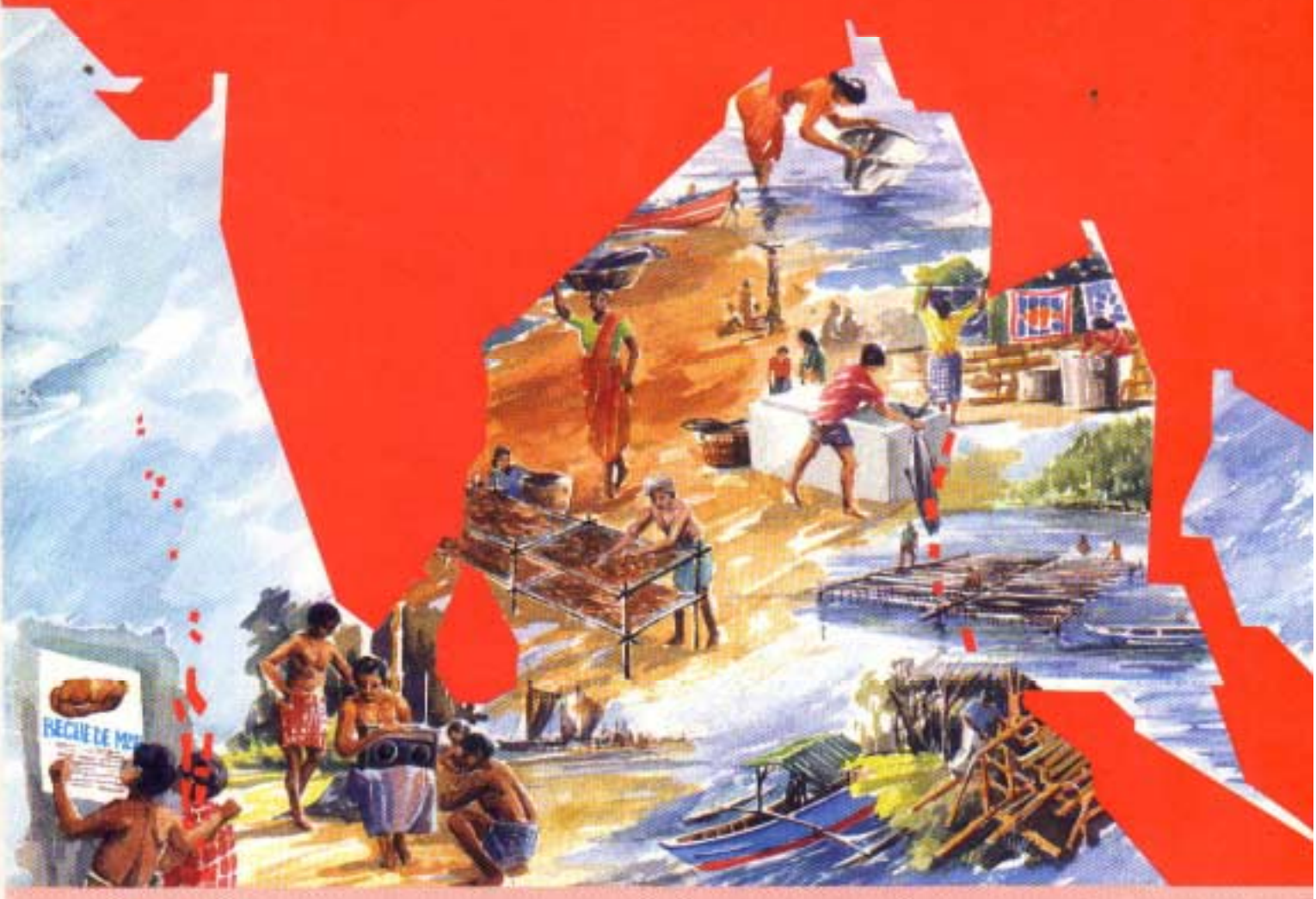
BOBP/REP/62

Fisheries Extension Services in the Maldives



BOBP For Fisheries Development
BAY OF BENGAL PROGRAMME

Fisheries Extension Services in the Maldives

by
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BAY OF BENGAL PROGRAMME
Madras, India
1994

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This report describes the progress, achievements and learnings of a subproject which set out to give directions for the development of a fisheries extension service aimed at the artisanal fisherfolk of the Maldives. The subproject was cleared by the Government of Maldives (GOM) in December 1988 and was initiated in three target atolls – Meemu, Vaavu and Faafu – in April 1989.

The subproject focused on building awareness among the fisherfolk and began a consultative process with them that would pave the way for a community-based management of the country's coral reef resources. The Bay of Bengal Programme's involvement in the activities came to an end in December 1993 and the subproject was handed over to the Ministry of Fisheries and Agriculture (MOFA) of the Government of Maldives.

MOFA was responsible for the extension component of the subproject. The Bay of Bengal Programme (BOBP) provided technical assistance, expertise, training inputs, support for training and some equipment, besides monitoring the project's progress.

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, Shri 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).

This document has not been cleared by the FAO or the Government of Maldives.

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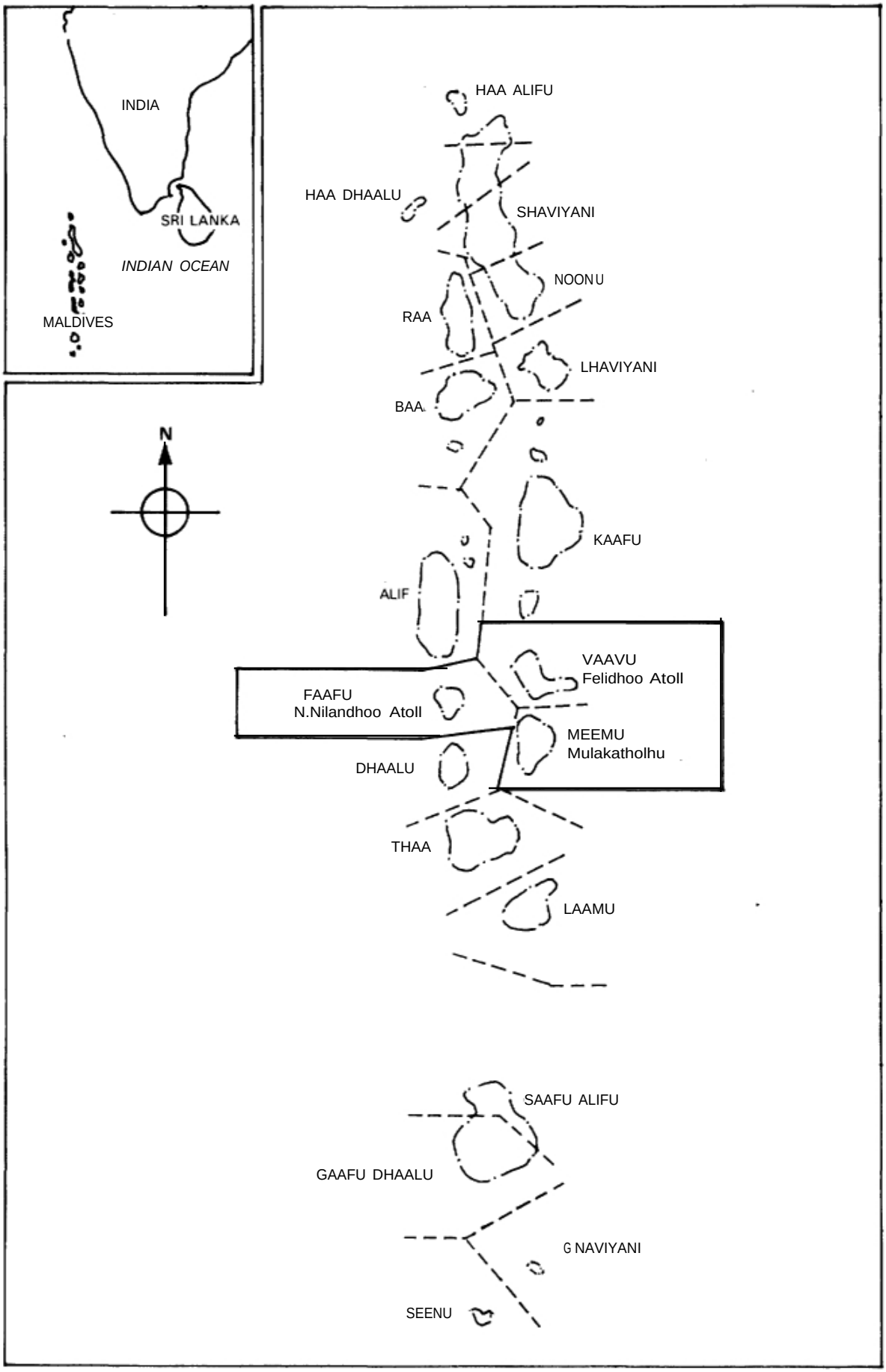
Fig. 1. Map of the Maldives showing the project area



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1. GENESIS

In 1987, the Bay of Bengal Programme (BOBP) received a request from the Ministry of Fisheries and Agriculture (MOFA) in the Maldives to assist in the design, development and assessment of a fisheries extension service system to meet the specific needs and conditions of the country. Owing to the geography of the island nation, the marine resource is the only renewable natural asset and, therefore, of considerable importance to the country's development. Given the significance of fisheries to the economy – as a provider of employment, food and foreign exchange – MOFA was interested in establishing an extension service that would assist the fisherfolk to improve their income and quality of life.

