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ERRATUM

In the last issue we carried an article entitled 'Coral Reef Sanctuaries for Trochus Shells' by G. Heslinga, O. Orak and M. Ngiramengior. Unfortunately, due to a typographical error, the meaning of an important sentence in that article was reversed, when the word 'not' was inadvertently interposed. The third sentence, second paragraph of page 18 should correctly read "From a practical standpoint, this means that larvae produced in trochus sanctuaries probably do help populate nearby reefs." We apologise to the authors and to readers for the error.

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SPC ACTIVITIES

18th SPC Regional Technical Meeting on Fisheries

As noted in SPC Fisheries Newsletter No 35, this meeting will be held in Noumea from 4 - 9 August inclusive. The provisional agenda is being finalised and will be circulated by SPC Savingram in April. Major items for discussion at the meeting include:-

- a review of SPC coastal fisheries development activities in the past 12 months;
- report on SPC Regional Fisheries Training Project activities, and consideration of a core programme for 1986/87;
- progress on priority items of the SPC Tuna and Billfish Assessment Programme;
- revision of regional logsheet forms for reporting commercial tuna catch and effort statistics;
- workshop on fisheries extension services in the Pacific Islands;
- regional marine resource information needs;
- survey and assessment of inshore fishery resources;
- reports by other organisations on specific activities of regional interest.

The meeting promises to be an interesting one, with a full agenda covering a broad range of topics of interest to fisheries development workers throughout the region.

Stock Assessment Training Workshop

The SPC Tuna and Billfish Programme is offering a training workshop for fisheries officers of the region in the fundamentals of fisheries stock assessment. Special emphasis will be given to the scale and type of data that are realistic for the South Pacific region. Preliminary groundwork for an understanding of the dynamics of exploited fish populations will be provided and methods used to assess these stocks will be explored.

Training will consist of hands-on analysis using microcomputers, augmented by lectures and case studies in stock assessments in developing countries. The workshop will be held at SPC headquarters in Noumea from the 30th of June to 11th of July 1986. The workshop will be directed by the staff of the SPC Tuna and Billfish Programme and Dr Carl Walters, a consultant from the University of British Columbia, Canada.

Fish Handling and Processing Project

Recruitment for the new post of SPC Fish Handling and Processing Officer has now been completed. Mr David Burford, an Australian citizen, was appointed to the post in March and will take up his duties in late April. Mr Burford previously worked as an extension officer for the New South Wales Fish Marketing Authority, where his duties involved liaison with fishermen and industry representatives to encourage the upgrading of fish handling, processing and presentation in general. He has extensive experience of the development of the sashimi industry in New South Wales, as well as a broad training background which includes seafood technology, and extension/communication.

The Fish Handling and Processing Officer will be responsible for the field operation of the SPC Fish Handling and Processing (FHP) Project. This was established in response to a recommendation from the 15th SPC Regional Technical Meeting on Fisheries, which reiterated concerns that fish marketing ventures in many Pacific Island countries were suffering because of poor fish handling practices at all points along the distribution chain. The meeting recommended that the SPC assist its member countries to upgrade fish handling and processing activities throughout their national fishing industries by providing in-country training in this field. It was ultimately agreed that this training should follow the lines of the Commission's very successful Deep Sea Fisheries Development Project, in which roving Master Fishermen work with government departments, fishing communities and individual fishermen on specific, technical fishery development projects. In the case of the FHP Project, the place of the Master Fisherman is taken by the Fish Handling and Processing Officer, who will undertake country assignments of a few weeks or months to work with fishermen, fish processors and retailers, municipal fish market staff and others, to assist in upgrading handling practices, product development and marketing, and alternative processing techniques.

Before commencing on his programme of country visits, Mr Burford's first job will be to assist with arrangements and provide on-site direction for the forthcoming SPC Fish Handling and Processing Course. This 10-week course, officially announced in SPC savingram No 15/85, will be held in Port Vila, Vanuatu, starting on the 9th of June and will accommodate 16 trainees from fish handling and processing operations throughout the SPC region. As well as providing basic training in a very wide range of technical subjects concerned with fish handling, processing, storage, marketing, and business management (see SPC Fisheries Newsletter No 35, p2, or SPC Savingram No 15/85 for details), the course will also serve as a launching pad for the FHP Project by focusing attention on the subject field, and by allowing the Fish Handling and Processing Officer to establish contact with some of the people among whom he will subsequently be working.

