

**COMMUNITY-BASED MANAGEMENT OF SUBSISTENCE FISHERIES IN SAMOA**

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**Abstract**

Many subsistence fishers in tropical regions live in discrete communities, which have a high level of marine awareness and some degree of control of adjacent waters. These factors provide an ideal basis on which to motivate communities to manage their own marine resources. A fisheries extension programme in Samoa encouraged each village community to define its key problems, discuss causes, propose solutions and take appropriate actions. Various village groups, including women's and untitled men's groups, provided information which was recorded (as problem/solution trees) on portable white-boards. The extension process culminated in a community-owned Fisheries Management Plan, which listed the resource management and conservation undertakings of the community. Undertakings ranged from enforcing laws banning destructive fishing methods to protecting critical marine habitats. Of the first three years, the extension process commenced in 65 villages, of which 64 produced Village Fisheries Management Plans so far. A large number (54) of these villages chose to establish community-owned Marine Protected Areas.

**Introduction**

As in many other coastal and island countries in the tropics, catches of fish and shellfish have been declining in the lagoons and inshore reefs of the Pacific island of Samoa for many years (Horsman & Mulipola, 1995). Reasons for this decline include overexploitation, the use of destructive fishing methods, and environmental disturbances. Overexploitation has resulted from a combination of factors, including increasing population sizes and the use of overly-efficient, and sometimes destructive, fishing methods. The use of modern materials such as chicken wire for fence traps and monofilament nylon for gill nets, for example, has made fishing efforts more effective. In some cases, modest developments, such as the availability of underwater torches, which allow the spearing of fish resting under corals at night, have resulted in a dramatic increase in fishing efficiency. Destructive fishing methods include the use of explosives and chemicals such as bleaching agents, as well as traditional plant-derived poisons. Environmental disturbances have resulted from not only natural events, such as cyclones and storms, but also from human activities. These activities include the destruction of nursery areas (including mangrove areas) by road construction and land reclamation. Poor land management practices have resulted in erosion and the siltation of lagoons.

The general decline in fish stocks is of particular concern in coastal tropical countries where subsistence catches of seafood provide a traditional and important source of protein. In spite of this importance, most developing countries have disregarded their subsistence fisheries, even though the resultant catches may be collectively larger than those from commercial fisheries. In Samoa, the subsistence catch has been estimated at 4600 t/yr (King, 1989), almost twice as much as the commercial catch of approximately 2600 t (A. Mulipola, 1998).

Government responses to falling subsistence fish catches usually involve setting up public awareness programmes and enacting national laws to protect fish stocks. However, due to many factors, including poor enforcement regimes and particularly lack of community ownership, these actions are rarely successful. In some cases, attempts are made to involve communities in working with government authorities on a cooperative basis (co-management) with limited success. Often, community consultation is merely used to seek approval for courses of action predetermined by Fisheries authorities.

However, fishing communities are often repositories of valuable traditional knowledge concerning fish stocks and have a high level of awareness of the marine environment (Johannes, 1982). In addition, many subsistence fishers in tropical regions live in discrete communities which have some degree of control, either legal or traditionally assumed, of adjacent waters. Together, these factors provide an ideal basis on which communities can be encouraged and motivated to manage their own marine resources. This paper is based on the authors' experience with a community-based fisheries extension programme, in which each participating village was assisted to develop its own Village Fisheries Management Plan.

### Methods

#### *The Fisheries Extension Strategy*

The overall extension strategy in Samoa was to seek a community-developed Fisheries Management Plan from each village participating in the extension programme. Each participating village was encouraged to analyse its fishing practices and develop a community-owned plan with undertakings to introduce appropriate regulations and pursue other conservation measures. Reciprocally, the Fisheries Division gave undertakings to support the community by providing scientific advice and assistance. The project strategy was based on four principles: a) maximum community participation; b) motivation rather than education; c) a demand-based extension system; and d) the development of alternative sources of seafood to those resulting from the present heavy and destructive exploitation of lagoons and near-shore reefs.

#### *Maximum community participation*

Regardless of legislation or enforcement, the responsible management of marine resources will only be achieved when fishing communities themselves see it as their responsibility. Accordingly, the strategy focused on mobilising each community through direct contact with key village groups. These included women's groups and untitled men's groups to ensure the widest community participation and eventual ownership of the village fisheries management plan.