The need for a fisheries extension service had previously been discussed within MOFA, but a variety of constraints, one of the more serious ones being the limited availability of qualified technical personnel, had prevented implementation. What made such a service of particular importance now was the fact that the rapid expansion of the Maldivian economy had meant that fisherfolk had begun to move to other sectors where earnings were more regular.

While the fisheries sector has traditionally been the backbone of the economy, its contribution to the GDP had shown a continuous declining trend for over a decade; from around 22'per cent in 1978 to 16.4 per cent in 1987. It was **felt** that in order to reverse this trend, measures would have to be taken to:

- improve the standard of living for fisherfolk, and
- make fishery-related activities more attractive.

In January 1988, the Advisory Committee of BOBP endorsed a subproject to establish a Fisheries Extension Service (FES) in the Maldives.

2. PROJECT IDENTIFICATION

BOBP's initial response was to send an international FAO consultant to the Maldives in 1988. The primary purpose of this visit was to explore the feasibility of the establishment of a Fisheries Extension Service. An examination of the predicament of the small-scale fisherfolk was intended, to gain a preliminary understanding of what type of extension service would be needed.

After conferring with several fisherfolk, as well as with senior Government officials, the Consultant suggested that the proposed extension subproject should :

- Explore the possibility of establishing a pilot extension activity in Vaavu, Meemu and Faafu Atolls (see map on facing page).
- Prepare needs-oriented extension programmes for each individual island, whilst trying to ensure participation in problem identification and implementation.
- Introduce improved technologies and methodologies which could, in time, enhance the standard of living and the earnings of the fisherfolk.
- Select community members for appointment on the islands as field extension officers who would act as a link and facilitate communication between the fisherfolk and MOFA.
- Establish an extension and project section at headquarters level in Male, with a view to train, guide and support field staff and undertake specific extension activities.

3. THE MATURATION OF A PROJECT PROPOSAL

On the basis of the findings of the Consultant and visits to the Maldives by BOBP staff, a subproject proposal was formulated.

The two enterprises most important to the Maldivian economy are tourism and *fishing.* Although exploitation has been limited to tuna, some other species have recently been targeted. Evidence showed that an efficient and productive tuna fishery had evolved indigenously over the years. The Maldives remains one of the world's few genuine pole-and-line fishing nations and is the only country where this fishing technique manages to support a sizeable commercial industry involving the export of frozen and canned fish. However, there seemed to be considerable scope for not only improving the fishing but also for upgrading handling and processing.

Returning with the day's skipjack catch.

By taking into consideration some of the difficulties that the fisherfolk were experiencing, it became possible to more systematically classify the types of problems and propose solutions to them. These included:

- Low-cost boat-hauling devices that would take the drudgery out of the frequent beaching of *dhonis* for maintenance.
- Instruction and training in gear-making and in engine-maintenance to increase profitability. The former would make it possible for fisherfolk to make their own gear and thus effect savings, the latter would ensure maintenance of engines in a condition that would improve performance.
- Improved post-harvest handling of fish on board the *dhonis* to enhance the quality. This would not only add to the value of the fish, but wpuld, perhaps, also open up new markets.
- Increase the efficiency of the smoke-drying process when making Maldive Fish from skipjack, in order to use less firewood, which is scarce and costly in the islands.
- Develop infrastructure, with participation by the fisherfolk in its construction, maintenance and management, in order to enable access to islands which had no channels in the reefs or which had insufficient navigation markers and lights.

The fisherfolk were eager to acquire new knowledge and were particularly interested in hands-on demonstrations of new and superior technologies. It appeared that an appropriate response to this would be to provide fishing and fishing-related technology transfers based on demonstration as well as training.

Preparing skipjack for smoking and drying to make 'Maldive Fish'

Initial enquiries showed that there were already a number of Government agencies and programmes whose aim was to help fisherfolk gain access to infrastructural facilities. The problem was that community members often lacked competence and experience in identifying and communicating the specific needs of their individual islands. The geography of the country imposed isolation as well as logistical and communication difficulties. It was obvious that just as the fisherfolk were unfamiliar with how to contact the right person in Government, so did the Government find it difficult to communicate and respond to the islanders. To solve the problem, enterprising and enthusiastic fisherfolk, with leadership qualities, would have to be identified on each island to promote two-way communication. These 'contact' fisherfolk could also play a vital role in any demonstrations organized of new technologies and training programmes.

In order to finally determine a suitable form and size of the future extension service, it was also necessary to consider

- the critical shortage of trained manpower within MOFA,
- the geographical spread of the atolls and islands, and
- the responsibilities and jurisdiction of other Government authorities.

By the end of 1988, a subproject proposal for the establishment of a pilot fisheries extension service had been finalized and agreed to.

The immediate objectives formulated were as follows:

- Establishment of a fisheries extension unit and training its staff. The unit would help fisherfolk communities to increase their earnings and improve their quality of life, through
  - training and demonstration of new and improved technologies, primarily in fishing and post-harvest technology,
  - facilitating infrastructural development, and
  - improving communication and organization of fisherfolk by establishing a network of 'contact fisherfolk'.
- The targets of the subproject to be the fisherfolk communities in Meemu, Vaavu and Faafu Atolls. A countrywide expansion in due course was envisaged.

4. APPRAISING THE FISHERFOLK COMMUNITIES

Having planned and designed the strategy, MOFA and BOBP were eager to put it into action. The implementation process involved, distinct phases. However, the content and phasing of the subproject were not rigidly determined in advance, as it required flexibility, creativity and readiness to respond to changes.

The pilot phase commenced in 1989, with an in-depth appraisal of the fisherfolk communities.

This was followed, in 1991, by a series of training sessions on the target islands.

It ended, in 1993, with the completion of a handbook, for fisherfolk, on how to best safeguard the reef environment.

During the entire implementation process, BOBP supported the activity by means of technical aid, visits and supervision, by the Senior Extension Advisor and Socioeconomist, and some financial assistance.

EQUIPMENT SUPPLIED

The folowing equipment was supplied to the MOFA Extension Unit by BOBP:

- sony Walkman with carrying case and microphone
- Photocopying machine
- Colour slide developer

