AQUACULTURE UPDATE FOR VANUATU

Up to now, the aquaculture sector in Vanuatu has had a relatively low profile. With recent developments aquaculture may be poised to deliver both extensive farming programmes that will benefit Vanuatu rural areas and also intensive culture programmes of national economic significance. SPC Aquaculture Adviser Ben Ponia recently visited the country and reports on the current status of developments.

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Vanuatu is composed of more than 80 islands arranged in a Y-shaped chain, with a land mass of 12,200 km^2. The islands are mountainous, of volcanic origin with a narrow coastal plain. The main island is Efate where the capital Port Vila is located. The country has a population of 196,000.

The history of aquaculture has been a sporadic development. The farming of Pacific oyster (*Crassostrea gigas*) was attempted in the early 1970s. Experimental culture of *Macrobrachium rosenbergii* was also carried out on Efate Island but was not continued.

The Fisheries department (under the Ministry of Agriculture, Forestry, Fisheries, Quarantine and Inspection Services) is the main agency responsible for aquaculture developments in Vanuatu. The research section based at its headquarters in Port Vila is the aquaculture focal point. Its staff oversee research and pilot trials. Another important section is the extension service, which has staff based in four main provinces. The extension officers have a lot of experience and are very good at focusing on practical outcomes. The Japanese government is also providing some technical assistance with a volunteer for green snail and trochus hatchery spawning in Port Vila and another volunteer on Malakula Island for seaweed farming.

Alongside the Fisheries department are the Quarantine and Environment departments, which also have important roles to play in terms of aquaculture development.

The Quarantine department is responsible for ensuring safe practices in bringing in livestock and the certification of food exports. Like many such departments in the region, there is not a lot of capacity for dealing with aquatic animals, but the department is interested in addressing this gap.

One of the important roles of the Environment department is as the CITES management authority. It issues CITES permits for export, particularly focusing on the ornamental trade. The government has put a ban on *Tridacna crocea* clam exports because the harvest levels were considered by Environment and Fisheries as unsustainable. The Environment department would like to see more aquaculture in the aquarium trade to substitute for harvesting from the wild. Consistent with this, Fisheries has developed a five-year plan to phase in cultured animals.

Seaweed (Kappaphycus *sp.*)

Kappaphycus seaweed (Euchema) is a commodity with potential for coastal inhabitants, particularly on the outer islands where there are fewer opportunities for cash income. Fisheries staff have already conducted extensive growth trials throughout Vanuatu's islands, particularly on Efate, Malekula and Santo. Research and extension staff have a high degree of technical competence and are able to expand seaweed production to commercial levels when necessary. However, Fisheries has resolved not to commit to scal-

Pannangisu village in North Efate. A site where the Fisheries department has conducted seaweed farming trials

ing up production to commercial levels until a stable buyer or market is in place.

One way to view the attractiveness of seaweed for village communities is to look at it as a substitute for copra, or as a commodity that can integrate with the copra marketing network already in place. Currently copra is purchased at a subsidised price somewhere in the range of VUV (Vatu) 15,000–25,000 per tonne. This is compared to about VUV 40,000 per tonne currently paid for seaweed (unsubsidised) in Kiribati, Fiji Islands and Solomon Islands.

At Pannangisu village in northern Efate, SPC Aquaculture Adviser Ben Ponia took part in a village meeting to review the potential of seaweed as a substitute for copra. The common view was that the current price of copra of about VUV 25,000 per tonne was no longer attractive, but a price range of VUV 40,000–60,000 per tonne would rekindle interest. This is in the upper price range of seaweed. However, given that seaweed farming requires less inputs than copra, according to our back-of-the-envelope economics, seaweed could be a viable proposition. Villagers did not see any cultural or social barriers to seaweed farming and thought women would be good seaweed farmers. One possible hurdle is that there is limited access to the micro-financing of VUV 10,000–20,000 that would be required to start up a seaweed farm.

