AQUACULTURE SECTION

Aquaculture updates from Papua New Guinea

In March 2009, SPC's Aquaculture Adviser, Ben Ponia, visited Papua New Guinea (PNG) to assess SPC programming assistance in that country. He was assisted by counterparts from PNG's National Fisheries Authority (NFA) including NFA's Aquaculture Manager Jacob Wani. Several locations were visited to view recent developments and some observations from that visit are provided here.

Daru Island, Western Province

Daru Island is the capital of PNG's Western Province, and is the largest province in the country, although it is sparsely populated and is one of the least developed. The Ok Tedi gold mine is the main source of revenue. Daru Island itself is small, just 5 km long and 3 km wide. It forms part of the Torres Straits group and sits at the junction between the border of PNG, Australia and Indonesia. The official population is around 15,000 but the number swells when Fly River claimants to Ok Tedi royalties visit the island to receive their payments and trade goods. During our visit, the foreshore was covered with many dugout canoes with makeshift tents. Some people travelled for as many as four days down river. The town is a hotspot of social problems including alcoholism and high rates of HIV.

The Ok Tedi Mine is funding (10 million kina – As of June 2009, 1 USD = 2.7 PNG kina) the Western Province Sustainable Barramundi Project, with Ian Middleton serving as project manager. the project aims to provide economic and social development by 1) farming barramundi in cage pontoons along the coast and inland freshwater bodies, 2) restocking barramundi in the Fly River to encourage eco-tourism fly-fishing, and (3) supporting habitat and biodiversity conservation in Morehead and Suki wetlands and the wider Trans Fly eco-region, which includes West Papua (Indonesia).

- The eight-hectare barramundi project site was halfway through construction during the time of our visit. The hatchery design has 12 indoor tanks, brood stock tanks and a large saltwater header tank that will gravity feed two earthen ponds for fingerling grow-out. The facility will have shared accommodation for four hatchery staff. A later extension phase will include housing for the hatchery manager and visiting scientists, and a jetty beyond the inter-tidal zone.
- The barramundi hatchery capacity is 500,000 fingerlings per year, and 20 breeders are already being conditioned. The first barramundi harvest is scheduled for April 2010. Ian has recruited experienced staff who previously worked at his barrumundi farm in Madang. Once construction is completed, fish breeding will begin immediately.
- We visited sites for fish grow-out. At the time, there was a fuel shortage due to shipping delays and purchases from royalty payments, so we observed first-hand the soaring fuel prices charged on the "black-market" (up to 15 kina per litre).
- We crossed the channel separating Daru Island and the PNG mainland to Pama Island, which has a village of about 800 people. The school principal, Wesly Kiwi, worked on Ian's farm in Madang and will be responsible for pontoons in the area. He intends to provide supplementary feed to the barramundi by gillnetting "trash fish", especially garfish species. Another area for grow-out will be Katatai village, located at the mouth of the Fly River (which is about 70 km wide). Pontoons will also be deployed by project staff in Daru Island channel, at an old pearl farm site.
- SPC is interested in collaborating on barramundi tag-and-release experiments in the Fly River as they could provide lessons for other Pacific Island countries interested in culture-based freshwater fisheries. SPC is also involved in an Australian Centre for International Research (ACIAR) mini-project

Dugout canoes, with makeshift tents, moored at Daru Island.

with Ok Tedi staff to assess Fly River herring as a possible fishmeal or supplementary feed source for the barramundi project.

Crayfish tails and barramundi are important fishery exports, and the main exporter on Daru would like to transship through Australia to the USA. However, there have been difficulties with Australian quarantine dept related to traceability issues that we hope will be addressed through a biosecurity and trade project. The management of the invasive snakehead from Indonesia is also a pressing issue as this species is becoming widespread and is now sold on the local market. Staff in Daru Island have offered to assist the ACIAR mini-project by collecting local *Penaeus monodon* shrimp for analysis at Australian Commonwealth Scientific and Industrial Research Organisation to assess the disease status of shrimp.

One of the main problems for provincial fisheries departments is the lack of resources for management and surveillance. Fisheries are becoming overfished and fishers are poaching from the Australian maritime area. Turtles and dugongs are caught and sold with few regulations. The sea cucumber fishery is one of the most important fisheries for coastal villagers but the sizes that are being harvested are becoming quite small (as little as 7.5 cm). Fisheries officials also described their concerns for the freshwater ornamental Saratoga fish stocks because villages along the Fly River have been deliberately targeting juvenile fish that are stockpiled in cages and later sold to Indonesian traders across the border.