#### *Motivation, not education*

The knowledge of island and coastal people regarding the marine environment has often been underestimated. Most coastal communities have an awareness of, and concern for, their marine environment. Although public awareness-raising activities were part of the fisheries extension programme, the prime need is not for education, but for motivation and support. Part of this

motivation depends on the availability of economically viable alternatives to the present unsustainable and destructive fishing practices (see *Development of alternative sources of seafood* below). The key task was to convince communities that they, not the government, have the primary responsibility to manage their marine environment.

*Extension system which is demand-based*

For reasons of efficiency and sustainability, the extension system focused on villages in which communities had a concern for the marine environment and were prepared to take action in finding solutions to problems. This required selectively working with villages which were eager to participate in the programme.

*Development of alternative sources of seafood*

It is unreasonable to expect communities to adopt conservation measures, which will (at least in the short term) reduce present catches of seafood even further, without offering alternatives. Accordingly, the extension programme included: 1) the diversion of fishing pressure to areas immediately beyond the reefs through the introduction of medium-sized, low-cost boats; 2) the promotion of village-level aquaculture; and 3) the restocking of depleted species.

*The Fisheries Extension Process*

Preparation for the fisheries extension programme consisted of designing a culturally-appropriate extension process and training extension staff to facilitate the process effectively. Training for extension personnel was based on the requirement for a balanced understanding of both basic scientific knowledge and community motivating/mobilising techniques. Scientific training provided a basic understanding of biology, ecology, conservation, fishing techniques, aquaculture, seafood handling, and fisheries management practices. Existing fisheries scientific staff were available if more specialised technical advice was required by communities. Community-related training provided skills in unobtrusively encouraging communities to discuss their problems and propose their own solutions; a key technique was the construction of problem-solution trees (see *Village Group Meetings*, below).

The developed extension process involved recognising the village *fono* (or council) and chiefs as the prime instigators of change, while still allowing ample opportunities for other community groups to participate. The process from initial contact with the village to the final production and overseeing of a Village Fisheries Management Plan is summarised in Figure 1 and described below.

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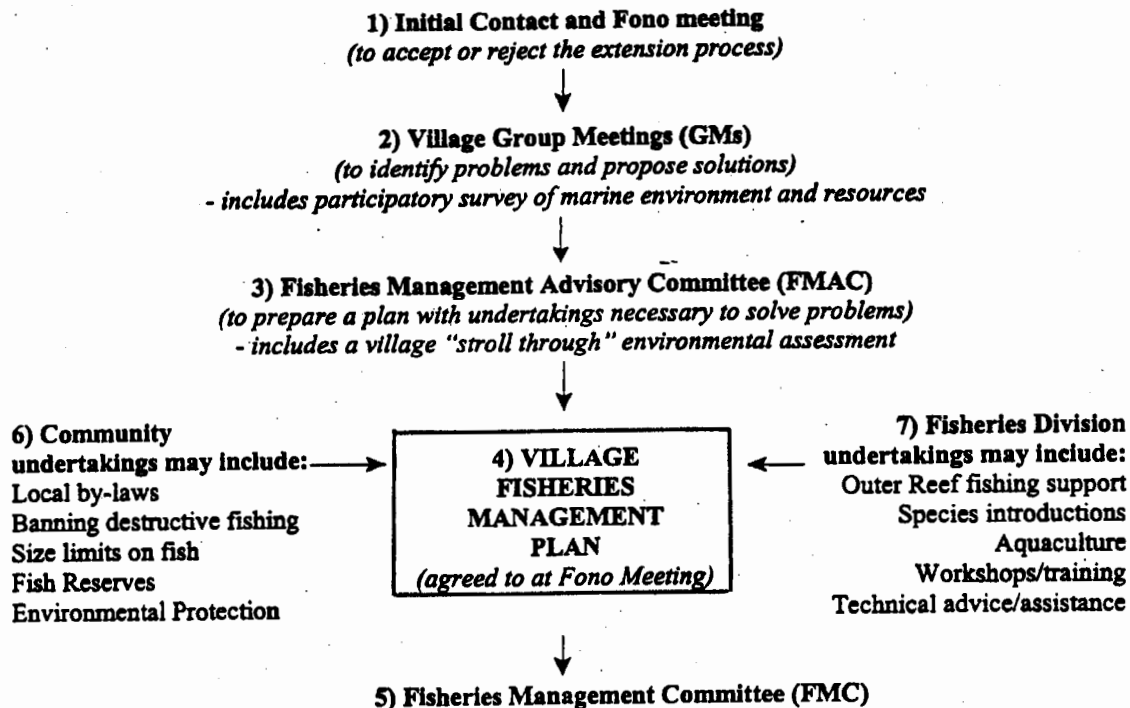


Figure 1: The Fisheries Extension Process in Samoan villages.

