Fisheries Newsletter

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Editorial

Accidental longline catches of endangered species or protected ones like turtles carry major economic risks: many markets could be lost if action is not taken by fishers to conserve endangered species and thus protect the biodiversity of the ocean. During the Pacific Island Maritime Training Institutions and Maritime Authorities (APIMTIMA) meeting in Fiji in May 2004, the SPC Marine Resources Division Training Section presented a training manual on Protected marine species and the tuna longline fishery in the Pacific Islands . This manual addresses the bycatch issue in the longline tuna fishery and hopefully will raise awareness of Pacific Island fishermen on this issue, for their benefit and that of protected marine species.

At a meeting in February 2004, fisheries experts and managers reviewed the topic of safety-at-sea, and agreed that it was essential that awareness work be continued, but especially that strong political support and national involvement from Pacific Island countries was needed so that appropriate regulations could be introduced. The United Nations Food and Agriculture Organisation (FAO) and the SPC have been collaborating on this issue for a number of years now. In News from in and around the Pacific , Bob Gillett, a consultant who has over 25 years of experience in the region and who is well known to our readers, revisits safety-at-sea, with particular reference to small fishing vessels.

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The training manual was written by marine biologist Dr Mike King and is intended for all persons involved of interested in the fisheries sector in the Pacific Islands region.

in This Issue

SECRETARIAT OF THE PACIFIC COMMUNITY
Prepared by the Information Section of the Marine Resources Division and printed with financial assistance from France.

TRAINING SECTION

A manual aimed at raising awareness on the bycatch issue

The bycatch issue in the longline tuna fishery — the accidental catching on longlines of endangered and protected species, particularly turtles — is one that could eventually result in the loss of important markets for tuna from Pacific Island countries. The protection of threatened species and the Pacific Island longline fishery require both awareness and cooperation actions on bycatch. Mindful that a proactive approach was required, SPC's Coastal Fisheries Programme has developed a series of resource materials targeting fisheries managers, longline vessel operators and crew members. Following the production and wide distribution of an informative leaflet (*Tuna longlining – The bycatch issue*) by the Fisheries Development Section in 2002, the Training Section has promoted some guidelines for releasing hooked turtles (poster, laminated card, sticker) and produced pocket-size identification cards for the seven species of marine turtles.

While the quality of the above materials is non-questionable, it was felt their use could be greatly facilitated if fisheries training institutions in the region could introduce a module on the bycatch issue as part of their ongoing courses for vessel crew and skippers. This concept was presented to participants of the 2003 meeting of the Association of Pacific Island Maritime Training Institutions and Maritime Authorities (APIMTIMA) and it received strong support. Subsequently, a funding proposal for the production and distribution of a training manual was submitted to NZAID's Pacific Initiative for the Environment. The proposal was finally approved in September last year.

The manual, "Protected marine species and the tuna longline fishery in the Pacific Islands", which was written by marine biologist Dr Mike King, is more than just a resource for trainers. It provides information on many facets of the bycatch issue, which will be of interest to all persons involved or interested in the fisheries sector in the Pacific Islands region. In addition to the manual, training institutions will receive a CD-ROM containing illustrations to be printed (for hand-outs or transparencies) or used as slides during classroom projections.

It is hoped the manual, together with the other materials previously released, will contribute to raising the awareness of Pacific Island fishermen on the bycatch issue, for their benefit and that of protected marine species.

SPC and the Nelson New Zealand School of Fisheries (NM IT) launch new course

At the end of last year SPC advertised a fisheries officer training course that has been modified to take into account the review findings and recommendations made at the Third Heads of Fisheries meeting in Noumea. Certain aspects of the course (notably its syllabus) are quite different from the training programme that had been run up until 2002.

The new course specifically targets government fisheries officers, with a main objective of providing broad-ranging training to enable them to assist fishing communities and fishing enterprises in developing sustainable and profitable fishing operations.

Fisheries in the Pacific have undergone a number of major changes over the last two decades as development of subsistence, artisanal and industrial sectors has occurred. This new course will aim to enable fisheries officers to maximise their abilities to face these changes.

This year's course started on Monday, 26 January at Nelson, when the 10 participants (from Solomon Islands, Samoa, Kiribati, Niue, Tonga, American Samoa, New Caledonia, Papua New Guinea and Fiji Islands) were given a tour of the New Zealand School of Fisheries. Students will first follow an 18-week training programme in Nelson before flying to New Caledonia for a 6-week field component in Noumea and Koumac.

The new fisheries officer training course welcomes again the participation of the Government of New Caledonia in the funding of this most popular fisheries training programme. SPC also acknowledges financial support from the Government of New Zealand and the Commonwealth Secretariat.

For more information contact the Fisheries Training Section, teril@spc.int

Tuna handling workshops in Rarotonga and Aitutaki

In March, SPC's Fisheries Training Adviser travelled to the Cook Islands following a request from the Ministry of Marine Resources (MMR). The purpose of the visit was to train new recruits in the onboard handling of sashimi-grade tunas. A series of similar workshops had been organised in August 2002, at the beginning of the tuna longline development in the Cooks.

The initial request was for workshops on tuna handling for vessel crew as well as hands-on training for local tuna graders. Due to present poor catches it was decided to postpone the latter and organise a visit by a professional grader from Fiji Islands at a later stage, when supply of tunas required for the practical grading demonstrations is more steady. In March, fishing was so poor that most longliners were tied up to wharves. This poor fishing period, on the other hand, was a good time for training vessel crew, as most if not all of them were available to attend the workshops.

Three workshops have been run in Rarotonga at the School of Maritime and Fisheries. This was a good venue with all the necessary equipment and audio visual aids (TV/VCR, overhead projector, white board, slide projector).

First workshop (Tuesday 2 March)

This was an introduction to grading for 13 staff of local processing plants (Blue Pacific and Cook Island Fish Export). The same persons are earmarked to attend the tuna grading demonstrations by a professional grader from Fiji Islands, later in the year. This introductory workshop included a presentation of tuna marketing in Japan, onboard handling procedures and the key grading factors. The handling process was demonstrated on a medium-size yellowfin tuna.

Second workshop (Wednesday 3 March)

This workshop was attended by 20 longline vessel crew, 3 boat owners and 3 staff of the Ministry of Marine Resources (MMR). The workshop focused on proper onboard handling procedures, including practical demonstrations.

Third workshop (Wednesday 10 March)

This additional workshop was requested by the Ministry to target

Top: Tuna longliner in Avatiu (Rarotonga)
Bottom: A good catch by MMR staff

small-scale fishermen and thus keep this important sector as part of current developments. The workshop was attended by nine participants, including the most active poti-marara operators of the Aravua area, as well as the owner/operator of a small take-away shop (in fact, the main buyer of fish caught by poti-marara vessels). According to MMR, the quality of fish landed varies greatly and is often poor (no ice carried onboard). It is hoped that having both the fishermen and their main buyer at the training will have an impact on the quality of fish supplied by the former.

Aitutaki workshop (Monday 8 March)

This workshop targeted local small-scale FAD fishermen as well as the crew of the sole commercial longliner operating from the island: in all, 16 trainees. Two large yellowfin tunas were used for the hands-on demonstration.

The turn-out for the workshops (64 trainees) was excellent and has exceeded everyone's expectations (in fact four sessions have been run instead of the two initially planned). It is hoped this training will have an impact on the quality of tunas landed in the Cook Islands.

Top: Aitutaki fisherman "spiking a tuna through its soft spot
Right: Participants watching a video during Aitutaki workshop

Sea safety posters for Papua New Guinea, Kiribati and Niue

The Fisheries Training Section regional awareness campaign on sea safety is getting its second wind.

The campaign, targeting small vessel operators, started in 1995 with the production of a series of four large-size posters in English and French. These posters have been a useful vehicle for the wide display of the sea safety message in Pacific Island countries and territories.

In line with Mike McCoy's 1991 recommendation that "education through publicity campaigns, repeated and reinforced over a long period of time (…) seems to offer the best chance for improving the safety at sea for artisanal fishermen", the Training Section felt a logical next step is to run a second print of the 1995 posters, this time

The safety-at-sea posters produced in I-Kiribati

with captions translated in vernacular languages.

Using its core operational budget and a contribution from SPC's Executive, the Training Section was in a position to initially cover three countries. Kiribati and Niue were selected in August 2003 after discussions with their respective Heads of Fisheries, during the Third Heads of Fisheries meeting. A request for sea safety education materials from the New Ireland Commercial Fisheries Association prompted the inclusion of Papua New Guinea in the list of countries to be served. While Training Section staff were liaising with fisheries agencies in Niue, Kiribati and Papua New Guinea to produce poster captions in their respective languages, SPC's graphic artist gave the 1995 posters a new look. Distribution of posters for Kiribati and Papua New Guinea took place early in 2004 (four sets of 500 posters for Kiribati and 5000 for PNG). The Niue posters should be distributed by the end of May.

A small grant from Taiwan/ROC will enable the coverage of some additional countries by the end of 2004.

FISHERIES DEVELOPMENT SECTION

Pacific Islands Regional Ocean Forum
(Suva, Fiji Islands, 2–6 February 2004)

Fisheries Development Adviser, Lindsay Chapman, attended the Pacific Islands Regional Ocean Forum held in Suva, Fiji Islands. The forum brought together representatives from all the CROP agencies and most Pacific Island countries and territories, and from a range of public and private sectors including fisheries, environment, tourism, maritime, education and the legal profession.

The forum was organised under the framework of the Pacific Islands Regional Ocean Policy (PIROP), which has five guiding principles: improving our understanding of the ocean, sustainably developing and managing the use of ocean resources, maintaining the health of the ocean, promoting the peaceful use of the ocean, and creating partnerships and promoting cooperation.

