for the purpose of managing its fisheries resources.

b) MIMRA responsibilities: normally include technical services to support the undertakings and management actions of the community.

viii. *Management Area*: There is a need to explain the coverage for which the FMP will apply in terms of activities and the imposition of rules and restrictions.

ix. *Establishment of a Local Fisheries Committee*: This will cover how committee members are chosen and lists committee responsibilities.

x. *Institutional Arrangement*: It is important to give a brief account of how the FMP operates in terms of the involvement of MIMRA, the Local Fisheries Committee, local government council, and other related partners. A flow chart will help with the explanation.

xi. *Monitoring and Evaluation of the FMP*: This is important as it advises on the successes and achievements of the plan and is required by the Marine Resources Act)

xii. *Review of the Plan*: A brief account of how the plan will be reviewed and the frequency with which it needs to be reviewed (This is required by the Marine Resources Act).

xiii. *Conclusion*: The FMP can conclude with a short statement on the expectation of the community as a result of its plan.

xiv. *Appendices*: It is important to keep detailed records of community discussions, a list of community members involved in the preparation of the plan, and other important information that is used during the preparation of the plan. Such information can be included as appendices to the FMP.

xv. *Extra flavour (optional)*:

a) *Statement by Mayor*: A statement by someone very important in the community (e.g. a very high chief or mayor) adds weight and value to an FMP. Usually, when a high-ranking person in the community makes a commitment, then he or she will ensure that commitment is followed through on. Such a statement should appear at the beginning of the FMP.

b) *Pictures or drawings*: Usually illustrations, especially colour ones, catch the eyes of readers, particularly those who do not have much formal education. Such illustrations or pictures could include that of a high chief or mayor, the atoll itself, community workshops, etc.

The above information was developed not only to help MIMRA's Director in approving several FMPs, but also to assist the programme staff for the revision of the FMPs that are yet to be approved.

AQUACULTURE SECTION

Update on aquaculture activities in the Marshall Islands

Aquaculture in the Marshall Islands is relatively diverse. Although much of it occurs on a small scale, there are a number of interesting developments on Wotja Atoll. Ben Ponia and Antoine Teitelbaum report on the situation in the Marshall Islands.

The Wotja hatchery: Spawning pearl oysters and diversifying to finfish

The pearl oyster hatchery at the Marshall Islands Marine Resources Authority (MIMRA) on Wotja (formerly owned by Black Pearls of Micronesia) is the main source of spat for pearl farms operating in the country. This hatchery has struggled to produce sufficient numbers of spat — a major bottleneck to pearl development in the Marshall Islands.

The hatchery has recently been fully refurbished and equipped with water quality treatment equipment such as a settlement tank and UV filters. Plumbing and pumping systems were also renewed and hatchery tanks rearranged to make the hatchery more efficient.

Unfortunately, even after refurbishment, MIMRA's first spawning runs crashed continuously at the larval stages. After a lengthy process of elimination, and trial and error, it was discovered that a dosage of EDTA (a heavy metal chelating agent) was necessary for successful spat settlement. However, the use of EDTA still points to discerning signals in lagoon water quality. The last hatchery batch produced by MIMRA consisted of several thousand oysters and was provided to the Robert Reimers Enterprises farm (on Jaluit) and Black Pearls of Micronesia farm (on Arno). Technically, the hatchery has the capacity to produce several hundred thousand spat, which is enough to meet the needs of the Marshall Islands. A two-year grant by the Center for Tropical and Subtropical Aquaculture has just been approved

to overcome bottlenecks in spat production and run experiments on transportation methods to increase survival.

MIMRA expatriate staff member, Provan Crump, based at the Wotja hatchery has trained local technicians in operating the hatchery and carrying out larval rearing. As a result, the operation is now mostly run by skilled Marshallese staff.