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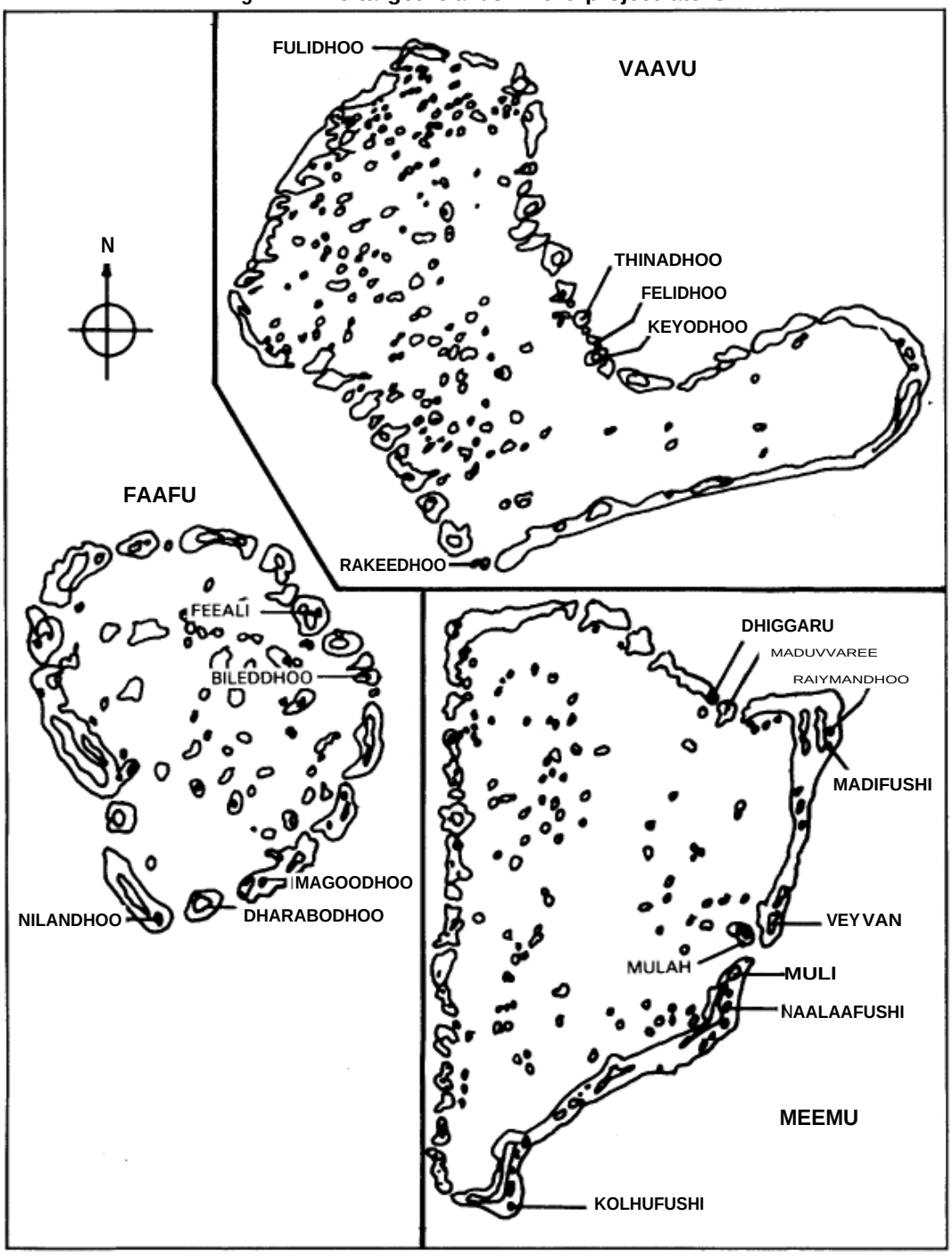
4.1 *Ascertaining the need*

In 1989, the preparatory phase of the subproject commenced. An extension unit was established within MOFA, and one senior and three junior officers were assigned to it.

The extension unit decided to commence its work by determining the needs and concerns, as well as assessing the status, of the fisherfolk in the target area. Consequently, a series of visits began to the 19 islands in the project atolls (see figure 2) to follow up on the Consultant's recommendations and to gain an in-depth understanding of the communities. Initially, the emphasis was on getting acquainted with the islanders and establishing a rapport with them in order to build a more solid working relationship.

Fig. 2. The target islands in the project atolls



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Traditionally, fisheries have **been** of central importance to the Maldivians, who have always been dependent on their marine resources for food and, more recently, foreign exchange. The significance of the sea is, thus, understandably interwoven with the fabric of the local culture. It pervades rituals and is the subject of popular myths, tales and local history. In a community which largely consists of fisherfolk, most members inevitably know a lot about the day-to-day business of fishing. Hence, the first task was to learn as much as possible from the islanders.

The information required was collected during a series of participatory rapid appraisals, community-focused group discussions and semi-structured household interviews, all of which actively involved the fisherfolk. The survey aspired to gain both a quantitative and qualitative understanding of the social environment that the subproject expected to eventually encounter, particularly as the extension staff viewed their roles as responding to the needs of the islanders rather than just expecting them to follow Government orders, advice or directions. During these survey visits, contact fisherfolk — from the islands — were identified and briefed. Formal assignments and briefings, however, had to be delayed until clearance was received from the President's Office.

4.2 The findings

Back from the field, the extension staff, assisted by BOBP, started to examine the information collected on the islands. To summarize the findings and do justice to the 19 fisherfolk communities, their fisheries, their economies and their social concerns, proved much harder than expected. Step by step, the contributions were analyzed, similar ideas grouped together, repetitious points eliminated and casual relationships deleted. Eventually, patterns started to emerge and it became possible to group and prioritize the remaining problems into five major, overlapping categories:

- The crisis in the fisheries.
- The energy crisis (primarily firewood shortages).
- Inter-sector labour shift.
- Lowering of environmental quality.
- The decline in health.

The first two clearly showed that the most important problems related to

- collection of fresh fish,
- prices received for fresh and processed fish, and
- fuel supply.

The cost of fishing, particularly fuel costs, were increasing, while prices of fresh and processed fish were remaining stagnant. It became obvious that very little in terms of extension of technologies and fisheries development could be addressed without eliminating the bottlenecks posed by collection and marketing.

The study also revealed that, as a consequence of the first two problems, a distinct inter-sector labour shift, away from fishing and processing of fish, was taking place in all three atolls. Fisherfolk were complaining that earnings were irregular, and were discovering that there existed alternative means of livelihood that provided more stable earnings than fishing. Hence, incomes from fishing were increasingly being supplemented by earnings from the construction industry, the tourist sector and by serving as merchant seamen.

The last two problems listed arose from the fact that the Maldivian population is increasing at a rapid rate. None of the interviewees expressed concern about this. Nevertheless, when analyzing some of the problems mentioned by them – shortage of firewood, inadequate fresh water supplies, health and school facilities that are unable to cope with demand, and the difficulty in disposing of garbage – it became clear that the limited island resources could not keep pace with the needs of a growing population. Evidently, population growth was negating development efforts and was, therefore, a factor to take into consideration.

This community appraisal resulted in a publication titled Status and Needs of Fisherfolk: Vaavu, Meemu and Faafu Atolls, Maldives (BOBP/WP/76), which contained a summary and analysis of the findings and recommendations.

The appraisal, however, indicated, on a more positive note, that the fisherfolk communities in all three atolls were relatively comfortable, when compared to their fellow-fisherfolk in South Asia. They lived in well-built, permanent houses, were well-clothed and had access to adequate food.

4.3 Interministerial meeting

The findings from the appraisal revealed a set of complex and interrelated issues that required remedial actions of a multidisciplinary nature. Many of the key areas did not even fall within the mandate of MOFA (see Appendix IV). This raised serious issues connected with the role and relevance of the Fisheries Extension Service as envisaged.

It was, therefore, suggested that, instead of direct action, it would perhaps be more important to facilitate coordination by enabling various agencies to come together for comprehensive action. Consequently, a discussion about the special requirements of a fisheries extension service was initiated in August 1990 at an inter-ministerial meeting, during which a final draft of the 'Status and Needs Study' was also presented for comment. Senior officials from the following ministries attended: Finance, Atolls Administration, Trade and Industry, and Planning and Environment. Most participants admitted that the problem was serious, requiring coordination and teamwork. The awareness generated about the need for integrated action was positive, but how such action could be achieved in practice or what role MOFA, given its mandate, could play in this, remained unclear.

5. ENTERING INTO DIALOGUE

Drawing on the recommendations and ideas of the inter-ministerial meeting, the extension staff attempted to get the other ministries into action so as to facilitate fisheries infrastructure development. As little came of these efforts, and considering logistical difficulties, manpower shortages within MOFA and the difficulties faced in coordinating with other ministries, it was felt that it would be best to enter into a direct dialogue with the communities themselves. Using contact fisherfolk as animators, it was intended to motivate and promote island- and atoll-level collective action. The enthusiasm of the fisherfolk, their clear definition of problem areas and the subsequent action taken by the project showed that much could be achieved by building up managerial and problem-solving capacities on the islands.

5.1 Working with the island committees

In early 1991, the President's Office declared that it did not favour a cadre of link fishermen being involved and recommended the subproject to operate, instead, through the already existing Island Development Committees (IDCs) and Atoll Development Committees (ADCs), which included representatives of the fisherfolk. It was considered more important to develop the internal cohesion and strength of these committees, so that they could serve as fora where the island dwellers could resolve their difficulties.