Observer Training

Two observer training courses, one in the Federated States of Micronesia, the other in Kiribati, were conducted by the SPC Tuna and Billfish Programme in January and another will be held in Solomon Islands in early April 1986. Provided at a national level, each course is designed to instruct prospective tuna fishing vessel observers in the methods of collecting data useful to national and regional fisheries agencies. The primary goal of the 3-5 day course is to establish standard data collection

guidelines for the observers to follow. Drafts of an observer's manual are distributed during the courses. Initial responses as to the usefulness of these manuals has been encouraging. Observer reports are an important source of fishery information and their improvement is considered beneficial to the countries involved and the region as a whole.

SPC/Nelson Polytechnic Course

The seventh SPC/Nelson Polytechnic Pacific Island Fisheries Officer course got underway in February 1986. 12 trainees from 12 Pacific Island countries (American Samoa, Cook Islands, Fiji, Kiribati, Niue, Northern Mariana Islands, Papua New Guinea, Solomon Islands, Tokelau, Tonga, Tuvalu and Vanuatu) travelled to Nelson, New Zealand, to start 18 weeks of training in practical fisheries-related skills, beginning on February 10. Among other subjects, the students will receive training in welding, inboard and outboard engineering, netmaking, navigation and chartwork, refrigeration, fish quality control, fibreglass construction and repair, and simple accounting and book-keeping. The training is intended to cover the range of basic skills and knowledge required of a fisheries extension officer responsible for providing support and advisory services to local fishermen.

Following the Nelson component, the students will travel to Tonga for a five-week practical fishing module. Conducted under the supervision of SPC field fishing staff, this module will enable the trainees to become familiar with a wide range of fishing skills applicable to the Pacific Island situation. They will also learn the basics of good seamanship and the proper handling and management of a small fishing vessel, and will have the opportunity to put into practice in a field situation many of the skills learned in the classroom or workshop at Nelson.

Southern Albacore Workshop Planned

The SPC Tuna and Billfish Programme is coordinating a workshop to: 1) review existing knowledge of southern albacore; 2) identify specific information requirements; and 3) prepare a coordinated research plan. The workshop will be hosted by the New Zealand Ministry of Agriculture and Fisheries and will be held in Auckland, New Zealand, during the week of 9 to 12 June 1986.

Fisheries for southern albacore tuna are becoming increasingly important for Pacific Island countries and territories as well as for countries from outside the region. Preliminary analyses of longline fisheries for albacore suggest that potential for expansion in this fishery is limited, but that there may be a potential for increased catches of the surface dwelling populations. Little is known about these stocks and a responsible assessment plan should be formulated. The goal of the workshop is to initiate cooperative information exchanges on southern albacore and coordinate research programs between institutions.

The NOAA research vessel 'Townsend Cromwell' recently completed a 31-day survey of the hydrography and biology of potential South Pacific albacore fishing grounds. The cruise investigated an area of subtropical convergence east of New Zealand early this year. The SPC Tuna and Billfish Programme sponsored Mr. Ulugamanu Faanunu, a fisheries officer from Tonga, to participate as an observer on board the cruise. Preliminary results

from exploratory troll-fishing in that area show promising catch rates. Results from this and other cruises are expected to be presented at the June southern albacore workshop.

Sub-regional Course in Fishing Methods and Extension Skills

This is a six-week course which will be held in Fiji, starting in late September. The course, which will accommodate a maximum of 12 students, was requested by the government of Fiji as a national-level training activity, but with their agreement has been expanded to cater for several trainees from the Fiji sub-region. This is a new course and will be evaluated carefully with a view to being repeated in other countries if this appears justified.

The course will give selected fisheries extension officers practical training in fish catching and boat handling skills, and will include a two-week section on teaching methods and techniques which will enable the student to improve his ability to better communicate with rural fishing communities. At the completion of the course, the student should have the ability to participate in and to demonstrate the more common fishing methods of the region at a level which fishermen will respect. He will also be familiar with various communication techniques applicable to general extension duties.

