

# SAMOA AQUACULTURE PROFILE

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## I. BACKGROUND

Samoa (Figure 1) is situated in the central Pacific and consists of two major islands, Savaii and Upolu and two smaller islands, Manono and Apolima. The total land area is approximately 2,839 km<sup>2</sup> with a population of 161,298 people (1991 Population Census). The Exclusive Economic Zone of Western Samoa covers an area of about 120,000 km<sup>2</sup> and is the smallest in the South Pacific region.

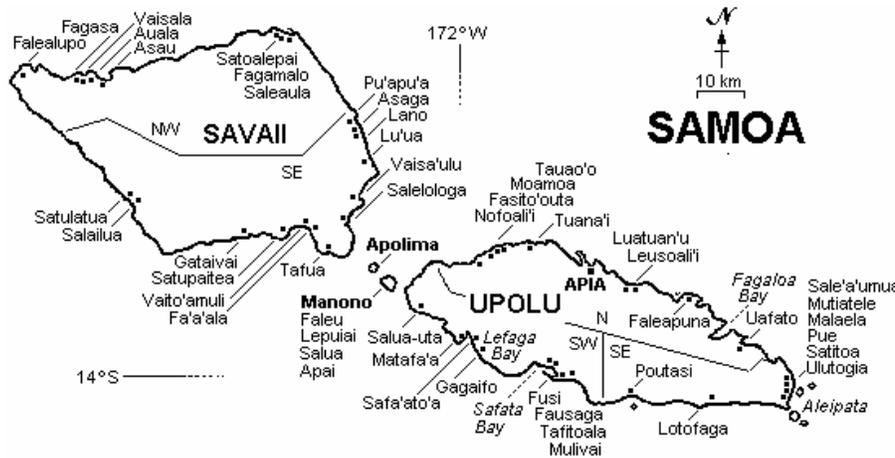


Figure 1. The map of Samoa

Samoa is not well endowed with vast lagoons and coral reefs like other Pacific islands, however, fringing reefs and barrier reefs enclosing lagoons surround all the islands. The reef and lagoon areas surrounding the islands have been estimated to be approximately 23,100 ha for depth less than 50 m (Johannes 1982). The mangrove and swampy areas have been estimated to be about 1,000 ha (Bell 1984).

The climate of Samoa is tropical and oceanic with abundant rainfall. Humidity averages 80 per cent and the annual average temperature is 26.5 °C. There are two major distinguishable annual seasons in Samoa: the rainy season from November through to April and the dry season from May to October.

The economy of Western Samoa is based on agriculture. Subsistence agriculture (including fishing) is the principal activity involving two-third of the labour force (Bell 1984). With limited employment opportunities, the majority of the population continues to live at a subsistence level as farmers and fishers. In 1989, 70 per cent of Samoan families were involved in one way or another in agricultural production of which 50 per cent were engaged in some fishing activities (Statistic Dept 1991). Fairbairn (1993) also noted that 75 per cent of the population and almost the entire rural population are still supported by agriculture (fisheries as part of the agricultural sector) and by related primary sector activities.

Aquaculture was not a traditional practice in Samoa. However, a traditional form of giant clam ranching was practised on village reefs or in lagoon where a community placed giant clams in a fenced off area for special occasion or reserves for seafood supply in bad weather. The idea of initiating true aquaculture in Samoa dated back in 1954 when an SPC Fisheries Officer investigated the possibility of establishing fish ponds near Apia. However, aquaculture activities have not been materialized until in the 1980's when several trials pertaining to farming tilapia, freshwater and marine prawn species, oyster, eucema seaweed, green mussels and giant clams were investigated. Objectively, aquaculture activities have been initiated in Samoa to:

- Alleviate pressure on over-exploited inshore reef and lagoon fishery resources;
- Create an additional/alternative source of food and income;
- Increase fishery production.

In summary, 13 new aquatic species have been introduced into Samoa specifically for aquaculture purposes. Of all the introduced species, one was introduced for mosquito biological control but later used for aquacultured baitfish. The *Hippopus hippopus* giant clam species was re-introduced as it is believed that this species became geologically extinct. The *Tridacna squamosa* was also imported, as it is believed to be functionally extinct.

