

28002

SPC/2<sup>nd</sup> Pacific Community Fish. Mgmt. Workshop/BP 15  
12 October 1998

ORIGINAL: ENGLISH

SECRETARIAT OF THE PACIFIC COMMUNITY

SECOND PACIFIC COMMUNITY  
FISHERIES MANAGEMENT WORKSHOP  
(Noumea, New Caledonia, 12-16 October 1998)

COMMUNITY-BASED MANAGEMENT OF SUBSISTENCE  
FISHERIES IN TROPICAL REGIONS

By

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APIA, SAMOA, 14<sup>th</sup> to 18<sup>th</sup> SEPTEMBER 1998

Paper no.	2/23
Organisation	Samoa Fisheries Division
Author	Ueta Fa'asili & Savali Time
Date/Time	Monday, 14th @ 13:15 hrs

## COMMUNITY-BASED MANAGEMENT OF SUBSISTENCE FISHERIES IN TROPICAL REGIONS

### Abstract

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Many subsistence fishers in tropical regions live in discrete communities which have some degree of control of adjacent waters. This provides an ideal basis on which to motivate communities to manage their own marine resources. A fisheries extension program 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 have ranged from enforcing laws banning destructive fishing methods to protecting critical marine habitats. During the 42 months of the AusAID Fisheries Extension and Training Project, the extension process was commenced in 70 villages, of which 53 have produced Village Fisheries Management plans. An unexpectedly large number (48) of these villages chose to establish community-owned Marine Protected Areas.

### Key words

community-based fisheries management; fisheries extension;  
tropical fisheries; 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 (including the use of traditional poisons, bleaching agents and dynamite), and environmental disturbances.

In many Pacific Island countries, overexploitation has resulted from a combination of 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 effort more effective. In some cases, modest developments such as the introduction of underwater torches have resulted in a devastating 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. In high islands, 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 communities 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 in the same way that industrialised countries have, until recently, ignored their recreational fisheries. This is particularly debilitating, as the catches from many subsistence and recreational fisheries are collectively larger than those from commercial fisheries. In Samoa, the subsistence catch has been estimated at 4600 tonnes per year (King 1989), almost twice as much as the commercial catch of approximately 2600 tonnes (A. Mulipola, personal communication).

Government responses to falling subsistence fish catches usually involve setting up public awareness programs 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). 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 program, in which each participating village was assisted to develop its own Village Fisheries Management Plan.

## **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 program. 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.

### ***a) 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.

### ***b) 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 program, 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 point d below). The key task was to convince communities that they, not the government, have the primary responsibility to manage their marine environment.

### ***c) an 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 participate and contribute in finding solutions to problems. This required selectively working with villages which were eager to participate in the program.

### ***d) the 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 program included the development of alternative sources of seafood to those resulting from the present heavy and destructive exploitation of near-shore reefs and lagoons. The three alternative seafood sources identified were 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 judicious introduction of new (exotic) or depleted species.

## The fisheries extension training program

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. Detailed knowledge in these areas was considered unnecessary as fisheries scientific staff could be called upon for advice. More importantly, extension staff were trained to unobtrusively encourage communities to discuss their problems and propose solutions.