The first part of the course, on fishing methods, boat handling and seamanship, will be supervised by SPC Master Fishermen, and will involve the use of boats of different design. The trainees will cover the basic techniques of bottom fishing, reef and FAD trolling, and, if time permits, vertical longlining. The practical fishing sessions will be reinforced by onshore explanation and discussion sessions. Closely tied into the fishing schedule will be classroom and sea-going instruction designed to encourage the practice of good seamanship. The trainees will cover subjects such as boat steering and manoeuvring, safe loading and storage, correct anchoring procedures, methods of mooring to a wharf or another boat, use of knots for fishing and general purposes, use of the mariner's compass, navigation and selection of fishing spots using marine charts, boat maintenance, and safety at sea.

The second part of the course, which will be carried out by SPC staff with the assistance of locally available specialists, aims to develop the students ability to communicate his knowledge and ideas to others effectively. The general content of this part of the course can be broadly divided into the areas of intra-personal skills, and technical skills. Under the former heading, the students will learn the basics of public speaking, how to prepare and use demonstration equipment, the basics of organising meetings -- observing local protocol, researching the subject to be discussed, using handout material and question sheets, talking to fishermen to achieve maximum response, explaining government policy to fishermen in a way they understand, etc. -- note-taking, and report writing. Under technical skills, the students will cover financial record-keeping, simple stock control and inventory, basic economics, management of a small ice plant, and good fish handling practices.

This extension skills part of the course will be held mainly in formal classroom sessions, but it is envisaged that the students will demonstrate their understanding of these skills by organising two practical sessions:-

and approach a local village to arrange a demonstration fishing trip, and then actually take the fishermen out on the trip and demonstrate the selected fishing method;

- prepare the material necessary to conduct a two-day course on "Basic Outboard Motor Handling and Maintenance" and then conduct this course in the field.

Both these sessions will be assessed by the instructors. The subject of training for fisheries extension officers has been raised frequently in recent discussions between SPC staff and representatives of Pacific Island governments. Most SPC member countries have identified this as an area of real need. An assessment of the SPC/Nelson course carried out in 1983 prompted many countries to note their interest in either incorporating communication skills training into this course, or developing separate training initiatives in this field. Subsequently, the review of the fisheries training needs and opportunities being carried out by SPC Fisheries Training Officer Alastair Robertson has, while not yet complete, clearly identified extension and communication skills training as a priority area of concern to most countries.

In response to the high level and consistency of this interest, the Commission has begun to explore possible ways of meeting the need for this type of training, via the SPC Regional Fisheries Training Project. From preliminary research, it does not appear that any national or regional institution, including those in Australia and New Zealand, are currently conducting courses on the subject of fisheries extension training suitable for the Pacific situation, although some, such as management or teacher training courses, cover aspects of it. The nearest approach to the type of training required is carried out by institutions training agricultural extension workers.

As a result of discussions with fisheries officers and representatives of training institutions, the Commission is now developing a number of initiatives which will draw on the experience of the agricultural sector, modifying the techniques and materials used to meet the needs of the fisheries extension officer. These will be presented for discussion in a full-day workshop at the forthcoming 18th SPC Regional Technical Meeting on Fisheries, with the aim of obtaining firm recommendations from the meeting on a programme of extension training activities for 1987.

SPC Logsheet Revisions Proposed

Recently the staff of the SPC Tuna and Billfish Programme reviewed the adequacy of regional SPC catch forms for reporting catch and effort information of commercial tuna fishing operations. The forms are completed by foreign fishing vessels, as a condition of their license agreement to fish within the exclusive economic zones (EEZ's) of South Pacific countries, and by local commercial tuna operations. The basic requirement of the logsheet is to provide useful catch and effort data for stock assessment and monitoring of commercially important tuna and billfish populations. Problems experienced with the forms currently in use were addressed and forms used in other areas were reviewed. The major improvements made to the forms were in the reporting of fishing effort information. Drafts of the revised SPC forms, along with instructions and explanations, are being distributed for review by SPC countries,

international tuna agencies, and appropriate fishery agencies of distant water fishing nations. It is hoped that the logsheet revisions will encourage more thorough and accurate reporting and provide better data for analyses.