The statement of economic Strategy 1996/97 summarised the current situation and effort of aquaculture development in Samoa is as followed: commercial farming of mussels, oysters, giant clams, prawns, Israel tilapia and mullet. The recent development of aquaculture saw the establishment of three local tilapia fishponds, 13 village fish farms and 37 small giant clam farms. Village natural lakes and streams and also earth ponds were stocked with tilapia and these farms ranged from small to medium scale. Similarly, villages have also established small giant clam farms as part of the community's inshore resources rehabilitation effort

## II. STATUS OF THE AQUACULTURE SECTOR

### 1. Production statistics

(a) Annual production from aquaculture projects are summarised in Table 1.

	1993		1994		1995		1996		1997	
	Qty	US\$	Qty	US\$	Qty	US\$	Qty	US\$	Qty	US\$
<b>AQUACULTURE PRODUCTION</b>										
<b>Finfish</b>										
Tilapia			25.5 kg	40	1.56 mt	2,200	0.984 mt	1,550	1.52 mt	2,400
<b>Crustacean</b>										
Yabbie	5.76 mt	10,000			500 kg	1,500				
<b>Giant clams</b>										
<i>T. derasa</i>	6,700 pcs		338 pcs		264 pcs		32,000 pcs 10-15 cm of mixed species		28,000 pcs 10-55 cm of mixed species	
<i>T. gigas</i>	148 pcs		11 pcs		7 pcs					
<i>T. squamosa</i>	2543 pcs		784 pcs		479 pcs					
<i>H. hippopus</i>	730 pcs		105 pcs		98 pcs					

Giant clams were mostly produced for re-population purpose and most were given out for the establishment of 37 community giant clam farms. Similarly the majority of tilapia produced were also given to villages to stock community-run fish farm as part of the community income generation effort.

(b) Estimated pond or culturing areas under culture (ha) at present by species and island.

Name island	Israel tilapia	Giant clams	Mullet
Upolu	3,300 m <sup>2</sup> of earth ponds and 6 large natural freshwater ponds of size ranges: 2,500-20,000 m <sup>2</sup>	Clams are placed in a location within 21 Village Fish Reserves (Fish Reserves have sizes ranged between (10,000 - > 100,000 m <sup>2</sup> ))	1,745 m <sup>2</sup> of earth ponds
Savaii	1,000 m <sup>2</sup> of earth ponds and 7 large natural freshwater ponds of size ranges: 2,500-20,000 m <sup>2</sup>	Clams are placed in a location within 11 Village Fish Reserves (Fish Reserves have sizes ranged between (10,000 - > 100,000 m <sup>2</sup> ))	
Manono		Clams are placed in a location within 5 Village Fish Reserves (Fish Reserves have sizes ranged between (10,000 - > 100,000 m <sup>2</sup> ))	

*(c) Main cultured system*

Species	Types (pond, cage, etc)	Intensity (extensive, intensive, etc.)	
Israel tilapia	Earth ponds and natural freshwater ponds, lakes and streams	Extensive	40%
		Semi-intensive	60%
Giant clams	Ranching within Village Fish Reserves	Semi-intensive	100%

*(d) Relative contribution to national aquaculture production*

Type	Production		Value	
	Mt	%	US\$	%
Israel tilapia	Very minimal			

*(e) Relative Contribution (%) to national aquaculture production of purposes:*

- Subsistence (mainly used for consumption only)
- Semi-commercial (small holdings, with produce marketed in local community and partly used for consumption)
- Commercial scale production (large output with broader market channels)

Species	Purpose	%
Israel tilapia	Subsistence	80%
	Semi-commercial	20%
Giant clams	Subsistence	70%
	Semi-commercial	30%

**2. Socio-economic**

*(a) Average farm size in m<sup>2</sup>.*

The existing fish farms of constructed earth ponds are all small-scale in operation except village fish farms which, are varied in sizes as mentioned. However, the average farm size based on the size of constructed fish ponds are between 1,200-1,500 m<sup>2</sup>.

*(b) Export/Import of aquaculture products*

Giant clams: 30,000 pieces of sizes ranged from 10-60 cm.  
Tilapia: 100 kg

*(c) Income*

Not available

*(d) Consumption of fish protein from aquaculture production.*

Not available

### 3. Employment in Aquaculture

#### *(a) Part-time:*

About 15 people were working partially or semi-full time for the established fish farms. However, the numbers of people per community-run fish farms can be varied from 10s to 50s on a voluntarily basis.

### 4. Main markets for aquaculture products

Currently tilapia productions are mainly disposed at local markets.