## The fisheries extension process

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

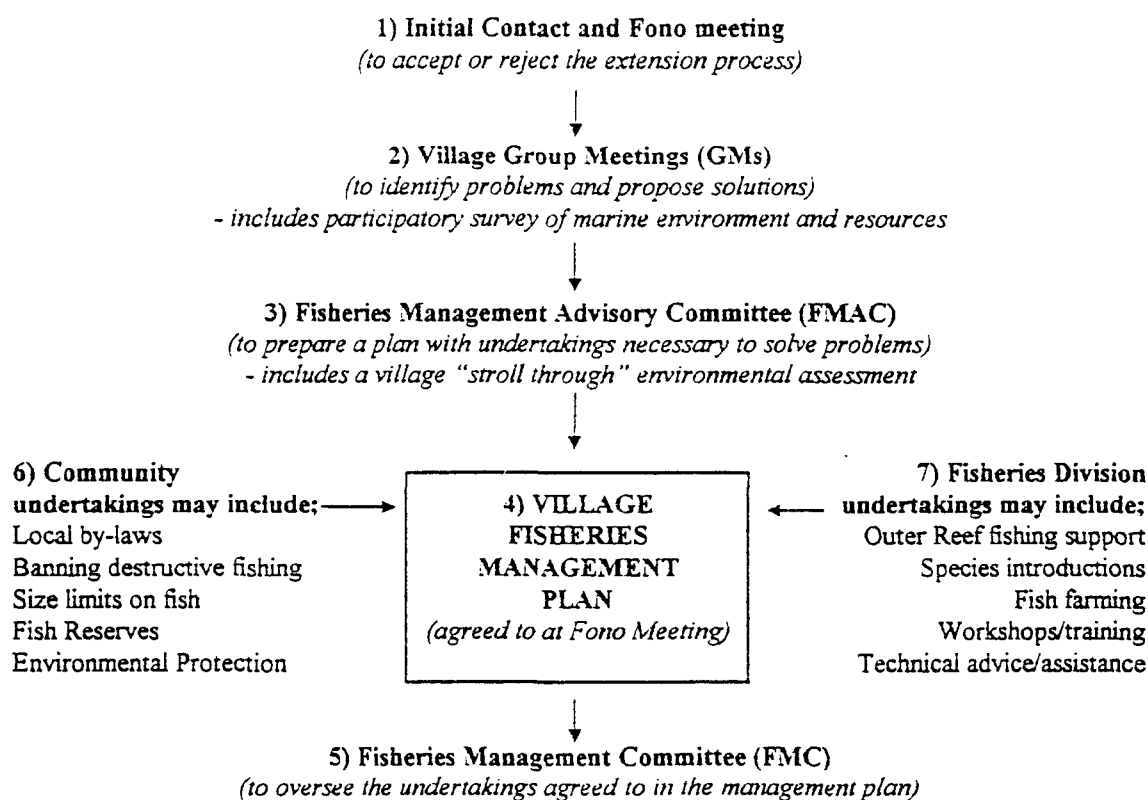


Figure 1: The Fisheries Extension Process in Samoan villages.

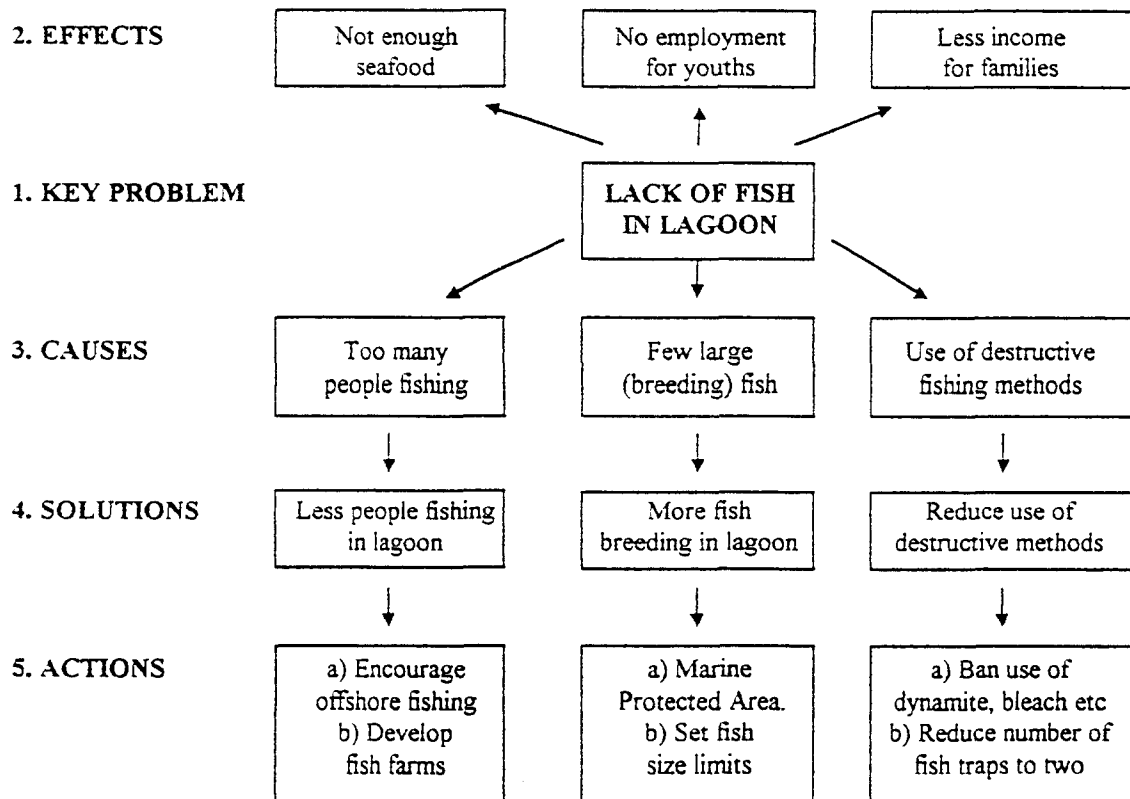
### 1) Initial contact and the village council (fono) first meeting

In the early stages of the program, villages were first contacted by a Village Extension Facilitator (VEF). Later in the program, this became less necessary as village leaders approached the Fisheries Division to express interest in the program. Following an expression of interest, a meeting was arranged with the village council (fono), at which the

community was provided with information to allow them to either accept or refuse the extension program. Senior Fisheries staff were present at the fono meeting to lend importance to the occasion. If the fono decided to accept the process, it was then asked to arrange for meetings of several village groups, including women and untitled men.

