

GOVERNMENT OF SAMOA
FISHERIES DIVISION
MINISTRY OF AGRICULTURE, FORESTS, FISHERIES AND METEOROLOGY



SAMOA FISHERIES PROJECT
an **AusAID** - assisted project of the Fisheries Division,
Ministry of Agriculture, Forests, Fisheries & Meteorology.

Management of village fisheries; Samoa's community-based management strategy

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Endorsed on behalf of the Fisheries Division

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Glossary, acronyms, and abbreviations.

<i>aumaga</i>	The untitled men of a village, i.e. not a <i>matai</i>
CPUE	Catch per unit effort. In the case of the village fishery, this is usually kg per person hour fished..
effort	The amount of fishing effort applied to a particular fishery. For management purposes, this effort needs to be quantifiable. In the case of the village fishery, it is usually person hours fished
El Niño	The extensive warming of the central and eastern Pacific that leads to a major shift in weather patterns across the Pacific.
FAD	Fish aggregation device
fish fence	A modern type of fish trap, probably introduced in the last 50 years. Made of sticks of wood, consisting of a barrier fence erected perpendicular from the shore, with a holding bay at the seaward end from which the fish are collected. More recently, gill nets and chicken wire have been added, making the traps more efficient.
<i>fono</i>	A council of village leaders
hookah	Underwater breathing apparatus, with a compressor usually mounted in a boat, supplying air to a diver through an air hose.
ICZM	Integrated Coastal Zone Management
<i>matai</i>	A title held by village chiefs.
mile	When fishermen refer to miles, e.g. 5 miles of line, they are referring to nautical miles (nm). 1 nm = 1.85 km.
mt	Metric tons, i.e. 1000kg or 2,205 lbs.
ORS	Outer reef slope
ORS boat	4.3m aluminium boats specifically promoted by the Fisheries Division.
SCUBA	Self Contained Underwater Breathing Apparatus
SPC	Secretariat for the Pacific Community (formerly the South Pacific Commission)
SAT	Samoan tala, or dollar (approximately USD0.30, May, 2001)
VFMaC	Village fishery management committee

EXECUTIVE SUMMARY

Recognising the difficulties involved in trying to manage remote fisheries from a central location, Samoa has adopted a community based approach to subsistence fishery management. A prime consideration was community ownership of this management. This plan provides the basic principles and guidelines that have resulted in what has become recognised throughout the region, and in other parts of the world, as a successful community-based fishery management programme. Thirty percent of Samoa's approximately 230 coastal villages now have village fishery management plans.

The goal is for each village to effectively manage their own fisheries resources. The strategy to achieve this goal is for the Fisheries Division to encourage and assist each coastal village to develop its own Village Fisheries Management Plan.

The process is to encourage a village community to analyse its fishing practices and problems, and suggest solutions. Community undertakings and actions to solve these problems may include introducing fisheries regulations and pursuing other conservation measures. These undertakings and actions are listed in the community-owned Village Fisheries Management Plan. The strategy is to address questions such as how to encourage a village to manage its fishery sustainably and how community ownership of the plan can be assured. As fishery management is likely, in the short term, to reduce the amount of seafood available to the village, the strategy should also include support for the village, such as assistance with developing alternative sources of seafood.

The Fisheries Extension service is the catalyst to facilitate village level management. The extension process consists of meetings with village leaders (*fono*) followed by meetings with other groups, including women and the untitled men (*aumaga*), which may otherwise be overlooked in the process. It is believed that the participation of women is particularly important, as they are more likely to have a long-term (inter-generational) perspective of the benefits of conservation. A problem/solution tree is used to assist these groups to identify their problems, and suggest solutions. A fisheries advisory committee (FAC) is set up from members of these groups, and this FAC produces a Village Fishery Management Plan based on the problem tree and group discussions.

A Village Fishery Management Committee (VFMaC) is then established, consisting of members of each of the groups (stakeholders). The VFMaC is responsible for overseeing the management plan that is produced.

In community-based fisheries management, communities enforce their own fisheries regulations. A number of regulations that may be suitable for village level management are discussed. These include banning destructive fishing practices, regulating or banning certain types of highly efficient fishing gear, closed areas and seasons, size limits, rejection of females of certain species and protection of the marine environment. Some regulations may need to be legislated as village by-laws in order to control the actions of people from other villages who may break local village regulations.

In order to gauge the success or otherwise of the management plan, a review is required approximately every six months. An example of an appropriate review format is given. For village management of fisheries to be successful, all stakeholders must play their part, and the roles of various stakeholders are outlined.

2. Introduction and background

The setting

Samoa^{1,2} consists of two larger main islands, Upolu (1108 sq. km.) and Savaii (1695 sq. km.) and seven smaller islands. Two of these smaller islands, Manono and Apolima, are inhabited. The islands occupy a relatively small area of the Pacific Ocean, between 13° 25'S -14°05'S and 171°23'W-142°48'W. The total land area is around 2,820 sq. km. The proximity of several other Pacific Island countries results in Samoa having the smallest Exclusive Economic Zone in the Pacific, at only 130,000 sq. km.³.

An extrapolation of data contained in the Demographic and Vital Statistics Survey (Statistics Department, 2000) indicates that the country has a present population of around 175,000 (Upolu, 132,000. Savaii 43,000), spread throughout 21,424 households in 324 villages on the four islands. The urban and peri-urban population in the greater Apia area is around 60,000. This means that the total population has increased nearly 500% this century, and continues to increase at a rate of approximately 1% per annum (FAO 1993, Taule'alo, 1993). As a result, pressures on inshore resources, particularly the more accessible lagoon resources commonly harvested by village fishers, are increasing, as more and more people are looking to the nearshore resources for their subsistence.

Over 70% of the villages are located on the coastal fringe of the islands, and village level fishing is a major activity of the inhabitants of these villages. A household fisheries survey in late 2000 found that there are approximately 10,800 fishers living in these coastal villages, with a further 900 living inland (Passfield et al, 2001).

Fisheries are vital to the economy of the Samoa. They are a major earner of foreign revenue, with reported fish exports in the year 2000 of around 4500 metric tons (mt) worth SAT40 million (Watt and Moala, 2001). This is equivalent to between 60% and 70% of the total value of all exports. Fishery production from subsistence and small-scale commercial inshore fisheries was estimated to be over 7000 tons in the year 2000 (Passfield et al, 2001).

Apart from the commercial importance of these fisheries to Samoa, they are also of major subsistence importance to the people, especially to those living on the coastal fringe. They contribute significantly to the health and nutrition of the people, and considerably reduce the country's reliance on imported animal protein sources.

Why manage the village fishery

Samoa's lagoon and inshore areas adjacent to villages have suffered severe degradation in recent times due to a combination of causes including severe cyclones, increased water temperatures (global warming and El Niño events), and destructive fishing practices. Areas continue to be damaged as a result of poorly planned coastal developments, particularly in urban industrial areas and potential tourist development sites. Poor land

¹ Excluding American Samoa.

² The Country's name was changed to Samoa from Western Samoa in 1997.

³ Exact boundaries for EEZs are still subject to international negotiation.

use practices in the inland areas as well as pollution also contribute significantly to coastal environment destruction.

Damage and destruction in these coastal areas significantly decreases their productivity. Clearing of mangroves, for example, destroys areas that are important for breeding and nurseries for a number of young fish and invertebrates that are relied upon by subsistence fishers.

Indiscriminate fishing methods also have a negative affect on inshore fisheries. Fish fences and gill nets are examples of highly efficient fishing gear used by village fishers to catch fish in the lagoon. Methods such as these take fish over a range of sizes, including immature individuals that do not get the chance to breed and contribute to the adult population. These fishing methods are utilised at village level largely because they are efficient, low cost and low technology. They can be conducted from shore, or from the small *paopao* (outrigger canoes) which are the common fishing vessels of the coastal villages.

There are short term benefits from utilising these low cost and relatively efficient fishing methods, i.e. food on the table that day, and an income. However, the negative impact of continuous intensive fishing on the easily accessible near shore lagoon fishery has been a significant reduction on near-shore stocks.

In order for fisheries production to be maintained despite the increased levels of exploitation brought on by a growing population, and threats to production because of coastal pollution and habitat destruction, it is necessary for fisheries to be effectively managed. This management plan describes how Samoa's village level fishery can be managed to maintain or even increase fisheries production, through a partnership between Government and fishing communities.

Samoa's community based fisheries management programme, initiated by an AusAID supported project, has received wide local support and has resulted in regional and international recognition. The strategies and methodologies contained in this report have been included in a manual prepared by project staff and published by the Secretariat for the Pacific Community to promote similar developments in other Pacific Island countries (King & Lambeth, 2000).

3. Involving communities in marine resource management

In the past, most countries, including Samoa, managed their fisheries using the "top down", or Government-based approach. Central Governments imposed a management regime on fisheries, and then proceeded to regulate the fishery to the best of its ability. While this approach may sometimes work for a large scale commercial fishery, it is unlikely to work in a village subsistence or small scale fishery. Most fishery divisions, especially in the Pacific, have limitations on budgets and staff which make it impossible to constantly work in many different coastal villages spread throughout a number of islands.

The alternative is to assist villages to effectively manage their own fisheries from within their own community. Such involvement results in the community ownership of fisheries management actions and regulations. Under community ownership, fisheries management measures are enforced by the communities themselves.

The Government of Samoa, through the Fisheries Division, and assisted by AusAID supported projects, has adopted a policy of community based management for small scale and subsistence fisheries. This means that Government is stepping back from direct management, and playing a supporting role, to assist the villages of Samoa to manage their own fisheries. This village management plan provides information that will assist the Extension Service establish assess the receptivity of villages to the concept of managing their own resources, and provides information on how the management process can be facilitated and supported by the Fisheries Extension Service.

A goal and a strategy

Setting up a community-based fisheries management programme involves defining a goal and a strategy to achieve that goal. The goal should be for a village to effectively manage their own fisheries resources. The strategy to achieve this goal is for the Fisheries Division to encourage each coastal village to develop its own Village Fisheries Management Plan.

A village should be encouraged to analyse its fishing practices and problems, and suggest solutions. Community undertakings and actions to solve these problems may include introducing fisheries regulations and pursuing other conservation measures. These undertakings and actions are listed in the community-owned Village Fisheries Management Plan. The strategy should address questions such as the following.

- How to encourage a village to manage its fishery sustainably?
- How can community ownership of the plan be assured?
- How can participating villages be supported?

Encouraging a village. A village may need to be made aware that effective community based management is an option for maintaining and/or revitalising their fisheries. An awareness campaign by the Fisheries Division can help to achieve this, though with over 70 coastal villages currently managing their own fisheries in Samoa, word is likely to have already spread. For reasons of efficiency and sustainability, the Extension Service should focus on villages in which communities already have a concern for the marine environment and are prepared to take action in finding solutions to problems. Although it is tempting to concentrate on villages where the need is greatest (say a village where destructive fishing methods are known to be used), community-based management will not work unless the community has a strong desire to address its own problems. The strategy involves working selectively with village communities eager to instigate community management. Success in these villages may encourage other villages in need of management to implement similar regimes, once they see the benefits of successful management accruing to participating villages.

Community ownership. Community ownership will be optimised if as many people as possible are allowed to contribute to the process of developing the Village Fisheries Management Plan. This will require involving all groups (stakeholders), including women and untitled men (*aumaga*), who might otherwise be overlooked in the management process. This is to ensure the widest community participation and eventual ownership of the plan. It is believed that the participation of women in particular is important, as women are more likely than men to have a long-term (inter-generational) view of the benefits of conservation. The length of the extension process in each village

has to be sufficiently extended to allow the community time to establish ownership of their plan and undertakings. Ownership by the community requires sufficient time for people to consider their own problems and causes, and think of their own solutions. It may take many months of facilitated discussions by community groups before the plan can be regarded as owned by the community.