### Initial contact and the village council (fono) first meeting

In the early stages of the programme, villages were first contacted by a Village Extension Facilitator (VEF). Later, this became less necessary as village leaders approached the Fisheries Division to express interest in the programme. Following an initial expression of interest, a meeting was arranged with the village *fono* (council), at which the community was provided with information to allow them to either accept or refuse the extension programme. If the *fono* decided to accept the process, it was then asked to arrange for separate meetings of several village groups, including women and untitled men.

### Village Group Meetings

The village was responsible for assembling various village groups for separate discussions; this separation was necessary to allow particular sectors of the community to express opinions which they otherwise may not do in large groups dominated by titled people. The groups, including women (*faletua ma tausī, aualuma*), untitled men (*aumaga*), fishers and titled men (*matai*), held meetings to analyse the condition of their marine environment and fish stocks by considering a series of questions. These questions were in the form of a Rapid Historical Appraisal or RHA (McArthur 1994) to assess the degree of change that fishing, seafood catches and the marine environment had undergone over recent years. After this, each group decided on key problems, determined causes, proposed solutions, and planned remedial actions. These were written (as a problem/solution tree) on a portable white board by a trained facilitator (Figure 2). At a second meeting, the groups continued to examine the most practical solutions to the problems in greater detail. Finally, a village

Fisheries Management Advisory Committee (FMAC) was formed with three people nominated from each group.

***The Fisheries Management Advisory Committee (FMAC)***

The FMAC held a series of meetings (typically 3) to further consider the problems and solutions identified by each group, and combined these into a single problem/solution tree (Figure 2). The committee then decided how the solutions could be made to work, which actions were required from the village community, and what type of support was required from the Fisheries Division.

At the first or second FMAC meeting, committee members and Fisheries Extension Officers conducted a village "stroll-through environmental assessment." This involved walking through the village examining and noting the environmental features which had been either discussed in meetings, or which should receive community attention. The purpose of the assessment was to prompt community discussions of environmentally-critical areas and to avoid wasting time on unrealistic undertakings (for example, the farming of freshwater fish when there is no permanent [year-round] source of fresh water). The assessment was to estimate the likely success of a proposed community action, and was not meant to replace a more detailed scientific assessment, which (if necessary) would be completed by fisheries scientific staff.

At the FMAC meetings, members (assisted by Extension Officers) prepared a draft Village Fisheries Management Plan for discussion and approval by the village council. The final draft of this plan was completed by members of the FMAC at the Fisheries Division, where scientific staff were available to provide additional plan-related technical information on demand.