## 2) Village Group Meetings

Several village groups, including women (faletua ma tausi, aualuma), untitled men (aumaga), fishers, and titled men (matai) held separate 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.



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

## 3) The Fisheries Management Advisory Committee (FMAC)

This committee 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 tilapia 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 take the place of 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 (fono). The final draft of this plan was completed by the FMAC at the Fisheries Division, where scientific staff were available to provide additional, plan-related, technical information on demand.

#### **4) The Village Fisheries Management Plan and final council (fono) meeting**

The extension process culminated in a Village Fisheries Management Plan. This community-owned plan was 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.

#### **5) 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 Fisheries Management Plan was formally agreed to, the Fisheries Division maintained regular contact with the Fisheries Management Committee and provided the technical support agreed to under the Management Plan.

#### **6) Community Undertakings**

Community undertakings have included decisions to support and enforce Government laws banning the use of chemicals, dynamite and plant-derived poisons (ava niukini) to kill fish. Many villages have banned traditional destructive fishing methods such as the smashing of coral to catch sheltering fish (*fa'amo'a* and *tuiga*). Most villages have made their own rules to enforce National laws banning the capture of fish less than a minimum size, and some have set their own (larger) minimum size limits. Some villages have placed controls on overly-efficient methods of fishing, such as the use of nets and the use of underwater torches for spearfishing at night. Community conservation measures have included collecting crown-of-thorns starfish as well as banning the removal of beach sand and dumping of rubbish in lagoon waters. An unexpectedly large number of villages have



chosen to establish Fish Reserves (in which all fishing is banned) in part of their traditional fishing areas. Many villages have made their rules into Fisheries By-laws (Faasili, 1977), in order that these can be applied to people from other villages fishing in their areas.

## 7) Fisheries Division Undertakings

Fisheries Division undertakings listed in the Village Fisheries Management Plan included the reciprocal actions necessary to support community undertakings. These undertakings have 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 have included the provision of assistance with the translocation and farming of new types of fish and shellfish, and in facilitating the purchase of medium-sized boats to allow villagers to fish outside the lagoons. Surveys suggest that catches from areas immediately beyond the reefs would support the purchase of such boats by village fishers (Matthew, 1997). In response to community demand, the Fisheries Division has run supporting workshops on tilapia farming, growing giant clams, fish handling, fish smoking, safety at sea, outboard maintenance, and on methods of fishing outside the reefs.

### Monitoring the Extension Program

Monthly extension meetings were held to review and assess progress, and to plan extension activities in the coming month. An important function of the meetings was to review agreements contained in the Village Fisheries Management Plans of all villages in the program; this was to ensure that the undertakings of both the village and the fisheries Division were progressing.

After 20 villages had completed management plans, a National Workshop on the Village Management of Fisheries and the Marine Environment was held. Each village with a management plan was invited to nominate two participants from their respective Fisheries Management Committees. The purpose of the workshop was to allow committees from different villages to exchange information, and to decide how villages could assist each other. The meeting was also used to obtain community feedback in order to improve the extension process. Media coverage on the day served to further promote the extension program in rural communities.

### Discussion

Within the 42 months of the project, full operation the fisheries extension process was commenced in 72 villages, and, so far, 53 of these have produced their own Village Fisheries Management Plans. The time taken (from initial contact to approval of the plan) by each village community ranged from 8 to 12 weeks with an average of 10 weeks. In the early stages of the program, the process was discontinued in some villages due to lack of community commitment. The process has been delayed in some other villages for a variety of reasons including other community commitments and local political disputes.

There are three basic requirements for setting up a community-based extension system, such as that in Samoa, in which the process culminates in a Village Fisheries Management Plan.



