

AQUACULTURE UPDATES: SAMOA

In October 2003, SPC's Aquaculture Adviser and Officer, Ben Ponia and Satya Nandlal, visited Samoa to review programme activities and participate in a one-day aquaculture workshop. During their visit they were updated on various ongoing developments in Samoa

History of aquaculture

There has been a long history of aquaculture research and development in Samoa, stretching over several decades.

- In 1954 SPC investigated the potential for aquaculture. That led soon after to the introduction of the Mozambique tilapia (*Oreochromis mossambicus*). In 1991 the Samoa Fisheries Department introduced the Nile tilapia (*O. niloticus*).
- Seaweed (*Kappaphycus* sp.) was introduced in 1975. Culture trials by the Fisheries Department recommenced in 1991 but stopped not long after.
- In 1978, the FAO/UNDP-funded pilot trials for top minnow (*Poecilia mexicana*) as bait for the pole-and-line skipjack fishery. Polyculture trials were most successful with milkfish. By 1983 the project was abandoned because it was not economically feasible.
- Post-larval giant freshwater shrimp (*Macrobrachium rosenbergii*) and giant tiger prawn (*Penaeus monodon*) were imported from French Polynesia to the Samoa Fisheries Department hatchery in 1980, and were successfully propagated. The project failed,

*Samoa Fisheries Department
giant clam hatchery at Toloa*

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however, to stimulate any private sector interest.

- In 1982, green mussel (*Perna viridis*) spat was imported from French Polynesia with the assistance of the predecessor organisation to IFREMER. Culture trials revealed good growth despite problems with poaching.
- In 1990 culture trials of the Pacific oyster (*Crassostrea gigas*) were initiated. Although growth was satisfactory and several markets were identified, constraints in production could not be overcome.
- Giant clam (*Tridacna derasa*) were imported from Palau in 1982. This led to a private commercial farm being established, which was later closed after cyclones in 1990 and 1991 destroyed it. A

giant clam restocking programme run by the Fisheries Department was also affected by the cyclones. Under an AusAID project, a stock enhancement programme was recommenced, leading to the establishment of the Toloa giant clam hatchery in 2000.

- *Trochus* (*T. niloticus*) were introduced in 1990 by an FAO project for reseeding.
- The freshwater crayfish red-claw (*Cherax quadricarinatus*) was introduced by a private entrepreneur for commercial culture in 1993 together with *C. destructor*. Culture trials resumed with a second introduction in 1995 of *C. quadricarinatus*, with successful propagation reported at the Fisheries hatchery. Growth was reported as excellent.

Institutional arrangements

The Fisheries Department is the main government agent responsible for aquaculture development. Within the department a small aquaculture section has been recently established under the management of Senior Fisheries Officer, Malwine Lober. Support is provided by the department's extension services.



The Toloa hatchery operated by Fisheries is the main centre for mariculture research. At the time of our visit the hatchery was focused mostly on giant clam propagation. Around 60,000 juveniles (around 4 cm) were being cultured onsite. At the hatchery, a JICA scientist is conducting trials for sea urchin aquaculture. After Cyclone Heta in January 2004 many of the giant clam broodstock for the Toloa hatchery perished.

The Fisheries Department in Apia has a series of concrete raceways that serve as a tilapia hatchery. In 2004 the department plans to increase its tilapia fingerling production. This effort will be supported by SPC, which in December 2003 provided a small financial grant to upgrade the hatchery and has programmed some assistance in training and extension.

Savaii Island

Along the Savaii Island coastline there are 15 village marine

reserves that have been reseeded with giant clams produced at the Tolao hatchery. The majority of restocking is with *Tridacna derasa*, a fast-growing clam highly valued for its meat, and which is now extinct in Samoa. In addition, there are several sites along the fringing reef where trochus recently introduced from Vanuatu under an ACIAR project are being reseeded. Trochus shell has a well established market in the button industry and could provide an economic opportunity for Samoa.

Savaii is fortunate in having an abundant source of freshwater from underground springs that could support fresh and brackish water aquaculture including restocking of fisheries resources.

One of the major estuaries on Savaii is shared by several villages including Salotepai and Safai. Freshwater is provided by springs on the inland side and seaweed enters with tidal flows from the lagoon side. Mozam-

bique tilapia introduced in 1950s is an important artisanal fishery and fishers with their canoes and nets are a common sight. The Fisheries Department prefers to restock the estuary with Nile tilapia from the hatchery because, unlike the Mozambique tilapia, the Nile tilapia breed in freshwater so it is less likely for populations to establish themselves in the marine coastal areas. Also, Nile tilapia has superior growth characteristics compared with Mozambique tilapia.