Support for villages. As many subsistence fishers require seafood for their families on a daily basis, it is unreasonable to expect communities to readily take conservation measures, which, at least initially, will 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 village management regime which does not provide for support such as promoting alternative means of obtaining seafood is unlikely to be sustainable. Developing alternative sources of seafood is therefore discussed later in this plan.

An extension process

Before embarking on a community-based fisheries management programme, the level of community awareness must be assessed. If community awareness is considered to be low, greater efforts will be needed to raise public awareness. At the same time, care should be taken not to underestimate community knowledge, as judicious use of such knowledge may be invaluable to successful management. For example, women, who make up 18% of Samoa's fishers, may have knowledge of the breeding season of some species they harvest, such as the *gau* (*Dolabella auricularia*), which would assist in deciding on a closed season for this species.

Although it may be decided that public awareness-raising activities should be part of the fisheries extension programme, it is likely that the most important need in communities is not for education, but for motivation and support. An essential role for the Extension Service is to provide this motivation and technical advice, and, most importantly, to convince communities that they, not the government, have the primary responsibility to manage their fisheries and marine environment.

Preparation for a fisheries extension programme consists of designing a culturally-appropriate extension process and training extension staff to facilitate the process effectively. The extension process has to be designed specifically to encourage communities to discuss problems and propose solutions relating to fisheries and the marine environment.

This will involve recognising the *fono* as the prime instigators of change, while still allowing ample opportunities for other community groups to participate. In the early stages of the process, it will be necessary to explain what fisheries management will mean to the village. Later, and if the programme is successful, this will become less necessary as villages will begin to approach the Fisheries Division to express interest in joining the programme. The process is summarised in Figure 1 and described below.

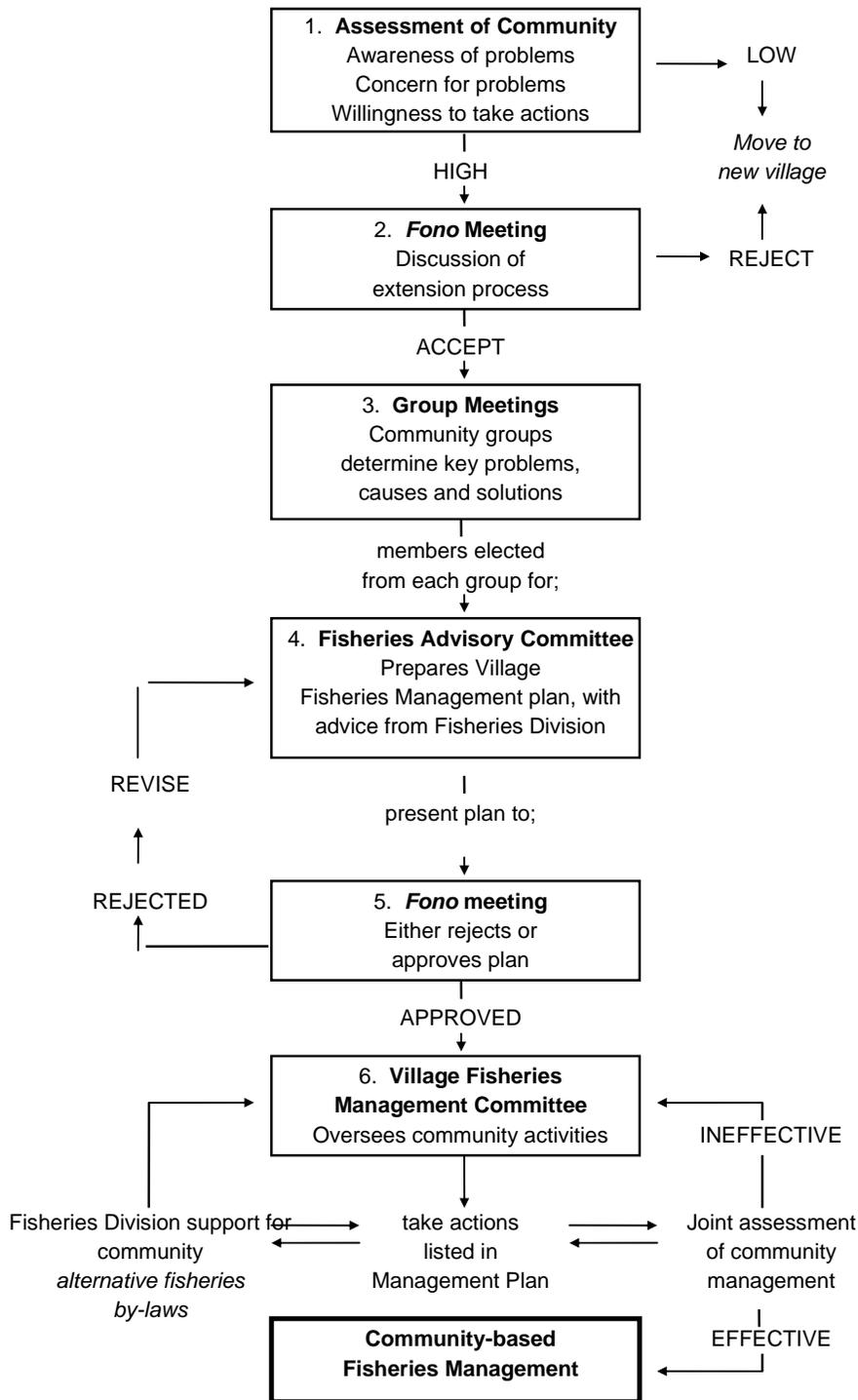


Figure 1: The Fisheries Extension Process. Activities are described by number in the text.

1) Assessment of community awareness and motivation

Following an initial expression of interest by a village *fono*, extension officers must assess whether the community as a whole is ready to commit to the process. The three key components are an awareness of problems with fisheries and the marine environment, a concern for these problems, and willingness to take actions to solve these problems. If this assessment is positive, it is then necessary to arrange a meeting with the village *fono*.

Awareness of the village fishery management programme in Samoa, facilitated by the Fisheries Extension Service, has reached the level where most Samoan coastal villages are aware that a management option exists. *Fono* members from villages can now be expected to contact the Fisheries Division if they wish to learn more about how they can achieve successful community based management in their village. The involvement of the Fisheries Extension Service in facilitating management in a new village therefore usually begins at step 2 in the flow diagram.

2) Meeting with community leaders

- acceptance or rejection of the extension process

At this meeting, the *fono* members are provided with information to allow them to either accept or reject participation in a management process. A village may decide not to participate, at least initially, for many reasons. Some *fono* members may have the mistaken belief that a government agency is attempting to take away their authority, or some may be involved in local political disputes. If the community declines to participate, extension staff should not try to “sell” the programme or otherwise persuade the community to change its mind. If the opportunity arises at a later date, villages initially not wishing to participate may be visited again, to re assess their willingness to participate in a management process.

If the meeting decides to pursue the management option, it must agree to arrange for separate meetings of several different village groups. If this did not happen, some stakeholders may be overlooked, and not have an opportunity to have some input into the management process. The separation is necessary to allow particular sectors of the community to express opinions which they otherwise may not do in large groups dominated by community leaders. The village should be encouraged to nominate its own groups (eg fisher groups, church groups etc), but extension staff may need to ask that women (as approximately 18% of Samoan fishers are women) and, untitled men have their own groups. Each of the nominated groups should then arrange to hold village Group Meetings (GMs) at some time in the near future.

3) Community Group Meetings (GMs)

- problem/solution trees

Each group meeting requires a facilitator and, if possible, a second person to act as a recorder of the discussions. As there may be three or more different community groups in a particular village, it is most convenient to arrange for the individual Group Meetings to be held on the same day. A portable white-board should be taken to each of the

separate meetings and used by the facilitator to record the results of discussions. Recording results in a large format, visible to all, emphasises the ownership of the written words by the group.

At the first series of Group Meetings, each group should be encouraged to analyse the condition of the marine environment and fish stocks adjacent to the village. This could include making an assessment of changes in fishing, seafood catches and the marine environment over recent years. Any important local information on biology and habitat of species should also be discussed. Notes on these should be kept for eventual inclusion in the Village Fisheries Management Plan.

At a second series of Group Meetings, each group should discuss problems relating to fisheries and the marine environment as the first step in the construction of a problem/solution tree. In most cases several problems can be resolved into a single key problem which the facilitator should write on the white-board a little way down from the top (as shown in the example in Figure 2). Once the key problem is agreed upon, the group should list the effects of this key problem on the community. The facilitator writes down these effects on the white board in a row above the key problem. The group is then asked to think about the causes of the key problem and these are written by the facilitator on row 3 of the white board. After this, the group is asked to think about these causes, and about possible solutions, before coming to the next meeting (perhaps arranged for one or two weeks later).

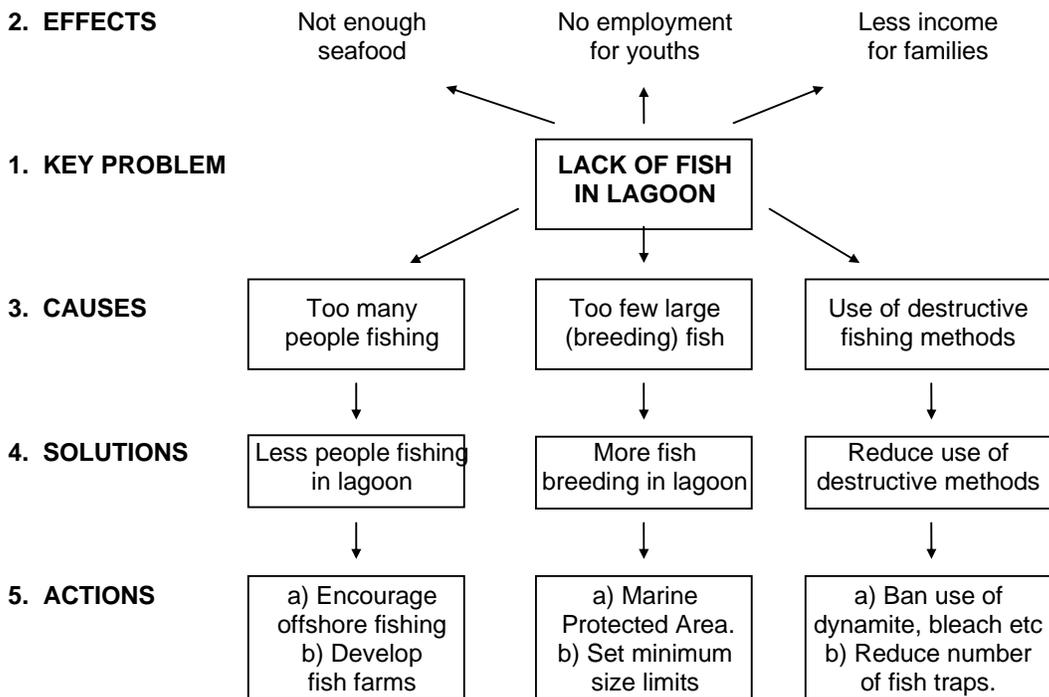


Figure 2: A simplified example of a problem/solution tree as constructed by a village community (from King & Faasili, 1999). The process begins with step 1 (Key Problem) before proceeding in the numerical order shown. All information is provided by the community, with a facilitator recording information on a white board.

At a third series of Group Meetings, each group is encouraged to discuss the causes of the key problem, and to propose possible solutions. The solutions are written by the facilitator on row 4 of the white board. Finally (and perhaps at a fourth series of meetings) each group is encouraged to discuss practical remedial actions to put the solutions into effect. These should be written by the facilitator on row 5 of the white board. These community actions will eventually be listed as community undertakings in the Village Fisheries Management Plan. At the final series of Group Meetings, each group should be asked to nominate two or three of its most active members to form a village Fisheries Advisory Committee (FAC). This action ensures that women and untitled men make up two thirds of all committees.

The above facilitated group meetings may be held over a period of one or two months, and should not be completed in less than a month. If the period is too short, people will not have time to think about the problems and will have less ownership of the results. However, if the period is too long the community may become impatient with the slow rate of progress.