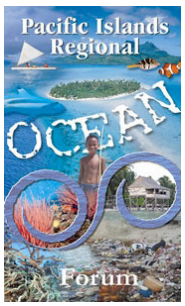
The meeting was opened by the Prime Minister of Fiji Islands, the Honourable Laisenia Qarase. A representative from each Pacific Island country and territory presented a brief country statement, outlining the main concerns with regard to ocean issues. Rapporteurs summarised the concerns and developed a list of themes and issues.

Most days were spent addressing each of the five guiding principles within the policy. Each principle was introduced with a keynote address followed by three to five panel presentations looking at different aspects or areas covered by the principle. The meeting then broke into eight small groups, which each examined the same principle. The groups focused on the strategic direction and tried to identify primary challenges, priority initiatives and actions, mechanisms that could be used to address the priority actions, and the partner agencies involved in addressing each action. The groups then reported back in plenary.

The outcomes of each of the sessions were grouped under five strategic directions:

- improving governance of coasts and the ocean;
- adopting an integrated approach to the sustainable development and management of coasts and the ocean;
- building capacity of Pacific Island communities for sustainable development and management;
- fostering alliances for securing a healthy ocean; and
- establishing high-level leadership on ocean issues and commitment to effective management of ocean resources. Under each strategic direction, a wide range of priority initiatives and priority actions were identified to cover the different sectors involved in use of coastal resources and the ocean.

The final half-day was spent reviewing the format of the information collected during the forum. It was decided that a preliminary draft of the outcomes would be circulated in a table format soon after the meeting so that participants could comment and include additional material where relevant. The meeting was closed by SPC's Director-General, Ms Lourdes Pangelinan.



FAO/SPC Regional expert consultation on sea safety in small fishing vessels
(Lami, Fiji Islands, 9–13 February 2004)

Fisheries Development Officer, William Sokimi, attended the FAO/SPC consultation on small vessel sea safety to provide input based on his experiences in the region. The consultation was attended by 30 participants and involved some prominent persons in fisheries development in the region, key persons from government fisheries and maritime divisions, as well as experts from international organisations such as FAO and IMO. Participants also included small boat builders and veteran artisanal fishermen.

The consultation was a follow-up to previous initiatives undertaken by FAO and SPC to conduct surveys on fisheries-related, small vessel sea safety in the region and to educate Pacific Island fishermen in proper sea safety procedures recommended for use on small fishing vessels. The concern realised from the results of the FAO survey was that mishaps involving small fishing vessels were responsible for the major loss of life at sea in the Pacific region.

The use of small vessels has always been taken for granted and hardly any Pacific Island nation has realistic legislation, if any at all, to effectively regulate and monitor the movement and safety standards of these vessels.

The objectives of the consultation were to:

- discuss suitable small fishing vessel regulations for the region;
- improve and promote sea safety programmes in the region;
- develop effective systems of sea accident data compilation;
- improve the safety construction standards of fibreglass vessels; and
- formulate plans for future sea safety programmes based on recommendations from the consultation outcomes.

The consultation group dealt with several complex issues in order to make recommendations that might lead to realistic and effective legislation. Some of these issues included:

- Is it necessary to implement legislation at this stage or would major awareness programmes be sufficient?
- Consider the boundaries of where small fishing vessel safety legislation should be applied, as compared with addressing the issue through a major awareness programme.
- Implementation of appropriate/realistic legislation.
- Jurisdiction of legislation in terms of rural and urban areas.
- Category of vessels that should be covered under the legislation.
- Monitoring, regulating or enforcing the legislation?
- Should legislation be implemented in its entirety or should it be implemented in stages?
- What are the costs of implementing legislation, domestically? Regionally?

Follow-up on tuna longline project in the Marshall Islands

From 18 February to 20 March, William conducted follow-up training on tuna longlining with the skipper and crew of the Marshall Islands Marine Resources Authority (MIMRA) vessel, F/V *Wa Bal*. This training followed on from initial training and fishing trials conducted during the first half of 2003 (see *Fisheries Newsletter* #105 & #106). The difference was that a new longline reel had been fitted to the vessel, and William would train the crew in how to use it.

The first week was spent preparing the vessel and fishing gear. The first fishing trip was for seven days, with five sets averaging 700 hooks per set. Squid and mackerel scad were used as bait, attached to alternate hooks spaced approximately 50 m apart as the mainline was set.

Forty fish weighing 1040 kg were landed on the first trip and were well iced. One grade "A" and four grade "B" bigeye tuna weighing 274 kg, plus two grade "A" and eleven grade "B" yellowfin tuna weighing 420 kg were processed and packed for export. All export fish were sold through the Marshall Islands Fishing Venture's (MIFV's) markets in the US. Fish sold on the local market consisted of one grade

Back deck of F/V **Wa Bal** *ready for setting the gear*

"D" bigeye tuna weighing 28 kg, five grade "D" yellowfin tuna weighing 157 kg, 13 mahi mahi (dolphin fish) weighing 79 kg, 1 wahoo weighing 18 kg and 2 blue marlin weighing 64 kg.

After discharging the catch, the vessel was thoroughly cleaned. Over the next four days, the damaged fishing gear was repaired, supplies and fuel were purchased through the MIMRA accounts section, and the crew paid. The second fishing trip commenced on 9 March and lasted for seven days with five sets averaging 750 hooks per set.

The vessel returned to port with a total catch of 50 fish that weighed 1494 kg. Only one grade "A" bigeye tuna weighing 69 kg and five yellowfin tuna (1 grade "A" and 4 grade "B") with a total weight of 194 kg were processed for export before the discharging process was called off due to unsettled exporting arrangements between MIMRA and MIFV. The rest of the catch was graded and transported to MIMRA's Outer Islands Project market for local sales and distribution. These included five bigeye tuna (3 "A" grade, 1 "B" grade and 1 "D" grade) weighing 217 kg, 18 yellowfin tuna (3 "A" grade and 15 "B" grade) weighing 616 kg, six "D" grade yellowfin tuna weighing 174 kg, three blue marlin weighing 99 kg, nine mahi mahi weighing 55 kg and two wahoo weighing 41 kg. In addition, one bigeye tuna ("A" grade) weighing 30 kg was processed for the President.

Iced fish being unloaded

While the two fishing trips, involving ten longline sets and 7250 hooks were sufficient practice for MIMRA's crew to familiarise themselves with the new reel, they still need to conduct more fishing trips with the new reel to fully realise the vessel's catch potential. In addition to this, a better arrangement needs to be made for the marketing of export quality fish, as the prices received from MIFV, based on a flat purchase price, were much lower than what they could have been on the Japanese auction floor.

Deep setting technique for bycatch mitigation project

In March, Fisheries Development Officer, Steve Beverly, went to Mooloolaba, Australia (Mooloolaba is situated on the Sunshine Coast north of Brisbane) to start a project testing a new bycatch mitigation technique for longline fishing (see *Fisheries Newsletter* #106). The objectives of the project are to field-test a deep setting technique for tuna longline fishing that is designed to mitigate bycatch encounters (especially marine turtles) and to enhance target species CPUE (especially bigeye tuna). The first task is to perfect the technique; the second task is to test the new technique alongside normal setting practices.

Gear was purchased and prepared and contact was made with two Mooloolaba fishing companies who agreed to provide some vessel time during the course of their regular operations. The project received funding from the Australian Fisheries Management Authority (AFMA) and will be conducted by SPC with assistance from SeaNet. SeaNet is an organisation that provides extension services to Australia's commercial fishing industry and is aimed at finding solutions to environmental and bycatch issues. The extension officer for Australia's Eastern Tuna and Billfish fishery, Elton Robinson, worked with Steve to initiate the project. Elton also provided support services from SeaNet headquarters in Mooloolaba.

The new gear consisted of 3-kg lead weights that will be attached to the mainline just under the floats at depths of 100 m or more, additional floats and floatlines, and temperature-depth recorders (TDRs). The result of attaching lead weights will be that all hooks in a basket of longline gear will be fishing at depths below the mixed layer and out of range of marine turtles – down where bigeye tuna feed. The TDRs will be used to monitor actual depths of the longlines. They were supplied by Star-Oddi, a company in Iceland.

Top: 3-kg weight with line and swivel snap
Bottom: Temperature-depth recorder in protective housing and snap for attaching to mainline

After Steve arrived in Australia, there was some discussion about whether the project would start on time as the longline fleet fishing from Mooloolaba was going through a rough time and several boats were tied up. By the end of March, however, the owners of one of the vessels, Southernmoves Pty Ltd, agreed to provide some vessel time for the initial trials. All project gear and equipment was loaded onto F/V *Blue Moves*. The first deployment of the experimental gear will not occur until April, so readers will have to wait for the next issue of the *Fisheries Newsletter* to find out the results of the project. The project will continue into May 2004.

F/V* Blue Moves *loading ice at Mooloolah River Fisheries in Mooloolaba

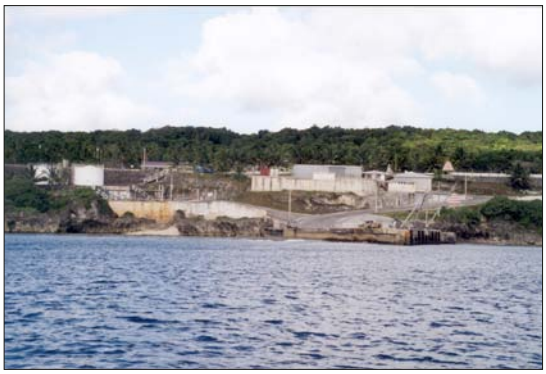
Niue and Cyclone Heta

Cyclone Heta devastated Niue on 5 January 2004 and caused widespread destruction on the island. Extreme sea conditions, with waves coming up onto the island in some locations, were the cause of many houses, the hospital and several businesses being damaged beyond repair. In the wharf area, some concrete walls and vegetation have been washed away. The coastline to the south of the wharf has also been scoured with most vegetation gone.