In 2004, the Fisheries Department (with SPC's assistance) plans to increase the number of Nile fingerlings to be stocked in this estuary. This will be an interesting case study as the success of the programme will require the combined management effort of all villagers who have access to the estuary. For example, a short ban on harvesting will probably be required in order to allow the first cohort of maturing fish to breed. Fortunately it appears from our meetings with village



Nile Tilapia at Samoa Fisheries Department hatchery

chiefs that an inter-village fisheries management council is already in place and could implement controls.

At Sapapalili village a small freshwater pond, 20 x 20 m, was constructed by the Fisheries Department and stocked with several hundred Nile tilapia. The source of water for the pond is an underground spring with brackishwater intrusion from the coast. From visual observations the fish appeared to be in excellent health and there was a high survival rate. It was reported that a 47 cm, 1.1 kg fish had been caught recently. Given the high quality of water, a pond of this nature could be intensively stocked with up to 2000 fish.

Close to the main town of Salelologa is the site of a proposed black pearl farm. The site already has land-based infrastructure in place and has identified a section of the lagoon where the oysters will be held. A bottleneck facing the farm is a sufficient supply of pearl oyster stocks because the wild oyster populations on Samoa have

nearly been fished out. One option is to raise juveniles at the Toloa giant clam hatchery. A few months after our visit, SPC commissioned a consultant from the Cook Islands to visit the proposed pearl farm and provide technical advice.

Upolu Island

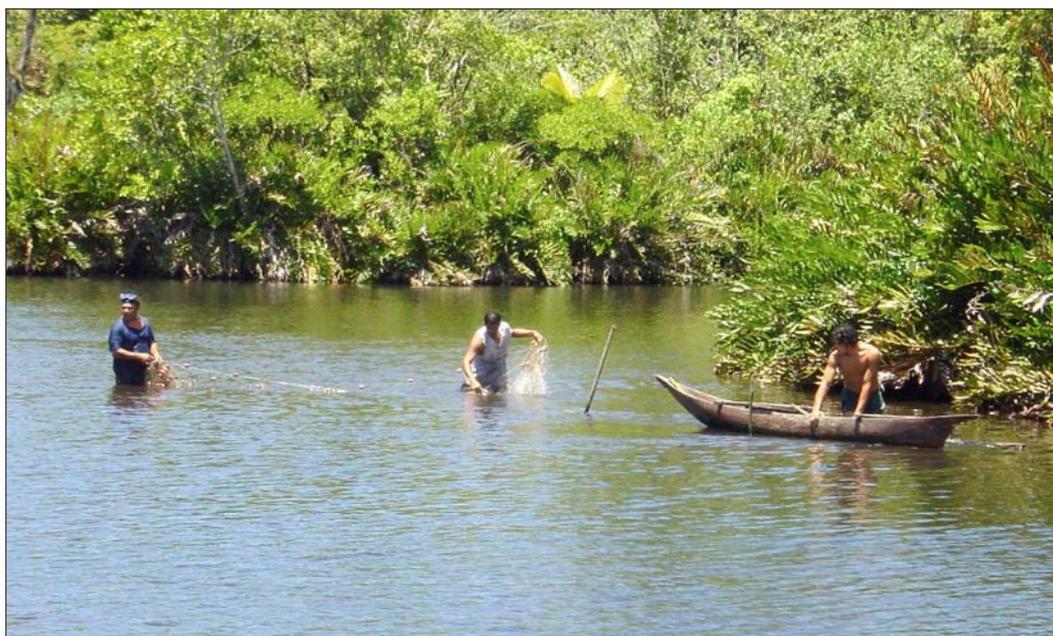
Like Savaii, the main island of Upolu has many village marine reserves where giant clams from the Fisheries hatchery are being restocked.

Fisheries have been conducting a small growth trial on mud crab with the assistance of a local businessman. The trial is located on the coastal mangrove area and fenced off with plastic mesh. Design features are being tested to minimise escape of crabs during the high tidal flow, and to protect them from the sun. Preliminary results suggest that the omnivorous mudcrab will react positively to a diet of household scraps and trash fish.

Freshwater *Macrobrachium* shrimp were farmed in Solau in the early 1980s, and more than a

tonne of shrimp was harvested. According to project reports, the site has 74 hectares suitable for farming and there is an adequate water supply from the river that runs through the property. Several large earthen ponds from the trial still remain although the land has been reclaimed for cattle farming. There are private sector interests that wish to re-examine the feasibility of shrimp farming.

The University of the South Pacific campus at Alafua has an emphasis on agriculture and, with similarity between aquaculture and livestock or crop production, the institution could assist in aquaculture development. Dr Ajayah, a lecturer, provided a tour of the campus set-up, including a duck farm with tilapia ponds. One of his MSc students, Evangeline Singh, aims to study the productivity of an integrated agriculture-aquaculture system (taro, duck and tilapia), which will be modelled on typical rural village conditions.



Artisanal fishers netting freshwater tilapia at Sapapalii village in Samoa