4) The village Fisheries Advisory Committee (FAC)

The village Fisheries Advisory Committee (FAC) holds a series of meetings (say two to three) to further consider the problems and solutions identified by each group, and combines these into a single problem/solution tree (Figure 2). The committee then decides how the solutions could be made to work, which actions are required from the village community and what type of support will be required from the Fisheries Division.

At the first FAC meeting, committee members and extension staff should conduct a village “stroll-through environmental assessment”. This involves 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 is to prompt community discussions of environmentally-critical areas and to avoid wasting time on unrealistic community undertakings. For example, if the village wants to create a marine reserve in a particular area of bare coral rubble, then extension staff could point out that there may be more suitable areas. An example form for use during a stroll-through environmental survey is given in appendix 1.

At this stage, extension staff may have to diplomatically suggest alternatives to some aspects of community plans. Previous experience has shown, for example, that some villages initially elect to ban fishing in their entire lagoon area. In such cases, extension staff were obliged to curb over-enthusiasm, and ask the community to balance the perceived fish production advantages of a large reserve against the sociological disadvantages of banning fishing in a large proportion of the village’s fishing area. In the latter case, although young men would still be able to go fishing beyond the reef, women (who traditionally collect echinoderms and molluscs in subtidal areas) and the elderly would be particularly disadvantaged through losing access to shallow water fishing areas. A large reserve may also induce people to fish in the waters of neighbouring villages, thereby increasing the potential for inter-village conflict (King & Faasili 1998).

At the FAC meetings, members (assisted by extension staff) prepare a draft Village Fisheries Management Plan which should include;

- the names of all members of the groups and committee,
- the names of all extension staff involved
- a background of the village's marine environment and fisheries
- a map of the village and fishing areas (completed by community members)
- details of tradition-based controls on fishing
- undertakings and actions to be taken by the community
- support to be provided by the Fisheries Division

Although the draft Village Fisheries Management Plan may be typed at the Fishery Division office, it must be returned to members of the village Fisheries Advisory Committee for checking. As the plan is an important community document, its appearance and presentation should reflect this. The final draft of the plan should be bound in a printed cover for committee members to present to the village *fono*. Appendix 2 shows an example of a fishery management plan for a hypothetical Samoan village called Fiaola. All plans must be written in Samoan.

5) The village *fono*' meeting to consider the Village Fisheries Management Plan

The Village Fisheries Management Plan lists the resource management and conservation undertakings of the community, and the servicing and technical support required from the Fisheries Division. The plan should be presented to village *fono* by the Fisheries Advisory Committee at a formal and culturally appropriate meeting. Extension staff should attend this meeting as observers (to signify the meeting's importance), but all questions relating to the plan should be answered by the committee wherever possible. If the village *fono* accept the plan they should be asked to appoint a village Fisheries Management Committee to oversee the working of the plan.

6) The Village Fisheries Management Committee (VFMaC)

The VFMaC is appointed by the village *fono* to administer the conservation undertakings of the community. Members of the previous Fisheries Advisory Committee are most likely to be appointed to the Fisheries Management Committee, but this remains a village decision. Once the Village Fisheries Management Plan is formally agreed to, the Fisheries Division must agree to make regular contact with the VFMaC and provided the technical support agreed to under the plan.

Ensuring continuing community commitment

Once a community has prepared its Village Fisheries Management Plan, it is responsible for taking actions and enforcing regulations that are listed in their plan. However, it is unlikely that a community will sustain these actions without some support, at least in the short to medium term. In particular, post-management plan activities must include regular contact with villages and support for the village Fisheries Management Committees. Types of support will include:

- **Regular contact between communities and extension staff.**
- **Exchange of information between communities.**
- **Support for developing alternative sources of seafood.**
- **Support for producing food and income.**
- **Technical advice and training.**
- **Review of fisheries management in participating communities.**

Regular contact between communities and extension staff. Extension staff must maintain regular contact with communities with Village Fisheries Management Plans. Communities having recently completed management plans may feel disappointed and “let down” if extension staff stop visits once their plans have been completed.

Exchange of information between communities. Opportunities should be provided for the Fisheries Management Committees from different villages to exchange information. For example, a national workshop for members of the committees, or exchange visits between communities could be arranged. Such a workshop will allow people from different villages to compare types of conservation activities in their respective management plans.

Support for developing alternative sources of seafood. Communities imposing fisheries regulations and conservation measures will experience short term decreases in fish catches. Support for participating communities should, therefore, include promoting the development of alternative means of obtaining seafood (discussed in more detail later).

Support for producing food and income. Government agencies and NGOs should be asked to give preference in development projects for those villages involved in community-based fisheries management. Such support could include assistance and advice in agriculture and livestock production as well as with craftwork and curio production.

Technical advice and training. Scientific advice may be required for several proposed community activities. Examples include the positioning of a community-owned Marine Protected Area and the development of new fishing methods. Training could include offshore fishing methods, fish handling, value added processing, and marketing. It should be noted that the Fishery Division must target the most appropriate community group which may be women in the case of fish processing and marketing.

Review of fisheries management in participating communities. Extension staff will need to assist communities in reviewing their conservation and fisheries management efforts after a period of time (say, after six or twelve months). Reviews should seek to measure how well,

- communities are carrying out the activities listed in their management plan,
- community regulations are being enforced,
- communities are taking advantage of fisheries development support, and,
- communities feel that the Fisheries Division is supporting their management plans.

Reviews are important in that the Fisheries Division, with limited resources, will have to rationalise its work if there are a large number of villages with management plans. Options may include dropping poor performing communities from the programme (Kallie, Taua & Faasili, 1999). An example review form is given as appendix 3.

To coordinate the support for, and visit to, rural communities, the extension programme has to be well managed. This should include monthly meetings for extension staff to review the management plans of all villages in the programme, and to ensure that the undertakings of both the village and the Fisheries Division are progressing.

4. Community-based management measures

A case has been made that fisheries have to be managed, and that in order for fisheries to be sustainable, regulations which control fishing and fish catches will have to be imposed. To be effective, fisheries regulations must be enforced. In the case of national fisheries regulations, government staff, often fisheries or police officers, have the task of enforcing fisheries laws. In the case of community-based fisheries management, communities themselves enforce their own fisheries regulations.

This plan is concerned with encouraging communities to take conservation actions necessary to exploit seafood resources on a sustainable basis. Under such community-based management, fisheries regulations are more likely to be effective as they are enforced by communities with a direct interest in their continuation and success.

However, it must be recognised that there are many things that a local community cannot do. Some environmental problems are complex and involve activities and areas beyond the control of a local community. For example, fish catches may be falling in a particular village because silt from a nearby river is killing the corals in its lagoon. Mangroves may be dying because a sea-front road has been built without proper planning. These effects may be caused by decisions and actions taken some distance from the village. Siltation, for example, may be the result of poor farming techniques or the logging of timber in hills many kilometres away from the village.

Such problems can only be addressed through an integrated effort by government agencies and community groups working together. Integrated Coastal Zone Management (ICZM) takes into account the inter-dependence of ecosystems, and the involvement of many different agencies (for example, those responsible for agriculture, forestry, fisheries, public works and water supply) and other stake-holders. This is beyond the scope of this plan, but it may be possible for extension staff to provide the necessary link between communities and government to begin to address these issues.

Community conservation measures and fisheries regulations

In many respects, conservation measures and regulations that a village can impose on its own community will reflect and support those imposed by the Government. The difference is that the measures and regulations are owned, imposed and enforced by the community. Communities must be allowed to take actions and to impose regulations that they have developed themselves (as long as these do not contradict national laws). Many communities have tradition-based controls on fishing. The following sections describe some types of fisheries regulations and their applicability to village communities.

Limiting the number of fishers

In commercial fisheries, the numbers of fishers are often controlled. Often this is done by issuing a limited number of fishing licences. In the Cook Islands, for example, a set number of licences is issued for people to collect trochus. In subsistence fisheries, the method has little application. However, some village communities in Samoa have limited the number of fishers permitted to use fence traps.

Limiting the efficiency and types of fishing gear

The use of some highly efficient fishing methods may be restricted in the interests of conserving fish stocks and allowing more people to use the resource. Limitations on gear types may include banning a specific fishing method in particular areas, or on a particular species. For example, the use of gill nets may be banned in lagoons. Commercial gillnetting has been banned by communities in parts of Fiji and this is supported by the Fijian government – in order to obtain the necessary government-issued licence for commercial fishing the applicant must first produce a district administration permit which is only given with the permission of the customary fishing rights holder.

The use of scuba diving for fishing is another highly efficient fishing method that is usually wise to be ban. Some communities have also placed restrictions on the use of underwater torches for spearfishing at night. In some subsistence fisheries, the survival of the resource depends on inefficient exploitation!

Banning destructive fishing

Highly destructive methods of fishing, such as those involving the use of chemicals, bleaches or explosives are illegal in Samoa, but in some instances the methods are still used. Village communities may wish to support and enforce these laws, and add others of their own. Some communities in Samoa have banned the traditional smashing of coral to catch small sheltering fish. Others enforce Government prohibitions on the use of dynamite and plant poisons to kill fish.

Closed areas and seasons

Closed areas can be used to protect juveniles and the spawning stock. Shallow water mangrove habitats, for instance, are known to be nursery areas for many species and are permanently closed to fishing in some coastal areas. In some countries, known breeding areas for trochus are permanently closed to fishing. Fishing can be banned either during particular seasons, or in particular areas, or both. If the spawning season of a particular species is known from traditional community knowledge, for example, a closed season at the time of spawning may allow adults to breed without interference. Turtles, for example, are protected in some countries during the egg-laying months of November to February. Closures can also be used to prevent stocks being overfished.

In Samoa, a large number of villages have chosen to establish small areas closed to fishing in part of their traditional fishing areas. By social necessity, many of these community-owned MPAs are small. In terms of total fisheries production, a small reserve is unlikely to be as effective as a large one. Larger reserves are more likely to provide suitable breeding areas for small inshore pelagic fish such as *anae* (mullet) and *atule* (scads), but even small reserves may be beneficial for non-migratory and especially territorial species such as some surgeon fish and groupers. For non-migratory species, the combined larval production from many small reserves is likely to be greater than that from a smaller number of large ones. Although the community-owned MPAs are small, their large number, often with small separating distances, forms a network of fish refuges around the coast. Such a 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 migration (King & Faasili, 1998).

Minimum mesh sizes

If gill nets are not banned altogether in lagoons, setting minimum mesh sizes may allow small fish to escape and grow to a size at which they can reproduce at least once before capture. Samoa has minimum allowable mesh sizes of 50mm stretched for gill nets, and 30mm for cast nets and beach seines. Some communities may set their own larger mesh sizes, to further reduce the catch of small fish.

Size limits (minimum and maximum legal lengths)

Limiting the size of individuals caught involves returning captured individuals smaller than a prescribed minimum size to the sea. Traditionally, size limits have been applied to allow individual fish to spawn at least once before capture. Minimum legal sizes have been applied by the Samoan Government to a number of species including sea cucumbers, giant clams, spiny lobsters, mangrove crabs and a number of species of fish. Size limits are only useful in fisheries where individuals are not harmed by the catching method, such as molluscs gathered by hand, or crustaceans caught in traps. Although some shallow-water fish caught on hooks may survive well if returned to the water immediately, this type of regulation has little application to spear-caught and deepwater fish species. Fish caught in deep water are unlikely to survive after being hauled to the surface and released. Village communities may decide to support and enforce national regulations on minimum sizes. Some villages in Samoa have already set their own minimum size limits, which must be larger than those set under national regulations.

In some cases it is also beneficial to have a maximum legal size for a species. This is because as a species grows in size, it becomes much more productive. For example, a 50cm fish may produce 5 times as many young as a 30cm fish of the same species. For this reason, it is sometimes good to have a maximum and a minimum size for catching a certain species. In Aitutaki, in the Cook Island, the minimum size at which a trochus can be harvested is 8cm, and the maximum is 11 cm.

