

Community-owned protected areas in Samoa

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The need for marine conservation

A survey of inshore fisheries resources by Zann (1987, 1998) revealed a decline of marine resources in the inshore waters of Samoa. The increased population and subsequent pressure on marine resources from people living by subsistence means together with excessive use of destructive fishing practices (bleach, *ava niukini*, and dynamiting), natural disasters (cyclones Ofa and Val) and run-off from land activities have been purported to contribute to this decline. As a consequence, coastal villagers, in particular subsistence fishers, have been finding it increasingly difficult to catch traditional food from lagoon waters. Since these foods are an integral part of Samoan diet and livelihood, there is significant Government concern to institute measures to protect and conserve inshore resources.

Six years ago, the Fisheries Division and the AusAID Samoa Fisheries Project were instrumental in initiating and developing a novel approach to the management of inshore fisheries which has proved to be highly successful. It has attracted considerable Pacific and worldwide interest. It appears to work well because it empowers villagers themselves to take responsibility and to recognise that they alone hold the key to the protection of marine resources for their children and for their future. In early 1995, with assistance from AusAID, the Fisheries Division commenced their Fisheries extension program. This outreach program continues to provide coastal villages in Upolu, Savaii and Manono with much needed advisory assistance. The process used in the program is a bottom-up approach to management in that each participating village develops its own undertakings to manage its marine resources and its environment, rather than being told what to do by a government authority. Fisheries Division input is to provide technical assistance and guidance to allow the village to achieve its management aims and objectives.

The extension process engages the village community through an outreach program which begins with a meeting with the village council or *fono*. The initial meeting is attended by the matai's (chiefs) and the *pulenuu* (village mayor), key decision-makers for the community. At the meeting, the Fisheries Division introduces its program and discusses the critical issues relating to sustainable management of marine resources and the environment. Ideas and viewpoints are exchanged between village chiefs and Fisheries Division staff and if agreement is reached, arrangements are made to continue the extension process. Over the next several weeks, a series of separate group meetings are held in the village. Usually three groups are involved; the *matai's*, the *aumaga* (untitled young men) and the *komiti o tina* (women committee). This allows all members of the community to have the opportunity to express their opinions and ideas.

At the group meetings, specially trained Fisheries Division extension staff, skilled in facilitation, encourage group discussion of the perceived causes and effects of the lack of marine resources within the village. A number of potential solutions to problems are generated by the villagers within the different groups. The derived solutions are consolidated

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into village-specific marine resource and conservation management undertakings before approval for them is sought from the village fono. Once obtained, a committee representing all groups, is elected to work with Fisheries Division staff, to draw up a Fisheries Management Plan for the village. The plan describes the marine environment, lists the advisory and management committee members and documents the management undertakings, which the village has agreed to follow. Thus each village fisheries management plan embodies the specific rules that villagers themselves have suggested during group meetings.

Compliance and the use of bylaws

The Fisheries Act (1988) has the flexibility to allow the formulation of bylaws to incorporate local village marine resource and conservation undertakings. Since the village *fono* has the capacity to formulate bylaws, specific undertakings in the village fisheries management plan can be made into bylaws, which are recognized and enforced by the government. This procedure has become central to the extension process as it ensures that both villagers and outsiders must comply with village rules.

Once the village agrees to rules becoming by-laws, they are forwarded to the Fisheries Division for deliberation, before being passed onto the Attorney General's Office, for processing. On approval, the by-laws are signed by the Director of Ministry of Agriculture, Forests, Fisheries and Meteorology, and then passed onto to the Legislative Assembly for advertisement in the Government Gazette. By-laws are also published in local newspapers. They become effective seven days after publishing in the Government Gazette.

The function of village by-laws is therefore to protect and conserve the marine resources of that village. They apply to residents and non-residents who fish within inshore waters adjacent to that village. In the past, local offenders have been fined by the village *fono* (tinned fish, pigs and/or money) and recently, prosecution processes have been instigated against outside offenders for transgressing village bylaws.