In line with this recommendation, the extension team, accompanied by BOBP staff, visited all the IDCs in the target area to present and discuss conclusions and recommendations of the status and needs study. It turned out that the needs profile had changed slightly since the survey had been carried out, mostly in terms of priorities. This was partly due to action taken by the communities themselves in resolving their problems and partly due to government interventions. The only issue, other than a requirement for more boat-hauling devices, which fell within the mandate of MOFA, was the concern over the reef resources. This had emerged as response to indiscriminate exploitation of certain species almost to levels of complete extinction.

DEMONSTRATION OF MANUAL BOAT-HAULING DEVICES

As labour was becoming scarce in the atolls, MOFA asked BOBP for help, in 1988, to develop a simple, low-cost hauling device which would reduce the number of hauling crew necessary. With assistance from BOBP's Fishing Technology Unit, three different types of hauling devices — a wooden capstan, a wooden winch and a steel winch — were developed and then demonstrated in Meemu Atoll, In addition, the use of a rope-tackle to haul *small dhoni* was demonstrated in Faafu Atoll.

The response of the fisherfolk, particularly the women, was positive. Information about the demonstrations broadcast on the Fisherfolk Radio Programme by MOFA, attracted several enquiries from other atolls seeking details and technology transfer.

In reviewing the experience, it was found that the steel capstan was the preferred device. MOFA promptly ordered ten more units, for distribution on credit, with support from the UNCDF. (See BOBP/WP/71 for details).

Among the manual boat hauling devices, the steel capstan was preferred.

In Meemu Atoll, fishing was still the main source of income.

In Vaavu Atoll, things looked a little bit different, in that tourism-related activities were gaining in importance, with two resorts already located in the atoll.

In Faafu Atoll, it had turned out that hardly any fishing was being conducted. As UNDP was in the process of implementing an Integrated Atoll Development (lAD) project here, which included many components similar to those of the subproject, it was decided that it would be more worthwhile for the subproject to concentrate its efforts only in Vaavu and Meemu Atolls.

lalung into consideration the specnic aemancis or the fisherfolk ana, at tne same time, keeping in mind the capabilities of the extension staff, MOFA, in consultation with BOBP, decided that the subproject should address

- the management of the reef resources,
- the problems relating to reef openings, and
- harbour silting and erosion due to jetty constructions.

The women's committees were specifically interested in collective action to combat rat and bat infestation and in gaining access to population education.

5.2 Field visits

The outcome of the preliminary discussions with the IDCs resulted in four extended field trips to Meemu and Vaavu Atolls, during which training sessions were held with the Committees. Resource personnel from the Ministries of Health, Public Works and Labour and the Atolls Administration were invited to inform the Committees about the Government's thinking on, and plans for, some of the prioritized subjects.

Due to the remoteness of the target areas, the activities on the islands can broadly be classified into two types:

- Those that took place during extended field trips; and
- Those that were undertaken by the communities after the field trips.

5.3 Training aids

Educational posters concerning health, population and resource management issues were developed by the extension staff. These were used as training aids to illustrate and clarify points. After the explanatory sessions, these were left behind on the islands.

Although a large family is often an aspiration in the Maldives, the female committee members, in particular the younger ones, had sought advice on family planning. On an average, the island women marry at the age of 15 - 18, go through three or four marriages and have seven or eight

An island training session.

pregnancies. Anaemia, due to too closely spaced pregnancies, is a common health hazard amongst the women; a 'risk analysis' made by UNICEF showed that nearly 12 per cent are clinically anaemic.

Knowledge about child-spacing methods and the availability of, and awareness about, contraceptives are not very firmly rooted. Therefore, information kits with commonly used and culturally accepted. contraceptives were developed with the help of the Ministry of Health. These were distributed in the islands.

*5.4 Rat and bat infesta*tion

The rat infestation problem was addressed with material inputs from MOFA's Department of Agriculture. The extension staff suggested that each IDC should organize a competition to see who among the islanders could kill the most rats. This idea was enthusiastically taken up by the female committee members. They announced the contest, kept records and MOFA rewarded those who were most successful.

Women and children lake some time off during their war against bats.

The infestation of bats was a constant threat to the small but valuable vegetable gardens on the islands. A simple method to trap them was demonstrated. A fishing net, strategically fastened, high between two palm trees, would catch them as they flew around.

5.5 Gender

The meetings normally began with a relatively formal introduction, prepared in advance. After this the committee members were given the opportunity to ask questions and discuss various aspects of the information which had been provided. A major difficulty encountered was the low level of women's participation. It was obvious that they needed extra support and encouragement to take part in the discussions. Speaking in public, and in front of men, was unfamiliar to them,

particularly as men and women in this Muslim society have been used to acting in separate social spheres. In order to build up, and strengthen, the IDCs, it became necessary to organize separate discussions. This decision turned out to be critical, as the women's contribution and interest suddenly increased considerably.

5.6 Informal encounters

Travelling between the Maldivian islands takes time and is largely determined by the tides. Often the staff had to spend a long time on an island, waiting for an opportune moment to leave. As a result, opportunities arose for more informal encounters with the islanders, on the beach or over a cup of tea. During these interactions, it was possible to learn a lot from the experience and problems of the fisherfolk. These informal meetings also helped to build mutual trust.

5.7 A workshop

At the end of 1991, it was decided to have a two-day discussion workshop on Muli Island, in Meemu Atoll. It would end with the annual December celebration of Fishermen's Day. The Minister of Fisheries and Agriculture and other senior Government officials accepted an invitation to attend the valedictory function. To hold this celebration on an island was something out of the ordinary, as the main function is normally held in Male.

The workshop drew together 30 representatives from the IDCs and ADCs of Meemu, Vaavu and Faafu Atolls. Senior officials from the Ministries of Atolls Administration, Health, and Public Works and Labour attended as resource persons. Despite the fact that some of the participants were not used to sitting through long meetings, the discussions stayed lively for the full duration. The workshop turned out to be a vital instrument to break through the isolation of the islanders and build a basis for communication. In evaluating the experience, the participants agreed that its main significance was in the fact that it had provided a rare opportunity for people from different islands and Government officials to come together, to share and exchange experiences and to learn from each other. They felt that the workshop had led to new ways of looking at problems, making decisions and working out solutions.

The inputs and the recommendations that were made helped to clarify the focus of the subproject activities for 1992 and paved the way for the final phase. The feeling was that, in addition to encouraging action by the other Ministries, the subproject should focus on education and awareness-building with regard to better management of the reefs. It is noteworthy that this emphasis was initiated by the workshop participants themselves. There were various reasons for this, one being the realization that the reef resources were finite and able to produce only a limited quantity of fish and other useful organisms.

Whilst the traditional lifestyle had almost a negligible impact on the reef environment, recent socioeconomic developments have led to a marked deterioration. Tuna is the traditional and most important fishery resource of the Maldives. A large part of this catch is consumed locally, as most people, given a choice, prefer not to eat reef fish. But with the demands of an export market, exploitation of the reef resources began a few years ago. The traditional management systems cannot always ensure a sustainable reef fishery that adapts to the demands of the expanding tourist sector, population growth and increasing exports.

Signs of overexploitation of certain reef species, already increasingly in evidence, had alerted the islanders to a situation that threatened their reefs. It was obvious to the fisherfolk and Government alike that some serious thinking and planning had to be done to maintain, or enhance, the reef resource base.

6. BUILDING MANAGEMENT AWARENESS

The request from both the islanders and Government for training in the dynamics of reef resources, so that the former would acquire sufficient knowledge to actively participate in the management process, had been agreed to at the workshop. Since reef management corresponded with the Government's aim to evolve a national management policy, and it also coincided with the MOFA mandate, this, together with the staff's complementary background in fisheries science, made it a feasible task to handle.

6.1 Training

Raised awareness, leading to active local participation in the resource management process, was the main aim of the training sessions. The underlying principle was that no management programme could be successful without the IDC's involvement. Therefore, efforts based on strategies to strengthen local capabilities were perceived as likely to result in lasting changes. But the idea was not merely to add to the store of knowledge; it was to actually enable fisherfolk to utilize the resource in a sustainable and careful manner.