Rejection of females, or spawning females

Regulations making it illegal to retain females, or females bearing eggs, can only be applied sensibly to species in which the sexes can be distinguished easily by fishers, and where the catching method does not harm the individuals caught. The sex of most fish cannot be determined by external examination. In most crustaceans the sexes are readily distinguished, and regulations making it illegal to retain egg-bearing, or "berried",

lobsters and crabs are commonly used in Pacific Islands. In subsistence fisheries, the regulation may have application in certain cases. One example is where crabs are caught in traps, and females bearing eggs can be returned to the sea. However, in cases where lobsters are caught by spearing, the regulation would be of no use. In this case, a ban on spearing would also be required.

Catch Quotas

Fisheries agencies may determine that, in order to protect fish stocks, total catches should not exceed a certain amount called a quota. In the trochus fishery in the Cook Islands, for example, fisheries scientists have estimated that fishermen should be allowed to catch about 30% (or about 40 tonnes) of the total trochus stock each year. Once this quota has been reached the fishery is closed. In subsistence fisheries, catch quotas have little application. However applying a daily quota, or bag limit, for particularly desirable species is a possibility.

Protecting the marine environment

Different government organisations are responsible for, and make laws to protect, the marine environment. Community actions can often complement and extend these actions. Such actions can include protecting corals and mangroves, organising the collection of crown-of-thorns starfish, controlling the removal of beach sand, and banning the dumping of rubbish in lagoon waters. Some have, or can re-vitalise, customary controls on environmentally damaging practices. In Samoa, over 70 villages have already produced their own Village Fisheries Management Plans with a range of community undertakings which differed from village to village. The most common undertaking are summarised in Table 1.

Table 1. Community actions and regulations in villages in Samoa. Figures in the right-hand column indicate the percentage of all villages using the particular action or regulation (from King & Faasili, 1999).

ACTION/REGULATION	PERCENTAGE
Banning the use of chemicals and dynamite to kill fish.	100%
Banning the use of traditional plant-derived fish poisons.	100%
Establishing small protected areas in which fishing is banned.	86%
Banning other traditional destructive fishing methods (eg smashing coral).	80%
Organising collections of crown-of-thorns starfish.	80%
Enforce (national) mesh size limits on nets.	75%
Banning the dumping of rubbish in lagoon waters.	71%
Banning the commercial collection of sea cucumbers (Holothuroidea).	41%
Banning the capture of fish less than a minimum size.	41%
Banning removal of mangroves (in villages with mangroves).	27%
Restricting the use of underwater torches for spearfishing at night.	21%
Banning the removal of beach sand.	14%
Placing controls or limits on the number of fish fences or traps.	<10%
Prohibiting the collection of live corals for the overseas aquarium trade.	<10%
Banning the coral-damaging collection of edible anemones (Actinaria).	<10%
Protecting areas in which palolo worms, <i>Eunice</i> sp, are traditionally gathered.	<10%
Offering prayers for the safe-keeping of the marine environment.	<10%

Community compliance and enforcement of regulations

To be effective, fisheries regulations must be enforced. Under community-based fisheries management, the rules and regulations described in the previous section are enforced by the village communities. Under such community-based management, fisheries regulations are more likely to be effective as they are enforced by communities with a direct interest in their continuation and success.

Village rules and regulations are set by members of a community, and are therefore usually only applicable to members of that community. In cases where people from outside a village come into local waters to fish, the community may be powerless to insist that the visitors obey local rules. However, there may be customary ways of dealing with this problem, including negotiations with the home villages of offenders. Samoa also is fortunate in having an infrastructure which allows rural communities to make their village rules into by-laws which, after government approval, apply to all people and are enforceable under national law (Faasili, 1997). These can then be enforced by the police or designated fishery enforcement officers, similar to the way in which National fisheries legislation is enforced.

Some villages may decide to include the fines associated with breaches of various community regulations in their Village Fisheries Management Plan. Other villages may want to have the village *fono* set fines, or apply them on a case by case basis. Although it is best left for the community to decide on appropriate fines, extension staff may be asked for advice.

The first and most important aspect of enforcement is education, and prosecution should be regarded as a measure of last resort. Each Fisheries Management Committee should be encouraged to make all members of the community familiar with any regulations, and the reasons for their imposition. However, necessary regulations must be rigorously enforced to be effective and fair. If regulations are not enforced, benefits will accrue to those who ignore the regulations at the expense of those who fish according to the rules. Penalties applied should be significant to the offender, and relevant to the offence. For example, although a small fine may be appropriate in the case of a young person catching undersize fish, the use of explosives to catch fish should attract a large fine to act as an effective deterrent. Fines of cash, pigs, or food can be imposed on offenders.

5. Alternative fishing methods and sources of seafood

Supporting community-based fisheries management

The extension process already outlined describes a joint effort, with both the community and the government making certain commitments to help find solutions to problems. In this process the community agrees to certain actions, while the government agrees to reciprocal actions necessary to support the community's undertakings. These may involve the Fisheries Division 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. Non-government organisations may assist both the government and the community in this work, both in the area of information as well as training. Community-based fisheries management depends on the availability of professional technical support for the communities involved. Scientific input is required to assist communities with alternative sources of seafood and to advise on and monitor community actions.

To improve the chances of success, it is necessary to develop alternative sources of seafood which are available to the village communities. Accordingly, an extension programme should include the promotion and development of alternative sources of seafood. The overall aim is to compensate communities for the short-term decrease in availability of seafood which inevitably accompanies the imposition of fisheries regulations, whether community-based or not. A community-based extension programme which does not promote alternative means of obtaining seafood is less likely to be sustainable.

The expanding longline fishery in Samoa has provided one alternative to exploiting inshore resources, as less expensive bycatch from this fishery now replaces some higher priced inshore species as a market commodity and component of the diet. A recent survey suggested that between 1000 and 2000 tons of bycatch from this fishery is consumed in Samoa

Village-level aquaculture

Village-level aquaculture is one way of ensuring the community continues to have a source of seafood. It can also be used to restock species that have been overfished; this is especially important for sedentary species such as sea cucumber, giant clam and other invertebrates). Aquaculture of food or non-food species can also be used to provide a small-scale business for a community.

Several questions should be asked, and the advice of fisheries agencies sought, before deciding what species would be appropriate for aquaculture. Is there a possibility that the farmed fish could have a detrimental effect on the environment? If being farmed for food for the community, is the fish acceptable to the local tastes? Is it easy and cheap to farm? How soon and how often will it be able to be harvested?

In Samoa, a fast-growing species of tilapia, *Tilapia niloticus*, has proven to be popular, easy to look after and cheap to feed. Village level aquaculture of *Tilapia niloticus* is now promoted where fresh water ponds are available. Details on this aquaculture programme can be found in the Fisheries Division Annual Report (Anon, 2000), and a manual of farming practices was produced by Bell et al, 1999.

Sometimes the long-term success of a project is affected by whether or not the whole community is involved. For instance, an aquaculture project in Palau, aimed at farming milkfish, rabbitfish and shrimp, provided training for the men in the communities where the farms were located. However, the traditional role of the men is to go fishing in boats while the main role of the women is to daily tend the crops. As the aquaculture project had more similarities with farming than with fishing, providing training for women would have been preferable (Lambeth, 1999). It may have been better to involve women in the day to day tasks of the fish farm while the men could have been responsible for the large and irregular tasks such as building the ponds and harvesting the fish. Not involving the whole community may have partially contributed to the failure of the project.

Although aquaculture is an option for providing an alternative source of food and income for a community, it should be stressed that to date there have been very few successful attempts at aquaculture in the Pacific Islands. One of the major reasons for this is that most aquaculture prospects are labour intensive, and returns to labour are often low. They are also prone to damage and destruction from severe weather conditions such as

cyclones. It may be that effort expended on aquaculture would be better spent on other options.

Fishing for less exploited species, and in less exploited areas

Fishing for offshore species is one of the alternatives to overfishing in inshore areas which has the most potential for quickly providing seafood to the community. The introduction of low cost boats and new fishing techniques into a community has the potential to reduce fishing pressure on inshore fish stocks while providing fishers with access to less exploited areas and stocks. Tuna and other offshore resources are targeted by commercial and foreign fishing vessels in most Pacific Island countries, but their potential for subsistence fisheries is also significant.

In Samoa low-cost boats with outboard engines for outer reef slope fishing were promoted in villages participating in the Fisheries Division's extension programme (Passfield et al, 1999). This was combined with training in fishing gear and methods, fish handling and processing, sea safety, small boat handling and outboard engine maintenance. A catch and effort data collection programme was also introduced with three-monthly summaries of the information being given to the fishermen to encourage continued interest. The relationship built up between the village fishers and the fisheries extension officers during the long process of developing the village fisheries management plan made it much easier to introduce a data collection programme. The catch and effort data are valuable in monitoring the long-term health of the species targeted, but it should be noted that the collection and analysis of data is a labour intensive and difficult task for any fisheries agency.

The introduction of outboard engine powered boats into the village fishery must however be done with caution. Any management plans developed by the village may need to include a restriction on fishing methods used by these boats, and locations where these vessels are allowed to fish. A management plan has already been produced for the village based fishery, and management regulations which may need to be applied were suggested (Passfield et al, 1999). Although these regulations can apply to fishing in general, and have already been mentioned in the previous section, they are particularly relevant to outboard engine powered small boats that may be utilised in a village level fishery. These suggestions included :

1. Ban on using engine powered boats for net-fishing inside the lagoon

Net fishing, particularly with small mesh nets, is probably one of the major reasons for a decline in inshore fish stocks. Even larger mesh nets can be set loosely to entangle small fish. Netting from outboard powered may need to be banned inside the lagoon.

2. Ban on spearfishing using underwater breathing apparatus

Spearfishing is an efficient method of catching fish, particularly by skilled divers. Larger fish can be selected, and smaller fish left alone. Some larger fish can escape to deeper waters, where free-divers cannot reach. This is particularly important, as it means that some of the larger fish, which are the best breeders, are left to replenish the population. However, SCUBA and hookah spearfishing requires less skill, and allows divers to follow these larger breeding fish into deeper waters where they are speared. It also allows divers to search more

thoroughly in deeper waters for fish to spear. The result is that fewer fish can manage to escape, to contribute to the production of new young fish for the fishery. A ban on SCUBA spearfishing should be considered by the VFMaC.

3. Ban on using the engine powered boats to move fish fences around the lagoon

Fish fences were originally constructed from natural materials. Construction was labour intensive, and took a long time. The harvested fish were shared among the many people involved in the construction of the trap. As the fences took so long to make, there were not many of them.

Today, fish fences are still made from natural materials, but often also utilise gillnets and chicken wire. Thus they do not have to be so well made, and can be constructed more quickly, with the net covering any gaps from which the fish might escape. The cash economy now allows more people to buy nets and more fish traps to be made. This means that more fish are being caught than there used to be from within the lagoon, and the fish traps take all sizes, including undersize.

The ORS boats allow these traps to be rapidly moved around the lagoon, and set in different areas with higher densities of fish, thus further increasing the efficiency of the fishing method. Fish stocks in the lagoon continue to decline partly because of these improvements in fishing technology.

A ban on using the outboard powered boats to move fish fences around should be considered, as it makes the fish fences overly efficient.

4. Ban on using engine powered boats to scare or herd fish

Because of its speed, manoeuvrability, and the loud noise made by the outboard, outboard powered boats may be perceived by some users as being ideal to scare fish into traps and nets in lagoons. Although it could be argued that this is not “fishing” in the lagoon, this practice may need to be prohibited.

5. Total effort on bottom fish stocks should be limited

Just like the lagoon, the reef slope bottom fish fishery is also vulnerable to over exploitation. One potential risk is a transfer of effort from the tuna longline fishery to the reef slope during periods of poor tuna fishing, as these alias can easily fit hand reels and start bottom fishing. Usually they would fish in deeper water, greater than 200m, but they can also easily fish closer inshore on the reef slope. With more than 200 alias in the longline fishery, considerable additional effort could be exerted on the reef slope.