Management in practice

Following acceptance of the management plan by the *fono*, a committee is then selected to manage the plan. It is known as the Village Fisheries Management Committee (FMC) and consists of selected representatives from *matai*, *aumaga* and *aualuma* groups. The members take on the responsibility of monitoring inshore waters and enforcing village by-laws. They also liaise with the Fisheries Division staff in all future transactions. As part of the ongoing extension service, at least monthly visits are made to the village to discuss progress and problems, arrange training workshops, monitor the fish reserve, measure clam growth and mortality and collect records for outer reef slope fishing. The Fisheries Division assesses their management capacity at six-monthly intervals and provides feedback to the committee.

Marine fish reserves as a conservation measure

One of the conservation and resource management procedures adopted by the majority of villages participating in the program is the establishment of fish reserves or small marine park areas. A fish reserve area is a practical management strategy to protect the biodiversity of marine species and to enhance degraded inshore fisheries resources. Reserves are located within the lagoonal waters belonging to the village. They are thus relatively easy to monitor and protect.

59 community-owned and managed fish reserves have been established on Upolu (38), Savai'i (17) and Manono (4). The reserves are community-owned and managed, with technical support from the Fisheries Division. Some villages have declared a total ban on fishing within the reserve area (no-take zones) while others allow the selective opening of reserves to catch fish for large village gatherings. Whilst it is preferable to have reserves as absolute no take zones for maximum recruitment of fish stocks, acceptance of the social and cultural obligations of village life also needs to be recognized. Restricted and controlled opening of reserves is a wiser management practice than indiscriminant and uncontrolled plundering of fish stocks.

Once a participant in the program, a village may decide to establish a fish reserve. The proposed area is assessed by technical staff of Fisheries Division, allowing confirmation of the suitability of the site, estimation and documentation of the abundance and diversity of marine species in the chosen area. Reserves are usually delineated by poles or floats, which increase public awareness of their presence.

Established reserve areas range in size from 15,000 to 175,000 square metres and many include ecologically important mangrove and sea grass environments, and hence important breeding grounds for fish stocks. Although individual reserves are relatively small it is believed that together, they constitute a vital network of safe havens around the three islands. Linking of larval sources and suitable settlement areas is maximised thus ultimately replenishing adjacent fishing areas through reproduction and migration. In time, fish and other marine resources are expected to increase in numbers, benefiting subsistence fishers and their families.

Following the initial assessment of a reserve, the Fisheries Division continues to monitor changes in flora and fauna diversity and abundance aiming to re-survey sites on a 12 monthly basis. The survey methods used by the Fisheries Division are belt transects for counting fish and invertebrates and line intercept transects, used to assess sessile benthic communities (live coral, dead coral, algae, seagrasses, sand and rubble). The methods used have been adapted from those outlined in ReefCheck and the AIMS Survey Manual for Tropical Marine Resources. A database has also been developed for data collection from fish reserve surveys.

Aim

Informal reports from villagers suggested that an increase in abundance and diversity of fish and non-fish species was occurring within many fish reserves, in a relatively short time. During monthly extension visits, several villagers had mentioned that some species of fish, shellfish and corals, formerly found in the area but latterly destroyed by excessive exploitation, destructive fishing methods, previous cyclones and run-off from land activities, were again beginning to flourish within reserve areas. A few villagers also commented on the arrival of new species to their waters. For example, ape or sea hare eggs were reported by some, and others, spoke of schools of mullet, anae, in their reserve, where none had occurred in previous times. Villagers also told Fisheries Division staff that fish could be observed closer to shore in the reserve area than in other areas.

In order to more rigorously document colloquial reports, a questionnaire pertaining to perceptions of change in fish, shellfish and corals species numbers was drafted. Changes to key fish, coral and shellfish food resources were targeted. These included seven reef fish species, twenty-two invertebrate species and five coral species. The fish and invertebrate species are all important seafood resources for subsistence fishers. Line diagram illustrations

and local names were included to ensure accuracy of identification of species. This paper presents the findings of a feasibility trial of the questionnaire used for a pilot study of a small number of villages, which have been in the extension program.