Deep Sea Fisheries Development Project

An update of the activities of each of SPC's three Master Fishermen was presented in the last issue of the SPC Fisheries Newsletter. Since that time, Master Fisherman Paul Mead has concluded his assignment to Tonga, which principally involved training local fishermen who have purchased boats from the Tonga Fisheries Department. Paul is now on home leave but will be returning to Tonga later in the year, first to supervise the practical fishing module of the SPC/Nelson Polytechnic Pacific Islands Fisheries Officer Course (see article on page 4 of this issue), and then to commence work on the SPC Gear Development Project (see SPC Fisheries Newsletter No. 35). Master Fisherman Lindsay Chapman is continuing his experimental fishing around FAD's at Rarotonga, Cook Islands, but by necessity has been devoting much of his time to the problem of catching suitable bait for this activity. Master Fisherman Pale Taumaia's assignment to Tuvalu has been extended to allow completion of his FAD-fishing work programme after this was delayed by bad weather, plus an extended visit to Nanumea, in the northern group, to carry out extension training in deep-water snapper fishing.

More detailed notes on the Master Fishermen's activities will appear in the next issue of the Newsletter.

Tuna and Billfish Programme to Receive New Computer

The SPC Tuna and Billfish Programme is scheduled to begin operating a new HP-9000 computer in early June 1986. The new machine will improve the function and data storing capabilities of the programme's rapidly growing database. The system conversion will be gradual to avoid down time and is hoped to be completed in one year.

NEWS FROM IN AND AROUND THE REGION

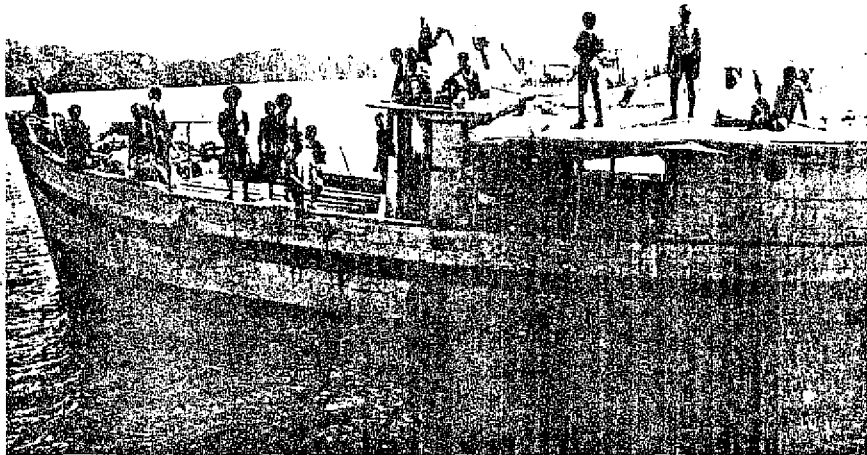
Palau Seizes More Fishing Boats (Source: Palau Gazette)

The Palau Government has recently been active in the surveillance and protection of its fishing zone, and in 1984/85 at least two foreign vessels were arrested for illegally fishing in its waters (see SPC Fisheries Newsletter No. 32 and No. 33). The pattern is continuing into 1986, which saw two unlicensed fishing vessels arrested in January. The vessels, a Taiwanese longliner and an Indonesian boat, were boarded and seized by Palauan authorities on January 25 for illegal fishing and other marine violations in Palauan waters, at Helens Reef.

The Taiwanese longliner was manned by a crew of four, while the 40-foot Indonesian vessel Sentousa carried 70 people! The latter vessel left its home port of Sorong, in Indonesia, on January 20, according to the

captain. In an interview with the Palau Gazette, through a local interpreter, the captain said that the Commander of the Indonesian Navy had told him that Helens Reef belongs to Indonesia as "it is located within 200 miles of Indonesian water." Asked what they were doing at Helens Reef, the captain said "We were fishing for trochus to be used for our churches."

The officers on the Indonesian vessel have been charged with immigration violations and the illegal taking of marine products, and are in jail. The Government has asked the U.S. State Department to request the Indonesian government to repatriate the rest of the crew. The four onboard the Taiwanese vessel have been charged with similar offences, and the captain and engineer are in jail while the other two are confined on board the boat. A search of the vessel revealed approximately 3 tonnes of fish, including about 1.5 tonnes of large tuna. The Court has authorised the Government of Palau to sell this fish in Hawaii where it will bring the highest prices.



(Photo: Palau Gazette)

The 40-foot Indonesian boat, Sentousa, was seized at Helens Reef, on January 25.

