New SPC Freshwater Aquaculture Officer appointed

SPC’s Aquaculture Section recently hired a new Freshwater Aquaculture Officer, Dr Tim Pickering. Tim worked previously as a lecturer in aquaculture at the University of the South Pacific (USP) in Fiji. Tim took up the post in June 2008, and follows in the giant footsteps of tilapia and prawn expert Satya Nandlal, who departed SPC late last year for new challenges in Australia. Tim’s background encompasses both freshwater and marine aquaculture commodities in Pacific Island countries.

He has been involved in diverse projects that include seaweed, marine shrimp, sponges, sea cucumber, eels, live rock, marine ornamental fish and corals. Much of his recent work, however, has been in helping to establish and manage a freshwater prawn and tilapia farm as a commercial joint-venture between USP and the private sector in Fiji. Along with Marine Aquaculture Officer Antoine Teitelbaum and Aquaculture Adviser Ben Ponia, Tim’s arrival brings the strength of SPC’s Aquaculture Section’s back up to three.”

Fourth Fisheries Ministerial Conference held in Palau

In an unprecedented move, aquaculture was included as an agenda item on the Forum Fisheries Committee Officials Ministerial Conference. This forum traditionally focusses on tuna fisheries and provides guidance for the Pacific Islands Forum Fisheries Agency based in Solomon Islands. But given the interconnectivity and importance of coastal fisheries and aquaculture, it was decided to include agenda items from these sectors in the meeting.

A “State of Coastal Fisheries and Aquaculture” report was drafted and delivered by SPC staff at the conference.

The aquaculture agenda item focussed on delivering the regional aquaculture strategy — the SPC Aquaculture Action Plan 2007 — which was recently completed. The inclusion of aquatic biosecurity in the aquaculture strategy was a “talking point” that raised considerable interest among participants.

The regional strategy was warmly received by officials and endorsed by ministerial representatives attending the conference.

The Fourth FFC Fisheries Ministerial Conference was held in Palau from 19–20 May, and was attended by SPC’s Aquaculture Adviser.
Aquaculture updates from Palau

While attending the FFC Fisheries Ministerial Conference in Palau, SPC’s Aquaculture Adviser, Ben Ponia, took the opportunity to make some site visits and meet with people involved in aquaculture and coastal fisheries, including:

- Ngatpang State milkfish farm project. Located about an hour’s drive from Koror, the farm receives up to 2.4 million fingerlings per year from Taiwan. Seventy-five per cent are farmed for live bait and the remainder are left to grow larger to be sold as food fish. Staff involved in the project have recently received training in fish de-boning techniques, which makes the product much more marketable. The project is largely funded by Ngatpang State, with technical advice and labour provided by Philippine expatriate staff.

- Local fish outlets in Koror: PMCI Fish Market and Happy Fish Market. We discussed reef fisheries, processing, marketing issues, etc with the owners and staff.

- Palau Mariculture Demonstration Centre (PMDC), operated by Palau’s Bureau of Marine Resources. The PMDC continues to produce large quantities of giant clams in its hatchery. The most common species is *Tridacna derasa*, which are provided to villages for community grow-out schemes. The PMDC fish hatchery is also active with a large batch of hatchery-reared tiger groupers and rabbitfish juveniles in production. Other fish species, such as Napoleon wrasse and coral trout, are being conditioned for future spawning. The fish hatchery manager, Percy Rechellulul, is collaborating with various private businesses and state projects (including the Ngatpang milkfish farm) to provide rabbitfish for cage culture trials. The PMDC also hopes to produce milkfish fry from its hatchery in the future.

- Accompanied by Bureau of Marine Resources staff, the Aquaculture Adviser viewed some PMDC sites where rabbitfish cage culture trials were being conducted. This included the Rip Tide Restaurant, which has two cages, each holding 2,000 fish that are five months old; the Airai company farm,

![Figure 1 (top): Palau PMDC fish hatchery.](image1)

![Figure 2 (bottom): Rabbitfish breeders at the PMDC hatchery.](image2)
which has six cages, each with more than 2,000 fish; Neco Marine Ltd, which has a small trial cage with rabbitfish and milkfish. This company plans to build its own rabbitfish hatchery for a large fish farm.