### 5. Aquaculture Development Policies and Policy Instruments

#### *(a) Sectoral policy and instrument*

The Statement of Economic Strategy 1996/97 policies stated that effort to expand the Fisheries Sector will be centered on the following areas which included aquaculture:

- Tighter policing of poisoning and dynamiting within the reef;
- Continued installation of FADs at selected sites, with Fisheries Division addressing questions of cost recovery from fishermen;
- Encouragement of offshore tuna fisheries through training in longlining using alia fishing vessels;
- Development of a new boat designing, smaller than the alia, for short-range fishing outside the reef;
- *Commercial farming of mussels, oysters, giant clams, prawns, Israel tilapia and mullet;*
- Facilitating exports of high-value fish, already established on a small scale by the private sector.

The new Fisheries Act 1998 (in preparation) mandated the promotion of aquaculture nationally

- to improve primary production;
- to facilitate conservation and management of marine fishery resources and;
- as an alternative means of income and food generation the for subsistence sector.

#### *(b) Sectoral Planning*

The national plan pertaining to aquaculture development included the introduction and cultivation of potentially commercial fishery resources to increase primary production for both local consumption and overseas markets. Moreso, it helps to generate income opportunities for many local communities. The following table summarises the on-going current aquaculture projects with associated objectives, beneficiaries and the main supporting agencies and institutions.

Project	Objectives	Beneficiaries	Supporting Agencies
Tilapia Fish farming (small-scale)	<ul style="list-style-type: none"> <li>▪ Increase fish production</li> <li>▪ Generate income</li> <li>▪ Food security</li> <li>▪ Improve nutrition</li> </ul>	Villagers, Schools and individual farmers	Samoa Govt, SPADP-FAO and AusAid.
Village Giant Clam Farms	<ul style="list-style-type: none"> <li>▪ Increase primary production</li> <li>▪ Generate alternative income</li> <li>▪ Food security</li> <li>▪ Improve nutrition</li> </ul>	Local villages and communities, groups, etc.	Samoa Govt, SPADP-FAO, ICLARM and AusAid.

## 6. Institutional Framework

- (a) The Fisheries Division of the Ministry of Agriculture, Forests, Fisheries and Meteorology is the only local agency/institution currently involves in the development of aquaculture in Samoa.
- (b) At present, some of the existing tilapia fish farms are served as demonstration venues for the public sector in particularly individuals and communities interest in developing aquaculture projects.

## III. INTERACTION WITH SECTORS

Aquaculture is currently has minimal or negligible contribution to the production of the fisheries sector. Likewise, the impacts of aquaculture on other sectors and also vice versa are relatively insignificant.

## IV. TRENDS

Although aquaculture currently has negligible or minimal contribution to the production of the fisheries sector, the future trend for aquaculture development will mainly focus on the identification of suitable and potential aquatic animals and plants for commercial farming. Farming of Israel tilapia and giant clams will expanded on a national scale anticipating to repopulate depleted areas and provide alternative income and food sources communities. The further development of aquaculture is anticipated to provide diversion and alleviation of the existing fishing pressure from the inshore fisheries.

In addition, national development policy and objectives pertaining to aquaculture are likely to influence, as many communities have opted to reserve their lagoons and reefal areas for rehabilitation motive. Aquaculture developments will certainly be further expanded given the restriction of the utilisation of inshore fishery resources.

## V. EMERGING PERSPECTIVE: MAIN CONSTRAINTS AND OPPORTUNITIES FOR FURTHER DEVELOPMENT

Further developments of aquaculture in Samoa will both have constraints and opportunities. In regards to the development restriction, factors such as

- Limited ideal and suitable sites (land with adequate water supply, protected nursery lagoonal areas, etc);
- Lack of interest and enthusiasm by local groups or individuals;
- Restricted preference for freshwater cultured aquatic species ;
- Lack of support from funding sources (borrow agencies and institutions, etc);
- Lack of incentives;
- Lack of strong policies and clear objectives
- Poor management and longterm interest;

conceivably contributed to the slow development of aquaculture in Samoa.

Possible opportunities may arise from the present and future developments of aquaculture will be as follows:

- Alternative income and food securities;
- Alternative inshore fishery resources management tool;
- Improve nutritional element for many local communities;
- Increase production which helps the economy
- Stock enhancement opportunity

## VI. OBJECTIVE FOR AQUACULTURE DEVELOPMENT AND MANAGEMENT OVER THE NEXT DECADE

The followings are the expected development objectives and management measures for aquaculture in Samoa:

- Identifying commercially and suitable potential cultured freshwater and marine animal and plants species through trials and researches;
- Identifying and promote low-tech, cost effective and practical aquaculture techniques that can be transferred to communities;
- Establishing sources (hatcheries) of seedling, fry, spats, etc for supplying farms
- Assessing the market element for aquaculture products (i.e. high demand for baitfish (milkfish) from the local *alia* longline fishery);
- Promote training and transferring of skills and knowledge on aquaculture developments and sustainable management to local farmers.
- Continue stock enhancement program of giant clams, green snail, trochus, etc.
- Promote added-value for aquaculture products.
- Generate environmental, social and economic awareness of the impacts of aquaculture developments.