The training took on a dual approach:

- A generalist, or multi-disciplinary, approach which provided an overview of resource management; and
- A more specialized, in-depth system aimed at saving specific endangered resources.

The different issues were introduced in a manner aimed at provoking discussion and reflection rather than providing readymade answers. The underlying factor was to stimulate the understanding needed to critically examine issues and, thereafter, appreciate what could be done to bring about change.

In 1992, the extension unit conducted regular training sessions on the islands in the target area. Soon it was discovered that although the fisherfolk possessed some knowledge of the reef resources, they lacked a more profound understanding of the reef. Fisherfolk develop a natural insight of their fishery, but much of this is localized, focusing on fish-finding and - catching. They learn where and when to harvest fish, but rarely perceive the total picture. It is customary, in fact, to believe that the resource could exist undiminished for ever; the fisherfolk had never envisaged that overutilization of the sea was possible.

The islanders had good reasons to take the sea for granted. Until not so long ago, the Maldives was one of the few countries in the world without any apparent overfishing problem. In recent years, however, fisherfolk have to face the reality of rapid exploitation of particular reef species threatening to eradicate these valuable resources. In the meetings, particular attention was given to the harvesting of beche de mer and giant clam. Neither of these species had been harvested in the Maldivian waters until recently, as they are not part of local culinary tradition. The demand for them overseas, however, made these fisheries not only a novel employment area but also a welcome alternative to tuna fishing in the lean seasons.

To begin with, earnings were high and fishing efforts intensive in both the beche de mer and giant clam fisheries. Within a relatively short period, however, the first signs of dwindling stocks become obvious. The rapid reduction of these two fisheries in several atolls came to serve as a powerful illustration of how particular resources can be depleted quickly through unregulated fishing and the temptation of short-sighted financial gain (see Appendix V for 'Case Study on Giant Clam').

6.2 *Communication channels*

Tackling these problems entailed the development of various types of communication materials that would ensure that the training was more effective. And these had to take into consideration the thinking, knowledge and perceived constraints of the receivers, based on an interpretation of what had been learnt from the past and current activities on the islands.

The media developed included those discussed below.

VISUAL AIDS

The MOFA team brought a portable generator, a VCR and underwater wildlife documentaries to portray, in colourful and dramatic fashion, the reef environment. These were highly appreciated, as they showed a well-known milieu from a new perspective.

The extension staff, with the help of MOFA's Marine Research Section (MRS), also developed several extension pamphlets and posters relating to beche de mer, giant clam and bait fishing. For clear and easy comprehension, diagrams and sketches were used. The committee members found these particularly useful.

Ms Sana Mohamed, Reef Biologist, from the Marine Research Section, explains the process of resource depletion to a group of IDC members.

RADIO

The, islanders' link with the outside world is mainly through the radio, which has proved to be an effective way of reaching a large audience. Most people, in even extremely remote islands, listen to the radio regularly; at least, the radios are switched on from morning to night.

To prepare the ground for the field-visits, the extension staff, in collaboration with the national radio, Voice of Maldives (VOM), prepared five radio programmes (each running for ten minutes) on why reef

VOICE OF MALDIVES

The Maldives, which has one of the oldest fisherfolk radio programmes in the region, wanted to make its programming more participatory in nature, and requested BOBP's help to train its radio staff. in late April and early May 1993, BOBP organized a training input, wherein Michael Pickstock of World Radio for Environment and Natural Resources (WREN), UK, trained some staff as well as a few others. Two were producers from the VOM, four came from MOFA's extension and marine research sections, and four came from Meemu Atoll local administration.

The training covered both theory and practice and included hands-on experience during a field recording trip to some of the islands in Meemu Atoll. On their return to the Male studio, the trainees put together radio programmes based on their recordings and VOM broadcast them.

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Mr Badru Naseer, Director General Voice of Ma/dives, in the transmission room – his voice is well known to most Maldivians.

Enjoying the Fisheries Radio Programme.

resource management was required and how it could be achieved. These were broadcast on the very popular twice-weekly programme exclusively aimed at fisherfolk. Through these means it was intended to extend the reach of.information to the whole nation.

Audio tapes of these progammes were given to the committees in Meemu and Vaavu Atolls so that they could be repeatedly listened to, at their convenience, and then discussed.

BOOKS FOR CHILDREN – AND OTHERS

As sustainability implies that future resource users must also be made responsible, the committees felt that it might be a good idea to teack children about the reefs and their ecology. It was also considered important to make them aware, as early as possible, of the value of protecting the natural environment.

When bringing this up with the teachers, they expressed concern about the paucity of simple and interesting textbooks which could be used to familiarize the children with the coral reefs. Consequently, MOFA, with BOBP assistance, developed a colouring-cum-work book titled *Life on Our Reefs* (BOBP/MAG/20) aimed at primary schoolchildren on the islands. The main purpose of this book was to encourage the children to

- critically examine their natural environment,
- learn about the impact which humans could have on the coral reefs, and
- consider what could be done to help safeguard the future of the coral reefs.

This book is so designed as to be used by different age groups, in the classroom and on the beach. Throughout the book, facing pages have, on one side, black-and-white, scientifically accurate, line

Tomorrow's fisherfolk

The sea as playground

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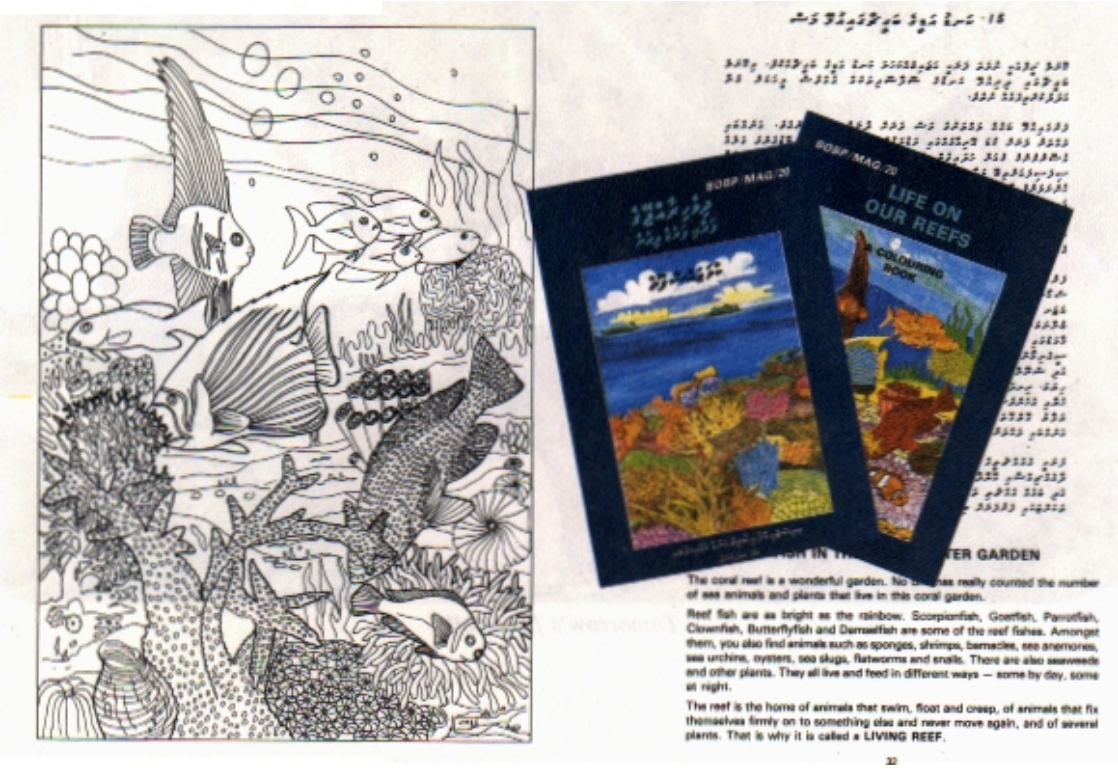
drawings, which the child can colour, and on the other side explanatory notes in both Dhivehi and English. The book can be used simply as a colouring book, or as a lesson book or as a work book, to be taken to the beach where the children can try to spot the different coral and reef organisms referred to.