Recently, the Australian company, Good Fortune Bay Fisheries, a large and reputable aquaculture operation based in Bowen, Queensland, has imported juvenile humpback groupers (*Cromileptes altivelis*). The intention is to collaborate with MIMRA on an aquaculture joint venture for growing-out humpback groupers in cage systems in Majuro's lagoon.

MIMRA has been holding the fingerlings in a simple quarantine facility located at the Wotja pearl oyster hatchery. So far, the trial has demonstrated that shipping by air from Australia to the Marshall Islands is a success as there was virtually no mortality and the fingerlings have adapted very well and shown good growth rates. No signs of disease have been observed.

Floating cages are being put together by Good Fortune Bay Fisheries and MIMRA experts. The fish will be grown-out in Majuro's lagoon near passes on the northern side, an area with pristine water quality and permanent oceanic water exchanges.

At this stage MIMRA still lacks aquatic biosecurity capacity for importing marine finfish and so have been working with the Marshall Islands Environmental Protection Agency on an import risk analysis. MIMRA will work with FAO on biosecurity training with SPC's assistance.

Ongoing efforts in diversifying aquaculture at College of the Marshall Islands

The College of the Marshall Islands (CMI) science station has a simple hatchery with an algae lab and several 10-ton concrete tanks onsite. Recently, a five-year US Department of Agriculture project granted monies for pearl transshipments to other atolls, triploidy experiments, and monitoring plutonium levels in the oysters at Bikini atoll to assess radiation impacts from nuclear testing during World War II.

MIMRA and CMI could potentially be involved in a regional project, possibly involving Kiribati, Fiji and Cook Islands, to grow half pearls (mabe).

Marine ornamentals at the Marshall Islands Mariculture Farm

The Marshall Islands Mariculture Farm — owned by Ocean Reefs and Aquarium (Florida), and formerly owned by Robert Reimer Enterprises — operates 24 large concrete raceways and 48 smaller fibreglass troughs. Some lagoon grow-out is also coordinated by the technical staff of a farm on Arno Atoll. Giant clams (Tridacnae) are one of the mainstay export products although the farm also exports coral fragments (soft and hard corals).

Marine ornamental stocks also come from the outer Marshall Islands (e.g. clams from hatcheries at Likiep and Arno). The farm also holds and exports products from other countries such as soft corals from Pohnpei (Federated States of Micronesia).

High mortality levels in recent years have decreased the farm's exports. These mortalities are blamed on a disease and on poor water quality; the farm's water intake pipes are located just a few kilometres downstream from Majuro's dump.

Taiwan stepping into aquaculture in the Marshall Islands

The Taiwan Technical Mission in Majuro has recently begun construction of a fish hatchery in Laura. So far, four large (~ 20-ton) concrete tanks (to be used for spawning) and about 20 five- and two-ton tanks (to be

Taiwanese marine fish hatchery under construction

used for larval rearing and as nurseries) have been built.

This project aims at culturing groupers (Epinephelidae) and rabbitfish (Signidae). There is also an interest in propagating tiger prawns (*Peneus monodon*). All of these could be grown for the small existing local markets for a start, and there may be potential for exporting them to markets in Hawaii, in the future.

First commercial harvest of red tilapia in Vanuatu

Red tilapia culture in Vanuatu began in 2007 with Teuoma Prawns, a local shrimp farming company that is collaborating with the Vanuatu Fisheries Department (VFD) and Vanuatu Quarantine Department in importing sex-reversed red tilapia from Thailand.

Several importations have been made and information at hand received from VFD's Principal Biologist, Robert Jimmy, is that red tilapia are farmed in cages (see Figures) in a lake near Port Vila, which is infested with Mozambique tilapia and surrounded by a cattle farm. The fish are fed on a locally formulated diet based on copra meal, meat meal and wheat bran produced by VFD. This feed is also used by local farmers for Nile tilapia (*Oreochromis niloticus*) culture.