The VFMaC should monitor their own village-based boats to ensure that the small area of the reef slope near their village is not overfished. Advice should be sought on a case by case basis from the fisheries division on the advisability of other boats entering the fishery, and these vessels should also be covered by this management plan. In the event that more boats do enter the fishery, it may then be necessary to share the bottom fish catch between boats fairly, and encourage boats to concentrate on pelagic fishing. This could be achieved by imposing a

“bag limit” of, for example, only 10 reef fish per boat per day, after which boats must go fishing for pelagic species.

It will be more difficult for villages to control fishing of the reef slope by boats from elsewhere, such as alias from the commercial fishing fleet. Villages have no legal control over their waters, and although they appear to be able to control lagoon areas effectively, the reef slope is more difficult. Control of the commercial fleet may have to come through licencing by the National Government. This could be achieved by imposing a condition on the licence of the alias limiting them to fishing more than 5 miles offshore, or in water of more than 200m depth.

An alternative resource not utilised in Samoa is flying fish. This is an offshore species, and though under threat in other parts of the world, there is no concern for stocks in this region. In other Pacific Island countries in such as the Cook Islands, French Polynesia, and even neighbouring Tokelau, flying fish fishing from small outboard engine powered boats is a significant subsistence and commercial fishery. Although in Samoa, a preliminary trial conducted by the Fisheries Division did not achieve very high catch rates, further trials may be warranted.

The potential for fishing alternative inshore species is much more limited and care should be taken not to contribute to existing problems. There are species which are utilised in some parts of the Pacific and not in others, especially sea urchins, seaweeds and some types of sea cucumbers, but these are all very vulnerable to overexploitation. Any encouragement to fish for an alternative species should be combined with training and information on sustainable harvesting techniques.

Whichever alternative is promoted, the Fisheries Division and the community should have an ongoing commitment to achieving and maintaining a healthy marine environment.

6. The role of stakeholders in the management plan

All stakeholders and interest groups have a role to play in effective management of the village fishery. The various groups and their possible roles are summarised below.

The fishers

The obvious obligation of the fishers and boat owners is to faithfully abide by the regulations as laid down by the VFMaC to manage the fishery. The fishers are the ones ultimately responsible for obeying the rules, and they are the ones to blame for breaking the rules, leading to a further reduction of lagoon fish, which is bad for the whole community.

The Village Fisheries Management Committee (VFMaC)

The Village Fisheries Management Committee is charged with managing the inshore fisheries of their village. They set local rules, and may formulate bylaws if they feel it is necessary to protect their marine resources. It is also the role of the VFMaC to ensure that the rules enforced, and that appropriate fines or other deterrents are used to punish offenders.

The Government enforcement agencies

While the VFMaC may be able to enforce regulations on people from their own village, they will have no legal power over people from outside who may come in and break

village fishing regulations. If however these regulations have been made into by-laws, they can be enforced by the Government through the Police Department or authorised fishery enforcement officers.

The Government agency responsible for enforcing the National Fishery regulations and the Village By-laws must be consistent in enforcing regulations. Though it may be prudent to let a first time offender off with a stern warning, subsequent offences must be dealt with according to the law. It is unfair on those that do obey regulations to allow offenders to get away with repeated offending, and this will send the wrong message to other members of the village.

The Fisheries Extension Service

The Fisheries Extension Service role is to monitor the effectiveness of the village fisheries management, and advise the VFMaC where needed. In some cases, observant extension staff may notice infringements that are not acted upon by the VFMaC. This information should be passed on to the VFMaC, and advice given on how to overcome any problems with which the VFMaC find difficulty.

The other very important role for the extension service is to ensure that the reasons for the locally imposed and enforced fishery regulations are well understood by all people in the community. Awareness raising should be an ongoing activity of the Extension Service. One method is to distribute information sheets around to the community, especially to people in a position to assist with education such as teachers, church ministers, and village elders.

The Extension Service should also facilitate training on alternative fishing methods outside the lagoon, as well as on post harvest and value added processing of seafood, particularly targeting women as they are the ones normally responsible for post harvest activities.

The Fisheries Research Section

The Research Section can assist the Extension Service in monitoring the small fish reserves that may established as a part of a fishery management plan. However, it must be remembered that there are already approximately 60 such reserves in Samoa, and it is likely that the Research Section could ever monitor only a sample of these.

The village community

The whole community has a part to play in management. If anybody suspects that the fishers are not fishing according to their Management Plan, this should be reported to the VFMaC who will take the appropriate action. Although difficult in a small society where many people are related, this is a very important requirement for successful management. Peer pressure as well as pressure from respected members of the community can be of great assistance in encouraging fishers to do the right thing.

The village churches

The Church is a powerful influence in Samoan village life. Church ministers should be encouraged to actively support all fisheries management regulations. These regulations have been put in place to allow all the people of the village, as well as future generations, to continue to enjoy God's gift to them in the form of fish from the sea. Such support can come by conducting regular sermons that include appropriate reference to the Management Plan. Information sheets provided by the Fisheries Extension Service may be useful in preparing sermons. Church ministers should be targeted along with fishers for workshops on fisheries conservation.

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Appendix 1.. Village 'stroll-through' environmental assessment

The basic idea of a Village 'stroll-through' environmental survey is for Extension Staff and village FMAC members to stroll through the village examining and noting environmental features which have been discussed in meetings, or should receive community attention. The purpose of the 'stroll-through' survey is to;

- a) prompt community discussions of environmentally critical areas;
- b) allow Extension Officers to make best use of their technical knowledge, and,
- c) avoid the committee wasting time on unrealistic options - for example, the farming of tilapia when there is no permanent (year-round) source of fresh water;

The village stroll-through involves the Facilitator (at least!) walking around the village with members of the village VFMAC after the first meeting. This could be initiated by the Facilitator saying *"You have suggested several actions which involve particular areas in the village. Can you take us on a walk around the village so that we can see and discuss some of these places?"*. Remember, you are making an initial assessment of the likely success of a proposed action, NOT a detailed scientific assessment. In some cases, you will need to suggest that research staff will have to visit the village to make a more detailed assessment.

The following notes are meant to act as a guide to 'where to look' and 'what to ask' in some of the common areas of interest.

Tilapia: If the community is interested in farming tilapia, ask to see the proposed area. As you view the proposed area ask questions such as the following.

- Is there a supply of fresh water? [YES] [NO]
 Does the water flow all year round? [YES] [NO]
 Is there a lot of pond preparation work to do? [YES] [NO]
 If there is, do people realise this? [YES] [NO]

Have you made sure that people have the Information Sheet on the topic?

Marine Plants: If the community says that it has a problem with marine plants, walk to the beach and ask to see some samples - if you cannot identify these (using the Information Sheet), take them back to the Research Unit.

- Has there been a recent increase in marine plants? [YES] [NO]
 if yes, in which year was this increase first noticed? [.....]
 Do nutrients (eg. Sewage) get into the lagoon? [YES] [NO]
 What problems do the marine plants cause?

Fish Reserve: If the community is interested in a Fish Reserve, ask to see the proposed area. As you view the proposed area ask questions or check details on the following.

What is the area (square metres or yards) of the proposed reserve? [.....]
 - if less than 2000 m² you should suggest (gently!) that the area is too small.

- Does the proposed area include corals and/or reef? [YES] [NO]
 Does the proposed area include mangroves? [YES] [NO]

If the area contains just bare sand or rubble, point out that this may not be a worthwhile place to have a Fish Reserve. Suggest looking at other areas.
 Have you made sure that people have the Information Sheet on the topic?

Boats: If some people in the community are interested in buying the medium-sized fishing boats that the project are promoting, walk to the beach and look at the coast.

What sort of coast is it?

- Wide lagoon with reef? []
- Narrow lagoon with reef? []
- Fringing reef (no lagoon)? []

How many canoes are there in the village? []

How many alias are there in the village? []

How many days in the month are the seas beyond the reef too

rough to go fishing in a small boat? [] days per month in the dry season

[] days per month in the wet season

On a rough, exposed coast, it may be too rough for a fisherman to go fishing for enough days each month and catch enough fish to repay the loan. If you think that this could be the case, discuss it with the people concerned. Have you made sure that the people interested have the Information Sheet on the topic?

Introductions/translocations: If the community is interested in introducing Trochus, Giant Clams or other molluscs, walk down to the beach to see the lagoon and reef.

What molluscs are found in the village area today? - take shells back to Research Unit

Species 1) [FEW] [SOME] [MANY]

Species 2) [FEW] [SOME] [MANY]

Species 3) [FEW] [SOME] [MANY]

Trochus require an exposed reef with strong wave action.

Does such an area exist? [YES] [NO] - if yes, point the area out to the villages.

Giant Clams require clear shallow water with oceanic salinity.

Does such an area exist? [YES] [NO] if yes, point the area out to the villages.

Other (burrowing) bivalves require a sandy or silty bottom (depending on species).

Does an area of silt/sand exist? [YES] [NO] - point the area out to the villages.

Others features, effects etc: During your "stroll" you may have noticed other things in the village that are worth suggesting to the committee as a topic for discussion. For example:-

- Is the beach eroding away?
- Has sand been removed?
- Are mangroves being threatened?
- Are there many fish fences?

Appendix 2. Fiaola Management Plan

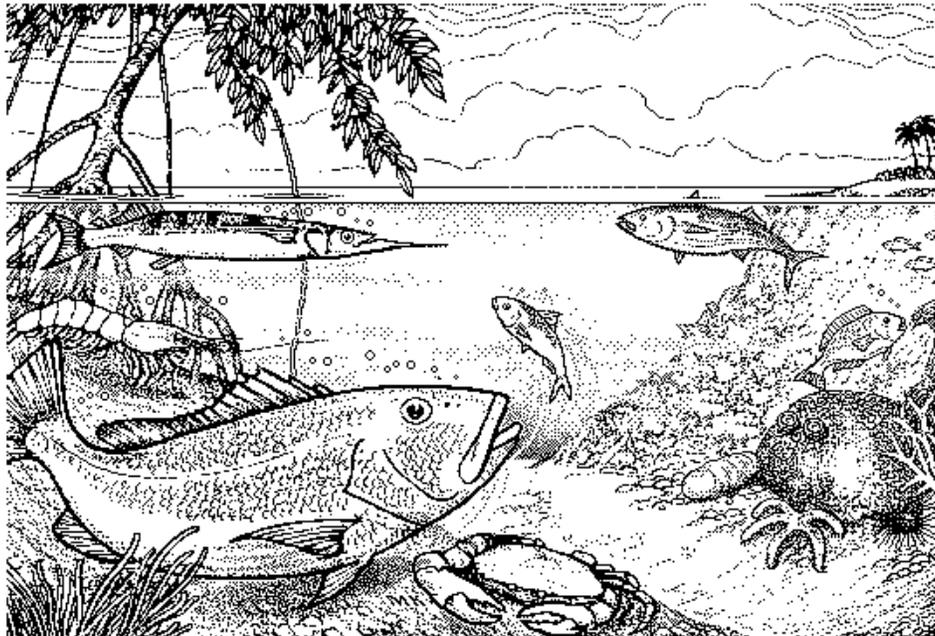
Village Fisheries Extension Program

FISHERIES MANAGEMENT PLAN

**FUAFUAGA TATAU MO LE VA'AIA
LELEI O I'A MA FIGOTA**

For the Village of / o le Afioga

FIAOLA



SAMOA FISHERIES PROJECT

an AusAID - assisted project of the Fisheries Division,
Ministry of Agriculture, Forests, Fisheries & Meteorology.