From 24 March to 5 April 2004 Lindsay assisted Niue with their FAD programme, as many FADs were lost due to the cyclone, and fish landings were low as a result. The two deep-water echo sounders in Niue were both damaged by salt water, so Lindsay carried an SPC deep-water sounder with him so that replacement FADs could be deployed offshore. Although three offshore FADs were made up, poor weather conditions and the unloading of the cargo vessel did not allow the FADs to be deployed during his time in Niue.

While in Niue, a full inventory was made of project materials, which didn't amount too much after the three offshore FADs were made up. Lindsay also worked with fisheries staff to collect additional catch and effort data and work out identifiers for each fisherman providing data, regardless of what boat they fished on.

The foundations for the new tuna processing facility were not damaged by Cyclone Heta, so construction of the building continued in February and March. The building itself is mostly erected and the concrete floors have been poured. In the coming months the refrigeration equipment will be installed and the processing room fitted out. It is anticipated that the processing facility will be operational in May/June 2004.



Left: Alofi wharf area before Cyclone Heta
Right: Alofi wharf area after Cyclone Heta showing damage

Left: Coastline south of Alofi wharf before Cyclone Heta
Right: Coastline south of Alofi wharf after Cyclone Heta
Below: Construction of the new tuna processing facility on Niue

FAD research project update

Five project FADs were lost off Niue as a result of Cyclone Heta, so there were only two project FADs on station as of 30 March 2004. One of these was an original FAD deployed in February 2002, while the other was a replacement FAD deployed in May 2003. In the Cook Islands, two of the remaining five FADs were lost during the first quarter.

Data collection continued in both locations, although fishing activities in Niue were greatly restricted due to the crane on the main wharf having been lost in the cyclone. Improvements in data provision have been made, with good, consistent data being provided by some fishermen. This data will be analysed soon and given back to the fishermen who provided it.

The Niue community surveys scheduled to take place in March were postponed to later in the year, to allow people to recover from the effects of the cyclone. A funding proposal was also submitted to the New Zealand Pacific Initiative for the Environment (PIE) fund to extend the project for a further three years. The outcome of the proposal should be known in May 2004.

AQUACULTURE SECTION

New publications added to the aquaculture portal

1. *Regional assessment of the commercial viability for marine ornamental aquaculture within the Pacific Islands*. Lindsay, S.R. Ledua, E. and Stanley, J. This report, commissioned by SPC, provides a regional overview of the status of the marine ornamental trade and an assessment of the role for aquaculture. The report has a detailed profile of statistics and contacts in those countries that are active in the ornamental trade. To download the document in pdf format (320 kb) go to the following URL:

   http://www.spc.int/aquaculture/site/publications/documents/Marine_Ornamental.pdf

2. *Profiles of high interest aquaculture commodities for Pacific Island countries*. This document was originally produced as a resource for the 1st SPC Aquaculture Meeting, in Fiji Islands in 2002. Regional experts wrote profiles of 17 species considered to be of high interest for aquaculture in the Pacific. Each species is summarised according to its biology, culture and marketing features. There is also an assessment of the advantages and disadvantages for production of the commodity in the Pacific. To download the document in pdf format (357 kb) go to the following URL:

   http://www.spc.int/aquaculture/site/publications/documents/Commodity%20profiles.pdf

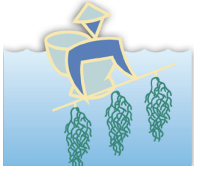
Project grants disseminated

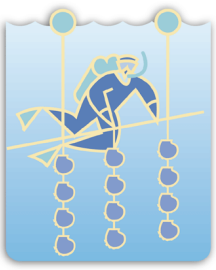
Two minor project grants have been funded through SPC programme funds. The Institute of Marine Resources at the University of the South Pacific has been granted FJD 5000 for phase II of development/verification of the SPC *Kappaphycus* Seaweed Quarantine Protocol. The main investigator is Reuben Sulu.

Emily McKenzie of SOPAC will undertake an economic cost–benefit assessment of the pearl industry monitoring systems in the Cook Islands.

Attachments

In March 2004 the Aquaculture Section partially supported travel costs for three representatives from the New Caledonia government to study marine finfish aquaculture developments in Australia and Bali. The three reported that they were particularly impressed by the new research they observed in Cairns.





Rural aquaculture and agriculture economic models go online

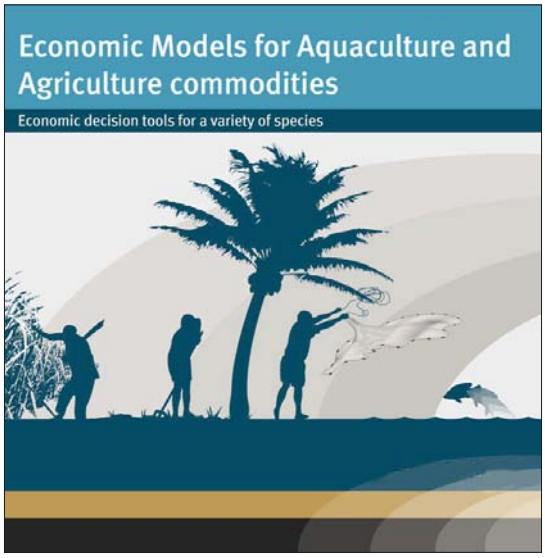
A toolkit for economic modelling of a rural aquaculture or agriculture farm is freely available at SPC's Aquaculture Portal website (www.spc.int/aquaculture) and on CD-ROM. The farm models include freshwater *Macrobrachium* shrimp, black pearl, penaeid prawn, tilapia, *Kappaphycus* seaweed, inshore fishing, copra, rice, *dalo* (taro) and sugarcane.

Terrestrial agriculture is included in the toolkit because of its similarity with aquaculture production systems and its potential for integration or substitution. The likelihood of displaced sugarcane farmers in Fiji Islands is one example where aquaculture may have such a role.

By changing the level of inputs or combining several farm systems, the model can provide a quick and simple answer to fundamental questions such as, What is the most profitable farm set-up? How does my investment compare against other types of farming? and Would it be more profitable to adopt an integrated (i.e. agriculture/aquaculture) system?

The model is based on an MS Excel spreadsheet in a user-friendly format. Values for production levels, capital infrastructure investment and expenditure costs are entered directly. The model automatically generates an analysis of data such as a timetable of production volumes, cost breakdown per unit, payback period, gross and net revenue and internal rate of return. By estimating the likelihood of risk factors, such as natural disasters (flooding), theft or diseases, a graph of risk analysis showing probability of positive or negative profit margin is generated. The model will be an ideal tool for prospective farmers, government extension officers, or investment bankers.

The farm models were derived from consultations between an economist from the Queensland government and Fijian representatives from the various farm types. This workshop was held at the University of the South Pacific campus in September 2003 with support from the USP Marine Studies Program, WorldFish Center and SPC.



SPC aquatic animal health mission

In March 2004, SPC's Aquaculture Adviser, Ben Ponia, organised an aquatic animal health and quarantine mission to four member countries: Fiji Islands, Vanuatu, Samoa and Cook Islands. Included in the team were Dr Steve Angus, SPC Veterinary Epidemiologist (Suva), and Dr Ramesh Perara from BioSecurity Australia, Department of Agriculture, Forestry and Fisheries (Canberra).

The issue of quarantine and health of aquatic organisms has been a longstanding priority for the region, although unfortunately it has hardly been addressed. At the SPC Heads of Fisheries Meeting in 2003, some policy guidelines were developed. The mission has identified several key areas where SPC's technical work efforts can be directed.

1. Strengthen capacity in import risk analysis (IRA) and environmental impact assessment (EIA) processes

   - *The Aquaculture section is presently undertaking a consultancy to establish an overall framework for import risk analysis. This framework will include a risk analysis of the ecological risks (i.e. pest, invasiveness and the pathogen risks).*
   - *Under the risk analysis framework, two IRAs will be commissioned for SPC member governments. The first risk analysis for the Government of Fiji Islands is the importation of* Litopenaeus stylirostris *prawn from Brunei to Fiji with an emphasis on pathogen risks. The second risk analysis, for the Government of the Cook Islands, is the importation of* Macrobrachium rosenbergii *from Fiji to Cook Islands, emphasising the ecological risks. The framework and two import risk analyses are planned to be completed by the third quarter of 2004.*
   - *After establishing a framework, it is intended to develop regional guidelines for movements, incorporating the*

Asian technical guidelines and broader ecological aspects. This may involve a regional consultation with experts and other organisations such as FAO Rome, possibly in mid-2005

2. Strengthen links to animal health and quarantine organisations

- *Establishment of national government consultative groups, for example those involved in IRA communications — comprising fisheries/ aquaculture, environment, veterinary and quarantine services. Also consider the inclusion of private sector and university experts.*
- *Develop stronger links to World Animal Health Organisation (OIE) and the quarterly disease report. Also contacts with experts in Australian state governments with similar tropical climates (e.g. Western Australia, Queensland) and explore potential linkage to NACA (Network of Aquaculture Centres for Asia-Pacific).*
- *Strengthen linkages between aquaculture and agriculture services in the overlapping areas of livestock production and quarantine.*
- *Raise awareness of the WTO agreement on sanitary and phytosanitary measures (SPS Agreement). Also seek clarification of the relevance of WTO membership to the aquaculture sector of the region.*

3. Encourage the development of a national aquatic animal health management plan

Macrobrachium rosenbergii ***shrimps are subject of a Cook Islands import risk analysis.***

Litopenaeus stylirostris ***marine prawns are the subject of a Fiji Islands import risk analysis.***

- *Key areas for development include: improvement of extension services; reporting (surveillance/monitoring); risk assessment capability; import controls/ quarantine detention capability; legislation – overall; emergency response; awareness building; international linkages, national coordination; domestic controls – translocation and end-use, diagnostic capacity (laboratory and epidemiological)/proficiency testing; and industry codes of practice/conduct.*

World Aquaculture Conference 2004

The World Aquaculture Conference 2004 was held 1–5 March at the Hawaii Convention Center and was a valuable occasion to assess the opportunities and challenges in the Pacific region in relation to global trends and new research findings. The conference has become the premier event for a broad spectrum of organisations (e.g. private sector, academic institutions, NGOs) to showcase their latest products or findings. Over 300 presentations were given during 16 concurrent sessions. Around 300 companies and organisations also provided exhibits.