Approximately 19 t of fish were ready for harvesting in July 2007, and the company was carrying out partial harvests of 100 kg/week to promote the product in Port Vila. The fish are sold fresh on ice at local municipal markets and kava bars for VUV 550/kg and to restaurants and hotels for VUV 600/kg (1 USD = 104.05 VUV). According to Robert Jimmy, the price of tilapia may be reduced once the market is established, and may also depend on the demand and operating costs of the farm.

Red tilapia

Red tilapias have become an economically important food fish. They exhibit many qualities that make them well-suited for aquaculture. They are enormously adaptable and capable of reproducing under a wide range of conditions, they exhibit excellent growth rates on a wide variety of natural and low protein diets, they are resistant to handling and disease-causing agents, and are highly palatable and have broad consumer appeal as a food fish.

The genetic heritages of the existing varieties of red tilapia are not well documented. Their derivation is generally attributed to the crossbreeding of mutant reddish-orange *O. mossambicus* (a normally black species) with

Red tilapia cages

other species, including blue tilapia (*O. aureus*), Nile tilapia (*O. niloticus*) and *O. hornorum*. There is some evidence of the presence of genes from *Tilapia rendalli* and *Sarotherodon melanotheron*. Among the popular hybrids are 1) Florida red, a species cross between *O. aureus* and *O. mossambicus*, 2) a hybrid between *O. aureus* and *O. niloticus*, and 3) Taiwanese red tilapia, a cross between *O. mossambicus* and *O. niloticus*. There is also the Philippine red tilapia, Thai red tilapia and several other variants.

The presence of a red colour has been commercially important in terms of marketing because red tilapia resemble reef fish. Red tilapia is often preferred over wild-type tilapia and the price for red tilapia is usually higher than that of wild types. The promotional price of red tilapia (average USD 5.52/kg) in Vanuatu is comparable with prices elsewhere, where red tilapia is a high-value species sold mostly in urban markets. For example, in the Philippines, the domestic price is USD 6.15/kg, which is roughly twice as much as the Nile tilapia.

Despite the reputed salt tolerance of tilapias, research into their culture has been limited to freshwater in the Pacific Islands. In Fiji, research on the culture of the Taiwanese strain of red tilapia — a *Oreochromis mossambicus* x *O. niloticus* hybrid — involved genetic strain evaluation in growth and other economically important traits such as fecundity, survival and red colour inheritance.

National Pearl Workshop — Republic of the Marshall Islands

Consultation is a key ingredient in industrial development that is often overlooked. The Marshall Islands national pearl workshop was an opportunity to hear the aspirations of stakeholders and to assess the opportunities and constraints facing the pearl industry. An outcome of the workshop was a draft strategy identifying the most urgent issues that need to be addressed.

The Marshall Islands was one of the first countries in the northern Pacific to trial pearl farming. Pioneering efforts were carried out by Black Pearls of Micronesia and Robert Reimers Enterprises in the early 1990s. Much of the research and development efforts have been supported by grants provided through US agencies such as the Center for Tropical and Subtropical Aquaculture based in Hawaii.

The national pearl workshop, which was held from 29–31 March, was organised by the Marshall Islands Marine Resources Authority (MIMRA), College of the Marshall Islands (CMI), University of Hawaii at Hilo, and SPC. The key organiser and workshop facilitator was Simon Ellis. Assistance was provided by Glen Joseph, Don Hess, Maria Haws and Ben Ponia. There was a strong turnout of representatives from various government, private sector, financial institutions and community bodies. Representatives from Likiep, Mili, Rongelap, Ebon, Ailuk and Bikini Islands travelled to Majuro for the workshop.

The majority of presentations were delivered by Simon, Maria and Ben, and covered topics such as regional and global trends of the pearl industry, basic fundamentals for pearl farming techniques, pearl marketing and pearl economic modelling. The workshop also had a panel discussion from past and present pearl farmers sharing their experiences. MIMRA staff member Virgil Alfred, one of the Marshall Islands' most experienced pearl farmers, also prepared a mock-up of a pearl farm line for demonstration to outer island participants.