Village Fisheries Extension Program
FISHERIES MANAGEMENT PLAN

**FUAFUAGA TATAU MO LE VA'AIA
LELEI O I'A MA FIGOTA**

For the Village of / o le Afioga

FIAOLA

*This Village Fisheries Management Plan
written in English, is based on a hypothetical village,
and is intended for instructional purposes only.
However, the community undertakings herein are based
on real actions proposed by several different villages
in the Fisheries Extension Program.
Actual plans are written in Samoan to this format,
by members of each village community*



SAMOA FISHERIES PROJECT
an **AusAID** - assisted project of the Fisheries Division,
Ministry of Agriculture, Forests, Fisheries & Meteorology.

NOTES (not included in actual Management Plans):

The background information in this Village Fisheries Management Plan is provided by the community. Groups in the community consider a series of questions (Annex A) and, in the company of Fisheries Extension Officers, conduct a village "stroll through" environmental assessment (Appendix 1, main report). Several groups, including women untitled men (aumaga), fishers, titled men (matai), hold a series of meetings which are recorded and facilitated by Fisheries Extension Staff. These groups hold extensive meetings to discuss their marine environment, decide on key problems, determine causes, propose solutions, and plan remedial actions. Fisheries Information Sheets on a wide range of topics, from fish reserves to destructive fishing methods, are available to assist discussions (Fisheries Information Sheet number 1 describes the actual extension process - see appendices). The problem, causes, solutions and actions proposed by the community are written (as a problem/solution tree) on a portable white board by a trained facilitator.

This process, which is necessarily lengthy (a minimum of 12 meetings held over about 3 months), culminates in a Village Fisheries Management Plan. Most importantly, this plan sets out the resource management and conservation undertakings of the community, and the servicing and technical assistance inputs of the Fisheries Division. Full details of the extension process are given in;

Fisheries Extension Manual. Fisheries Division, MAFFM, Samoa

King, M. And O'Sullivan N. 1996. Village Fisheries Extension Program (English and Samoan). Fisheries Information Sheets number 1. Fisheries Division, MAFFM, Samoa

King, M. & Faasili, U. 1997. Community-based management of fisheries and the marine environment. Pacific Science Association Intercongress, Suva, Fiji, 1997.

King, M. & Faasili, U. (in press) Community-based management of subsistence fisheries in tropical regions. Fisheries Ecology & Management UK.

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Preparation of this Management Plan

This Village Fisheries Management Plan was prepared by the community of Fiaola, with the assistance of the Fisheries Division of the Ministry of Agriculture, Forests, Fisheries & Meteorology and the AusAID-supported Fisheries Extension and Training Project. The final draft of this Fisheries Management Plan is to be presented to the village fono by the chairperson of the Village Fisheries Management Advisory Committee (VFMAC). At this fono meeting, the plan is to be approved by;

The High Chief,
The Pulenuu
The Talking Chief,
And other members of the fono, in the presence of;

The Head of the Fisheries Division (or his representative),
The Senior Fisheries Officer (Extension),
The Village Extension Facilitator,
And other members of the Fisheries Extension Unit, as well as
Other Men and Women of the village of Fiaola.

The authors of this plan include the following nine elected members of the village Fisheries Management Advisory Committee (FMAC);

Taumasina Pisa	Vasa Iosefa
Talatoa Soatama	Iakopo Ropeti
Lualua Alo	Aimainu Viliamu
Mauigoa Soataga	Kitiona Tafaimaa
Mafutaga Ah Chong	

The following Fisheries Division and Project staff provided assistance -

Ueta Faasili	Assistant Director (Fisheries)
Michael King	Project Team Leader
Apulu Fonoti	Village Extension Facilitator
Siamupini Iosefa	Acting Senior Fisheries Officer (Extension)
Peter Mathew	Regional Fisheries Extension Officer
Lyn Lambeth	Regional Fisheries Extension Officer
Ioane Mulipola	Fisheries Officer
Autalavou Taua	Fisheries Officer
Voli Sooaemalelagi	Fisheries Assistant
Aa Mauletaua	Fisheries Assistant
Susau Siolo	Fisheries Assistant

Background information

(Community-assessment of the Marine Environment and Resources)

1.1 Description of the village

Population of Village		600 - 700
Number of Schools	Primary	1
	Junior High	0
Number of churches	Methodist	1
	Catholic	1
	7 th Day Adventist	1
	Assembly of God	1

Reef/Fishing area:

Length of barrier reef in front of the village	1000m
Average distance between the reef and the shore	800m
Depth in deepest part of the lagoon at low tide	2m
Depth in deepest part of the lagoon before the cyclones	3m

Description of Fisheries:

Men in the village who fish more than once a week	30-40
Women in the village who fish more than once a week	40-50
People who fish outside the reef at least once a week	6-9
Number of canoes used for fishing in the village	32
Number of alias (catamarans) used for fishing in the village	2
Are people from other villages allowed to fish in the village lagoon?	Yes

Catches:

Fish	Fishing method	<u>Time spent catching string of 10 fish</u>	
		At present	10 years ago
Common fish (five most commonly caught):			
1. Surgeonfish	underwater fishing at night using spears and torches	1-2 hrs	30 minutes
2. Lines surgeonfish	underwater fishing at night using spears and torches	1-2 hrs	30 minutes
3. Sea mullet	underwater fishing at night & fishing nets	3-5 hrs	30 minutes
4. Trevally	underwater fishing at night and using hooks and lines	1-2 hrs	30 minutes
5. Emperor	underwater fishing at night and using nets	1-2 hrs	30 minutes

Shellfish etc.	Fishing method	<u>Time spent catching ten individuals:</u>	
		At present	10 years ago
Other seafood (three most commonly caught shellfish):			
1. Venus shell	Feeling the shells with fee, and by diving.	1 hour	3/4 hour
2. Seahare	Feeling them with feet, and by diving.	4 hours	1 hour
3. Jellyfish	With net	1 hour	1 hour

Other types of fishing.

Type of seafood	Time needed for a good fisher to catch 10 individuals
Turtles	(catching of turtles prohibited by fonono)
Giant clams	6 hours
Lobsters	2 hours
Crabs	2 hours
Sea cucumbers	3 hours
Sea Urchins	1 hour

Areas of different types of Marine Environments

	At present	10 years ago
Mangroves	300 metres long	400 meters long
Corals	3 miles	3 miles
Seaweeds	200-300 sq. Metres	100-200 sq. Metres

2.1 Village Policies in the Past and at Present

Fiaola has banned the use of dynamite since early 1994. However, some people are still using ava niukini and poisonous chemicals. The catching of turtles has been banned by the Fono since early 1995. In the early days, there was one fish trap (fence) built of stone and used by the whole village. At present, there are four fish traps made of wire mesh, and the fono has refused to give permission for people to build any more.

Many groups said that National laws, particularly those preventing people from catching small fish, were not enforced. Police very rarely visited the village.

Enforcement - information from the Fisheries Division. The Government is very concerned about damage to the marine environment and low fish catches. However, the Government recognises that fish stocks cannot be effectively protected simply by passing national laws. Solutions to these problem are in the hands of the village people and especially their Fonos. Communities must work together and take action to protect fish and shellfish stocks for future generations.

3. About this Management Plan

3.1 Objective

The various groups and committees involved in preparing this Fisheries Management Plan decided that the aim of the plan is;

"to protect the marine environment in order to increase the numbers of fish and shellfish available for present and future generations"

This management plan lists the Community Actions necessary to achieve this aim. If approved by the village fono, this plan should cover a three year period, and be reviewed after this time.

3.2 Preparation

This Fisheries Management Plan was completed by the community of Fiaola, with the assistance of the Fisheries Division of the MAFFM, for approval by the village fono. A history of the steps taken are shown below.

First Contact: Following a request by the village Pulenuu (mayor), Apulu Fonoti and Extension Officer, Siamupini Iosefa travelled to Fiaola on the 18 September 1996. Copies of Information sheet number 1 (describing the Extension Process) were left with several matais (chiefs).

First Fono meeting: The village requested that the Fisheries Division make a formal presentation to the fono (village council), which was held on 25 September. The meeting was attended by the Assistant Director (Fisheries), Ueta Faasili, Apulu Fonoti, and two

extension staff. The Senior Extension Officer, Siamupini Iosefa described the extension programme, which, after some discussion, was accepted by members of the fono.

Group Meetings (GMs): The fono elected to set up 3 groups - Matais (chiefs), Aumaga (Untitled men), and the Women's Committee. These three groups met on 16 October (at the first Group Meetings - GM1) and discussed their key problems concerning fish and shellfish stocks and the marine environment. These groups met again on 8 November (GM2) to examine causes of these problems, and propose solutions. The groups elected 3 members from each group to attend the first Fisheries Management Advisory Committee meeting (VFMAC1) which was held on the afternoon of the same day.

Village Fisheries Management Advisory Committee meetings (VFMACs): This Committee, consisting of 3 members from each of the 3 groups, met on the afternoon of 8 November to combine all of the information from each group into a Problem/Causes/Solutions and Activities diagram. The Committee met again (VFMAC2) on 5 November to start preparation of a draft Village Fisheries Management Plan. On 3rd December, the Committee travelled to the Fisheries Division in Apia for the third meeting (VFMAC3) to prepare a final draft of the Village Fisheries Management Plan. After this meeting Extension staff made the required alterations to the draft plan, prepared the finished document, and delivered 15 copies to the village.

Final Fono meeting: The final fono meeting was held on 17 December, and attended by the Assistant Director (Fisheries), Ueta Faasili, Michael King, Apulu Fonoti, Siamupini Iosefa and two other extension staff members. The Fisheries Management Plan was presented to the fono meeting by the chairperson of the FRMAC, Taumasina Pisa. Fono members asked several questions, and eventually accepted the plan. The Fono appointed 3 members of the VFMAC to form a Fisheries Management Committee (FMC) to oversee the implementation of the plan.

4. Village Undertakings

The undertakings listed below represent those activities, actions and regulations that the members of the Group Meetings and the Village Management Advisory Committee of Fiaola have submitted to the fono for approval.

4.1 To enforce bans on destructive methods of fishing

Background:

Several destructive fishing methods are being used, including the use of clorox, ava niukini, and dynamite. These methods not only kill small fish but also kill corals, which take many years to grow back. Fishing methods which involve smashing coral to collect sheltering fish (tuiga/faamo'a) are also commonly used. When there are no corals left, there will be no more fish.

Corals - information from the Fisheries Division. Corals are killed by fishing methods such as the deliberate smashing of corals to catch sheltering fish (fa'amo'a/tuiga). Using dynamite, ava niukini, and bleach (clorox) not only kills fish, but kills corals and most other marine animals. Corals provide food and homes for many types of plants and sea animals. Once corals are killed, they take many years to grow back. The cyclones in 1990 and 1991 destroyed many of the corals in Western Samoa's lagoons. Dynamiting the coral has the same effect as a cyclone. Killing a coral reef to catch fish is as senseless as cutting down a coconut tree to get coconuts

Community Actions:

That the fono ban the use of clorox, ava niukini, dynamite and tuiga/faamo'a (smashing the coral to collect fish) in traditional waters of the village of Fiaola. To make these prohibitions effective against people outside the village, the Fono should take steps to make them bylaws of the village.

Timing:

The above laws should come into effect immediately following approval of this plan by the fono (at the meeting proposed of 17 December, 1996).

Penalties:

A person from the village will be penalised with a fine of up to 5 pigs or \$500. Following the declaration of the above rules as bylaws, police action will be taken against a person from any other village breaking the rules.

Fisheries Division undertakings:

The Fisheries Division will provide advice and assist the village with the drafting and submission of bylaws.

4.2 To restrict the number and length of Fish Fences:

Background:

There were also concerns about the number of fish fences (traps) in the village fishing area. Fish traps catch too many fish, and many of the fish caught are very small.

Fish Fences – information from the Fisheries Division. Fish fences or traps catch fish moving along the shoreline. In the case of fish travelling in groups (or schools), large numbers of fish may be caught. If too many fish are caught, there will be too few fish left to breed and produce more young fish.

Community Actions:

The village should have a maximum number of only two traps (fish fences), with a maximum length of 30 m each. There are four traps in the village at present. One is not used and is falling down - this should be removed on a community work day organised by the Women's Komiti. The Fono should decide which one of the remaining 3 traps should be removed.