Trade disputes (in particular, the United States anti-dumping dispute over *Litopenaeus vannamei* prawns) caused some instability on the world markets. These disputes will probably become more frequent and intense as countries such as the US try to protect their domestic suppliers from more cost-efficient farms, particularly in Asia and South America. Other cross-cutting issues commonly found on the agenda were increased biosecurity, genetic improvement, and feed formulation advances.

In terms of commodities, considerable research and development is being focussed on *vannamei* prawn, tuna, grouper, cobia, and the marine ornamental trade. Many countries are investigating the domestication of their indigenous species.

The innovativeness of the sector is reflected in the diversity of farming approaches, which include super intensive systems, low technology, rural applications, integrated agriculture and hydroponic systems. Offshore culture is also being promoted as an alternative to bottlenecks facing coastal farming. In Hawaii, the farming of Pacific threadfin (*Polydactylus sexfilis*), or moi, has drawn much interest as a model for offshore cage culture.

The conference included a day session for pearl culture, with presentations from all parts of the Pacific. Many reported progress in artificial propagation techniques. Challenges in commercialisation, economic and marketing analysis remain.

Australian-funded opportunities for aquaculture research in the Pacific

A new project to support the sustainable development of aquaculture in the Pacific Islands region and northern Australia commenced early this year. The project is funded by the Australian Centre for International Agricultural Research (ACIAR) and augments the AusAID-funded Pacific Aquaculture Program. The lead organisation is the Department of Primary Industries and Fisheries in Queensland (DPI&F), working in collaboration with SPC and the WorldFish Center.

The project, which kicked off in January this year, has a unique approach to the goal of promoting sustainable aquaculture in the region. By combining extension, research and training activities it aims to improve and apply a range of appropriate aquaculture technologies.

Part of the project involves the extension of existing ACIAR and WorldFish projects to other Pacific Island countries and northern Australia. One of these is post-larval fish capture and culture technology, the outcome of a five-year research project in Solomon Islands. The other is the transfer of sea cucumber hatchery technology from New Caledonia with complementary research on shrimp co-culture and/or bioremediation of shrimp pond effluent. We envisage that technical and research skills in aquaculture within partner institutions will be upgraded through training associated with these components.

An important facet of the project is its capacity to fund small research projects via the "miniprojects" component. The aim of this component is to assist Pacific Island countries to carry out research on bottlenecks to sustainable aquaculture development in their area. In particular, miniprojects should concentrate on commodities where there is existing expertise and knowledge to build upon. Priority will be given to commodities identified in the SPC Aquaculture Action Plan. Ideally, the projects will not only benefit the country where the research is carried out but will positively impact other parts of the region. There are two categories of miniprojects: small miniprojects will receive funding up to AUD 5000 and have a duration of less than one year; and large miniprojects will receive funding up to AUD 10,000 and have a duration of around two years.

If you have an idea for a miniproject, please contact Ben Ponia at SPC or Cathy Hair at DPI&F (see contact details below). Application forms are available from SPC. Remember, the miniprojects must be aquaculture-related, target an existing constraint and preferably have widespread potential application and benefits. On completion, your results will be disseminated in the region, primarily through SPC publications. We also aim to apply the results in a practical sense by ensuring that improvements in technology or recommendations are followed up through ongoing SPC support.

For more information or to make an application to the Sustainable Aquaculture Development in Pacific Islands region and northern Australia Project, contact: Ben Ponia (Aquaculture Adviser) at benp@spc.int or Cathy Hair (Senior Fisheries Biologist, DPI&F, Northern Fisheries Centre) at cathy.hair@dpi.qld.gov.au

REEF FISHERIES OBSERVATORY

DemEcoFish approaching its end . . .

The two-year MacArthur-funded DemEcoFish research project has commenced its final stage. The project has been extended until mid-2004. Accordingly, final project activities are under way, including the presentation of country reports, the holding of a scientific roundtable to summarise experiences and results, preparation of publications, and compilation of the project's final technical and financial reports.

Tonga and Fiji Islands were selected for DemEcoFish field surveys. Socio-economic and resource assessment were completed by the end of 2002 and mid-2003, respectively, and were followed by data entry and the establishment of a database. Country socio-economic reports have been compiled and submitted to respective fisheries departments for approval.

A number of papers have been written and submitted to various regional and international journals summarising or highlighting the project's activities or components. Papers include the results of methodological approaches tested and analysed, gender related aspects of subsistence and small-scale fisheries, economic analysis of village-based fisheries, and the collation of socio-economic and resource data.

As announced in the last *Fisheries Newsletter*, the scientific roundtable discussion titled "The status of marine resource-user relationships: Bringing together socioeconomic and ecological data to provide the basis for sound management decisions" will be held at SPC headquarters in Noumea, 2–4 June 2004. Major results and experiences from the DemEcoFish project will be presented and discussed among relevant professionals engaged in comparable or complementary activities in the region. A publication in the journal, *Ambio* of the major outcomes of this roundtable is envisaged.

COASTAL FISHERIES MANAGEMENT SECTION

Training of trainers workshop on community-based fisheries management in Samoa

The Coastal Fisheries Management Section held a workshop on community-based management for American Samoan and Tokelauan fisheries officers in Samoa from 3 to 9 March. This workshop specifically targeted fisheries extension officers who normally work in communities. Although the section had already introduced the programme in American Samoa, the large turnover in staff in the Fisheries Department necessitated the running of another workshop for new recruits.

The four staff members who attended the workshop were already working on the ground on some community-based management projects, but needed to take the training course to assist them in implementing projects in the villages that requested assistance. American Samoa, with the assistance of the Coastal Fisheries Management Section, set up community-based projects two years ago. The projects started off well, but implementation in some cases was hindered by a lack of commitment from community leaders. Most people are engaged in paid employment and are unable to take time off to attend meetings. Getting volunteers at the community level has not been easy. The Fisheries Department was nevertheless pushing ahead with the project, with the long-term goal of building up a network of community-based sites and increasing people's awareness of their roles in the future sustainability of their resources.

Participants at the workshop included four fisheries officers from American Samoa and six representatives from Tokelau. The workshop that preceded the mission to Tokelau was also an opportunity for Tokelau representatives to be exposed to concepts and exercises relating to setting up management meetings, and discussions to facilitate drafting of management plans.

Because Tokelau has no fisheries officers apart from the Director of Fisheries, community representatives were chosen by the Taupulega, on the basis of their interest in the course. Out-migration has always been a problem for Tokelau, thus there was very little choice as to who attended such workshops, or who would be involved in projects in the country. Despite this, participants were keen to learn and participate in all activities. The challenge for the community participants in the workshop was to learn about fisheries and management issues.

Community support, institutions and mechanisms were no problem for them.

The workshop covered the basic principles of community-based management, why there is a need for community-based management, how to initiate village contacts and meetings, facilitating at the village level, and steps in the development of a village management plan. Procedures and processes to follow when approaching communities was thoroughly covered, as this is an important starting point for projects. There was also a session on bylaws and why there was a need to have village bylaws in community-based management. Although the Samoa case was used as an example, participants were assured that the approach differed according to countries and social structures. In Tokelau, for example, the approach will be very different because each atoll has only one village. Therefore approaching the Taupulega on each island was sufficient for starting work.

Three fisheries officers from the Samoa Fisheries Department assisted in the facilitation of the workshop. They were Etuati Ropeti, Talavou Taua and Iulia Kelekolio. Foua Toloa of the IUCN World Bank programme in Samoa was Tokelau's facilitator at the workshop.

Formulation of a management plan

This was conducted by the Samoa fisheries officers who used their experiences as field officers to train participants on the important components of formulating a management plan. Fisheries Department and communities will ensure the implementation of the management plans.

A field trip was made to some of the community-based management sites, to show participants where the sites were in relation to village fishing areas, how the areas were marked, the improvements made on the management sites, and how progress was measured.

On the last day of the workshop, participants tried their hands at facilitation, conducting meetings and working through problems to find solutions. Facilitation of participants included chairing and leading discussions, and group work.

There were also discussions on fisheries problems in the two countries. Exercises on how to use the problem/solution tree were used, and participants were introduced to other methods of gathering information. This included the use of participatory learning activities (PLA). Foua Toloa cited examples of other management processes in place, including different approaches and challenges and the benefits of some of the approaches used.

SWORDFISH LONGLINE FISHERY REOPENED IN HAWAIIAN WATERS

The Western Pacific Regional Fishery Management Council and NOAA Fisheries hosted a press conference in March this year to announce the reopening of the swordfish longline fishery. Present at the press conference were the Chair of the Council, Roy Morioka, and the Assistant Administrator for NOAA Fisheries, Dr. William Hogarth. The Council Executive Director, Kitty Simonds, introduced a distinguished panel of experts on turtle conservation and bycatch reduction, which included John Watson of NOAA Fisheries, Martin Hall of the Inter-American Tropical Tuna Commission, Kimberly Davis of the World Wildlife Fund and Eric Gilman of the Blue Ocean Institute.

Swordfish targeting using shallow (<30 fathom) sets by Hawaii-based longliners has been prohibited by US federal regulations since April 2001. This ban was implemented because the bycatch of loggerhead and leatherback sea turtles by Hawaii-based longliners was thought to be too high for the populations to sustain. Most of the turtle bycatch was taken by shallow setting swordfish longliners, which bore the brunt of management regulations designed to minimize this bycatch.