Methodology

The 10-item questionnaire was tested within the Fisheries Division, prior to distribution to extension staff. Staff were skilled in interview techniques and were reminded not to prompt answers to ensure reliability and veracity of responses.

A total of 13 villagers from 8 villages in Upolu, Manono and Savaii were interviewed. Villages and villagers were selected for convenience. The selected villages had a mean time of participation in the Fisheries extension program of 39 months, (range 25 to 50 months). This also represents the mean age of fish reserves. Small group (maximum of three) or individual interviews were conducted during scheduled extension visits in September. Subjects were either members of FMC or active fishers who regularly used the inshore waters. Interviews were conducted in Samoan and diagrams employed, where necessary, to clarify participant responses. Questionnaire responses were entered into a database and analysed using Excel software.

Results

A survey of village perceptions of the value of fish reserves was carried out to verify informal comments regarding apparent biological changes within the reserves. The survey was restricted to members of the FMC and fishermen who actively foraged in the local marine environment.

All respondents believed that their reserves helped to replenish inshore resources. Results show that the relative increase, decrease or no-change responses to question items pertaining to different fish, coral and shellfish species. Notable increases in Butterfly fish, Parrotfish and Goatfish were recorded. It is highly likely that this is correlated to the increase in Table, Massive and Branching corals also noted in the survey. Surgeon and Emperors numbers were not changed in four villages.

The relative perception of change to shellfish species is less striking. This may be due to the fact that all interviews in the pilot study were conducted with males and traditionally, females collect shellfish. Future data collection for this survey will aim to survey both male and female fishers to ensure a more comprehensive measure of perception. Nonetheless, increased numbers of mudcrabs, razor clams, eels and seahares were noted in four of the eight villages in this study. Only one village recorded an increase in giant clam numbers, although two villages reported the appearance of Pipi and other bivalve species. The Fisheries Division intends to continue with its current restocking program of these species and the newly finished clam hatchery is expected to begin production of spat later in the year.

Reserves were thus clearly seen to restore the wealth of marine resources and most respondents claimed that catches outside or adjacent to the reserve were improving. Seven of the eight respondents believed that the reserve and the increases in catches are related events, fish spilling-out from the reserve accounting for the increase in adjacent areas. The remaining respondent believed that fish have learned that the reserve is a safe haven but that numbers within the reserve had not reached large enough proportions for a spill-out effect to be noticed.

Most communities acknowledged that they had viewed the concept of a marine reserve with some doubt when it was first introduced. However, at interview, all respondents confirmed the current acceptance and appreciation of the idea.

Most villagers agreed that it was their initiative to conserve an area of lagoon, ban fishing and establish good management practices, and that the success of small fish reserves in Samoa was a great achievement. Most communities strongly supported the idea of conservation and preservation of their marine environment. Villagers have seen with their own eyes the benefits that a reserve can bring.

Most villages also stressed the importance of these reserves for the village and its future. However, on a cautionary note, whilst communities do appear to recognize and acknowledge that fish reserves increase fish numbers at one level, some still appear to have a short sighted approach to conservation. Two management committee members stated they were under continual pressure to open fish reserves, indicating the long-term objective to preserve the reserve for the ongoing production of larvae for settlement in adjacent areas was not completely understood.

Conclusion

A pilot study, of village perceptions of the value of fish reserves in restoring key fish, coral and invertebrate species, was conducted in eight coastal villages participating in the Fisheries Division extension program. A ten-item questionnaire was used to obtain responses. All respondents reported increased numbers of fish, shellfish and corals in reserve areas. Fishing areas adjacent to reserves are being replenished with marine species through reproduction and migration, seen by increases in catches for eight villages. Communities show a clear interest in the continuation and success of their fish reserves confirming that responsible management of marine resources is achieved only when fishing communities themselves accept it as their responsibility. Fish reserves are a practical management strategy to protect the marine biodiversity and to enhance degraded inshore fisheries resources.