The colouring-cum-work book in Dhivehi and English

Since the literacy rate in the Maldives is high, MOFA and the committee members also agreed to use the written medium to convey the reefs' message to the fisherfolk. Accordingly, an effort was initiated to develop a practical workbook in a simple form, targeting both IDCs and fisherfolk. The intention was to provide readers the facts and skills necessary for participation in the consultative and negotiating process.

The islanders usually have a more sensitive understanding of local conditions and problems than central Government officials. MOFA's idea was that this book would assist the committees in making informed decisions based on their practical experience and on a sound knowledge of the biological characteristics of the resources concerned. The Ministry decided it would, in fact, only play a facilitating role, providing further information and support whenever needed.

To assist the extension staff in the painstaking task of casting scientific data into a simple, comprehensible language, BOBP hired a Fishery Biologist as consultant. With his help, a draft, consolidating some of the broad ideas, was prepared. The aim was to pose a series of- questions about the commonly extracted reef resources and offer possible answers and suggestions. Some of the questions asked were

- How much can we fish without getting into trouble?
- How do we share what we have?
- What should we not do?
- How can we ensure a better tomorrow?

A method to collect and compile extraction data, to be compared over a period of time and in a geographical area, was also evolved as part of the book. This was meant to assist the current

status and resource analysis, as well as in the observation of changes and trends. If the data collected indicated departure from what could be considered normal, simple preventive measures could be suggested. When at a loss locally, MOFA could be alerted, so that, if required, more sophisticated techniques to investigate the endangering situation could be considered.

When completed, the committees were asked to examine and revise the rough draft. As continuous consultation and interaction with the island-dwellers was regarded as an integral component of the implementation process, great care was also taken to incorporate the changes and additions suggested by them, when transforming the abstract into a more substantial document. (For 'Table of Contents' of the book see Appendix VI.)

STUDY TOUR

At this stage, the staff felt a need to improve their knowledge about community-based management. In particular, they were interested in discovering methods of extending information to adults with limited education and no formal scientific training. They wanted to exchange experiences and gain inspiration from others involved in similar activities.

Consequently, in March 1993, a group consisting of four persons – one each from MOFA, Ministry of Atolls Administration, Vaavu Atoll local administration and BOBP – visited the Philippines, a country with a history of promoting participatory reef management projects. A carefully planned programme was organized by the Bureau of Fisheries and Aquatic Resources, the Philippines. Meetings and discussions with staff of government and nongovernment institutions and projects, as well as visits to field sites, proved very useful as they helped provide a broader perspective on the activities in the Maldives. In addition, some of the more formal lectures provided the participants with a theoretical foundation for community-based management, which had previously been lacking.

After ten hectic days, the staff returned to the Maldives, full of new ideas but also feeling reassured that they were on the 'right track'. The study tour had given a healthy boost to their professional confidence and acted as a source of fresh inspiration. It had been confirmed that management education was very much an innovative field where new concepts had to be constantly tried and tested.

6.3 The second interministerial meeting

Once the first draft of the handbook was completed in August 1993, an interministerial consultation was convened by MOFA and was attended by senior representatives from the Marine Research Section (MRS), Ministries of Atolls Administration, Trade and Industry, Planning and Environment, Public Works and Labour, the Voice of Maldives and BOBP.

The discussions centered on the document, and several constructive suggestions were made. Important issues discussed in this connection included :

- The importance of building awareness of the need for, and the benefits of, reef resource management at all levels, and the mechanisms of participatory management, particularly at senior and policy levels of Government.
- The necessity to clarify, and legally define, the directives of the IDCs and ADCs, in order to enable them to assume responsibility for the local management effort.
- The urgency for improving coordination between the different Government agencies.
- The need to rationalize data collection processes and develop a management information system

A shift in the GOM thinking, from the notion of inducing and motivating the local committees to take management action to thinking in terms of enabling, supporting and empowering them to take such actions, had been accomplished.

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6.4 The final island workshop

In October 1993, MOFA and BOBP jointly organized an island-based workshop, during which the committees were given the opportunity to react to the handbook and air their views, priorities and perspectives on decentralized reef resource management. This event brought together 35 elected members from the IDCs and ADCs in the target atolls. The participants comprised a cross-section of an average island population: fisherfolk, teachers, headmasters, magistrates, midwives, housewives, health workers, religious leaders and island chiefs.

Workshop participants

The main objective was to evaluate the draft of the handbook, chapter by chapter. It was scrupulously scrutinized, and the content, style, presentation and usage were debated. The discussions were exceptionally lively and numerous recommendations emerged. The participants felt that the book already contained more than sufficient information, but that there was a need for illustrations to liven up the text.

With regard to the section on data collection, it was felt that it would consume too much time and effort. It was suggested, as an alternative, that students from Grade 6 and upwards could be involved in the information-gathering. It was felt that the general principles and methods of management could be incorporated into the Fisheries Science curriculum and taught in the higher grades.

In the final session, the participants concluded that:

- As a result of the training, they had come to appreciate the benefits of, and need for, looking after the resources.
- The handbook would be a crucial instrument when attempting to detect signs of stress in time for remedial measures to be effectively instituted.
- There should be local involvement at all the various stages of management.

7. LEARNINGS

1. The status and needs analysis, which was carried out in all the three target atolls, identified several clusters of problems which were related in one way or another. This necessitated the

Reviewing the Reef Resource Management Handbook at a workshop

Sharing and exchanging experiences during this workshop

subproject to opt for an integrated and holistic approach. The study clearly indicated that some of the key problems related to collection and marketing of fresh and processed fish. Evidently very little could be done in terms of extension of technologies and fisheries development in general, without eliminating some of the obstacles posed by these two problems.

2. Some of the other immediate concerns did not fall within the mandate of MOFA, and required coordination and linking of several ministries and agencies. In principle, it was possible for MOFA to take on a catalytic role, facilitating integrated action and cooperation between ministries. However, when attempting to put this into practice, it was hard to achieve and the results were disappointing.

3. As the subproject evolved, fisherfolk clearly identified the need for conservation and management of the reef resources as their priority. This preference was in line with MOFA's official directive and enabled the staff to more effectively support the committees.

   Taking into consideration the manpower shortages in the GOM, the difficult logistics and the budget constraints on the one hand, and the importance of the reefs to the island communities on the other, it appeared logical to strengthen and enable the IDCs and the ADCs to take a lead role in such efforts. The subproject found them committed and interested, although, in order to empower the members, they needed further training in conservation, management and negotiation techniques.

4. In order to authorize the IDCs and the ADCs to participate and take responsibility in the local management of the reef resources, there was need to reconsider their mandate and terms of reference.

5. The capabilities of the extension staff to design training materials, assist in radio programme production and in mediating discussions have improved. Nevertheless, the fact that the unit is relatively small and located in the capital will continue to affect achievement. It will not be possible for the staff to systematically cover the nation and give regular support to the committees. Whereas the islanders are enthusiastic and eager to work towards management of the reef resources, the problem is the lack, within MOFA, of the managerial direction necessary to sustain the efforts.

8. EPILOGUE

Projects, by definition, are time-bound. One way or another, they end. But the end of a project, logically seen as a termination, is often actually just the beginning. What begins at the project's end is, if anything, ultimately more important than the project itself; what CONTINUES, represents the real contribution of the project.

MOFA's extension unit has planned and budgeted for four extended visits to the target area in 1994, during which the Reef Resource Management Handbook will be distributed and tested. A variety of strategies and approaches, some conventional and others more innovative, are likely to be explored. Finally, a gradual distribution on all inhabited islands is envisaged, followed by implementation of local management of the resources.

It is too early to say how the local management regime will ultimately be structured and operated in the Maldives, as it is still in its infancy and has to be further tailored to meet the specific needs. This is likely to be arrived at after much experimentation. But MOFA has commenced this challenging process.

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APPENDIX I

Chronology

1988

JAN. The Advisory Committee of BOBP endorses a subproject to establish a Fisheries Extension Service.

APR. An outline of an extension subproject is prepared with the help of an FAO Consultant.

SEP. BOBP prepares a concept note on how the planned extension service could address the needs of fisherfolk

DEC. BOBP and MOFA reach agreement on the aims and objectives of the subproject.

1989

APR. An extension unit with four staff is established in MOFA.

Three types of boat-hauling devices are demonstrated. Programmes on the demonstration are broadcast and enquiries are received from fisherfolk.

An NRI consultant identifies methods to improve the quality of cured fish. Two MOFA staff participate in a training course in fish-drying at CIFT, Cochin.