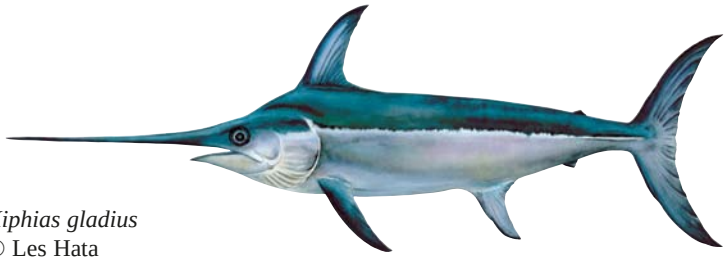
Fortunately, research led by John Watson with US longliners in the Atlantic has shown that the combination of 18.0 circle hooks and mackerel type bait can reduce the catch of leatherback turtles by 67% and loggerhead turtles by 92% compared with fishing with J-type hooks and squid bait. In November last year, Western Pacific Council recommended a conservative reopening of swordfish longline by the Hawaii fleet using this gear combination. However, the Council set an annual limit on the number of shallow sets (2,120 sets), or half of the annual number of sets before the swordfish closure, to be divided up among fishermen expressing an interest in targeting swordfish. The new management measure also imposes "hard caps" on the number of leatherback (16) and loggerheads (17) that can be caught in any one year, and 100% observer coverage to ensure that all interactions are monitored and reported. If either cap is reached, the fishery will be closed for the year regardless of how many sets remain unused.

Council Chair, Roy Morioka, noted that "the reopening of the swordfish fishery is the product of the partnership of industry, government, and environmental non-government organizations (NGOs)". He applauded them for successfully developing a fishing regime that complements and fulfills the challenging goals of economically viable longline fishing with minimal impact on turtles.

Dr Bill Hogarth stated that "while we are reopening the swordfish fishery, it is being done with the utmost caution and with significant safeguards to ensure continued sea turtle conservation. These include the strict caps on the number of sea turtle interactions and a limit on swordfish sets that can be made each season". Like Morioka, he praised all the individuals concerned who had worked on developing the swordfish management measures, including the Council, NOAA Fisheries and environmental NGOs.

Kimberly Davis, Deputy Director of the Marine Conservation Program of the World Wildlife Fund in the United States, added that research on the effectiveness of the circle hooks and other measures to minimize turtle bycatch needs to commence in the Hawaii longline fleet as soon as possible. She added, "the lessons learned in the Atlantic must be tested, refined, and shared in the Pacific as quickly as possible." Ms. Davis also underscored the international dimension of the problem of longline bycatch, "It is essential that we reduce bycatch not only in the U.S. fleet, but in all fishing fleets fishing in the Pacific. WWF is hopeful that improvements adopted and refined in the Hawaii swordfish fishery will be instrumental in transforming other fleets." Finally, she emphasized that reducing fisheries bycatch must be part of a broader conservation initiative, "Ultimately if we are to save turtles, we need to protect them everywhere they live - on beaches as well as in the water."

Eric Gilman, Fisheries Bycatch Program Manager for the Blue Ocean Institute, added that successes had already been achieved in perfecting methods to reduce seabird bycatch by



Xiphias gladius
© Les Hata

Hawaii-based longline vessels, through a fishing industry-NGO-government partnership. This effort led to a simple but very effective method of longline deployment called "side-setting". Gilman said, "the next step is to establish a formal broad trial of side-setting in the Hawaii fleet to confirm that side-setting will both nearly eliminate bird mortality and provide substantial operational and economic benefits." Gilman also acknowledged that, "the reopened Hawaii longline swordfish fleet will employ the best available turtle bycatch mitigation methods, but as is the case with side setting, additional research and commercial demonstrations are needed to refine, improve and confirm their effectiveness." Gilman was, "cautiously optimistic that seabird and sea turtle mortalities can be reduced to insignificant levels in Pacific longline fisheries with further study." Gilman also echoed the remarks of Kimberly Davis that an international approach is critical due to the highly migratory nature of seabirds and sea turtles, calling on the U.S. government and industry to play a leadership role to catalyze bycatch mitigation research in other countries.

(Source: Western Pacific Fisheries Management Council, March 2004)

WHEN IS CORAL REEF REHABILITATION AN APPROPRIATE USE OF MPA FUNDING?

Over the past few years, a range of coral reef rehabilitation techniques has been developed, many involving the placement of three-dimensional hard substrate forms (including cement, rock and ceramic) in areas of degraded reef. Although the science of reef restoration ecology is truly in its infancy (and hence a steep learning curve is to be expected), these methodologies have tended to draw a negative response from reef ecologists, who often compare them to the many ill-conceived artificial reef projects of the past—including dumping of used tires to create "reefs" that aggregate fishes. These skeptics maintain that reef rehabilitation is expensive and drains resources that would be more prudently dedicated to better management of intact reefs, and that it is best to allow natural reef recovery processes to run their course in degraded areas.

While these criticisms certainly have merit and should be carefully considered by MPA managers on a case-by-case basis, I strongly believe that there are situations where reef rehabilitation (defined herein as efforts to enhance natural reef recovery processes in areas that have suffered severe degradation, with the end goal of returning the reef to its natural condition prior to damage) is an appropriate intervention. In particular, rehabilitation should be considered in those situations where an MPA's reefs:

1) Have suffered large-scale, physical damage and show no signs of natural recovery on an economically meaningful decadal time scale;

2) Are currently well-managed, with major threats to the reefs under control;

3) Have sufficiently good water quality and larval availability to support vigorous reef growth; and

4) Can attract dedicated funding for reef rehabilitation (e.g., from the private tourism sector) that would not otherwise be available for general reef management.

I would like to focus on one specific example of this: that of legacy blast fishing damage in MPAs in the "Coral Triangle". Across Southeast Asia, hundreds of thousands of hectares of once-productive coral reefs have been decimated by blast fishing, leaving vast rubble fields in their place. Despite generally excellent water quality and abundant coral larval availability, these rubble fields often show no signs of natural recovery on a decadal scale. This is because corals recruiting to unconsolidated rubble are quickly smothered when the rubble invariably moves as a result of currents or waves. This "alternate stable state" is particularly frustrating to those MPA managers who have instituted effective management but are forced to live with legacy bomb damage; to them, reef rehabilitation is an enticing option.

One case study is Bunaken National Park in Indonesia, where blast fishing has been largely brought under control but large areas of rubble field remain (many blasted nearly 20 years ago). Two stakeholder groups have shown strong interest in rehabilitating these rubble fields to increase productive reef area: village fishers eager for enhanced fisheries yields and dive operators hoping to spread effort among more dive sites and thus raise the diver carrying capacity of the park. In response to this interest, the Seacology Foundation (www.seacology.org) provided a grant to the park village of Manado Tua to purchase 600 ceramic "EcoReef" modules to rehabilitate a nearly 1-hectare

rubble field in return for the villagers' commitment to set aside this area as a no-take zone. While this rehabilitation effort is focused upon fisheries enhancement (the area is off-limits to divers), local dive operators donated nearly 300 hours of dive time to install the EcoReef modules to help determine if this methodology is one in which they might invest to restore other degraded sites.

Completed in mid-January 2004, the results to date have already been impressive. The ceramic "snow-flakes", designed to mimic a branching coral thicket, immediately attracted large numbers of both schooling and sedentary fishes to the previously barren and lifeless rubble field. Benthic recruitment to the modules has been rapid, with coralline algae, bryozoans, vermetid worms, tunicates, and hard coral recruits now covering the modules. Perhaps most encouragingly, over one hundred coral fragments transplanted to the EcoReef modules (by simply wedging between the ceramic spines) have shown 100% survival, with nearly two-thirds of the fragments cementing to the modules and laying down new tissue over the ceramic in the first two months. Additional transplantation is scheduled for May 2004.

To be sure, the verdict on the success of this reef rehabilitation project will not be clear for 3–5 years. A grant from the Packard Foundation will permit us to monitor the biological and socioeconomic impacts of the project for the next three years to gauge cost-effectiveness of this technique. Villagers, dive operators and park management are pleased with the results to date and hopeful that within five years' time, the ceramic modules will no longer be visible—overgrown by a thriving reef with high fisheries productivity. The potential for such a result certainly seems worth the effort.

Photos and video of the Manado Tua installation are viewable at www.ecoreefs.com.

(by Mark Erdmann, Bunaken National Park, Indonesia)

(Source: MPA News, Vol. 5, n¡9, April 2004, reprinted with permission)

WORKSHOP ON ILLEGAL, UNREPORTED AND UNREGULATED FISHING

A workshop on illegal, unreported and unregulated (IUU) fishing was held on 19 and 20 April 2004 at the Organisation for Economic Co-operation and Development (OECD) headquarters in Paris, France. The objective of this workshop was to gather information and data on the extent of IUU fishing and identify the economic and social drivers to IUU fishing. Around 120 experts from OECD and non-OECD countries, regional fisheries management organisations, international governmental organisations, non-governmental organisations and academia attended the workshop.

The following is the summary of the discussions and conclusions of the workshop, reprinted with permission from OECD.

The issue of illegal, unreported and unregulated (IUU) fishing has moved to the forefront of the international fisheries policy agenda in recent years. Governments around the world have recognised the negative effects of IUU fishing activities on resource sustainability, biodiversity and economic and social sustainability. In many cases, the burden is borne by the fishing industry.

The workshop was organized around 4 sessions addressing: the state of play of IUU fishing; data and information needs; economic and social drivers; and possible future actions. The following observations and findings from the Workshop have been compiled by the Workshop Chairs.

The state of play on IUU fishing

- IUU fishing is a world-wide problem, affecting both domestic waters and the high seas, and all types of fishing vessels, regardless of their size or gear.

- IUU fishing is harmful to fish stocks and undermines the efficiency of measures adopted nationally and internationally to secure fish stocks for the future.

- IUU activities also have adverse effects on the marine ecosystem, notably on the populations of seabirds, marine mammals, sea turtles and bio-diversity as a whole (discards, etc.).

- IUU fishing distorts competition and jeopardizes the economic survival of those who fish in accordance with the law and in compliance with relevant conservation and management measures.