## **VII. CAPACITY BUILDING THROUGH TRAINING, RESEARCH AND EXTENSION**

Local capacity building has been strengthening through local and overseas training as well as via researching and extension developments. Several selected staff members had opportunities to undertake long and short term specialised training in Fiji, China and Philippines on aquaculture farming methods and management. Furthermore, some communities and individuals have received on the spot training from the Research Unit of the Division on farming, management and maintenance aspects of tilapia culturing. Overseas training and study tour were also extended to some individuals where they had the chance of visiting fish farms in Fiji. Through the current extension program of the Division, many rural communities have farmed tilapia and giant clams as alternative means of food and income. By doing this, knowledge and skill pertaining to aquaculture are virtually transferred to the village level, hence enforcing and strengthening local capacity.

## APPENDIX

### ISLAND PROFILE

Tabulate feature of all islands in the country reference cited

Name of island Features	Upolu	Savaii	Manono
Population	117,400	47,600	5,000
Area of Land	1,115 km <sup>2</sup>	1,820 km <sup>2</sup>	5 km <sup>2</sup>
Distance from main land	0 miles	20 miles	4 miles
Area of inland lagoon	23,100 ha of total reef and lagoon area in Samoa		
Main sources of income	Salaried employments, manufactures, overseas remittance, agriculture and fisheries	Agriculture, forests and fisheries and overseas remittance	Fisheries and overseas remittance
Main products	Coconuts, kava, tuna and offshore fish,	Coconut, kava, staple crops, native timbers and fish	Inshore fisheries

### LIST OF COMPANIES, INSTITUTIONS AND PERSONEL IN AQUACULTURE RELATED INDUSTRY IN THE COUNTRY

Name and business	Address	Phone & fax	E-mail	Remarks
Chanel College Fish Farm	Moamoa, Apia	21821		Commercial culturing Israel tilapia
Satapuala Mullet Farm	Satapuala Beach Resort			Commercial farming mullet
Fisheries Division	P.O.Box 1874	20369		Researching and experimenting on potential species.

## RELEVANT PUBLICATIONS ON AQUACULTURE IN THE COUNTRY

<b>Author</b>	<b>Year</b>	<b>Title</b>	<b>Documented reported</b>	<b>Publisher</b>
Uwate, K. & Kunatuba, P.	1984	Aquaculture development in the Pacific Region.	Critically reviewing of Aquaculture Development in the Pacific Region included Samoa	East-West Centre. Paper presented to the Pacific Congress on Marine Technology Hawaii
Zann, L.	1991	A review of Aquaculture projects undertaken in Samoa	Review summary of all past and present aquaculture in Samoa	Fisheries Division, MAFFM.
Mulipola, A.	1994	A report on assistance provided to the Solaua Freshwater Crayfish	Documenting feeding and management assistance given to the Solaua crayfish farm	Fisheries Division, MAFFM.
Bell, L. & Ropeti, E.	1995	Potential for Aquaculture in Western Samoa. Report No. 95/19.	Present and future of aquaculture research and development in Samoa.	Fisheries Division, MAFFM
Bell, L., Mulipola, A. & Matsunaga Y.	1995	The platability of tilapia in Samoa.	Report on taste-testing of Israel tilapia cooking using various recipes. Report for Fisheries Division.	Fisheries Division, MAFFM
Mulipola, A. & Taulofa, P.	1997	Report on Chanel College Tilapia Fish Farm.	Summary report of Chanel College Tilapia Fish.	Fisheries Division, MAFFM
Kallie, J., Mulipola, A. & Trevor, A.	1998	The introduction of aquatic species into Samoan villages	Summary report of tilapia and giant clams introduction for community-run village farms.	Fisheries Division, MAFFM
King, M. & Faasili, U.	1998	Community-based management of subsistence fisheries in Samoa.	Detailing approaches imposed by communities with regards to the management of subsistence fisheries.	Fisheries Division, MAFFM.