- SPC’s Aquaculture Adviser and other senior SPC staff assisted the Bureau of Marine Resources in an intensive one-day workshop to draft a new Coastal Fisheries and Aquaculture National Development Plan.

Regional aquaculture status report presented to FFC Fisheries Officials and Ministers meeting

Copies of the SPC Aquaculture Action Plan 2007 were given to ministers and senior government officials at the FFC Fisheries Ministerial Meeting in Palau in April 2008. Also presented, was the Regional Status Report on Coastal Fisheries and Aquaculture (drafted by SPC aquaculture staff).

The SPC Aquaculture Plan 2007 provides a snapshot of the region’s substantial and diverse aquaculture sector. It provides a forward looking perspective on how the region’s aquaculture can play in meeting the challenges of population growth and global changes. It is a regional strategy that provides SPC’s member countries with guidance on how the burgeoning aquaculture sector can be tailored to the needs and values of the Pacific community.

Highlights of the aquaculture status report include the following key points:

1. Aquaculture is the world’s fastest growing food sector. It provides almost 50% of the world’s food fish. With a plateau in sustainable wild fisheries harvest, the sector has been identified as a key option to make up the shortfall in food security and livelihoods.

2. Aquaculture is also expanding rapidly in the Pacific. SPC estimates that the average annual production is USD210 million dollars. The volume of production is 4,600 metric tonnes of bulk marketed product (e.g., shrimp and seaweed) and 250,000 pieces of individual-

Figure 3 (top): Annual value of aquaculture commodities produced in the Pacific.

Figure 4 (bottom): Annual value of aquaculture production in the Pacific per country.
ly sold product (e.g. giant clam and corals). Up to 25,000 people may be directly involved in the aquaculture sector.

3. In the Pacific, from atoll archipelagos to mountainous highland regions, aquaculture is diverse and involves farming inland freshwater and marine species. Exports are dominated by black pearls from French Polynesia and marine shrimp from New Caledonia. Production for domestic consumption is also increasing. For example, it is estimated that there are at least 10,000 fish farms (such as for tilapia) in Papua New Guinea. Other key aquaculture commodities include freshwater prawns, marine ornamental species (e.g. giant clams, corals, live rock), and kappaphycus seaweed. Emerging commodities also include sea cucumbers, mud crabs and marine finfish (as highlighted in the Aquaculture Action Plan).

Workshop on preventing biological invasions

International guidelines for the responsible trade of live aquatic animals, which could be ecologically invasive if they are released into the wild, are not properly addressed institutionally within the various UN agencies. In this arena the pet trade, live bait and aquaculture industry are some of the key risk sectors.

Under its mandate for invasive alien species, the subsidiary body on scientific advice (SBSTTA-13) for the Convention on Biological Diversity (CBD) recommended that the CBD secretariat convene an expert workshop to advise the 9th Meeting of the Conference of Parties (COP-9) on best practices for minimising the risks associated with the introduction and trade of live aquatic animals.

To tackle this initiative, the CBD partnered with the Global Invasive Species Program (GISP), the IUCN’s Invasive Species Specialist Group, and the University of Notre Dame (USA) in organising a workshop. About 40 participants, including SPC’s Aquaculture Adviser, were invited and sponsored to attend the workshop, which was held from 9–11 April 2008 at the University of Notre Dame Campus.

The workshop had three main sessions:

- **Current science and economics on risk assessment for animal species in international trade.** This session was moderated by scientists and was interesting because of the apparent gulf between the quantitative “pre-screening” techniques proposed by ecologists and the qualitative judgments that decision-makers realistically operate under. One of the outputs from the workshop was a draft of key principles involved in pre-import screening, or import risk analysis as it is more commonly referred to by primary development sectors.

- **The international legal and institutional context for risk assessment of animal species in international trade.** There are clear gaps in the international instruments governing the trade and movement of live aquatic animals that are potentially invasive. Some related issues are covered under other instruments. For example, endangered species come under the Convention on International Trade in Endangered Species (CITES), plants are covered by the International Plant Protection Convention (IPPC), and pathogens under the World Trade Organization (WTO) by standards set by the World Animal Health Organisation (OIE).