Lae, Morobe Province

We were unable to travel to Lae but met with a representative from Bris Kanda, a non-governmental organisation currently implementing a large NZAID rural enterprise development project for the Huon Gulf area. According to Lukis Romaso, project manager, the tilapia pond-farming component of the project has expanded faster than they had anticipated. They began in 2008 with 20 tilapia ponds and now have about 100 ponds that are supplied by a satellite hatchery. The fish are sold in villages at 12 kina each, but they would now like to sell them in the main market in Lae where they believe that there is a strong demand. SPC will assist in this commercialisation phase.

SPC was requested to assist with a Japan International Cooperation Agency project in Lae, which is supporting community-based aquaculture. The Aquaculture Section of SPC believes there is an opportunity for fattening mud crablets in the mangrove and may carry out some trials.

Nago Island, New Ireland Province

Nago Island is a small uninhabited islet located just off the town of Kavieng. It is the site of the new NFA Nago Island Mariculture and Research Station, which is currently under construction. NFA has secured 11 hectares of land connected by a jetty. The station has a hatchery, algal laboratory and "wet" laboratory and indoor and outdoor larval tanks and raceways, with replicates and free spacing set aside for experiments. There is a separate area for quarantine. There are also offices and two resident houses onsite for staff. Because the island is uninhabited, the facility will be fully self-sufficient in providing its energy and water needs.

Nago Island also has tourism potential and NFA intends to sub-lease part of its land to Nusa Resort to build some tourist accommodation. It is intended that the resort and station will share power and water utilities, an interesting example of public and private sector partnership. Nusa Resort already runs a successful eco-tourism/surfing bungalows operation on the neighbouring island.

Hugh Walton (Principal for the National Fisheries College) is project coordinator and Peter Minimulu from NFA is hatchery manager. We discussed projects that might help commission the facility once it is completed. Project ideas included, trochus community restocking trials, cage farming rabbitfish, introducing *Kappaphycus* seaweed, mariculturing marine ornamentals and mabe pearl culture trials.

A quick visit to the National Fisheries College was made to see a small tilapia hatchery and ponds that Peter has established as a part of the college's (introductory and advanced) course.

Postscript: after our visit, John Morrison from James Cook University was engaged by NFA to review the hatchery designs and specifications and he provided very useful suggestions.

Rabaul

Peter Cooper is the General Manger of the Carpenters Company in Rabaul, which is farming black tiger shrimp (*Penaeus monodon*). Carpenters is a large trading firm and exporter of tea, cocoa and copra. The first crop of shrimp (12 t) was harvested in 2008. It is a fairly large operation with about 10 x 0.5 hectare earthen ponds with a capacity to produce 80 t of shrimp per year. At the time of our visit, the farm was preparing for a harvest the following week. This harvest was forecasted to be around 24 t, of which 4 t would be sent to Fiji.

The farm has a new purpose-built processing facility. Sorting, grading, freezing (-35°C) and packaging the harvested shrimp is all done onsite. The facility has a capacity for about 1 t per day and during peak processing periods an additional 20 workers are hired (mostly female). The facility has passed NFA's audit section's food safety standards.

The hatchery is located close to the staff compound and is run by a hatchery manager recruited from Indonesia. One ongoing problem is the lack of broodstock around Rabaul, so live breeders have been sourced from trawlers operating in the Gulf of Carpentaria. The hatchery has a high use of probiotics (bacteria) to feed its larvae.

Farmed black tiger prawn from Rabaul.

The Rabaul "Tovarur" shrimps retail at 47 kina per kg, and the taste is delicious!

Meeting announcement: Tilapia Summit meeting

SPC's Aquaculture Section will hold a tilapia summit meeting in December 2009.

This will be a Pacific regional meeting to address strategic issues in tilapia fish aquaculture for Pacific Island countries and territories.

Inland aquaculture of freshwater fish in small ponds has been identified by regional policymakers as one of three main "Fish for Food Security" strategies, to meet the needs of increasing populations and as a vehicle for adaptation to climate change.

In all other tropical regions of the world, tilapia aquaculture has been developed to the point where it is now regarded as "the aquatic chicken". Tilapia has been present in most parts of the Pacific Islands region since the early 1960s but, with a few exceptions, tilapia aquaculture has not yet been developed to any great extent. There is huge potential still waiting to be achieved, although some constraints still to be addressed.

The purpose of the Tilapia Summit will be to:

- share experiences from within the region, and from outside (Asia, Africa, South America), to identify constraints;
- identify the most appropriate project models and development pathways for tilapia aquaculture under Pacific Island environmental and social conditions; and
- establish a regional "roadmap" for the sustainable development of tilapia aquaculture in the Pacific.

A mouth-brooding tilapia female inspected by Solomon Islands fisheries aquaculture staff.