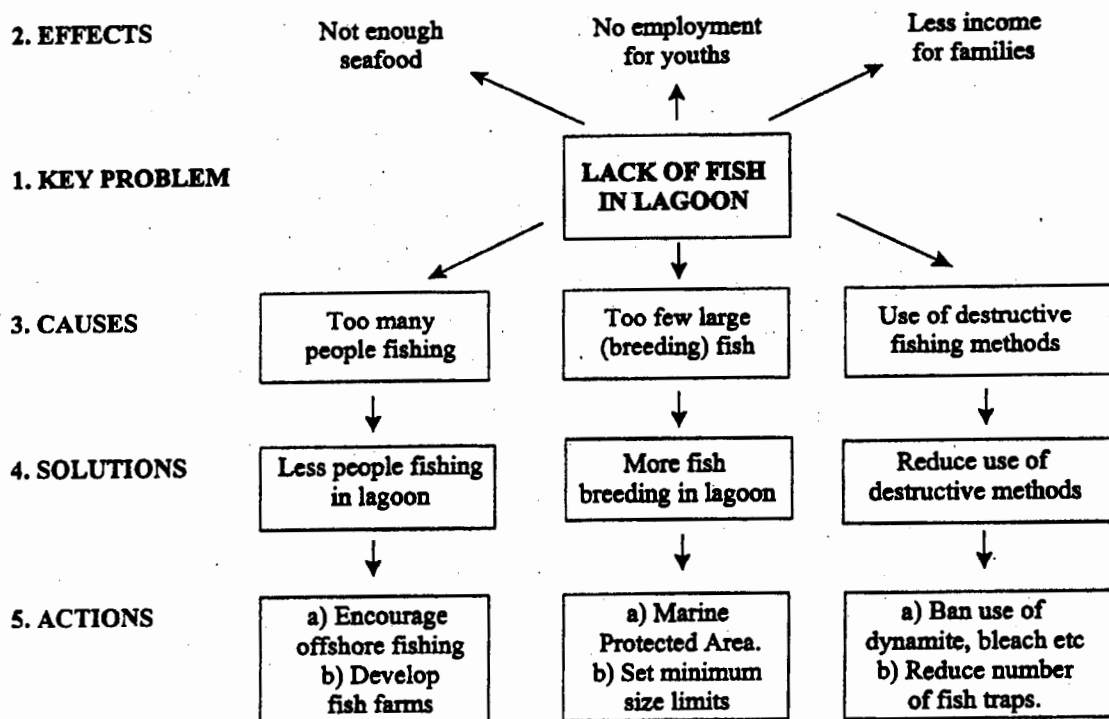
***The Village Fisheries Management Plan and final fono meeting***

The community-owned Village Fisheries Management Plan is in the form of an agreement between the village and the government in that it lists the resource management and conservation undertakings of the community, and the servicing and technical support undertakings required from the Fisheries Division. The plan was presented to the *fono* by the FMAC, in the presence of Senior Fisheries staff (to signify the meeting's importance). If the plan was accepted by the *fono*, both the *fono* and the Fisheries Division agreed to carry out their respective roles and undertakings. The *fono* then appointed a Fisheries Management Committee to oversee the working of the plan.

***The Fisheries Management Committee (FMC)***

The FMC was appointed by the *fono* to administer the undertakings of the village. In most cases, members of the FMAC were appointed to the FMC. Once the Village Fisheries Management Plan was formally agreed upon, the Fisheries Division maintained regular contact with the FMC and provided the technical support agreed to under the plan.

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*Figure 2: A simplified example of a problem/solution tree as constructed by a village community. The process begins with step 1 (Key Problem) before proceeding in the numerical order shown. All information is provided by the community, with a facilitator acting as a recorder.*

**Results**

Within the first two years of full operation, fisheries extension staff attempted to introduce the extension programme in 65 villages. The extension process was either rejected by or discontinued in 13 of these villages. Of these, six villages rejected the programme at an early stage, possibly due to a suspicion that a government authority was attempting to usurp the control of the village chiefs. Three communities lost interest when they discovered that the programme was not designed to supply goods and materials to the village, but to support the village's own endeavours to manage its own marine resources. The programme was discontinued in four villages when extension officers noted a lack of community commitment. The extension process was temporarily delayed in several other villages for a variety of reasons, including other community commitments and local political disputes. Later in the programme, the number of rejections and discontinuations became less as the extension programme was only started in villages in which leaders approached the Fisheries Division to express community interest.

Of the villages remaining in the programme, 64 progressed to the stage of producing their own Village Fisheries Management Plans. The time taken (from initial contact to approval of the plan) by each village community averaged 13.4 weeks. The plans contained a range of community undertakings which differed from village to village.

All villages included undertakings in their Village Fisheries Management Plans to support and enforce government laws banning the use of chemicals and dynamite to kill fish. Similarly, all villages banned the use of traditional plant-derived fish poisons. Most villages (80%) also banned other traditional destructive fishing methods, such as the smashing of coral to catch small sheltering fish (*fa'amo'a* and *tuiga*).

Villages set rules to either enforce mesh size limits on nets (75%) or to place controls on the use of chicken-wire fish fences or traps (9%) in their fishing areas. Many communities (41%) made their own rules to enforce national laws banning the capture of fish less than a minimum size, and some set their own (larger) minimum size limits. Some villages (21%) placed restrictions on the use of underwater torches for spearfishing at night.