JUN. A newly designed rapid appraisal method is tested in Faafu Atoll. On the basis of this experience, the strategy is refined.

A simple pulley block-hauling device is demonstrated in Faafu Atoll.

SEP. MOFA with BOBP assistance undertakes rapid appraisals in all the target islands. The first of the contact fisherfolk are identified.

OCT. The steel capstan is the preferred boat-hauling device. The Ministry orders eleven more units.

1990

JAN. The extension staff start analyzing the field data.

APR. A draft of the Status and Needs Study is completed.

AUG. The Status and Needs Study is discussed at an interministerial meeting.

SEP. 12 fisherfolk undergo training in improved salt-drying of fish.

Two MOFA officers go on a study tour IO Shri Lanka, to learn about fisheries extension.

OCT. Eleven capstans are shipped from Madras to Male. Ten are to be distributed on credit and one is for demonstration purposes.

DEC. Eleven fisherfolk are trained in maintenance of engines.

Eight fisherfolk receive training in making hooks and lures.

1991

JAN. : Field visit cancelled due to austerity measures enforced by Government.

FEB. : The Status and Needs Study is cleared by the Ministry of Planning and Environment

APR. : The Status and Needs Study is cleared by the GOM.

The availability of ten boat-hauling devices, for purchase on credit, is announced on the radio. MOFA receives 41 requests.

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MAY : The President's Office recommends the subproject to operate through the Island Development Committees.

An eight-day field trip is undertaken by MOFA and BOBP staff to islands in Meemu and Vaavu.

JUL. : A nine-day field trip is undertaken by MOFA and BOBP staff, representatives from the Ministries of Atolls Administration, Public Works and Labour and Health, to all islands in Meemu Atoll.

SEP. : A seven-day field trip is undertaken by MOFA and BOBP staff to all the islands in Vaavu and Faafu Atolls.

NOV. : An eight-day field trip is undertaken by MOFA. BOBP and Atolls Administration staff to all islands in Meemu.

DEC. : A workshop brings together thirty representatives from the Island and Atoll Development Committees in the three target atolls.

The annual 'Fishermen's Day' is celebrated at the end of the workshop.

1992

MAR. : A group of MOFA staff is selected to take responsibility for the implementation of activities in 1992. They are trained, in-service, on extension methodology and issues relating to fisheries management.

APR. : MOFA, in cooperation with the Voice of Maldives, produces and broadcasts five programmes focusing on reef management.

MAY : A field visit of nine days is carried out to Meemu and Vaavu Atolls. The team consists of BOBP, MOFA and Voice of Maldives staff.

JUL. : During a seven-day field trip to islands in Meemu and Vaavu, MOFA and BOBP staff undertake training exercises, on coral reef management, for the Island Development Committees and schoolteachers.

SEP. : An effort to write a handbook for Atoll and Island Development Committees, on reef management, is initiated.

Preparation of a colouring book on coral reefs, for schoolchildren, gets underway.

DEC. : The first draft of the colouring book is given for scientific editing.

1993

FEB. : A consultant, together with MOFA staff, prepares a chapter/content outline of the handbook.

A six-day field trip is made to Meemu and Vaavu, by a team consisting of the Consultant, MOFA, BOBP, Atolls Administration and Voice of Maldives staff.

The first draft of the handbook is circulated for comment.

MAR. : A study tour for GOM officials and BOBP staff, to learn from the experience of community-based resource management efforts in the Philippines, is undertaken.

MAY : MOFA staff receive training in participatory radio programming by an international Consultant.

JUN. : Work on the translation into Dhivehi and the illustrations for the colouring book are undertaken by two national consultants.

Draft of the handbook shown to the Coastal Resource Management Project in Shri Lanka.

JUL. : Translation of the handbook draft completed by a Consultant in the Maldives.

AUG. : The contents of the handbook are discussed at an interministerial meeting in Male.

OCT. : The committees review the handbook at an island-based workshop.

DEC. : The colouring-cum-work book is officially released at the Fishermen's Day celebrations in the Maldives.

The subproject is terminated and handed over to MOFA.

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APPENDIX II

Documentation relating to the subproject

Consultancy reports

TIETZE, U. (1988). *A BOBP Project Idea, Fisheries Extension Services, Moldives.* BOBP-FAO. Madras, 1988.

PICKSTOCK, M. *(1993). Fisheries Rodio — Republic of Mu/dives.* World Radio for Environment and Natural Resources (WREN), U.K.

Working documents

BAY OF BENGAL PROGRAMME *(1988). Fisheries Extension Services, Muldives subproject.* BOBP, Madras.

Published material (Working papers, reports, etc.)

THE EXTENSION AND PROJECT SECTION, MOFA. *(1991). A View from the Beach : Understanding the status and needs of the fisherfolk in Voovu. Meemu and Foofu Atolls, Maldives.* BOBP/WP/76. BOBP-FAO, Madras.

BAY OF BENGAL PROGRAMME (1992). *Manual boat hauling devices in the Maldives.* BOBP/WP/71. BOBP-FAO. Madras.

MOFA (1993). Life on Our *Reefs.* A colouring book. BOBP/MAG/20. BOBP-FAO, Madras.

Bay of Bengal News

ROY, R.N. (1991). Maldives — Needs and concerns of Maldives fisherfolk — A view from the beach. Bay *of Bengal News,* Issue No. 41. BOBP-FAO. Madras.

HAGLUND HEELAS, A.M. (1992). Extending the message of resource management in the Maldives. Boy *of Bengal* News, Issue No. 46. BOBP-FAO, Madras.

HAGLUND HEELAS, A.M. (1992). Voice of Maldives : Using airwaves to reach scattered fisherfolk communities. *Boy of Bengal News, Issue No.* 47. BOBP-FAO, Madras.

ROY, R.N. (1993). Radio training pays dividends in Maldives. *Bay of Bengal News,* Issue No. 51. BOBP-FAO, Madras, 1993.

HAGLUND HEELAS, A.M. (1993). Protecting the riches of the reefs. Boy *of* Bengal News. Issue No. 52, BOBP-FAO, Madras.

Radio programmes

VOICE OF MALDIVES and EXTENSION AND PROJECT SECTION, MOFA. Five radio programmes on reef resource management Male 1992 (In Dhivehi).

VOICE OF MALDIVES: Programme Director Badru Naseer, for SAVE (SAARC'S Audio Visual Exchange): *Facing a Challenge.* Based on the experience and Iearnings from the subproject, broadcast in the SAARC region, September IS, 1993 (in English).

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APPENDIX III

Training inputs

The staff of the Extension Unit received several short training inputs, some on-line, some abroad. The programme included :

- A tour to study fisheries extension activities in Shri Lanka and India, organized by the National Institute of Fisheries Training, Shri Lanka, and BOBP, Madras.
- Training in fish drying, organized by the Central Institute of Fisheries Technology (CIFT), India.
- Training in extension methodology, participatory rapid rural appraisal methods and needs analysis techniques, by BOBP staff.
- A tour to study community-based resource management projects in the Philippines, organized by the Bureau of Fisheries and Aquatic Resources, Philippines.
- Training in participatory radio programming for fisherfolk, by World Radio for Environment and Natural Resources (WREN), U.K.

Selected fisherfolk, from the target atolls, received training in the following :

- Improved salt-drying of fish, at the STO Fish Processing Centre, Meemu Atoll.
- Maintenance of inboard engines, conducted by MOFA staff.
- Hook-making and Japanese lure-manufacturing, by a private sector ironsmith.
- Population education, by the Ministry of Health
- Reef resource management with special reference to :
  - The giant clam fishery.
  - The beche-de-mer fishery.
  - The bait fishery.
  - The reef shark fishery.
  - Coral and sand mining.

Provided by the Marine Research Section (MRS), Male.

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APPENDIX IV

Official mandate of MOFA

The basic mandate of the Ministry of Fisheries and Agriculture, Republic of Maldives, is to :

- Formulate and administer regulations on matters relating to fisheries;
- Carry out the research needed for such development;
- Develop and promote fisheries;
- Collect and analyze statistical information on fisheries necessary for the management and development of the sector;
- Maintain and administer work related to uninhabited islands; and
- Promote agriculture in the Maldives.

The Fisheries Law of the Maldives (Law No. 5187 of 24.8.1987) provides MOFA with much of its mandate.

