuarine fisherfolk communities.* R. N. Roy. (Madras, 1994.)
66. *Promotion of Small-scale Shrimp and Prawn Hatcheries in India and Bangladesh.* C. Angell. (Madras, 1994.)

67. The Impact *of the Environment on the Fisheries of the Bay of Bengal*. Ed. by S Holmgren. Swedish Centre for Coastal Development and Management of Aquatic Resources. SWEDMAR/BOBP. (Madras, 1994.)
68. *Fisheries Extension Services: Learnings from a Project in Ranong, Thailand*. R.N. Roy. (Madras, 1994.)
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49. *Pen Culture of Shrimp by Fisherfolk : The BOBP Experience in Killai, Tamil Nadu, India*. E. Drewes, G. Rajappan. (Madras, 1987.)
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52. *Experimental Culture of Seaweeds (Gracilaria Sp.) in Penang, Malaysia*. (Based on a report by M. Doty and J. Fisher). (Madras, 1987.)
53. *Atlas of Deep Water Demersal Fishery Resources in the Bay of Bengal*. T. Nishida. K. Sivasubramaniam. (Colombo, 1986.)
54. *Experiences with Fish Aggregating Devices in Sri Lanka*. K.T. Weerasooriya. (Madras, 1987.)
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