Trochus

Trochus is a valuable source of cash to coastal villagers. It is worth around VUV 400 per kg. Green snail is another highly valued mother-of-pearl ornamental shell. It sells at VUV 1700 per kg.

Batches of trochus for seeding are raised periodically at the Fisheries hatchery in Port Vila. Currently, there about 2 million juveniles in the nursery raceways. A Japanese aquaculture volunteer is based at the Fisheries hatchery to assist with spawning the green snail.

At the time of Ben's visit, Fisheries staff had just returned from seeding trochus broodstock on Malakula, Pentecost and Tanna islands under an ACIAR-funded project. One of the advantages of restocking broodstock instead of using hatchery juveniles is that the offspring from broodstock in the wild have a thicker shell and better survival rates compared to the hatchery juveniles. Research conducted on juvenile grow-out has shown that floating cages produced high survival rates compared to benthic cages, although the benthic cages had better growth rates.

In 2000, 30 tonnes of trochus button blanks and 43 tonnes of trochus scraps were exported, worth about VUV 31 million. In 2001 the export volume was 31 and 57 tonnes respectively, worth at total of VUV 79 million.

Currently the country is experiencing problems with supply of trochus, partially due to unsynchronised harvest moratoriums and overfishing. In 2002, trochus had to be imported from Australia to make up tonnage. The shortage of trochus is reflected in the decline in the number of button factories in the country. At its peak there were four button factories operating but now there are just one or two factories.

Hong Shell Products trochus button factory

The Hong Shell Products factory is an affiliate of a large Asian company. The manager of the factory explained that with less trochus being harvested the factory is looking for alternative sources of mother of pearl. The turban shell (*Turbo sestus*) and large pen shell (*Penna* spp.) are several alternative species being processed. The company is interested in finding sources of mother-of-pearl outside of Vanuatu, for example pearl shell from Pacific countries with a pearl culture industry.

Hong Shell trochus button factory

Freshwater shrimp and marine prawns

There has been a lot interest from the public in farming freshwater shrimp, particularly the Macrobrachium species. The Fisheries department plans to establish a trial farm and a demonstration site for shrimp farming in the near future.

The domestic prices for shrimp are good. The local freshwater shrimps, the Pacific shrimp [FAO: Monkey river prawn] *Macrobrachium lar*, are sold domestically at VUV 1200 per kg while imported marine prawns retail between VUV 2600 and VUV 4500 per kg. In some places, taro farming in the swamps is integrated with shrimp farming. The harvests have reportedly been quite successful.

The Pacific shrimp is widespread. Fisheries extension officers identified 11 islands where it is found, and that have locations where it could be farmed. During a visit to a proposed shrimp farm site in the middle of Efate Island, Ben saw a 15 cm adult among the shrimp traps, not an uncommon size he was told. Since the Pacific shrimp is reputedly plentiful and a good prospect for aquaculture, a good research project would be to undertake some farming trials to assess the basic biological characteristics such as growth rates, stocking densities and feed requirements.

The Fisheries department is also interested in revitalising its *M. rosenbergii* programme. Two fisheries officers Felix N'guyen and Sompert Gerava, recently participated in a training attachment to Fiji where they were able to successfully hatchery rear this species. Since his return Felix has been seeking support for Fisheries to conduct pilot trials.

Fully grown Pacific shrimp (*Macrobrachium lar*) caught in the wild

Teouma Prawns

Teouma Prawns is a partnership between several prominent local businessmen. One of the partners, Robert Monovisin, is involved in cattle farming and heavy industrial engineering works. A second member has experience with farming tilapia in China. The technical partner is David Challenger, who owned a *Penaeus monodon* prawn farm in Solomon Islands.