- **Current national practices and available tools for risk assessment in international trade.** During this session, various countries and regions shared their experiences with “pre-screening” potentially invasive species. There is a contrast between countries such as the USA, Australia and Israel, which have accumulated good biodiversity databases and judicial/litigation processes, and some South American countries that have a vast and largely unreported biodiversity and a rapid pace of economic development.

The dichotomy of the invasive concept between aquaculturist and ecologist was noted by SPC. “Invasive” attributes, while negatively viewed by naturalists, are looked favourably upon by farmers.

The SPC regional experience presented to the workshop was that “pre-screening” controls were best incorporated into holistic approaches such as “aquatic biosecurity” because of the limited capacity available in the region to deal with the range of risk factors excluding invasiveness (for example, pathogen risk). However, ensuring the use of responsible practices requires cooperation between all stakeholders from the ground level upwards. Among the UN agencies, especially the CBD, FAO and OIE, a similar cooperative framework must be established.
**SPC ACTIVITIES**

**Dr Dale Hamilton engaged as SPC aquatic biosecurity consultant**

Aquatic biosecurity is recognised as a major challenge to ensuring responsible aquaculture and fisheries development and trade in the Pacific region. Implementation of the regional aquatic biosecurity programme will require a new regional initiative involving fisheries, environment, quarantine, veterinarian and public health departments.

The region faces a variety of challenges in this area. Some current examples include:

- A trade embargo imposed by Australia on shrimp imports from countries that have IHHNV virus. This embargo affects shrimp producers in the region such as Fiji and New Caledonia.

- The increasing numbers of Pacific Islands that are importing live, genetically improved tilapia fingerlings from Asia have requested advice on quarantine protocols.

- The European Commission has recently imposed new regulations on imports of live aquatic animals into the European region and has advised that exporting countries will need to become members of the World Animal Health Organisation (OIE) and have competent national authorities to issue health certificates. This will directly impact the marine ornamental sector in the region, which currently provides livelihoods to some 800 households and exports of USD15 million dollars per annum.

Various forums have tasked SPC (as the lead CROP agency) to take initiative in this area.

Dr Hamilton, who is the former Vanuatu chief veterinarian and quarantine officer, has been engaged as a short-term consultant to advise SPC on aquatic biosecurity matters. Some of the key activities he will be involved in include:

- Providing urgent advice to member countries on meeting the new European Commission regulations affecting the trade of live aquatic (ornamental) exports;

- Assisting with the drafting of a new SPC policy brief on aquatic biosecurity;

- Assisting in the review and final drafting of the regional aquatic biosecurity framework developed at the SPC regional aquatic biosecurity meeting (held in October 2006);

- Providing desktop advice on aquatic biosecurity issues (e.g. quarantine, disease) as they arise.

**Hatchery production and restocking of sandfish in community-managed fishing rights areas (qoliqoli), Fiji Islands**

Sea cucumbers are valuable but severely depleted fisheries throughout Pacific Island countries and territories (PICTs), and Fiji is no exception. In Fiji, dairo (or sandfish, Holothuria scabra) is an important sea cucumber species that also forms part of the Fijian traditional diet, so it contributes to food security in addition to being a lucrative export commodity. In the last 20 years, fishing pressure — stemming from export demand — has resulted in declines in size and abundance of individuals of this accessible shallow-water species.

Sandfish hatchery technology has been developed in New Caledonia and in Australia through research supported by the Australian Centre for International Agricultural Research (ACIAR) and the WorldFish Center. Techniques to spawn sandfish and rear larvae up to juvenile size (>3g) are now relatively straightforward, and can be transferred to other PICTs. On-growing juvenile sandfish to larger sizes in tanks is not feasible however, because feed and space quickly becoming limiting factors. Release into large ponds or into the coastal environment is necessary for growing juveniles to commercial size.