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APPENDIX V

The Giant Clam - A resource at risk: The threats and issues

Introduction

In many Southeast Asian countries, the giant clam's adductor muscle tissue (which hinges the two halves of the shell and is responsible for opening and closing the valves) is a highly priced delicacy. In the Maldives, the giant clam fishery began as recently as in June 1990 and continued only until January 1991. It then was recognized that, to protect dwindling stocks, a ban on export had to be introduced.

An early warning signal had been the increasing distances some fishermen had to travel to target the giant clams. In the beginning, they collected clams in the lagoon areas of their islands. But as the numbers decreased, they were forced to move to deeper waters. Once a reef was exhausted, they would move on to the next: As they progressed further from the base island, they had less time for fishing and, so, less would be collected in the day. The number of giant clams in some atolls had fallen to such low levels that the fishery was not profitable to pursue.

Already, at an early stage, the giant clam fishery provoked great concern among fishery and non-fishery people. This led to a survey, by a Consultant hired from the 'International Giant Clam Programme' in Australia and the Marine Research Section (MRS) of the Ministry of Fisheries and Agriculture (MOFA), to assess the current status of the giant clams in the Maldives. The survey was limited to four northern atolls -Shaviyani, Raa, Lhaviyani and Kaafu.

The initial centre for the giant clam fishery in the Maldives had been R Ugoofaavu. The general opinion of the fishermen was that Raa Atoll originally had the highest density of clams.

THE GIANT CLAM

Giant clams are slow-growing and long-living organisms. *T. squamosa*, the faster growing of the two species found in the Maldives, shows a slowing in growth after an age of approximately ten years. Their expected life span is more than 25 years.

The most outstanding attribute of giant clams is their symbiosis with a specific algae, which lives in their bodies. The algae makes food by photosynthesis and shares it with the host clam. Thus, the giant clam rarely uses any other reef organisms for food. Hence, as far as nourishment is concerned, these animals are quite independent and have a very loose connection with the reef food-web.

Giant clams are predominantly found in coral reef areas. *T. squamosa* is mainly found in sheltered areas, from the reef flat in shallow waters, down the reef slope and right to the bottom. *T. maxima* is found in all areas of the reefs, down to approximately 15 m, although it is more abundant on the reef flat and crest.

Species composition

Only two species of clams, *Tridacna* squamosa (averaging 45 cms shell length) and *Tridacna maxima* (reaching a maximum of 35 cms shell length) have been identified in the Maldives. The Dhivehi term for giant clam, kaa kaha, refers to both species.

The major target of the clam fishery was *Tridacna squamosa*.

The giant clam fishery

Until 1990, giant clams were not harvested in the Maldives and many reefs probably still support pristine clam populations. However, once harvesting began, the stocks of T. squamoso seriously declined in less than one year.

As the clams usually inhabit shallow reef-flats and are unattached, they are easy to find and remove, making them especially vulnerable to over-exploitation.

The fishery was started by a private, local company, which commissioned fishermen to collect whole clams. The buyers were Taiwanese. Only the adductor muscle was exported; the clam meat and shell were discarded. Adductor muscles weighing less than 100 grams when frozen were not accepted. Therefore, only the larger species T. squamosu were preferred. Shortly afterwards, another local company started buying both dried adductor muscle and mantle tissue. Again, the buyer accepted only large clams.

From discussions with the fishermen and the local buyers, it appeared that they believed that all the small clams were juvenile T. squumosu that would grow and replenish the stocks. This was incorrect; most of the small clams were *T. maxima*. There was a serious risk of fishing *T. squamosa* to below a critical population density, whereby natural population growth would not occur. It is estimated that it will take eight or more years before the depleted areas can be fished again.

The stock position

FISHED REEFS

The survey covered a total of 38,700 m^2 of fished reef and found an average density of 3.4 clams per hectare*. The highest density *seen* was 18.8 *T. squamosa* per hectare in one area of R. Maadhunifaru. All other sites on this reef had

* 1 ha = 10,000 m^2

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no 7. squanrosa at all. The findings showed that there were very few, and frequently no, 7. squamosa on fished reefs (mostly Raa and Shaviyani Atolls). They were found only on 33 per cent of the surveyed reefs. Overall, their average density had been reduced to about a third of an unfished population.

7. maxima, which has not been targeted by the fishermen. was reasonably abundant in all areas surveyed. An average of 29.9 clams per hectare was seen in fished areas.

UNFISHED REEFS

7. squamosa was seen in 93 per cent of the unfished reefs in the area surveyed. The average density for 46,050 m^2 of unfished reefs was assessed to be of 10.6 clams per hectare. Some of the resort islands in Kaafu Atoll alto showed relatively high densittes of this species.

An average of 39.6 of T. maxima per hectare was seen on unfished reefs.

It was noted that it took approximately six months to fish an atoll to the point where it became too expensive to collect any more clams. The natural population densities would only have sustained the fishing pressure for a few more years.

Subsequently, export of giant clams was prohibited

ISSUES

If and when the fishery is re-opened, hou should it be managed? The following measures could be considered and discussed:

- Establishing a minimum size limit;
- Determining a permitted harvest level:
  - Number of clams in general, or
  - Number of clams per fisherman;

  Introducing giant clam culture;
- Increasing the population of clams, through stocking spats artificially;
- Periodical closures, to enable recovery;

  Limiting the number of fishermen allowed to harvest in one area; and
- Allowing fishing to develop without any controls

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APPENDIX VI

Coral Reef Management Handbook for the Island Development Committees

TABLE OF CONTENTS

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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/lNF/...) which are bibliographies and descriptive documents on the fisheries of member-countries in the region.

Newsletters (Buy 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 for 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 Summary 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 Molocca 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 rhe 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 rhe Fourteenth Meeting of rhe Advisory Committee. Medan. Indonesia, 22-25 January, 1990. (Madras, 1990.)*

45. *Gracilaria Production and Utilization in the Boy of Bengal Region: Report of a seminar held in Songkhla, Thailand,* 23-27 *October 1989.* (Madras, 1990.)

46. *Explonatory 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 Commirree. Colombo. Sri Lanka, 28-30 January 1991. (Madras, 1991.)*

49. lntroduction of New Small Fishing Craft in Keralo, 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 Culrure 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 o Beachlanding Craft on lhe East Coast of India. V L C Pietersz. (Madras, 1993.)*

55. *A Shri-Lanka Credit Project to Provide Banking Services to Fisherfolk.* C. Fernando, D. Attanayake. (Madras, 1992.)

56. *A Study on Dolphin Cotches in Shri 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 rhe Advisory Committee. Dhaka, Bangladesh, 6-8 April 1993. (Madras, 1993.)*

59. *Report on Development of Canoes in Shri 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 Boars* in *Shri Lanka.* G Pajot. (Madras, 1993.)

62. *Fisheries Extension Services 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 *Boar Motorizotion Projects and Their Impacts.* R Hall, A Kashem. (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-sole Shrimp and Prawn Hatcheries in India and Bangladesh. C Angell. (Madras. 1994.)*

67. The Impact of the Environment on the Fisheries of the Boy of Bengal. Ed. by S Holmgren. Swedish Centre for Coastal Development and Management of Aquatic Resources, SWEDMAR/BOBP. (Madras. 1994.)

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Working Papers (BOBP/WP/...)

49. Pen Culture of Shrimp by Fisherfolk : The BOBP Experience in Killai. Tamil Nadu. India. E. Drewes. G. Rajappan. (Madras, 1987.)
50. *Experiences with a Manually Operated Net-Braiding Machine in Bangladesh.* B.C. Gillgren, A. Kashem. (Madras, 1986.)
51. *Hauling Devices for Beachlanding Craft. A. Overa. P.A. Hemminghyth. (Madras, 1986.)*
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 Waler 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.)
55. *Study of Income. Indebtedness and Savings among Fisherfolk of Orissa. India.* T. Mammo. (Madras, 1987.)
56. *Fishing Trials with Beachlanding Craft at Uppada, Andhra Pradesh, India.* L. Nyberg. (Madras, 1987.)
57. *Identifying Extension Activities for Fisherwomen in Vishakhapatnam District. Andhra Pradesh, India. D. Tempelman.* (Madras, 1987.)
58. *Shrimp Fisheries in the Bay of Bengal. M. Van der Knaap. (Madras, 1989.)*
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