First, fishing communities must be aware of problems with the marine environment and fisheries resources, and have the desire to take actions to address these problems. Although awareness of the need for marine conservation may be high in Pacific Island communities, it may be necessary to provide motivation and technical advice. It will also be necessary to convince communities that they, not the government, have the primary responsibility to manage their marine environment. In Samoa, the Fisheries Division produced a video tape and a series of Fisheries Information Sheets (King & O'Sullivan 1996) which were designed to increase awareness and provide scientific information on a wide range of fisheries and related topics. The prime indicator of success in the program was the number of villages which continued with the undertakings and activities agreed to in their management plans, enforced their own regulations, and which have active and well-respected fisheries management committees.

A second requirement is that fishing communities must have either traditional, defacto or legal control over waters adjacent to their villages. 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 and Siar, 1994). In Samoa, villages councils have the ability to devise fisheries bylaws which, after government approval, become enforceable under national law (Fa'asili, 1997).

A third requirement is that 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. Because subsistence fishers operate on a short-term strategy, in which the aim is to provide for their own immediate needs (Pomeroy, 1991), any community-based extension program which does not provide alternative means of obtaining seafood is doomed to fail. Many conservation measures (whether community-based or not), such as stopping destructive fishing methods or imposing fish size limits, will cause a short-term decrease in catches. 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 shellfish. Similar inputs were required for diverting fishing pressure away from heavily exploited inshore areas to areas immediately beyond the reefs. It is doubtful that community-based fisheries management would continue on a sustainable basis without such continuing support.

Problems in initiating a community-based fisheries extension program may include the initial concern by government authorities in encouraging village communities to take actions for which they see themselves responsible. As repositories of technical and scientific expertise, fisheries authorities have traditionally assumed responsibility for using this knowledge to direct community actions and to set national laws protecting 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 government agencies.

Fisheries authorities may also be concerned by the length of time required under a community-based process when compared with a traditional top-down extension system. Under a community-based system, the length of the extension process in each village has to



be sufficiently extended to allow the community time to carefully consider their own problems and solutions. In the Samoan model, this time was necessary for communities to establish ownership of their Village Fisheries Management Plans and undertakings (in practice, however, it was found that a process which was too extended led to communities becoming impatient, and a compromise was reached). Although a community-based process is initially more time-consuming than a traditional top-down extension system, the results are more sustainable. Although government input is initially high, and support may be required on an ongoing basis, input over the long term is low. When fishing communities take control of their marine resources, some government actions, such as the enforcement of conservation measures, becomes no longer necessary in rural areas. In villages with management plans, most village councils have actively enforced their own rules, and have applied severe penalties for infringements.

The main benefit of community-based fisheries management is that conservation measures necessary to exploit seafood resources on a sustainable basis become a community responsibility, and therefore more likely to be sustained. However, there are other benefits relating to the exchange of information and collection of statistics on subsistence fisheries. Working with communities is a two way process, in which fisheries officers facilitating village meetings learn much more than they would in their more usual authoritative role.

The collection of statistics from subsistence fisheries is difficult due to the number and wide distribution of fishing communities as well as the lack of staff. However, community involvement is one way of addressing this problem. A trial run in Samoa used senior high-school students to record the daily subsistence catches in their own household or extended family (King, 1995). Students were asked to keep a "weekly fishing log" (supplied by the Fisheries Division) of all household fishing activities (fishing methods, effort and catches). Such a survey could be repeated at intervals over the year in order to detect seasonal variations in catches. 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) to estimate not only the sustainable catch, but also indicate villages where resources are presently under pressure.

An unexpected benefit of the Samoa program was the surprisingly large number of villages deciding to establish Fish Reserves, in which all fishing is banned, in part of their traditional fishing area. These reserves, the first in Samoa, provide the possibility of establishing a network of fish refuges around the entire country. Although hard evidence on the benefits of marine reserves in increasing inshore fish production is lacking (Roberts and Polunin, 1991), intuitively, they provide the means by which adjacent fishing areas may eventually be replenished by breeding and larval transport (King, 1995, 1996).

An extension of the community-based system developed in Samoa is the setting up of a Fisheries Department which is totally demand-based. That is, not only would villages take responsibility for their marine environment and resources, 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 island 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 the government's.

## Acknowledgments

We acknowledge AusAID (the Australian Agency for International Development) for its support for a project which included the introduction of a community-based fisheries extension system in Samoa. We also acknowledge valuable contributions from Neil O'Sullivan, Marc Wilson, Etuati Ropeti, Nichole Horsman, Peter Matthew, Apulu Fonoti, Lyn Lambeth, and a team of enthusiastic young extension staff members, all of whom had considerable input into the development and success of the extension program. We also thank Neil O'Sullivan, Lui Bell, Jenny Kallie, Peter Matthew and Lyn Lambeth for comments on this paper.

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