The workshop highlighted that pearl development in the

Maria Haws and Simon Ellis - two of the workshop organisers

Marshalls has not been easy. The pearl development strategy drafted by the workshop recognised several critical issues that need to be overcome in the very near future in order for the industry to be sustainable and profitable.

- ***Pearl seeding technicians***: Pearl grafting is the most critical aspect of producing a pearl. However, the expense of hiring a foreign technician and the logistical difficulties of organising their services is a major constraint to development. Options for training a local technician or securing a long-term arrangement for a seeding technician were raised.

- ***Spat supply***: Another major bottleneck to development has been the inconsistent and trickle supply of juvenile oyster spat. Without new seed stock the farmers have found it difficult to expand. MIMRA is aware of the issue and is putting considerable effort into rejuvenating its hatchery programme. CMI also has a small hatchery at Arak that produces spat for outer island projects. One positive development is that hatchery training has been well supported and local MIMRA technicians are becoming competent to run all aspect of the operations.

- ***Financing***: Private sector operations have struggled to maintain the investment and cash flow required for pearl farming. Possible sources of funding include local financiers, grants, micro-credit and traditional credit schemes.

- ***Other niche opportunities***: There are suggestions that the domestic market for finished pearl pieces on Majuro has not been fully saturated. This is an opportunity for the small pearl producers in the Marshall Islands who struggle to compete on the competitive international market. The pearl workshop identified low investment, risk options such as mabe pearls as a potential niche product for smaller community-based operations in the outer islands.

Top right: Virgil Alfred showing participants a demonstration pearl farm line
Bottom left: Black pearls from the Marshall Islands

18th NACA Governing Council Meeting, Bali, Indonesia

The 18th Governing Council Meeting of the Network of Aquaculture Centres in Asia-Pacific (NACA) was held in Bali, Indonesia from 2–5 May. It was hosted by the Government of Indonesia, and was attended by 75 people representing 15 member governments, one associate member, and five other organisations. SPC was represented by its Aquaculture Adviser, Ben Ponia. The meeting's welcoming address was provided by the Hon Minister for Marine Affairs and Fisheries of the Republic of Indonesia, Mr Freddy Numberi.

The meeting was called to order by IR Iran, the outgoing Chair of NACA's Governing Council. Indonesia was elected as the Chair of the meeting and Nepal was elected as the Vice-Chair. NACA Director-General Prof Sena De Silva led the overview of the NACA work programme. Delegates raised some issues regarding the NACA programme in the Pacific region, and these are highlighted below.

Shrimp farming, better management practices and aquaculture

The main activities of the shrimp programme during the past year have been the finalisation by the Consortium Program on Shrimp Farming of the "International Principles for Responsible Shrimp Farming", and the adoption at the 3rd meeting of the FAO Sub-Committee on Aquaculture in New Delhi, India (September 2006). There was general consensus that the document should become a global point of reference for aquaculture policy and development and best management practices. This work was recognised by the World Bank's Annual Green Award in November 2006.

Marine finfish aquaculture

The NACA Grouper Hatchery Training Course that was conducted in Situbono, Indonesia (20 November–9 December 2006) had the greatest number of participants to date and included some from the Pacific Islands. This annual course will run again in 2007. There are plans to develop best management practices for marine finfish aquaculture in the Asia-Pacific region.

Aquatic animal health

Delegates from Indonesia reported that around 40% of shrimp broodstock imports were from a specific pathogen-free (SPF) supplier in Hawaii. However, despite the SPF status of these animals, it was found that the shrimp were carrying a new virus against which they were not certified. The lesson from this experience is to exercise great caution in importing live animals from external sources for aquaculture production, and to follow appropriate quarantine, risk assessment and biosecurity procedures.

