Update on aquaculture of marine gastropods and bivalves in Vanuatu

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Gastropods and bivalves, including giant clams, trochus and green snails, have been commercially exploited in Vanuatu for decades. The heavy fishing pressure on these organisms has led the Vanuatu Fisheries Department (VFD) to consider artificial propagation of some of these species to (i) replenish overfished stocks, (ii) substitute the export of wild-caught animals with farm-raised animals, and (iii) develop new and sustainable industries for the country.

Trochus, giant clams and green snails remain the species of major interest for mollusc aquaculture in Vanuatu. However, other species such as edible oysters and pearl oysters could generate some interest for further aquaculture diversification in Vanuatu.

Trochus

Trochus (*Trochus niloticus*) is primarily targeted for its shell, which is processed locally into blank buttons (Fig. 1) and exported to China and Hong Kong. Trochus shells are sold to button factories for VT 350–450 per kg (USD 3.7–4.7 per kg). In 2006, a total of 36 tonnes (t) of processed trochus shell was exported, contributing more than VT 35 million (±USD 325,000) in foreign exchange. In 2007, exports increased to about 55.2 t, harvested from five provinces. All shells were sold and processed by the sole licensed exporter in Port Vila.

Trochus have been produced at VFD's hatchery since the early 1980s to assess the potential of reseeding the reefs of Vanuatu to enhance the fishery. The Australian Centre for International Agricultural Research (ACIAR) has funded extensive research focusing on various aspects of trochus biology and aquaculture, including nutrition, seed production and community participation in stock management.

The annual production from the hatchery is around 20,000 seeds, most of which are supplied to communities for restocking purposes. The continuous involvement of Vanuatu in trochus research demonstrates the importance of this resource to the economic and social well-being of its rural communities.

One of the major challenges faced in producing trochus in Vanuatu was the deteriorating water quality of Port Vila harbour where the trochus hatchery is located. The hatchery was renovated in 2006 with financial assistance from the Japan International Cooperation Agency (JICA) (Figs 2 and 3). This work reduced the water-quality problems and should enhance the survival of seeds produced in the hatchery.

Figure 1. Processing buttons at Vanuatu 's only trochus shell factory. (Image: Antoine Teitelbaum)

Figure 2. Fibreglass raceways at VFD facilities (donated by JICA), used for producing marine molluscs. (Image: Antoine Teitelbaum)

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Figure 3. Header tank, pumping and filtration room at VFD aquaculture facility, donated by JICA. (Image: Antoine Teitelbaum)

Giant clams

In 2001, the first batch of giant clams (*Tridacna crocea*) was successfully produced at the VFD land-based hatchery, with the aim of assessing the potential for restocking reefs as well as the commercial value of the clams on export markets. The work was prompted by concerns over the large quantity of wild giant clams being harvested for the aquarium trade. As a result, several hundred pieces, valued at over VT 100,000, were sold live to aquarium product exporters in Port Vila.

Vanuatu has four giant clam species (*Tridacna maxima*, *T. squamosa*, *T. crocea* and *Hippopus hippopus*). Four hundred pieces of the locally extinct *T. gigas*, the true giant clam, were introduced from Tonga by JICA and VFD in 2007. After acclimation, 200 specimens were established at Mangaliliu village and 200 at Mosso Island, North Efate. VFD expects that once they are mature, they will be taken back to the VFD hatchery for spawning. The juveniles produced will then be used to restock the reefs of Vanuatu.

High numbers of wild giant clams were harvested for the aquarium trade in 2000 and 2001, with exports worth VT 4–7 million. Soon after, harvests of *T. crocea* from the wild for export were banned throughout the whole archipelago and in October 2007, VFD decided to ban the export of all species of wild giant clams. Now, only cultured clams can be exported.

