AQUACULTURE SITUATION IN WESTERN SAMOA

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1. FISHERIES BACKGROUND

Fisheries in Western Samoa has made major advances over the past decade and now contributes significantly to the country's economy. In some fields, notably boat building and village fisheries development, Western Samoa was a leader amongst South Pacific states during the 1970's.

Western Samoa has received assistance in fisheries, mainly in the fields of research and evaluation. As a result of all these overlapping and often repetitive investigations, Western Samoa has comprehensive information and reports on the following items of fisheries interest:-

1. Skipjack and yellowfin tuna potential
2. Marine turtle potential
3. Spiny rock lobster potential
4. Freshwater grayfish potential
5. Aqua and mariculture potential
6. Boat building potential
7. Bottomfish (continental shelf) potential

2. RATIONALE OF AQUACULTURE DEVELOPMENT

Landing of inshore species have suffered serious declines in recent years, threatening the subsistence of much of the rural sectors. FAO Fishery Resource Assessment indicated that stock overfishing had secured in several years and some of the important inshore fishery resources are heading to extinction.

The development of aquaculture will help to restock some of these diminishing resources, allow village people to divert their style of fishing from harvesting existing resource to farming recommended fish species.

The Fisheries Division, other agencies, and private individuals have introduced a number of exotic aquatic species. The history of each known aquatic introduction to this country is briefly reviewed below:-

2.1 Mosquitofish, topminnows (Gambusia, Poecilia)

The topminnow or Mexican molly (Poecilia maxicana) was introduced into streams and ditches in Western Samoa around the beginning of the century for mosquito control and were aquacultured as tuna baitfish between 1978-1982. The mosquitofish gambusia is also recorded from freshwater but details surrounding its introduction are unknown. Today, mosquitofish are to be found in almost every permanent body of freshwater in the country.

2.2 Goldfish (carassius auratus)

Goldfish or carp, originally cultivated as ornamental fish and for aquaculture in China are established in the volcanic water lake, Lake Lanutoo on Upolu. Details surrounding its introduction are unknown, but it is likely that they were introduced from domestic ornamental goldfish which may revert to a wild type.

2.3 African tilapia (Oreochromis (Tilapia) mossambica)

The African tilapia was introduced into the country during the 1960's as a potential food fish and for mosquito and weed control. It was then used in aquaculture as tuna batifish trials in the 1970's and were reared in a pilot project at Afiosalani plantation in 1990 - 1991.

Today they are fond in most bodies of freshwater in Western Samoa including Lake Lanutoo.

2.4 Israel Tilapia (Oreochromis (tilapia) niloticus)

The Israel tilapia is desirable for its fast growing, reaching maturity and marketable size (0.3kg) in about six months and does not stunt in high population densities.

The Fisheries Division imported 300 Israel tilapia as future broodstock for aquaculture on June 2, 1991 followed by a second consignment of 1600 frys on June 18, 1994.

The advantages of this introduction are potentially great. This species has demonstrated aquaculture potential overseas. Village level aquaculture would greatly increase Western Samoa's fisheries yields and would hopefully reduce pressure on the capture fisheries.

2.5 Giant Clams

Western Samoa has two species of clams, Tridacna squamosa and Tridacna maxima. A third species Hippopus hippopus is recently extinct. The existing clam stocks have been very heavily fished and numbers have been so severely depleted in most areas that they are also approaching local extinction.

The Fisheries Division has established a small-scale hatchery and has produced several thousand Tridacna squamosa yearlings for stocking a private farm at Aleipata. It has also imported a number of consignments of exotic, faster growing species for growth trials.

Details of imports of clams

- 1000 yearling T. derasa from Palau 1988
- Several adult T. squamosa from Tokelau 1989 as broodstock (these subsequently died)

- 700 yearling T. Gigas from Cairns, Australia 1990
- About 150,000 three month old seed of H. Hippopus from Orpheus Island 1991.

2.6 Pacific Oysters (Carssostrea gigas)

In June 1990 a consignment of Pacific oyster seed (2-4 months age, 8mm size) was imported by the FAO Pacific Islands Aquaculture Development Program growth trials at Fusi, Safata. These comprised 5,000 diploid seed (capable of reproduction) and 50,000 triploid seed (do not produce gonads, faster growing). The oyster seed was produced by Kuiper Mariculture, California, from local aquacultured oysters. As the triploid technique is not completely successful, about 10% of the triploids were probably reproductive diploids.

2.7 Phillipine green mussel (Perna viridis)

Trials were undertaken by Fisheries Division between 1986 - 1988 on the aquaculture potential of the Phillipine mussels. Encouraging results were obtained and wild populations became established from natural spawning of the aquacultured stock. However, the breaching of the airstrip at Asau during cyclone Ofa has increased the ocean circulation within the bay, making it less eutrophic and less suitable for the establishment breeding populations, and for aquaculture.