- There are important social costs associated with IUU fishing as it affects the livelihoods of fishing communities, particularly in developing countries, and because many of the crew on IUU fishing vessels are from poor and underdeveloped parts

of the world and often working under poor social and safety conditions.

- The impact of IUU fishing for some species (primarily tuna and tuna-like species) is global, whereas that for other species (e.g., Patagonian toothfish and Orange roughy) is specific to those areas where such species occur. This means that global and local solutions are required, as well as solutions tailored to specific species.

- There is a concern that excess capacity in fisheries in OECD countries can lead to a spillover of capacity into IUU fishing activities.

- IUU fishing is a dynamic and multi-faceted problem and no single strategy is sufficient to eliminate or reduce IUU fishing—a concerted and multi-pronged approach is required nationally, regionally and internationally, and by type of fishery. The full range of players should be involved in helping bring forward solutions to the IUU problem.

- Many developed and developing states have not been fully responsible in complying with their responsibilities as flag states, port states, coastal states, states of vessel owners and trading nations.

- The FAO International Plan of Action to combat IUU fishing contains tools to tackle the IUU issue. The question is to find ways to better implement such tools.

Information and data needs

- In spite of recent improvements in information collection, there remains a lack of systematic and comprehensive information on the extent of IUU operations and impacts. This is compounded by the varying level in quality, accessibility, reliability and usefulness of the available data.

- There are a number of international instruments addressing the collection of fisheries information and statistics. However, these need to be integrated and further, there remains a need for improvement in national statistics on trade in fish and fish products, especially in relation to IUU fishing.

- There is a diversity of actors involved in gathering, processing and disseminating information on IUU fishing activities—governments, intergovernmental organizations, RFMOs, RFBs, NGOs and industry.

- Trade-tracking and the resulting accumulation of information by market countries are an enormous task but it is very important for the creation of effective measures to combat IUU fishing.

- There is a need to broaden the scope of the information gathered so it covers activities and situations "upstream" and "downstream" of the IUU fishing operations themselves. This will help to better define the nature and scope of IUU fishing and to improve knowledge of the economic and social forces which drive IUU fishing in order to help target future actions.

Economic and social drivers

- Under current conditions, IUU activities can be extremely profitable due, amongst other factors, to lower cost structures than for compliant fishing activities. Strategies to combat IUU fishing need to include measures that reduce the relative benefits and raise the costs of IUU fishing.
- The demonstration effect achieved by government and RFMO efforts in fighting IUU activities is significant. This will provide positive signals to legal fishers and send the message to IUU fishers that their products will be excluded from the international market and that their activities will not be tolerated.

- Inefficient domestic fisheries management may work as a driver for IUU fishing activities; the more economically efficient management is the higher the fisher income will be and thus lessen the incentive to engage in IUU activities.

- The size of penalties and the risk of being apprehended is not generally a sufficient deterrent to IUU fishing activities. This is complicated by the ease of re-flagging vessels and the difficulties in tracking company structures and identifying beneficial owners of IUU vessels. The lack of harmonisation of penalties across countries is also a concern.

- IUU fishing inflicts damage on a law abiding fishing industry aiming at sustainable exploitation.

- IUU fishing activities also make it harder for countries to strike a balance between food security and protection of the marine environment.

Possible actions

- There is a wide range of possible measures that can be undertaken to address the problem of IUU fishing. These will need to cover legal, institutional, economic and social dimensions and will require the involvement of multiple players in the

national, regional and international fisheries sectors.
- Determining the cost-effectiveness of alternate approaches to addressing IUU fishing problems should be undertaken to help identify priorities amongst the possible options so that the best results can be obtained from limited resources that are available to national governments and international organizations.

Flag state actions

- Links between flags of convenience and tax havens have been established and a more concerted approach towards both could be undertaken.
- There is a need to improve transparency on the procedures and conditions for re-flagging and de-flagging.
- More countries could usefully investigate the possibilities for applying extra-territorial rules for their nationals.
- The penalties for IUU offences should be significantly increased and harmonised between jurisdictions.

Port state actions

- The development of minimum guidelines for port state controls and actions against IUU fishers, particularly with respect to the use of prior notice and inspection requirements (including health and safety conditions), should be encouraged. The harmonisation of these controls and actions should be a priority.
- There is a need to ensure a broader use of port state control measures including inspections, preventing access to services and goods of IUU vessels.
- There needs to be an agreement to make it illegal to tranship, land and trade in IUU fish.
- There is also a need to improve the monitoring of the provision of at-sea services and transhipment of fish and fish products.

Coastal state actions and international trade responses

- It is necessary to augment monitoring, control and surveillance capacities and improve fisheries management across the board, but in particular in developing countries.
- Improving and extending the use of catch and trade documentation schemes could help provide additional information on IUU activities.
- Fair, transparent and non-discriminatory countermeasures should be adopted, consistent with international law, against countries that do not comply with the conservation and management measures adopted by RFMOs or fail to effectively control the vessels flying their flag in order to ensure they comply with the conservation and management measures adopted by RFMOs.
- Countries should identify the area of catch and name of fishing vessel and its past history (of name and flag) in order to collect information necessary for better fisheries management and elimination of IUU fishing.

RFMO actions

- Strengthening the mandate and role of RFMOs and RFBs, in particular their possibilities for tracking IUU fishing, is an important requirement.
- There is a need to improve information sharing and cooperation among RFMOs, particularly in terms of linking and integrating their data on IUU fishing activities.
- More RFMOs should consider publishing lists of companies and vessels engaged in high seas IUU activities and lists of vessels that are authorized to fish. The use of positive and negative lists of IUU fishing vessels and companies is strongly encouraged in this regard.
- The creation of a global record/register of authorised fishing vessels that are technically capable of engaging in high seas fishing should be considered.

International coordination

- Resources matter: more technical and financial resources are needed for capacity building, in particular in the developing states for monitoring, control and surveillance, and in all activities in combating IUU activities.
- The international community should move to ratify relevant international treaties on labour and working conditions in the maritime sector in order to strengthen international hard and soft laws to protect fishing crews in general.
- Improved monitoring foreign direct investments (outgoing and in-coming) in the fishing sector will assist in tracking potential IUU fishing operations.
- Work should be undertaken nationally and multilaterally to lift the veil of corporate secrecy surrounding the companies undertaking IUU fishing activities and related services. Partnerships between public authorities and businesses offer important scope in the fight against IUU. In this regard, the OECD Guidelines for Multinationals offers some possibilities that could be followed-up by national regulatory authorities.
- A major effort is required, in particular by regional fisheries management organisations and market countries, to collect and disseminate relevant information.

- The efforts already underway to improve information at all levels and mechanisms to share information need to be supported and strengthened.

NGO and private sector actions

- Whenever possible, governments should consider bilateral consultation with businesses engaged in IUU activities to determine if alternative means of getting IUU vessels out of the business can be found.
- There should be continued efforts to communicate the IUU problem, for example through promotional/educational campaigns with the market including intermediate buyers, processors, distributors and consumers. Such activities will help raise awareness of the problem and improve the knowledge of the social, economic and environmental consequences of IUU activities.
- Industry and NGOs should be encouraged to continue to self-organise their response to IUU fishing and in

TUNA FLEET HIT LOW PRICES, RISING COSTS

Fishing boat operators at Mooloolaba [Queensland, Australia] are struggling to keep their heads above water as a raft of circumstances combine to beset the industry.

Five boats are believed to have already been repossesed by banks with several more likely to suffer the same fate.

Other owners have elected to leave their vessels tied up in port for weeks on end, convinced that option is cheaper than taking them to sea to chase tuna or swordfish.

Brett Taylor, managing director of 4 Seas, one of four major exporters operating at Mooloolaba, said he wouldn't be surprised if up to 15 of the 40 boats in the fleet went under.

"Tuna prices are down in Japan because of oversupply from fish farm operators, the Aussie dollar's rise hasn't helped, fuel and insurance costs are up, and the cost of bait (squid from Argentina) is up because of a sever undersupply," he said.

"As well as that, annual licence fees have jumped from $6000 a boat two years ago to $14,000, some of our fishing areas have been closed and the catch is down perhaps as much as 25% in the past six months for reasons we're not sure about."

Mr Taylor said he had flown to Canberra last week to talk to Minister for Fisheries Senator Ian McDonald about assistance to help the industry through its toughest period in years.

The tuna and billfish industry is worth an estimated $35 million in direct export earnings to the Mooloolaba operators, and as much as that again in flow-on benefits to employees in associated businesses.

Mr Taylor said he expected the situation to remain tough for another 12 months, adding he was confident the industry would survive once the tide turned.

(Source: *Sunshine Coast Daily*, Wednesday, 7 April 2004, reprinted with permission)

SAFETY AT SEA, A PRIORITY
SMALL FISHING BOATS A TARGET

Far too often we read about small boat fishermen in the Pacific Islands being lost at sea, or if they are lucky being rescued after drifting at the mercy of the wind and weather. The usual situation is a small outboard-powered open fishing boat developing engine problems or running out of fuel while fishing or travelling outside the reef.

The fishermen may drift for days, weeks, or months as governments spend scarce money on search and rescue attempts, while families ashore become frantic over their fate.The size of the problem is difficult to estimate since statistics on small boat accidents at sea are not kept by most countries of the region.

In Samoa where some data exists, 38 lives have been lost and 107 search and rescue incidents recorded since 1995. What is clear from the information available is that it is the small fishing vessels that cause most of the serious incidents offshore. An FAO (Food and Agricultural Organization) survey conducted in 2003 showed that in most countries small fishing vessels are not even covered by their safety legislations.

In response to the problem, the Food and Agriculture Organization of the United Nations and the Secretariat of the Pacific Community (SPC) have been working to improve the safety of small fishing boats.