Figure 4. *Tridacna maxima* being produced by a private exporting facility. (Image: Antoine Teitelbaum)

Figure 5. *Tridacna squamosa* spat being settled on concrete blocks at VFD aquaculture facility. (Image: Antoine Teitelbaum)

The main market for cultured giant clams is the live aquarium trade. Clams are sold for high retail prices in overseas markets (USD 20–300 per piece). In Port Vila, exporters of aquarium products sell them at an average of VT 500 (USD 4.50) per piece, starting at a size of 4–5 cm (Fig. 4). There is also a lucrative market for the adductor muscle of the larger species, but it takes a long time to grow.

There is potential to engage communities in giant clam farming. Although mass seed production of giant clams in the hatchery for grow-out targeting the aquarium industry is yet to be shown to be commercially viable in Vanuatu, VFD is currently working on producing seeds for grow-out in rural coastal areas (Fig. 5). Rural grow-out is currently being trialled in Mangaliliu village, North Efate, and on Lelepa Island.

Green snails

Green snail (*Turbo marmoratus*) seed production in VFD's hatchery began in 2003. The objective was to assess the potential for propagation and reseeding to enhance the wild fishery on the reefs, where stocks had been heavily depleted by overfishing. Further trials were undertaken in 2007 through the coastal resource management project funded by JICA, in which green snail was identified as a priority commodity (Figs 6 and 7).

The current project is aimed at identifying ways to produce green snail seeds more easily. The seeds will be available for restocking reefs at targeted sites in Vanuatu. In 2007, VFD carried out two green snail spawning runs – one in February with relatively low survival (996 pieces) and another in September that resulted in much higher survival (3624 pieces).

Some green snail spawner groups have been established on the reefs off Efate and are protected to ensure increased natural seed production. The broodstock were collected from Anetiyum Island, which still holds a healthy broodstock. Targeted coastal communities are being trained to manage the spawner groups in the protected area surrounding their villages.

Pearl oysters

The potential for culturing black pearl (*Pinctada margaritifera*) was investigated in 1996 at Peskarus in the Maskelyne Islands in a collaboration between VFD and a Tahitian pearl company. The study concluded that while stocks of blacklip pearl oysters are present in the area, the numbers were not sufficient to support a commercial farm and the pearl farming trials were abandoned.

However, hatchery technology is now widely available for pearl oysters and there is good potential in Vanuatu for pearl farming based on hatchery-reared spat production.

Other molluscs and further potential

Further research on wild spat collection for pearl oyster species, scallops or edible coastal oysters could bring benefits to Vanuatu's growing aquaculture industry. VFD is building its capacity in aquaculture and is working hard to develop the country's full potential in this area.

Vanuatu's proximity to export markets (Australia, New Caledonia, New Zealand), its own domestic market (growing population of 200,000, with 20% living in Port Vila) and the rapid development of tourism (85,000 visitors in 2006) are all assets for the country's economic development. Vanuatu has great potential for aquaculture thanks to its huge diversity of sites, excellent water quality and supportive economic and social environment.

Further reading

Vanuatu Fisheries Department. 2007. Fisheries Department 2006 Annual Report. Vanuatu Fisheries Department, Ministry of Agriculture, Livestock, Quarantine, Forestry & Fisheries. 28 p.

Vanuatu Fisheries Department. 2008. Fisheries Department 2007 Annual Report. Compiled by Jason J. Raubani. Vanuatu Fisheries Department, Ministry of Agriculture, Livestock, Quarantine, Forestry & Fisheries. 46 p.

Vanuatu Fisheries Department (in press) Vanuatu Aquaculture Development Plan 2008–2013. A collaborative work by Vanuatu Fisheries Department, Ministry of Agriculture, Livestock, Quarantine, Forestry & Fisheries, and SPC Aquaculture Section. 35 p.

Figure 6. Second batch of green snails (4 months old) produced at VFD hatchery facility. (Image: Kenichi Kikutani)

Figure 7. Ten-month-old green snails ready for restocking. (Image: Antoine Teitelbaum)