The Australian delegation reported that the Department of Agriculture, Forestry and Fisheries is collaborating with NACA to produce an Asia-Pacific regional field guide for the identification of aquatic animal diseases

Biosecurity

Australia advised that a proposal on biosecurity arrangements for the aquarium trade had been raised at the recent meeting of the Asia-Pacific Economic Cooperation (APEC) Fisheries Working Group. The proposal's objective was to 1) review best practices for the ornamental fish trade in the movement of live specimens; 2) enhance members' capacity to implement biosecurity arrangements and respond to incursions; and 3) identify high-risk species and new diseases to consider for listing by the World Animal Health Organisation.

Environment

An FAO global review of environmental impact assessment (EIA) procedures and environmental monitoring is being conducted. A workshop to compile guidelines for coastal aquaculture EIAs will take place in 2008.

Certification, markets and trade

Indonesia expressed concerns over proposals to list the family Pristidae (sawfish) and the genus Anguilla (eels) under CITES. It was quite likely that such genus- and/or family-level listings could impact on future aquaculture developments of these species. FAO recently signed an MOU with CITES that will allow it to provide advice on the listing of species for fisheries and aquaculture purposes. This would provide members with an avenue to provide feedback on related CITES issues.

FAO also reported that it intends to conduct a workshop on technical guidelines for food safety in aquaculture.

Aquaculture information services

NACA's ongoing publishing activities will continue, including publication of the *Aquaculture Asia magazine* (quarterly; and the NACA Newsletter, also quarterly). All publications will continue to be made available for free download in electronic form.

Further improvement of the NACA website will include:

- Development of topic-specific sub-portals for work programmes. These will bring together the news, publications, and project summaries specific to each programme element, making it easier for people with specific interests to find information.

- Pilot of a regional 'training calendar' of activities offered by NACA centres, to facilitate inter-institutional training and exchange.

- Development of a 'donors' section that will recognize the contribution of current donor agencies contributing to NACA activities.

- Establishment of a more comprehensive photo library of key species and production systems as a resource for network scientists and production of publications.

Aquaculture updates from Nauru

*In May 2007, SPC's Aquaculture Adviser visited Nauru and was updated on the aquaculture situation of this small country. Farmed milkfish (*Chanos chanos*) has traditionally played a significant role in the diet and social customs of Nauruan people, but during the economic boom of the phosphate-based economy, much of the knowledge and many of the practices associated with milkfish farming were lost. Building capacity in aquaculture will hopefully contribute to rehabilitating the tradition of fish farming on Nauru.*

There has been quite a revival of aquaculture activity occurring in Nauru. Faced with an economic crisis, Nauruans are becoming more self-sufficient in providing food, and aquaculture is one of the options that is stirring interest.

Aquaculture development is being supported by the Coastal Fisheries and Aquaculture Division of the Nauru Fisheries and Marine Resources Authority (NFMRA – in particular, Margo Dieye, divisional head, and aquaculture officers Ricky Starr and Lucky Buraman). Support has been provided by SPC's Aquaculture Section from small trials funded by an ACIAR mini-project, tilapia fish training workshops, and several staff attachments with Naduruloulou aquaculture station in Fiji in 2006. In addition, FAO provided a short-term adviser from China.

There are about 30 small ponds that staff have been restocking with Nile tilapia and milkfish.

- **Site 1**: A backyard earthen pond (run by Junita, an elderly grandmother). This was the site where SPC ran the Mozambique tilapia eradication and pond rehabilitation mini-project in 2006. After the project ended, the fisheries staff assisted with several restockings of fish and one harvesting. However, much of the extension support reportedly ceased because of the lack of logistic support for fuel and transportation from the government. However, since the end of the project, Junita has had to resort to cheap, poor quality feed, such as expired chicken grower pellets, to feed her fish because she is unable to afford good quality feed. This highlights the importance of taking into account the socioeconomic aspects of

Fish pen in Buada lake

fish farming and how impoverished households with little cash flow will be able to sustain their fish ponds. One potential mini-project that was discussed was investigating low-cost, readily available feed ingredients. Poor farm management practices were also apparent at Junita's pond (e.g. the presence of numbers of juvenile fish, which will compete for food). This emphasises the need to continue to support fish farm training workshops. According to NFMRA aquaculture officer, Lucky Buraman, one positive sign was that the Nile tilapia harvested from her farm received a very good taste-test reaction from the public at the National Agro Fair.