The major research question yet to be convincingly answered is whether post-release survival of sandfish, and growth to harvestable size, are sufficient to justify the cost of breeding and rearing juveniles in captivity. Pilot studies by the WorldFish Center and other agencies demonstrate that sandfish restocking results are very unpredictable, and the benefits are uncertain. More releases of larger numbers of juveniles, with rigorous post-release monitoring, are necessary to provide baseline growth and survival information. Field experiments will then be needed to further refine release protocols and habitat selection criteria to obtain the best results.

The ACIAR project “Development of aquaculture-based livelihoods in the Pacific Islands region and tropical Australia” — led by James Cook University with project partners SPC, WorldFish Center and University of the South Pacific — funds aquaculture research “mini-projects”. These are small, tar-
geted research interventions to address bottlenecks or constraints to sustainable aquaculture development.

The mini-project “Culture of juvenile sandfish, *Holothuria scabra*, for re-stocking and sea ranching trials in Fiji” was launched in May of this year. A stakeholder’s consultation was held with country partners Fiji Ministry of Primary Industries (Department of Fisheries), Hunter Pearls, and the Fiji Locally Managed Marine Area Network (FLMMA), to define objectives and protocols for a juvenile sandfish re-stocking and sea ranching project in Cakaudrove Province on Vanua Levu.

This mini-project will transfer sandfish hatchery technology to Fiji, then will scale-up and extend earlier re-stocking research on post-release survival and growth. Some preliminary work will also be done to determine possible management frameworks for large-scale sandfish re-stocking and sea ranching that will meet the future needs of stakeholders.

The term “sea ranching” here means a “put, grow and take” operation, whereby owners harvest released sandfish from a lease or property rights area (e.g. qoliqoli) as a commercial operation. “Re-stocking” means to restore breeders in a depleted fishery by releasing sandfish into a restricted area and protecting them as a future spawning population. This latter activity is best combined with community-based marine resources management tools such as marine protected areas (MPAs).

Following the launch of this mini-project, the next task is to identify suitable environments and communities for re-stocking trials. Collaboration with Fiji’s Department of Fisheries and with selected communities in Cakaudrove Province is ongoing, and is aimed at finding the best possible juvenile release sites to increase the chances of success. WorldFish Center research has shown that seagrass beds comprising ribbon-like seagrasses on sandy-muddy substrates and growing at a depth of not less than 20 cm at low tide, are the most suitable.

Surveys must also be done to determine the most reliable sources of adult sandfish to use as broodstock for the hatchery production of juveniles, which will take place at the Hunter Pearls hatchery at Savusavu from November 2008–February 2009. During this hatchery phase, staff of Fiji’s Department of Fisheries and Hunter Pearls will be trained in sandfish breeding and larval rearing techniques.

Afterwards, sandfish will be released and monitored to track their progress. Rigorous sampling and statistical techniques are necessary to make sense of the high variability inherent in this type of survey data. An ACIAR-USP masters scholarship has been awarded to a Fijian student to lead the survey work. Access and management arrangements for this research and monitoring phase will be made with a custodian community at each site because, as the sandfish grow in size and value, security will become an issue. For example, communities who already delineate and enforce an MPA in their fishing rights area will be preferred for this research.

There are conflicting views about whether re-stocking or sea ranching sandfish can actually be successful. It is only through open, transparent and research-based approaches that stakeholders can gain the information they need to plan for the long-term health of the region’s sandfish resources. The Fiji sandfish mini-project is intended to be the next step along this path.

(Contribution: Tim Pickering, Secretariat of the Pacific Community, Noumea, New Caledonia and Cathy Hair, James Cook University, Townsville, Australia)

*Dairo* (sandfish) cooked the Fijian way: stuffed with corned beef and onions, cooked in *lolo* (coconut cream), served with *nama* (seagraves, *Caulerpa racemosa*), and topped with *kora* (fermented coconut) and *tavioka* (cassava).
The Vanuatu Aquaculture Development Plan 2008–2013 is now available. The plan was produced by Vanuatu’s Department of Fisheries, with financial and technical assistance provided by SPC. Appreciation is extended to other government agencies, NGOs and private sector companies in Vanuatu who contributed to the formulation of this document during a national planning workshop and follow-up consultations.