2.8 Giant Malaysian shrimps (Macrobrrachium rosenbergii)

Western Samoa undertook aquaculture trials between 1982-1986. A commercial venture was established but closed down two years later.

A shipment of M. Rosenbergii post-larvae were imported in 1990 as an aquaculture experiment in small freshwater pond by the Hann Seidel Foundation. Because the larvae require specific salinities for their development they can only be reared in a hatchery. It is therefore not possible for this species to become permanently established in Western Samoa.

2.9 Euchema seaweed (Euchema cottonii)

With funds made available by the FAO/SPRADP, two shipments of about 15kg of Euchema seaweed were introduced from Fiji in 1991 for growth trials and the establishment of a farm. Cyclone Val which struck in early December 1991, resulted in the loss of the plants already established in selected sites.

3. PRESENT SITUATION IN AQUACULTURE DEVELOPMENT

Limited funds for aquaculture development resulted in only two projects undergoing now.

3.1 Giant Clams

The project anticipated at providing clam seedlings for the reef restocking program and for farming in villages. Damages and losses induced by the two cyclones in 1990 and 1991 were the major setback in achieving of these goals. The first phase of the rehabilitation program was the importation of about 5,000 seeds of T. squamosa and H. hippopus from Fiji Fisheries in mid 1992. The second shipment of about 2,000 seedlings arrived on February 1993. All these two shipments were quarantined at the Fisheries before they were transferred to the ocean nursery.

At the ocean nursery, about 4,500 clams of various sizes remained cultured. About 75% of these are of T. derasa, 20% are of H. hippopus and 5% are of other types. The average monthly growth of T. derasa is about 4mm with 1.6mm for the H. hippopus species.

The Fisheries Division is now aiming at setting up another ocean nursery in Savaii at the end of 1994. This idea has come about since the nursery in Namua faces some problems of people stealing clams from the nursery early in the year.

3.2 Freshwater fish farm (Tilapia niloticus)

The fish farming program was initiated in 1991 as a solution to alleviate existing fishing pressure on the local fisheries and to provide an alternative income source for local farmers. With funds from FAO/SPRADP the Fisheries Division set up its demonstration farm at Afiosalani plantation.

Two grow-out ponds with sites of 25m x 20 and two production/nursery ponds with sizes of 10m x 5m have been set up. The grow-out ponds are now being stocked with frys from Fiji Fisheries imported on the 18th of June this year.

4. CONSTRAINTS AND COUNTER MEASURES

Possible constraints to freshwater fish farming in Western Samoa are the lack of permanent freshwater bodies suitable for aquaculture, and a widespread prejudice against eating freshwater fish (because of the poor taste or muddy flavour).

The former problem could be solved through a proposal submitted by the Fisheries Divsion to the government for the development of the Afulilo reservoir into a fish farm with some small fish ponds constructed in areas with suitable soil and sufficient water supply. A possible counter measure for the second constraint could be through promoting ways of processing and cooking to eliminate the muddy taste of these fresh water fish.

Lack of funds is another major setback for aquaculture development. Most of the projects are provided with limited funds to implement these projects. Therefore all phases of such programmes could not be achieved.

The lack of manpower or qualified personnel in the division also contributes to the failure of some project in Western Samoa.

5. PROPOSED AQUACULTURE RELATED PROGRAMMES FOR 1995

5.1 Extension of Giant Clams Project

Plans are made for the extension of our giant clam project. This started up with setting up new sites for two extra nurseries in Savaii. The main objective of having these extra nurseries is to produce sufficient broodstocks for spawning and future stocking.

Training in areas of spawning, larval rearing and culturing is very much needed to achieve such goals.

Therefore, priority is given to training for the Fisheries staff in the coming future.

5.2 Establishment of Afulilo reservoir into an aquaculture farm

Fisheries Division has submitted a proposal for the utilization of the Afulilo reservoir into an aquaculture farm with intensions to focus mainly on freshwater finfish culture namely Tilapia niloticus species.

It is also recommended that an aquaculture centre be established adjacent the reservoir as a demonstration centre to promote fish farming in Western Samoa.

Gillet, R. (1988). The transplantation of trochus to Tuvalu. FAO/UNDP Regional Fishery Support Programme.

Heslinga, G. and Hillman, A. (1981). Hatchery culture of the commercial top shell *Trochus niloticus* in Palau, Caroline Islands. Aquaculture 22: 69 – 172.

Nash, W. (1985). Aspects of the biology of *Trochus niloticus* and its fishery in the Great Barrier Reef regions. Northern Fiseries Research Centre, Department of Primary Industries, Queensland.

Sims, N. (1985). The ecology, abundance, and exploitation of *Trochus niloticus* in the Cook Islands. Proc. Fifth Internat. Coral Reef Congr., Tahiti.

Zann, L. P. (1991). Assessment of inshore fisheries in Western Samoa: Preliminary findings of first year of FAO/UNDP project SAM/89/002.