- **Site 2**: A backyard concrete pond stocked with Nile tilapia. Occasionally, the owner sells his fish at AUD 7.50 per kg. His fish are left to breed in the tank and excess fish fingerlings are removed periodically.

- **Site 3**: A concrete swimming pool no longer in use. It was decided to turn it into a fish pond, and was stocked with an all-male tilapia population in order to achieve faster growth rates. The fish are fed a diet of whatever is at hand, including arrowroot leaves, pawpaw, and bread scraps. The fish appear to be growing reasonably well.

Buada Lake is the largest inland water body on Nauru. Traditionally, milkfish fry caught in the

Top: Junita and Lucky at the tilapia fish pond

Middle: Unused swimming pool becomes a fish pond

Bottom: Taiwanese project - milkfish tanks

lagoon were stocked into the lake where they were later harvested under a communal system. Unfortunately, fry are no longer abundant in the wild and so in the past, fry have been sourced from nearby Tarawa Atoll in Kiribati. After the most recent restocking, several thousand milkfish fish were harvested. Several of the fish farming units now have enclosures and these have since been stocked with Nile tilapia. It may be interesting to conduct some research trials for polyculture of milkfish and Nile tilapia.

There are two associations that have an interest in fish farming in Buada: the Nauru Aquaculture Association (NAQUA), which has been established to assist farmers on an individual basis, and the Buada Land Owners Association (BLOA), which supports communal efforts.

A Taiwanese aquaculture aid project in Auobar, which mainly focuses on farming milkfish, will establish a hatchery for breeding. The site has two large concrete raceways supplied with seawater from the nearby lagoon. Tanks are stocked with one-year-old, 500 g milkfish fry from Kiribati. Thousands of juvenile surgeonfish have also been recruited into the raceways and are growing quite well. For reasons unknown to NFMRA, some Penaeus monodon shrimp were also imported from a Taiwanese project in Kiribati. The project (which is managed by the Ministry of Commerce) seems to lack coordination within Nauruan government agencies and the Taiwanese themselves were unclear about the objectives and timelines. The facility has the potential to serve as a national hatchery, broodstock management, and quarantine centre for finfish aquaculture.

In later discussions with Margo, Charleston Deiye Chief Executive Officer for NFMRA and Hon Roland Kun, Member of Parliament and Minister of Fisheries, it was reiterated that the rejuvenation of milkfish farming is an important priority, and Buada Lagoon is still the prime location for this development. It was also recognised that farming Nile tilapia provides a quick solution to addressing food security issues, which are becoming more important to households under the current economic crisis. Technical support will be needed. Margo also mentioned that there was interest in reseeding the reefs with trochus to provide another source of nutrition.

FAO workshop on Understanding and Applying Risk Analysis in Aquaculture

Aquaculture is the fastest growing food sector globally, but this rapid pace introduces biosecurity concerns that can impact on the industry's development, on its surrounding aquatic environment and the society we live in. In June 2007, SPC's Aquaculture Adviser participated in an expert workshop organised by FAO in Thailand to provide guidelines on risk assessment for aquaculture (i.e. the process of identifying hazards, their consequences and mitigation measures).

Aquaculture is a risky business. Government and the private sector are often forced to make decisions without having all the facts in hand, and under circumstances that may have a high degree of uncertainty. Furthermore aquaculture is a diverse sector, involving a range of species, culture systems, physical environments, markets and social strata. Risk management is an important tool for addressing biosecurity concerns, and involves cross-sectors that deal with food safety, aquatic animal health, and the environment

"Risk" can be broadly defined as the potential for an adverse outcome, which is the product of the probability of occurrence and severity of consequence. Risk assessment typically seeks to answer four questions:

- What can go wrong?
- How likely is it to go wrong?
- What are the consequences of it going wrong?
- What can be done to reduce the likelihood or consequences of it going wrong?