Timing:

Immediately after approval of this plan by Fono. The Women's Komiti will organise a community work day to remove the unwanted traps in late November.

4.3 To ban the use of underwater torches for fishing***Background***

The use of underwater torches means that fish sleeping under the coral can be easily speared. If too many fish are taken from the lagoon, there will not be enough fish left to breed and produce more young fish to replace the numbers caught.

Community Actions:

To ban the use of underwater torches at night in the village fishing area. To make this prohibition effective against people outside the village, the Fono should take steps to make it a bylaw of the village.

Timing:

Ban to be in force immediately after this Management Plan is approved by the fono.

Penalties:

A person from the village breaking this rule will be penalized with a fine of one carton of canned fish. Following the declaration of the above rule as a bylaw, police action will be taken against a person from any other village breaking the rule.

Fisheries Division undertakings:

The Fisheries Division will provide advice and assist the village with the drafting and submission of bylaws.

4.4 To protect mangroves***Background:***

Over the last 10 years many of the village's mangroves have been cut down for firewood, or to provide clearings for building fale. At present, the mangroves extend over about 300m of the shoreline.

Mangroves - information from the Fisheries Division. Mangroves are trees which are specialised for life at the sea's edge. They are important in that they provide shelter and food for fish and other marine creatures. Mangroves are used as nursery areas in which young fish and shellfish grow up before moving out to deeper water. Some types of fish need mangrove areas as places to breed. Many larger fish visit mangrove areas to feed on smaller fish and other creatures. Mangroves are also important in protecting and building up shorelines. The trees have an underground network of roots which hold the earth together and prevent it being washed away. Mangroves require water which is not too salty and not too fresh. Therefore, they are particularly affected by the construction of roads which prevents seawater and freshwater mixing. One way of protecting mangroves is to declare at least part of a mangrove area as marine reserves - areas in which trees cannot be cut down. An Information Sheet on Mangroves is available from the Fisheries Division.

Community Actions:

To ban the cutting down of mangrove trees in the village area. To make these prohibitions effective against people outside the village, the Fono should take steps to make the ban a bylaw of the village.

Timing:

Immediately after approval of this plan by Fono.

Penalties:

A person from the village will be penalised with a fine of up to 3 pigs or \$300. Following the declaration of the above rules as bylaws, police action will be taken against a person from any other village breaking the rules.

Fisheries Division undertakings:

The Fisheries Division will provide advice and assist the village with the drafting and submission of bylaws.

4.5 To prevent the catching of small fish

Background:

Many small fish are being caught in the village fishing area.

Minimum Size Limits - information from the Fisheries Division. There are National laws banning the catching of fish smaller than a certain legal minimum size for many important types of fish. These size limits have been set by Fisheries Scientists to allow fish to reach a size at which they can breed at least once before being caught. If fish are caught before they become adults, no new young fish will be produced, and the numbers of fish will continue to decrease. An Information Sheet on Size Limits is available from the Fisheries Division.

Community Actions:

Ban the catching of fish smaller than the Nationally-imposed size limits.

Timing:

Immediately after approval of this plan by Fono.

Penalties:

A person from the village will be penalised with a fine. As the size limits are National laws, police action will be taken against a person from any other village breaking the rules.

Fisheries Division undertakings:

The Fisheries Division will provide copies of the Fisheries Regulations.

4.6 To ban the dumping of rubbish on the shore-line***Background:***

Some people in the village are careless, and have left plastic bags, cans, and other materials on the beach and have thrown rubbish into the sea.

Information from the Fisheries Division. Rubbish thrown on the beach or in the sea may just make a village look untidy. However, some rubbish is dangerous. Old batteries, for example, contain chemical that can poison and kill corals and fish.

Community Actions:

It is recommended that the fono ban the dumping of rubbish on shore-lines, and impose fines on people ignoring this ban. It is also recommended that the Women's Komiti should organise a community "clean-up" day to remove rubbish and waste from shore-lines.

Penalties:

A person from the village will be penalised with a fine of community service.

Fisheries Division Undertakings:

None required.

4.7 To establish Fish Reserves***Background:***

The Committee was interested in protecting a small part of the village's fishing area from fishing, and asked Fisheries Officers for more information.

Fish Reserves - information from the Fisheries Division. One way of allowing the numbers of fish to increase is by creating a Village Fish Reserve in part of the village's fishing area. A Fish Reserve is an area in which no fishing is allowed, the environment remains undisturbed, and fish can grow and breed without interference. When fish breed, they produce very small fish (called larvae) which drift with the tide and currents. These larvae can settle and grow in areas outside the Fish Reserve, and therefore eventually increase fish catches in nearby fishing areas. A Fisheries Information Sheet on Fish Reserves is available.

Community Actions:

The village agreed that it should ask the fono to set aside a small area where fishing is banned, to provide a shelter where fish can grow and reproduce without interference. Village undertakings are to seek technical advice from the Fisheries Division on the best position for a Reserve, and to mark the east and west edges of the Fish Reserve with posts and signs. The fono should enforce a ban on fishing in the Fish Reserve. To make these prohibitions effective against people outside the village, the Fono should take steps to make them bylaws of the village.

Penalties:

A person from the village will be penalised with a fine of one carton of corned beef for fishing in the reserve. Following the declaration of the appropriate bylaw, police action will be taken against a person from any other village fishing in the reserve.

Fisheries Division Undertakings:

The Fisheries Division commends the village's decision to set aside a small area as a Fish Reserve, and agrees to support this action by -

- a) providing advice on the best position for a Reserve (report to be provided before February 1997).
- b) providing printed signs to mark the edges of the Fish Reserve;
- c) Monitoring the corals and fish within the reserve at approximately 3 monthly intervals, and report to the village fono through the Fisheries Management Committee.

4.8 To farm fish (aquaculture)

Background:

The Fisheries Management Advisory Committee considered that the possibility of growing freshwater fish in the village should be investigated.

Tilapia - information from the Fisheries Division. Nile tilapia is a freshwater fish, which is farmed in more than 100 countries in the world. They generally feed on plant material (algae), and ponds often need to be fertilised to encourage plant growth. They also need to be fed with additional food including ground coconut or similar plant material. The Fisheries Division may be able to supply small tilapia (called fingerlings by fish farmers) which should grow to harvestable size within 6 months as long as they are cared for properly. The village community would be required to construct a suitably sized pond. A Fisheries Information Sheet on tilapia farming is available.

Community Actions:

It was agreed that technical input from the Fisheries Division would be sought (before June fono meeting) on whether a small area of freshwater in the village would be suitable for the construction of ponds to grow the freshwater fish called tilapia.

Penalties:

Not applicable.

Fisheries Division Undertakings:

The Fisheries Division will inspect the proposed location for tilapia ponds and prepare a report for the Fono meeting planned for late December.

4.9 To introduce new types of seafood into the village fishing area**Background:**

The Fisheries Management Advisory Committee (VFMAC) of the village considered that the introduction of other types of fish and shellfish would provide additional seafood for the community. At the third VFMAC meeting (at the Fisheries Division) the committee asked Fisheries Research Officers to provide more information.

Trochus - information from the Fisheries Division. The trochus or top-shell, *Trochus niloticus* appears to be the species-of-choice for introduction where there are suitable locations. In other Pacific Islands, this species is a source of meat, and its shells are used in village-based industries for the manufacture of pearl discs which are exported and used in the manufacture of buttons. It has been translocated into other Pacific Islands including the Cook Islands and French Polynesia. Despite the numerous translocations of trochus, there have been no records of adverse environmental, ecological or economic consequences, except for possible competition with the turban snail in the Cook Islands. However, the Fisheries Division has to be very careful not to introduce diseases into the country with the trochus, and has to make suitable quarantine arrangements. This may take some time, and trochus will not be available until the end of 1997.

It was also considered that if the fono approved of the declaration of a Fish Reserve, then this would be provided an ideal opportunity to establish breeding populations of giant clams.

Giant clams - information from the Fisheries Division. Clams left or placed in a Fish Reserve, can grow and produce small clams (larvae) which drift and settle in surrounding areas. Clams in these surrounding areas can eventually be collected as long as the breeding stock in the Reserve is protected. The Fisheries Division may be able to obtain giant clams for stocking village Fish Reserves. Giant clams can be grown for food or for sale. In many countries it is now popular to keep small giant clams in seawater in a glass tank (an aquarium). Farmed, young live clams have been exported from Samoa for the aquarium trade. A Fisheries Information Sheet is available from the Fisheries Division.

Community Actions:

It was agreed that technical advice from the Fisheries Division would be sought (before the planned fono meeting in December). If the Division reports that the Fish Reserve area is suitable for giant clams, the community will have to agree to construct cages to protect the introduced giant clams while they are small.

Penalties:

If applicable, the village would have to penalise people taking or disturbing giant clams.

Fisheries Division Undertakings:

The Fisheries Division will survey the area proposed for a Fish Reserve to determine if the area is also suitable for the introduction of giant clams. The Division will report to the Committee before the planned Fono meeting in late December. If the proposed Fish Reserve areas is suitable, the Fisheries Division will supply up to 1000 small clams for placement in the area. The Division will also examine a small area of reef in front of the village to determine if it would be suitable for the placement of top shells (*Trochus*) imported from Fiji.

4.10 To reduce the number of crown of thorns starfish (alamea)***Background:***

Crown of thorns have been increasing in numbers at the western end of the village fishing area. Fishers diving in this area have seen many dead and white corals.

Crown-of-thorns (alamea) - information from the Fisheries Division. Crown-of-thorns (Alamea) are seastars or starfish which eat corals. They crawl across the coral reef and feed on the small animals (polyps) which make up the large blocks and branches of coral. As the starfish move across a reef it eats coral polyps and leaves white, dead corals behind it. Corals can take many years to grow back. Once corals are gone there will be a lack of food and shelter for many types of fish, particularly coral-eating ones such as parrotfish (fuga) and surgeonfish (alogo). One way of keeping the numbers of crown-of-thorns low is to collect and burn them on a fire well up above high-tide mark. A better idea is to bury them in a garden, as they make good fertiliser for plants. Crown-of-thorns should not be chopped up in the water, as each part of the starfish can grow into a whole new animal - this will increase their numbers dramatically, and make the problem worse. The spines of crown-of-thorns starfish are poisonous. An Information Sheet on Crown of Thorns is available from the Fisheries Division.

Community Actions:

The Women's Committee will organise a "***Get rid of Alamea Day***". On this particular day, the aumaga (young untitled men) will spear crown-of-thorns and take them to the shore. Here the women will bury them in the plantations as fertiliser.

Timing:

A "Get rid of Alemea Day" will be held within one month on this plan being approved by the fono.

Fisheries Division Undertakings:

The Fisheries Division has not funds to pay people for removing crown of thorns, but will help by giving technical advice.

4.11 To encourage fishing outside the reefs.***Background:***

Members of the various community groups suggested that too many people were fishing in the lagoon (inside the reefs). If this continues there will not be enough fish left to breed. However, the village does not have boats which are able to fish outside the lagoon, other than the 2 large ALIA catamarans owned by one family. There is a lack of intermediate size boats which could fill the gap between the small paopao (canoe) and the large and expensive ALIA.

Information from the Fisheries Division. One way of allowing the fish stocks in over-fished and damaged lagoons to recover is by encouraging people to fish immediately outside the reefs. The Fisheries Division has identified and negotiated for the supply of low cost Fishing Boat Packages. A 15ft aluminium vessel with 15hp outboard motor, basic fishing gear, anchor, rope, paddles and life-jackets will cost approximately WS\$12,000. The Division can provide training in Outboard Maintenance, Se Safety, Fish Handling and Fishing Methods.

All village groups considered that the introduction of medium sized, low-cost boats was a good way of increasing fish catches in underexploited waters on the outer slopes immediately beyond the reefs. This would increase the amount of seafood available to the community, and create some employment for young people. From meetings held by fisher groups it seems likely that 5 families would be interested in purchasing small aluminium boats.