Community conservation measures included (80%) organising the collection of crown-of-thorns starfish, *Acanthaster planci* (L), as well as (14%) banning the removal of beach sand and (71%) dumping of rubbish in lagoon waters. Some villages which had experience of the collection of marine species for commercial use from their fishing waters banned the collection of sea cucumbers (*Holothuroidea*) for export (41%) and prohibited the collection of live corals for the overseas aquarium trade (9%). All villages with mangroves (27%) imposed rules to ban their removal. In spite of predictions that villages would be reluctant to close areas to fishing, most villages (86%) chose to establish small Marine Protected Areas (MPAs, in which all fishing is banned) in part of their traditional fishing areas.

Other village undertakings include controlling the coral-damaging collection of edible anemones (*Actinaria*), protecting areas in which palolo worms (*Eunice* sp.) are traditionally gathered during brief synchronised spawning events in October or November each year, and offering prayers for the safe-keeping of the marine environment.

The village rules described above were made and enforced by each village council, and were applicable only to members of that particular village. In cases where communities were concerned that people from outside the village were likely to fish in their waters, some villages (18% so far) made their village rules into fisheries by-laws which, after government approval, became enforceable under national law (Faasili, 1997).

Fisheries Division undertakings listed in Village Fisheries Management Plans included the reciprocal actions necessary to support community undertakings. These mainly involved providing technical advice on how to care for the marine environment, and on the development of alternative sources of seafood to those resulting from the present heavy exploitation of lagoons and damaged near-shore reefs. Undertakings included the provision of assistance with the restocking of giant clams (*Tridacna* species) in village Fish Reserves (82% of villages), the farming of tilapia (16%), and in facilitating the purchase of medium-sized boats to allow community members to fish outside the lagoons (39%). In response to community demand, the Fisheries Division ran supporting workshops on tilapia fish farming, growing giant clams, fish handling, fish smoking, safety at sea, outboard maintenance, methods of fishing outside the reefs, and small business management.

Some Village Fisheries Management Plans have been in place for almost two years. A quantitative review of villages with plans for more than six months was conducted by each community working with fisheries extension staff to determine how well the activities contained in the plans (including



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the enforcement of village regulations) were being carried out on a continuing basis. An arbitrarily predetermined score of 75% was chosen as the lower limit of acceptability. The maximum score obtained by a village was 94%, and eight villages received scores below 75%. Villages received low scores for various reasons including holding few village Fisheries Management Committee meetings, not enforcing village rules, failing to monitor restocked giant clams, and poorly maintaining their Fish Reserve signs and markers.

### Discussion

In Samoa, community-owned Village Fisheries Management Plans promoted by the Fisheries Division were completed by 64 villages, and many more expressed their interest in joining the extension programme. Community undertakings included a wide range of activities and village rules designed to protect and rehabilitate the marine environment, and eventually increase stocks of marine species. Factors affecting the success or otherwise of marine resource management by communities are related to the extension process, community commitment, and the support of the agency promoting community-based management.

#### *The extension process*

The extension process was designed specifically to encourage communities to discuss problems and propose solutions relating to fisheries and the marine environment. The length of the extension process in each village had to be sufficiently extended to allow the community time to establish ownership of their Village Fisheries Management Plan and undertakings (in practice, it was found that a process which was too extended led to communities becoming impatient, and a compromise was reached). Post-management plan activities must include regular contact by extension officers and opportunities for the village Fisheries Management Committees to exchange information. In Samoa, fisheries staff held monthly meetings to review the management plans of all villages in the programme to ensure that the undertakings of both the village and the Fisheries Division were progressing. In addition, national workshops were held and attended by participants from each village with a management plan.

#### *The target communities*

The target communities must have an awareness of problems with the marine environment and fisheries resources and a desire to take actions to address these problems. In addition, they must have some control over their adjacent fishing areas and have the ability to make and enforce their own regulations.

Although awareness of the need for marine conservation is likely to be high in coastal communities, it is necessary to provide motivation and scientific advice. It is also necessary to convince communities that they, not the government, have the primary responsibility to manage their marine environment. In Samoa, a video tape and a series of Fisheries Information Sheets were designed to increase awareness and provide information on a wide range of fisheries and marine conservation topics.