This five-year plan will hopefully assist Vanuatu in working towards quality and sustainability while at the same time developing its aquaculture.

Both the plan and the Cook Islands post-larval fish culture report will soon be online at: www.spc.int/aquaculture. Copies can also be obtained from SPC’s Aquaculture Section: marieangeh@spc.int

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The seventh Symposium on Diseases in Asian Aquaculture (DAA VII) took place from 22 to 26 June 2008 in Taipei, Taiwan (http://homepage.ntu.edu.tw/~daaseven/index1.htm).

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This symposium is principally a forum for scientists and students from the Asia-Pacific region specialising in the health of aquatic animals. The Fish Health Section of the Asian Fisheries Society holds this event every three years. The group was established in May 1989 for the purpose of producing technical materials on the health of aquatic animals.
DAA VII was convened to bring together participants from around the world to discuss their work and develop new strategies for promoting aquatic animal health in Asia.

The theme of the 2008 Symposium was “Communication, cooperation and coordination: Key issues in aquatic animal health management”.

The four-day event comprised some 12 oral presentation sessions focused on aquatic animal health and addressed the following specific topics:

- Global perspectives in managing aquatic animal health
- Emerging issues in aquatic animal health management
- Epidemiology, detection and diagnosis of pathogens in fish, shellfish, molluscs and their environment
- Biosecurity and containment in aquaculture systems
- Recent developments in genomics and bioinformatics: implications for aquatic animal diseases
- Immunology/Disease resistance/Host-pathogen interaction
- Microbiology of aquatic animal pathogens and antimicrobial peptides
- Shrimp health and diseases
- Mollusc health and diseases
- Finfish health and diseases
- Pathogen risk analysis, probiotics, therapeutics
- Aquatic animal health management; International trade and risk.

Each session was introduced by an address on the current status of each area by a world specialist and followed by presentations from scientists, students, farmers and others.

A poster session was organised on Day 3 with nearly 200 posters on display for the duration of the symposium.

With funding from SPC’s Aquaculture Section, the Fisheries Service of French Polynesia was able to take part in the symposium and present a poster entitled: “Diseases of Platax orbicularis (Ephippididae) and Polydactylus sexfilis (Poly nemidae), two fishes farmed in French Polynesia”. Oral presentations were highly instructive and reported on the latest developments and progress in the diagnosis and detection of diseases observed in the aquaculture environment. Each session was an opportunity to exchange ideas with eminent specialists such as:

- Dr Brian Jones: Principal Pathologist with the Western Australia Fisheries and Aquaculture Department who had been previously met in Tahiti during exchanges on the Tahiti pearl oyster health watch network and in connection with some of his work on fish. A training session at his laboratory in Perth (Western Australia) is planned for next year.
- Dr Teruo Miyazaki: Professor of Fish Pathology at the University of Mie (Japan), a fish histopathology specialist who was also promoting his latest book entitled “Coloured atlas of fish histopathology” (volumes 1&2 ed. Dr Teruo Miyazaki). This book will be very helpful for diagnosis using histological techniques.
- Dr C.V. Mohan: Professor of Fish Pathology, in charge of training by the Network of Aquaculture Centers in Asia-Pacific (NACA) on histological techniques (Master Class), the most recent of which took place on 12 November 2007 in Bangkok, Thailand (see website: http://www.enaca.org).
- Dr Ingo Ernst: Scientist with the Aquatic Animal Health Unit of the Australian Department of Agriculture, Fisheries and Forestry (DAFF). Dr Ernst provided advice on how to solve ectoparasitosis problems in French Polynesia’s Paraha peue cage farming ventures.

This is not an exhaustive list of the various exchanges initiated during the symposium. For reference, the mission report will be passed on to SPC’s Aquaculture Section. French Polynesia’ fisheries service wishes, through this article, to warmly thank the various people who assisted during these very enlightening meetings. Events such as this are essential for acquiring new knowledge and contributing to the sustainable development of French Polynesia’s aquaculture.

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