Activities:

Seek fono support for village families to purchase medium-sized, low-cost, aluminium boats. The Fisheries Management Committee will also seek fono support to ensure that any boats purchased by villagers would not be used inside the reef.

Timing:

Depending on negotiations between Fisheries Division and banks and boat suppliers, boats will probably be available after May, 1997.

Fisheries Division Undertakings:

The Fisheries Division will assist members of the village to obtain finance for the boats, and also assist with training in Outboard Maintenance, Sea Safety, Fish Handling and Fishing Methods. It is estimated that the fish stocks of the outer reef slopes (excluding pelagic species such as tuna) could support 3 boats fishing an average of 4 days per week. The Fisheries Division regards this as the optimum number of boats, and would not support the introduction of more than 3 boats.

4.12 To offer prayers for the marine environment***Background:***

Members thought that Church Ministers could play an important role by leading prayer groups, and by reminding village people of the importance of seafood resources and their conservation.

Community Actions:

To request that the Minister organises prayer meetings and offers prayers for the conservation of fish and shellfish stocks. Also to request the Minister to include sermons on the need for people to protect the marine environment.

Timing:

After approval of this Village Fisheries Management Plan by the fono, members of the Fisheries Management Committee will discuss these matters with the Church Minister.

Fisheries Division Undertakings:

On request, the Fisheries Division will assist Church Ministers with information to use in their sermons.

ANNEX A. QUESTIONNAIRE

VILLAGE **DATE**..... **FACILIAATTOR**

GROUP (VFMAC?)..... **NUMBER IN GROUP**

Note: The group should decide on the correct answers to the questions on this page. The facilitator should **EITHER** enter an exact number **OR** circle range **OR** circle yes or no.

How many people are there in this village? []

0-100 100-200 200-300 300-400 400-500 500-600 600-700 >700

How many schools are there in this village? Primary? [] Secondary? []

How many churches in each denomination are there in this village? Catholic (.....)

Congregational (.....); Assembly of God (.....); Mormon (.....); 7th Day Adventist (.....)

How many MEN in the village go fishing on more than one day a week? []

0-20 20-40 40-60 60-80 80-100 100-120 120-140 >140

How many WOMEN in the village go fishing on more than one day a week? []

0-2- 20-40 40-60 60-80 80-100 100-120 120-140 >140

How many people go fishing outside the reef on at least one day a week? []

0 1-5 6-10 11-15 16-20 21-25 26-30 >30

How many canoes are used for fishing in the village? []

How many ALIAs are used for fishing in the village? []

Are outsiders allowed to fish in the village area? [YES] [NO]

How long is the reef in front of the village? [] yards or metres

What is the average distance from the shore to the reef? [] yards or metres

At low tide, how deep (feet) is the deepest part of the lagoon now? []

At low tide, how deep (feet) was the deepest part of the lagoon before the cyclones? []

Mangroves: What is the area (square metres) covered by mangroves now? []

<100 100-200 200-300 300-400 400-500 600-700 >700

What was the area (square metres) covered by mangroves 10 years ago? []

<100 100-200 200-300 300-400 400-500 600-700 >700

Corals: What is the area (square metres) covered by live corals now? []

<100 100-200 200-300 300-400 400-500 600-700 >700

What was the area (square metres) covered by live corals 10 years ago?

<100 100-200 200-300 300-400 400-500 600-700 >700

Seagrass: What is the area (square metres) covered by seagrass now? []

<100 100-200 200-300 300-400 400-500 600-700 >700

What was the area (square metres) covered by seagrass 10 years ago? []

<100 100-200 200-300 300-400 400-500 600-700 >700

Fish: What are the 5 most common fish in the catch of the whole village?

- 1)
How many hours does it take a good fisherman to catch 1 string/10 individuals (circle one) of this fish? []
10 years ago, how many hours did it take a good fisherman to catch the same quantity of this fish? []
- 2)
How many hours does it take a good fisherman to catch 1 string/10 individuals (circle one) of this fish? []
10 years ago, how many hours did it take a good fisherman to catch the same quantity of this fish? []
- 3)
How many hours does it take a good fisherman to catch 1 string/10 individuals (circle one) of this fish? []
10 years ago, how many hours did it take a good fisherman to catch the same quantity of this fish? []
- 4)
How many hours does it take a good fisherman to catch 1 string/10 individuals (circle one) of this fish? []
10 years ago, how many hours did it take a good fisherman to catch the same quantity of this fish? []
- 5)
How many hours does it take a good fisherman to catch 1 string/10 individuals (circle one) of this fish? []
10 years ago, how many hours did it take a good fisherman to catch the same quantity of this fish? []

Molluscs: What are the 3 most common molluscs (figota) in the catch of the whole village?

- 1)
How many hours does it take a good fisher to catch 10 individuals? []
10 years ago, how many hours did it take a good fisher to catch the same quantity? []
- 2)
How many hours does it take a good fisher to catch 10 individuals? []
10 years ago, how many hours did it take a good fisher to catch the same quantity? []
- 3)
How many hours does it take a good fisher to catch 10 individuals? []
10 years ago, how many hours did it take a good fisher to catch the same quantity? []

Turtles (laumei) - Do people in the village catch turtles? [YES] [NO]
If yes, how many hours does it take a good fisherman to catch 1 turtle? []

Giant clams (faisua) - Do people in the village catch giant clams? [YES] [NO]
If yes, how many hours does it take a good fisherman to catch 10 giant clams? []

Lobsters (ula) - Do people in the village catch lobsters? [YES] [NO]
If yes, how many hours does it take a good fisherman to catch 10 lobsters? []

Crabs (pa'a) - Do people in the village catch crabs? [YES] [NO]
If yes, how many hours does it take a good fisherman to catch 10 crabs? []

Sea cucumbers (sea; mama'o etc) - Do people catch sea cucumbers? [YES] [NO]
If yes, how many hours does it take a good fisherman to catch 10 sea cucumbers? []

Sea urchins (tuitui, sava'e, etc) - Do people catch sea urchins? [YES] [NO]

Others - What other types of seafood are commonly caught in this village?

- a).....
- b).....
- c).....

Appendix 3:

Joint review of Community-Based Management

This review form is currently used to review management in villages. The purpose of the review is to assist the Fisheries Management Committee (VFMaC) to review its performance and to make any improvements necessary. The review is to measure how effectively the Village Fisheries Management Plan has been used by the village, and how well the community has carried out its own undertakings.

The Joint Review should take place about six months after the Village Fisheries Management Plan was approved, and at a time proposed by the community (and recorded in the plan). Because the village must consider this review as their own, extension staff must be very open in their investigation and avoid being seen as policeman. No investigation should be made by extension staff without the full knowledge of the VFMaC.

Before the Extension Staff go to the village *a) all relevant information should be collected from records*. The VFMaC is then interviewed as a group on *b) their performance* and *c) the undertakings of the community*. While in the village, *d) interview 10 other people from the community*. The following form is used to record the information collected and calculate a total score for the village.

VILLAGE: **STAFF:** **DATE(S):**

A) INFORMATION FROM RECORDS

Staff should use information from their work and findings in the village concerned to circle either very good (score = 4), good (score 3), average (score 2), poor (score 1) or very poor (score 0)

If the village has a Fish Reserve, do records show that the community has shown good care by;

Cooperating/participating in surveys? [very good] [good] [average] [poor] [very poor] SCORE/4

Marking the reserve boundaries? [very good] [good] [average] [poor] [very poor] SCORE/4

Enforce rules banning fishing? [very good] [good] [average] [poor] [very poor] SCORE/4

SUBSECTION SCORE = out of 12

If the village has giant clams, do records show that the community has shown good care by;

Removing predators regularly? [very good] [good] [average] [poor] [very poor] SCORE/4

Cleaning cages regularly? [very good] [good] [average] [poor] [very poor] SCORE/4

Preventing loss by theft? [very good] [good] [average] [poor] [very poor] SCORE/4

SUBSECTION SCORE = out of 12

If the village has tilapia, do records show that the community has shown good care by;

Feeding the fish regularly? [very good] [good] [average] [poor] [very poor] SCORE/4

Maintaining the pond? [very good] [good] [average] [poor] [very poor] SCORE/4

Making regular catches? [very good] [good] [average] [poor] [very poor] SCORE/4

SUBSECTION SCORE = out of 12

ACTUAL SCORE = out of possible marks. **CORRECT TO** out of 20

(if out of 12 then times by 20/12; if out 24 then times by 20/24; if out of 36 then times by 20/36)

B) INTERVIEW WITH VFMAc MEMBERS

On the day of the Review, meet with the VFMAc members to discuss the review. Suggest that the process should be as honest/unbiased and thorough as possible and that it would be desirable, for example, to interview a range of villagers not involved in the VFMAc.

How many people were on the VFMAc originally? people.

How many people are on the VFMAc now? people.

If people have left the VFMAc, why is this?

If no decrease in people score 2; if decrease of 1-3 score 1; if more than 3 score 0 >> SCORE = /2

What additional relevant activities has the VFMAc undertaken other than those in the management plan?

.....

If activities undertaken score 1; if no activities undertaken score 0 >>> SCORE = /1

In the last three months;

How many times has the VFMAc held meetings? times.

If 3 or more meetings score 3; if 2 score 2; if 1 score 1, if 0 score 0 >>> SCORE = out of 3

On average, how many people attend each VFMAc meeting? people.

If more than 8 people score = 3; if 6 to 8 =2; if 3 to 5 =1, if less than 3 = 0 >>> SCORE = out of 3

How many times have meetings been held with other people in the village? times

If 3 or more meetings score 3; if 2 score 2; if 1 score 1, if 0 score 0 >>> SCORE = out of 3

How many times has the VFMAc reported to the village leaders? times

If 3 or more meetings score 3; if 2 score 2; if 1 score 1, if 0 score 0 >>> SCORE = out of 3

ACTUAL SCORE = out of 15.

C) INTERVIEW WITH VFMaC MEMBERS ON UNDERTAKINGS

Examine each undertaking one by one and consider the following

If the undertaking involves a conservation activity has this been carried out?

If the undertaking involves a rule or regulation, is the rule being enforced, how many people are breaking the rule, and how many people have had to pay a penalty for breaking this law?

UNDERTAKING

How well has the undertaking been carried out? [very well] [well] [not well] [very poorly]

(Score 3 for very well; 2 for well; 1 for not well; 0 for very poorly) >>>> SCORE =/3

(Repeat the above for all of the village undertakings -obtain the total score the following way)

TOTAL NUMBER OF UNDERTAKINGS (U) =

TOTAL SCORE (S) = out a maximum possible score (3 times U) of

CORRECT TO out of 50 (by calculating S X 50/(3 X U)

Example - If the community has 6 undertakings the maximum possible score (3 times U) is 18

If the village scored 12, multiply this by 50/18 to give 33

What more could the village/VFMaC/agency be doing to protect its fish stock and its marine environment?

.....
.....

D) INTERVIEW WITH OTHER VILLAGERS

Choose 10 adults (not VFMaC members) at random. Out of the ten people you interviewed;

How many know that this village has a Fisheries Management Plan? SCORE = people out of 10

How many have seen the Fisheries Management Plan? SCORE = people out of 10

How many know the name of at least one of the VFMaC members? SCORE = people out of 10

How many think that having a Fisheries Management Plan is good? SCORE = people out of 10

What more could the village/VFMaC/agency be doing to protect fish stocks and the marine environment?

.....
.....

TOTAL SCORE = out of 40. **CORRECT TO** out of 15 (times total score by 15/40)

TOTAL SCORE FOR THE REVIEW

Section A = out of 20

Section B = out of 15

Section C = out of 50

Section D = out of 15

TOTAL = out of 100

ASSESSMENT OF FISHERIES DIVISION PERFORMANCE

Explain that this is a joint review, and VFMaC members must have the right to comment on the performance of extension staff. Encourage members to be honest in their comments, and to highlight any areas where support should be improved.

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