An FAO survey in the early 1990s suggested that public awareness programmes on sea safety would be worthwhile. SPC has subsequently produced and distributed a wide range of safety awareness materials throughout the Pacific islands. The materials are aimed at changing attitudes to sea safety and include posters, stickers videos, radio materials, laminated cards, and TV clips.

FAO and SPC recently brought together a group of specialists in Suva in a workshop environment to see what further steps should be taken to improve the safety of small fishing boats.

The unique gathering drew on expertise in the fields of fisheries, maritime law, search/rescue, community development, training, accident investigation, and boat building and design. Participants included village-level fishermen and survivors of long drift voyages, one of whom told of his harrowing tale of survival in an open boat for more than 100 days.

The meeting discussed and made recommendations on four significant ways to improve small boat safety. Firstly, if we are to devise effective ways of tackling loss of life at sea, it is essential to better understand the extent of the sea safety problem. To help with this, countries need to record information on sea safety incidents. This information will be a valuable tool for creating greater awareness and the political will to address sea safety issues and provide the necessary resources.

Reliable data can also assist countries in working out the dollar and human costs associated with sea accidents and to assess if the resources committed to sea safety are being used effectively and efficiently.

Like road safety programmes, there is no "quick fix"to reducing loss of life at sea. Sea safety awareness needs to be approached with a view to long term strategies that really make a difference at the level of small boat operators.

Fishermen and others who use small boats must be made aware of the very real dangers they face each time they put to sea. Initiatives to raise awareness should focus on why so many accidents occur and be directed not just at fishers but also at communities and governments.

Not all boats are created equal with some small fishing vessels being built more strongly and providing greater levels of safety than others. To help raise sea safety standards there is a need to develop mandatory construction standards for small vessel construction in the region. The standards should include plan approvals, construction specifications, built-in buoyancy, engine size limits and colour of hull.

Finally, while the realities of life in remote islands where many incidents occur make regulation difficult, appropriate sea safety regulations can dramatically improve small fishing vessel safety.

Samoa serves as a prime example of how safety improvements by appropriate regulations has reduced loss of lives. Specialists felt that even where safety legislation for small boats is difficult to enforce, there is still value in having appropriate and publicised legislation to act as a target to aim for, a basis for local rules, and a useful standard, which can be a requirement for a fishing licence and loan approval.

These regulations should be simple, easy to interpret and drafted in plain words. So, where to go from here? The studies have been done, the results have been discussed and now it is up to the governments of the region to decide the resources needed to improve sea safety for small-scale fishermen.

(Source: Bob Gillett/
Islands Business, May 2004)

Increased public awareness through educational programmes and publicity will be one of the means to lower the number of accidents

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

by Ben Ponia, Aquaculture Adviser and Satya Nandlal, Aquaculture Officer
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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, 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 redclaw (*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.

Samoa Fisheries Department giant clam hatchery at Toloa

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. Mozambique 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 Fish-eries 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 Ajuyah, 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

REGIONAL ASSESSMENT OF THE COMMERCIAL VIABILITY FOR MARINE ORNAMENTAL AQUACULTURE WITHIN THE PACIFIC ISLANDS

This report was commissioned by the SPC Aquaculture Section and provides a timely and useful update on the status of the ornamental industry in the Pacific region and the prospects for aquaculture. The following is the edited executive summary of the publication. The full document in pdf format (320 kb) can be downloaded at:

http://www.spc.int/aquaculture/site/publications/documents/Marine_Ornamental.pdf

by S.R. Lindsay, E. Ledua and J. Stanley

The Pacific region consists of 22 countries and territories, and is made up of 2700 islands. Coral reefs dominate the inshore marine ecosystems and provide both subsistence and commercial income opportunities. Expanding populations and urbanisation, which create related needs for cash incomes, are placing ever increasing demands and pressures on the region's coastal resources. Striking the balance between environmentally sound reef resources and economically viable marine industries is important to securing long-term income generation and better standards of living for the region's people. Pacific Island states have identified mariculture of marine ornamental commodities as a potential opportunity that can be further developed to meet these objectives.

This review has been undertaken to provide a regional assessment of the level of marine ornamental commercial culture, as well as the economic and the biological viability of culturing marine ornamental commodities, to supply the export demand for the international aquarium markets. The review team was also tasked with recommending mechanisms and approaches that can be undertaken to enhance the production of existing and new aquaculture commodities for member countries of the Secretariat of the Pacific Community (SPC). Specifically, six aquaculture commodities were assessed (giant clam, hard coral, soft coral, fish, live rock and shrimp).

Work by the review team was done between July and November 2003. The team met with relevant government agencies, non-governmental organisations, private sector marine exporters and aquaculturists in the Marshall Islands, Federated States of Micronesia, Palau, Samoa, Fiji Islands, Vanuatu and Tonga. Discussions with individuals and agencies in six other Pacific Island countries were held by telephone, fax and email. Country visits were based on current levels of activities associated with the marine ornamental trade. Additional desk study summaries of the remaining Pacific nations that have been involved in this trade have been included. Information obtained for this review was sourced from a wide range of publications and stakeholder discussions, including regional and government agencies, communities, NGOs and private sector companies and individuals.

An economic assessment was made in order to provide an insight into the region's opportunities and constraints in developing marine-based industries; information has also been provided on current demands for each aquaculture commodity currently cultured within the region. Economic opportunities are closely related to marine and coastal resource endowments of each nation, which vary considerably within the region.

The wild collection and subsequent export of marine commodities for the international marine ornamental trade is currently an ongoing successful income earning industry and a provider of employment within the region. The industry has expanded over the past decade with those Pacific Island countries having access to international air transportation links actively participating in the industry. Fiji dominates the industry within the Pacific, with a market share of approximately 75% of all trade, annual export earnings of USD 19 million (2001), and employment of over 1000 individuals.

The marine ornamental industry is, however, based on resource extraction (approximately 95% by volume), and issues about the long-term sustainability and health of these natural resources is a Pacific regional and global concern. Management protocols are under development throughout the region in order to provide a mechanism that allows the sustainability of the wild collection industry. Wild collection replacement with aquacultured products is a viable alternative for organisms that can be cultured.

An industry of marine aquaculture products developed for and traded in the marine orna-

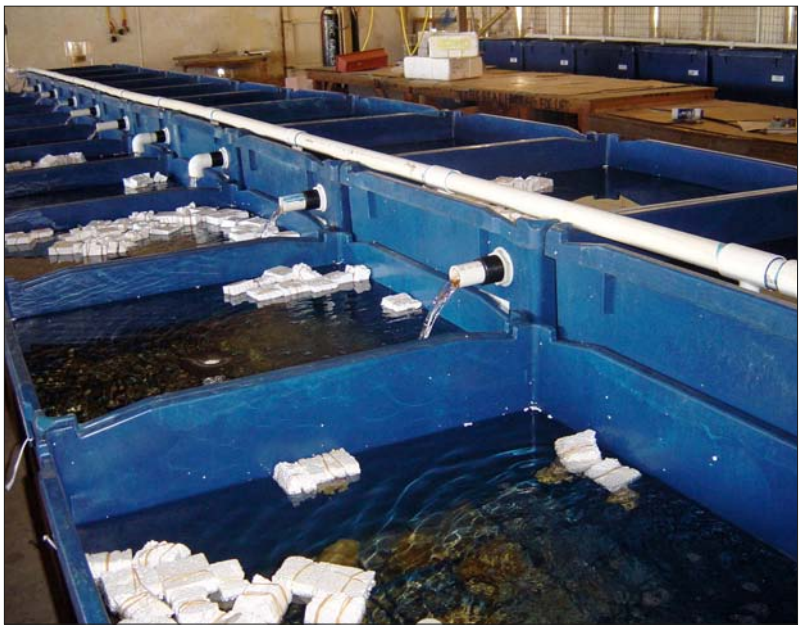
mental industry from the Pacific Islands region is in its infancy and currently commands a very small share of the market compared with wild collected marine commodities originating from the region. In general, cultured products are labour intensive, have higher risk factors, and incur time delays in profit earnings when compared with the wild collection of similar products. Nevertheless, the further development of existing and new aquaculture commodities destined for the international marine ornamental industry is potentially a viable economic prospect for the Pacific Islands region. The currently traded aquacultured commodities (giant clam, hard and soft coral, and live rock) have established markets, albeit small, within this industry and it is envisaged that, as the quantity and quality of these products develop, market share, market acceptance and commodity prices will increase. Proven technology for the culture of marine finfish and marine ornamental shrimp has yet to be realised. The development of aquaculture commodities to complement the correct utilisation of wild harvested products will assist in the development of the industry within the region while contributing to the ecological sustainability and environmental integrity of the resources.

The annual export of both cultured and wild harvested giant clams from the Pacific over the past decade has been on the order of 20,000–35,000 specimens, with approximately 85% being wild harvested. Giant clams are cultured in the majority of Pacific Island nations and are the largest aquaculture commodity currently traded in the international marine ornamental industry. The culture of giant clams requires the use of land based hatchery facilities and ocean based grow-out sites. The smaller, brightly coloured species of *T. crocea*, *T. maxima*, and *T. squamosa* attain the highest prices and this demand trend is expected to continue in the foreseeable future. At time of the writing of this report, *T. crocea* has yet to be cultured in commercial numbers. Tonga and the Marshall Islands, to a smaller extent, are currently the largest producers of cultured giant clams for the marine ornamental trade.

The production of cultured hard and soft corals is currently in its infancy and is limited. Corals are cultured commercially in Fiji Islands, Marshall Islands and Vanuatu. Fiji has the largest commercial hard coral farm in the region, with a current estimated production figure of 25,000 individual pieces made up of 40 different species. The demand for hard and soft corals in the marine ornamental trade is huge, comprising a large proportion of all invertebrates traded. Demand for corals over the past decade has expanding annually, with this trend envisaged to continue in the future. Cultured corals make up a very small proportion of products traded at the present time and therefore it is difficult to predict demand and market trends for these commodities. It is, however, envisaged that, as production increases with a subsequent increase in product quality and diversification, cultured corals will assume a larger proportion of the market.