For a village to set conservation regulations, it must have either traditional, de facto or legal control over its adjacent waters. In countries where this is not the case, it may be necessary to grant such rights (Territorial Use Rights in Fisheries, or TURFs), as proposed in the Philippines (Agbayani & Siar, 1994). In Samoa, villages have de facto control of adjacent fishing areas, and also have the ability to devise fisheries by-laws enforceable under national law. The prime indicator of success in the fisheries extension programme was the number of villages which not only continued with the undertakings and activities agreed to in their Fisheries Management Plans, but enforced their own regulations. In Samoa, most village councils actively enforced their own rules, and applied severe penalties for infringements. People breaking village rules have had traditional fines of pigs or canned goods imposed on them by the village council. In addition, some villages made their village rules into fisheries by-laws, in order that these can be applied to people from other villages.

### *The promoting agency*

There are several basic requirements of fisheries agencies setting up a community-based extension system. In particular, fisheries authorities must have the technical and scientific capacity, as well as willingness, to support community undertakings, and to encourage the development of alternative sources of seafood. In Samoa, scientific input was required, for example, in surveying proposed sites for fish reserves, developing community fish farms, and re-establishing stocks of depleted bivalve molluscs. Similar inputs were required for diverting fishing pressure away from heavily exploited inshore areas to areas immediately beyond the reefs through the introduction of medium-sized, low-cost boats.

As many subsistence fishers require seafood for their families on a daily basis, it is unreasonable to expect communities to readily adopt conservation measures, which will, at least initially, reduce present catches of seafood even further. Whether community-based or not, most conservation measures, including preventing destructive fishing methods and imposing fish size limits, will cause a short-term decrease in catches. Accordingly, a community-based extension programme which does not promote alternative means of obtaining seafood is unlikely to be sustainable.

A side benefit of fisheries staff working closely with fishing communities is that the collection of scientific data on subsistence fisheries is greatly facilitated by community involvement. A trial run in Samoa involved village high-school students keeping a "weekly fishing log" of all fishing activities (fishing methods, effort and catches) in their own household or extended family. A surprising amount of information, and even estimates of sustainable yield by area, may be gained from such extensive surveys on subsistence fisheries. Where data are collected from different areas with similar ecological characteristics, it may be possible to apply a surplus yield model (over area rather than time) not only to provide an estimate of the average sustainable catch, but also to indicate villages where resources are presently under pressure (King, 1995).

When embarking on community-based projects, it also may be necessary to overcome an initial government reluctance. Government authorities may have concerns about encouraging village communities to take actions for which they see themselves responsible. Fisheries agencies, as repositories of technical and scientific expertise, have traditionally assumed responsibility for directing community actions, and setting national laws to protect fish stocks and the marine environment. Consequently, a government fisheries agency may feel a loss of power, or that it is abrogating its own responsibility, by placing the initiative for marine conservation in the hands of

fishing communities. However, contrary to initial feelings of concern, the Samoan experience suggests that a government agency promoting community management gains both public support and respect. The numbers of rural people visiting fisheries offices have increased dramatically, media publicity has been positive, and the Fisheries Division is now regarded as one of the most active of local government agencies.

The main benefit of community-based fisheries management to a government is that conservation actions necessary to exploit seafood resources on a sustainable basis become a community responsibility. Thus the actions, being less dependent on public funding, become more sustainable and the costs of enforcing fisheries regulations are reduced. As activities and regulations listed in the individual Village Fisheries Management Plans are being overseen by communities with a direct interest in their continuation and success, enthusiasm and commitment appears high. An unexpected result of the extension programme was the large number of villages deciding to establish community-owned Marine Protected Areas, which have the potential of forming a network of fish refuges around the entire country. Although hard evidence on the benefits of Marine Protected Areas in increasing inshore fish production is lacking (Roberts & Polunin, 1991), intuitively, the network may maximise linking of larval sources and suitable settlement areas, and provide the means by which adjacent fishing areas are eventually replenished with marine species through reproduction and larval migration (King & Faasili, 1998).

A further development of a community-based fisheries extension system is the setting up of a Fisheries Department which is totally demand-based. That is, not only would villages take responsibility for managing their subsistence fisheries, but commercial fishers would take responsibility for commercial fisheries. Under this demand-based system, all usual sections of a fisheries agency (including research, development and extension) would work to support the undertakings and needs of all fishers. A Research Section, for example, which is a luxury that small tropical countries can ill afford, would become a demand-based Scientific Support Section, and would be responsive to the needs of both subsistence and commercial fishers. Although a totally demand-based fisheries service may be a development for the future, the responsible management of marine resources will only be achieved when all fishers see it as their own responsibility rather than that of the government.

### Acknowledgments

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