The scope of the workshop in Thailand was to consider risk assessment for seven major risk sectors: pathogenic, food safety and public health, ecological (pest and invasives), genetic, environmental, financial and social.

Surprisingly, there is a relatively small body of knowledge within the aquaculture sector and to a certain extent other primary production sectors (perhaps excluding crops) on risk assessment. However, among workshop participants there was an immediate appreciation of the principles and basic methodologies for assessing risks, despite the various geographical areas and interest groups present.

Workshop organisers, Drs Rohana Subasinghe and Melba Renataso from FAO Rome, have been close collaborators with SPC in strengthening biosecurity measures (e.g. Melba was part of an SPC consultancy to develop a model template for aquaculture import risk analysis).

This workshop will serve as a useful backdrop for the SPC regional workshop on Ecosystems Approach to Fisheries and Aquaculture (EAF) and Aquatic Biosecurity planned for October 2007. It also supports an SPC Governing Council directive in 2006 for its Marine Resources Division to build regional capacity in the area of aquatic biosecurity.

Workshop outcomes are to be developed into an FAO Manual on Understanding and Applying Risk Analyses in Aquaculture.

NEARSHORE FISHERIES DEVELOPMENT AND TRAINING SECTION

Technical assistance to a New Caledonia domestic longline fishing company

The New Caledonian fishing company, Navimon[1] , has been in the business of longline fishing, processing, wholesale local marketing, and export marketing of fresh longline caught fish since the mid-1990s. Navimon's initial fishing operations, which began with four French-built 16-m aluminium longliners, operated with varying degrees of success. Since 1996, however, Navimon has divested itself of all of the original 16-m vessels and has gradually acquired a fleet of eight 20-m steel vessels that are better suited to the type of fishery they are involved in. In 2002, the company was restructured and efforts were concentrated on fishing alone. Since then, processing and marketing of Navimon's catch is carried out by other New Caledonia-based companies under contract arrangements.

Despite this attempt at restructuring, the company experienced difficulties, due partly to a downturn in overall catches that was experienced by many SPC member countries in the early 2000s. By 2005, fishing had began to return to more normal conditions but Navimon was still facing the recurring problems that affect most longline fishing operations in New Caledonia and elsewhere in the Pacific: rising operating costs, diminishing returns due to market fluctuations and currency exchange rates, and difficulties in attracting and retaining competent captains and crew members. With a high turnover of vessel personnel, crew training become a priority, at least as a short-term solution.

In late 2006, Navimon asked SPC to provide some short-term monitoring and training of the newer captains and crews in their fleet. SPC's two Fisheries Development Officers (FDOs), Steve Beverly and William Sokimi, accompanied some of the newer and less successful captains on regular tuna longline trips to determine why they weren't as successful as their counterparts with more experience. (The fleet's eight boats were identical and had the same infrastructure and ground support.) Steve and William worked with Navimon crews between February and June 2007, making four fishing trips on four separate vessels: F/V *Katia*, F/V *Keitre*, F/V *Lanesera*, and F/V *Gossanah*.

In addition to providing onboard advice and training to Navimon's skippers and crew, the FDOs held debriefing meetings with Navimon's management and skippers, and offered specific advice and information on how to improve the vessel performance, fishing strategies, and fish quality. On completion of the project, a report highlighting the FDOs' findings and providing general recommendations was submitted to. Insights into the

Preparing a longline buoy for deployment during line setting

[1] Navimon is owned by SODIL (Société de développement et d'investissement de la Province des Iles Loyauté, the investment organisation of the Loyalty Islands Province of New Caledonia)