Cultured "live rock" is presently produced only in Fiji, with an estimated 50,000 pieces under cultivation. Although the demand for live rock is large with demand increasing considerably over the past decade, demand for cultured live rock is small and restricted to specialty markets. Price, quality and quantity of wild harvested rock currently available to the marine ornamental industry are not conducive to the development of cultured live rock. Demand by the industry for cultured live rock products may change if Asian and Pacific Island nation producers adopt legislation that strictly controls or bans the wild collection of live rock (as in Florida, USA).

The current biological knowledge and economic activity undertaken clearly indicates that the culture of a limited



Live rock being cultured in Tongatapu Islands, Tonga

number of marine ornamental commodities is an economic prospect for the Pacific region. However, additional development in all aspects of the industry is required before industry goals can be fully attained. These include: human resources; biological and technical knowledge; infrastructure; marketing and business; policy, management and enforcement.

The exact requirements of each nation will vary depending on current activities in place as well as related capacities. Furthermore, an integrated approach including bilateral and multilateral donor organisations, regional agencies, national governments, NGOs and the private sector is required to successfully develop this industry. The consultants recommend that SPC, through its Aquaculture Section, take the lead role in coordinating the development of this industry.

At present, regulatory mechanisms within Pacific Island nations are not adequate to sustainably manage this trade, for both wild and cultured commodities. Therefore, user-friendly management systems, including quarantine and CITES requirements, need to be further developed to allow the sustainable management of the industry for the long term. Concerns and constraints raised during stakeholder discussions throughout the region are highlighted and discussed within the text and a series of approaches are recommended to address these concerns.

A number of recommendations based on the results of this study are presented in the report. These have been provided to assist each nation and regional agencies to assess their capacity to develop this industry.

Top: Giant clam destined for the aquarium trade being raised on beachside raceways in Tarawa
Left: Soft coral being cultured in Palau

COMMUNITY-BASED FISHERIES MANAGEMENT PLANS FOR TOKELAU

by Aliti Vunisea,
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Fishing is an integral part of the lives of Tokelauan people and is an activity pursued almost daily by men. While most women do not fish regularly as in other Pacific islands, they do take part in all post harvest activities. Fishing has been and continues to be part of Tokelauan cultural heritage and is important for subsistence consumption and, to a certain degree, in the exchange system between relatives living in Samoa and New Zealand. Any changes within the fisheries sector will certainly affect people's lives.

A community-based management approach to fisheries depends significantly on traditional institutions and the implementation of socially acceptable laws and regulations to monitor resource use. In Tokelau, a strong traditional institution and resource use ethic, and a participatory approach to management already exist.

In Tokelau, the *lafu* system — where reefs, lagoons or general fishing areas are tabu for certain lengths of time — has existed for generations and has ensured continued resource use and sustainable harvest mechanisms. As in other parts of the Pacific these tabus were, in most cases, implemented to ensure continued food supply and to protect fishing areas. Resource management is therefore not a new concept to the Tokelauan people. The village mayor, or *Pulenuku*, has the task of overseeing village activities and is also responsible for the enforcement of resource use mechanisms. Continued respect for traditional institutions in Tokelau has ensured the survival of such traditional management mechanisms, despite changes to fishing practices in the past few decades.

In March 2004, SPC's Coastal Fisheries Management Section and the Samoa Fisheries Department assisted Tokelau[1] in developing community-based fisheries management plans for each of the three atolls: Nukunonu, Fakaofo and Atafu. The implementation and success of these plans will depend significantly on the Tokelauan people and how committed they are to following through with proposals they made in the management plans, which are written in the Tokelauan language. Throughout community consultations, it was stressed that the plans belonged to the people and it was up to them to implement them, and that the SPC and the Samoa Fisheries Department officers were merely facilitators of the process. The *Faipule* (chiefs) of each island were very optimistic about the success of the plans and did not foresee any immediate problems at the

The reserve or lafu area in Fakaofo. There are no markers but people are familiar with tabu areas, as the boundaries are the islets, the divide between the oceanic and lagoon sides of the islands and reefs. Reefs close to the islands at the far side of this photo are where people can fish. The tabu also covers a part of the oceanic side of the lagoon

Rubbish disposal, as in the above photo, was a problem common to all the islands

[1] SPC s Coastal Fisheries Management Officer acknowledges the assistance of: Samoa Fisheries Officers Etuati Ropeti, Ulia Keleoli and Tanielu Talavou; and two representatives from each of the three atolls: Katieli Peleti and Telesoni Mika from Fakaofo, Peni Teaku and Ropati Toma from Atafu and Peter Alesana and Hehilia Lemisio from Nukunonu.

implementation stage, as these plans were simply modern versions of their traditional management systems.

According to Pio Tuia, the *Faipule* of Nukunonu, "We already have traditional management systems that were practised by our forefathers; only now we have a proper written plan, which we can check what we have achieved against. We also need this plan now as resources are not in the state they used to be before, so this plan is timely for us." Community-based fisheries management maximises traditional institutions, beliefs, skills and knowledge, and norms, making it easy for people to more readily accept and understand what the plans entail.

During the development of the fisheries management plans, three Samoa fisheries officers worked with a Tokelauan counterpart for several weeks on each atoll, participating in meetings, discussions and interviews. Meetings targeted the major political and community groups in the villages, including the *Taupulega* (council of elders), *Aumanga* (men's group), *Fatupaepae* (women's group) and the youth groups. Because the Tokelauan people understand the Samoan language, there was no need for translations, which greatly facilitated interactions during these meetings. At the end of three weeks, the draft management plans were presented to the entire village on each atoll for comments and endorsement.

Also occuring at the time the community-based management plans were being developed, were discussions on a National Inshore Fisheries Management Plan for Tokelau[2]. Discussions focused on the need for a national vision for the future of Tokelau's inshore resources, and what the *Taupulega* and people see as the future of their fisheries. This also included looking at the current structure of the Tokelau Fisheries Department and determining if there was a need for additional fisheries officers. Transportation difficulties and the distance between each atoll make it very difficult for a single officer, as is the current situations, to implement and monitor projects and fisheries development in the three atolls.

During discussions about the National Inshore Fisheries Management Plan, there was considerable interest shown in aquaculture, sea safety, and the development of fisheries in general. Field surveys were made of areas that were currently designated as reserves.

Amidst all the work being done in the fisheries sector in Tokelau, the atolls are also undergoing changes to their governance systems. While the team was in Atafu, the first meeting of the Council for the of on-going Government of Tokelau was held. This council, a larger forum that includes the *Pulenuku*, *Faipule* and advisers, has replaced the previous Council of *Faipule* (chiefs). This council will now be the body that makes decisions for the country when the General *Fono* (parliament) is not in session. In addition to these changes, the *Taupulega*, as of July 2004, will have more statutory powers and will have the public service in their respective islands under their jurisdiction. Thus, the work on the community-based fisheries management plans and other developments at the island level will depend significantly on the *Taupulega* and the traditional authorities.

On Atafu, there was also a meeting of the Fatupaepae from the three atolls. This meeting — which had been reconvened after 15 years — was useful as SPC's Coastal Fisheries Officer and the three Samoan fisheries officers were able to discuss the intended projects on Tokelau with the women of Fatupaepae before they went back to their villages.

Left: Women in Atafu preparing food for the meetings
Middle and right: Tanielu Talavou and the Tokelau counterparts Peni and Ropati conducting survey work in the reserve areas in Atafu

[2] The community-based fisheries management plans for each atoll fall under the overall National Inshore Fisheries Management Plan for the country.

After the meetings on each atoll with different community groups, various committees were selected to collate information gathered from discussions, which would then presented back to the people at a later meeting. People on all three atolls described what in their view contributed to resource depletion.

On Atafu, these problems included net size restrictions not being strictly enforced, the effect of petrol from boats on the marine environment, rubbish disposal and a lack of proper dumping areas, lack of awareness of rules relating to fisheries resources, and overharvesting. A declining clam population was a concern, also raised on the other two atolls. Over-harvesting appears to occur for two main reasons: 1) clams, coconut crabs and certain fish are sent overseas to relatives in Samoa or New Zealand; 2) fishing is sometimes viewed as a game or sport, and becomes more a test of skills rather than a need to procure fish for consumption. Wastage is very common, with large amounts of fish thrown away almost daily, and some people fishing primarily to feed their pigs. Fish are plentiful in Tokelau and even very young children catch fish around the village boundary, so the problem of declining resources is not a reality to most of the people.

Village elders, however, recall larger populations in the past of certain fish species, clams and coconut crabs. Most of the solutions proposed by people were activities they themselves could do, as well as to support all of these, were suggestions for additions to existing by-laws to include specific fisheries regulations.

Most of the problems that were identified in Atafu were also raised in Fakaofo, including over-harvesting, rubbish disposal, petrol spills, small mesh sizes, and a lack of awareness of existing rules and regulations. In addition, Fakaofo people were concerned about fish poisoning; the wreck of the *Ai Sokula* on a nearby fishing reef, was identified as a likely contributing factor.

On Nukunonu, highlighted problems were nearly the same, and more in-depth surveys, training and awareness work were identified as urgently needed. Village meetings were held with specific groups, including the *Taupulega*, *Aumanga* and the *Fatupaepae*. Nukunonu's reserve area has many clams and there are signs of regeneration. Tabus are well respected on Nukunonu and people do not fish in areas declared tabu.

Most of the problems identified in the community fisheries management plans were common to all three atolls. With more than 5000 Tokelauans living abroad in New Zealand and only 1500 at home, the pool of qualified and specialised persons with fisheries development or management expertise is very limited. Thus, training is needed for community representatives and people living in Tokelau, to look after the resources themselves.

The community fisheries management plans are to be finalised and presented to the General *Fono* in June of this year.

The Village Management Committee in Fakaofo

Original text: English

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