The area put aside for prawn farming covers 70 hectares of land previously used for cattle pasture. The site can be viewed from the main highway where it begins and extends as far as the coastline. Farm construction began six months ago with an investment of VUV 250 million budgeted for. Already 12 hectares of ponds have been dug with a full time gang of workers and heavy equipment excavating on site. A lot of engineering works have been completed to create the necessary inlets and channels and a large reservoir for the water requirements. On the coast, a prawn hatchery has been built to supply post-larvae. Other infrastructure constructed includes large sheds for mechanical equipment, maintenance, storage and food processing.

The company is willing to sell post-larvae from its hatchery to support local interests who wish to set up their own farms. If developments stay on schedule the farm could be exporting by next year. The Teouma Prawns annual production farm is targeted at 6–10 tonnes of prawns per hectare. This would probably make it Vanuatu's most valuable fisheries export. It is estimated that about 50 local workers will be employed on the farm.

The prawn farm also plans to integrate itself with tilapia fish farming using the water discharge system. This will be a good source of cheap fresh fish for Vanuatu (since reef fish is scarce and expensive). In Fiji about one to two tonnes of tilapia are sold per week on the local market.

Fish farming

Like most of the Pacific, fresh reef fish at the local market is expensive. Cheap imported tinned fish is often more commonly consumed. According to Fisheries, the reasons fresh fish is

not readily available are because at some localities (and islands) the wild stocks are naturally low and in addition only a small portion of the population has access to motorised boats to travel to fishing grounds. Hence fish farming is considered as an alternative and there are regular enquires from the public to Fisheries for assistance. Islands such as Tanna, with its inland lakes, or Santo, which has an abundance of fresh water, are considered by Fisheries as some of the sites suitable for fish aquaculture.

One possible obstacle is the Mozambique tilapia, which was introduced to Vanuatu for mosquito control. This species is now widespread. Because it is such a prolific breeder and omnivorous feeder it could compete with fish aquaculture. The Fisheries department has expressed interest in other types of tilapia such as the GIFT strain, which is a much faster growing species and more suitable for aquaculture then the Mozambique tilapia.

On Santo Island Ben accompanied Clen Alo, the fisheries extension officer, to a number of prospective sites for fish and shrimp farming. Nampauk village was one of the sites visited and typical of the village setting in Santo, with traditional lifestyles still being maintained. Because the village was located quite far inland and unable to go fishing regularly, there was a lot of interest in farming fish. Using their initiative the village were constructing ponds for fish farming amongst the taro swamps in the valley nearby. A total of fifteen ponds were planned. However, the fish that had been trapped from the coast and stocked in a small isolated pond nearby was the Mozambique tilapia.

Fortunately the fish had not been released into the main ponds, so after explaining the pest characteristics of this particular tilapia it was agreed that it was better to destroy them rather then have them contaminate the swamps. In the interim it was suggested to do some trial culture of the local shrimp instead. The lesson learnt from this was the need for Fisheries and SPC to proactively assist in fish stocking programmes at the village level to ensure that, mistakes are not unwittingly made which may jeopardise future fish farming efforts.

From the road's end we were able to view extensive mountainous terrain where remote hill tribes lived. Clem reported that Fisheries had recently learnt that for a number of years the hill tribes had been experimenting with fish farming and that it was becoming a common practice amongst some tribes. The details were sketchy but it is thought the fish is a mullet species that is being restocked from juvenile phase. It was a member of the hill tribes passing through Nampauk village who sowed the idea of fish farming in the village.

Tridacna crocea *in the Fisheries giant clam hatchery*

Marine ornamentals

Although some small-scale hatchery rearing of giant clams is occurring, most of the ornamental trade is based on the wild fishery. Concern over the impact on the *Tridacna crocea* stocks has led the government to declare a ban on the harvest of this species. Along with giant clams, cultured coral and live rock are exported. Some exports figures for the ornamental trade are shown in table below.

	2000 Qty	2001 Qty
Cultured coral	275 pieces	6,737 pieces
Live rock	13,710 pieces	19,195 kg
Giant Clam		10,008 pieces
T. crocea	113,940 pieces	
T. maxima	4,825 pieces	
T. squamosa	1,402 pieces	