The Tilapia Summit will be of interest to all of those engaged in the fields of Pacific aquaculture development, food security or climate change adaptation. Participation is open to SPC member country government and territory administrations, as well as representatives from private-sector aquaculture, academic institutions, NGOs and civil-societies active in these fields. Some funding is available for government representatives from selected SPC countries and territories.

For more information, contact SPC's Aquaculture Officer Tim Pickering at: timp@spc.int

Teaming up for sustainable ornamental aquaculture in Tonga

In April 2009, SPC, Walt Smith International (WSI) and Tonga's Fisheries Division combined efforts and resources to develop a coral and live rock farm aimed at supplying the international aquarium market. This project, mostly funded by the Australian Centre for International Agricultural Research (ACIAR), also has significant in-kind contribution by all three stakeholders.

Background

Tonga's marine aquarium fishery has been developing over the past 20 years. It supports jobs in rural, low-income coastal areas, and has operated on mutual management and compliance effort since its inception and is now establishing a fisheries management plan. As a result, a specific aquarium fishery management plan has been drafted in consultation and cooperation with other stakeholders, including government departments, tour operators, aquarium industry personnel and fishing communities.

However, the Tongan government, under pressure from some environmental groups has decided (as a precautionary approach) to put a ban on live rock harvesting (previously 50 tonnes a year) in August 2008, and to bring coral quotas down from 300 pieces to 150 pieces per exporter per week. This has led to the closure of two private companies (out of five) and the dismissal of many employees of other companies. The closure has also induced the live rock trade to switch locations (e.g. to Vanuatu and Indonesia).

Initial trials

During the SPC marine aquarium trade conference in December 2008 (see previous issue of this newsletter), Tonga's Fisheries Division approached SPC to develop a project proposal that could assist motivated Tongan companies to venture into the aquaculture of corals and rocks. As part of the ACIAR- funded aquaculture mini-project scheme, SPC agreed and approached WSI to be the project partner, given their extensive experience in farming both of these commodities in Fiji.

The first step of this project was to make the best use of the existing flow-through aquaculture facilities at the Sopu Mariculture Centre. During the initial visit to Tonga, Walt Smith lent his entire crew to help the staff of the Fisheries Division and SPC to rehabilitate the facility and make it ready for the new coral farm. Once the tanks were ready, appropriate brood stock was collected under the supervision of Chris Turnier, WSI biologist and coral expert. He rightly pointed out that only what the aquarium industry wants should be collected and grown, otherwise it will be a wasted effort. The newly acquired corals were carefully placed in several holding tanks at the Fisheries Division, awaiting the fragmentation process where one piece of coral is turned into 50 or more cuttings. Both WSI and Fisheries Division staff were trained in fragmenting and planting coral colonies. Once cuttings are made from a mother colony it takes only about four to six months to grow them to the ideal market size ready for export.

Acropora clathrata broodstock.

At the end of this initial trip to Tonga, the team (staff from WSI, SPC and the Ministry of Fisheries, accompanied by Scott MacTier, an aquaculture volunteer from AusAID) was able to plant over 3,000 new coral fragments and over two tonnes of man-made live rock. The team intends to return to Tonga soon for the second installment of this project, which will include planting coral on racks placed in the ocean in preparation for community-based projects. The goal is to have over 40,000 pieces of coral planted and 25,000 tonnes of live rock in the water during the first few months of the project.

Artifical rocks, made of concrete, in a raceway at the Sopu Mariculture Centre.

What is the future for this activity in Tonga?

Tonga's Fisheries Division has been very supportive of this project because it has the potential to bridge the gap between the marine ornamental industry in Tonga and the national government, with a better understanding of just how renewable the resource is. . Currently, the industry is under a lot of pressure from groups that do not think that coral and rock harvest can actually be sustainable. Culturing corals and rocks is one way to engage communities and government to create awareness regarding coral reef issues and the use of a renewable and sustainable resource. In Tonga, there are very few natural resources that can be exported and if the resource is proven sustainable it will make a valuable contribution to the Tongan economy.

The Fisheries Division thinks that this project will benefit the environment and help to negate suspected excessive depletion of the resource by the aquarium trade. It is an exciting time and the marine ornamental industry should embrace this chance to be involved. Unfortunately, until the ban is lifted, the industry is suffering from a lack of export dollars to invest in such a project. The industry hopes that the knowledge gained from this exercise will enable the Ministry to re-establish the original quota in order for the trade to survive long enough to put this technology to use for the benefit of the communities, the Tongan economy as well as our industry.

For more information on this project, contact:

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The first fragment mounts made in Tonga.

Cutting fragments of *Acropora millepora*.

Kautai, from Walt Smith International, sticking a fragment of *Acropora millepora* in a cement mount.