Australian Government Provides Patrol Boats and Purse Seiners (Source: Australian Fisheries, Solomon Nius)

Seven patrol boats are to be provided to South Pacific nations by Australia through its Defence Cooperation Program. The Minister for Defence, Mr Kim Beazley, said Australian Shipbuilding Industries, of Jervoise Bay, Western Australia, now has an order for the seven boats valued at \$19.2 million in June 1985 prices. Mr Beazley said the vessels, to be known as 'Pacific Patrol Boats', would assist the islands concerned to establish or maintain effective national maritime surveillance and enforcement capabilities. One boat each is intended for Western Samoa, Vanuatu and the Solomon Islands, and four boats for Papua New Guinea.

The boats will be 31.5 metres long and displace 165 tonnes. They are a multi-purpose boat with a long-range patrolling capability to support their primary role of fisheries surveillance, Mr Beazley said. He added that the design was selected after extensive consultation with the Island states, and the evaluation of 13 design proposals submitted by 10 Australian companies. The first boat is expected to be ready for delivery in January 1987.

The Australian Government is also providing for the cost of two tuna purse seine fishing boats for Solomon Islands. The cost is expected to be about \$33 million. Mr Daniel Sande, Solomon Islands' Minister of Natural Resources, his Permanent Secretary Mr Geoffrey Siapu and the Chief Fisheries Officer, Mr Douglas Gibson, flew to Perth, Western Australia, in February to sign the construction contract with the Australian Shipbuilding Industries Pty Ltd.

Foreign Fishing Fees

(Source: Solomon Nius, Pacific Islands Monthly)

The Solomon Island government has announced it will impose a fee of \$1.5 million a year on any United States tunaboat wanting to fish in its 200-mile economic zone. This fee is the highest being asked of U.S. tunaboats by Pacific Island states, and contrasts to the \$1.3 million per year fee imposed by Papua New Guinea, and the \$1 million per year fee imposed by the Federated States of Micronesia.

Solomon Islands was among 16 South Pacific countries which concluded the sixth round of negotiations on a fisheries treaty, under which United States tuna vessels may fish in the fishing zones of South Pacific states. The negotiations were held in Kona, Hawaii, from January 27 to February 1. Considerable progress was made and an agreement was reached on many of the outstanding issues, according to a joint communique released in Hawaii, and further talks have been scheduled to discuss the remaining major issues.

Meanwhile in Fiji, talks on fishing access agreements have been held with the Soviet Union. A Soviet delegation consisting of the USSR ambassador from Canberra and two ranking embassy officials called upon Prime Minister Ratu Sir Kamisese Mara, and other leading figures in Fiji. The talks ranged on such issues as trade links and tourism, as well as fishing rights.

The USSR ambassador, Dr Evgeni Samoteiken, said that Moscow was presently evaluating the fishing rights agreement it had signed with Kiribati last October under which the USSR pays \$2.4 million annually to fish in that country's exclusive economic zone. The Soviet Union needed a lot of fish, he said, and would be happy to negotiate similar deals with other island nations.

Tokelau Benefits from Collective Licensing System

(Source: Te Vakai Tokelau)

Under an agreement negotiated in 1984 between the American Tunaboat Association (ATA) and five countries of the Pacific Eastern Subregion (ESR), Tokelau, one of the signatories, has been benefitting from its share of the license fees.

Under the agreement, 85% of the license fees payable by the ATA go to the country where fishing took place, and the remaining 15% are split evenly among the five signatory countries. Therefore, although most fishing by ATA boats in 1984 took place in Tuvalu, Tokelau still received its share of one-fifth of 15%. In mid-1985 this had reached US\$5,200--not a vast fortune but still important in an economy as small as Tokelau's. The money has been banked in a separate fund which Tokelau's General Fono (parliament) intends to devote to the conservation of marine resources and fisheries training.

Foreign License Concerns Tongan Fishing Industry
(Source: Tonga Chronicle)

Quite a stir has ensued in Tonga over the recent licensing of a Fijian fishing vessel. Though issued under present law, the license conflicts with a policy excluding foreigners from competing for fish among coastal reefs, in shore areas, and in shallow water. The policy intended that these areas be preserved for use by Tongan nationals only, since they are unable to compete on an equitable basis with overseas operators. The recently licensed vessel has modern equipment allowing it to harvest from the rich lobster, giant clam, and other shellfish grounds.

Mr Tomasi Simiki, Director of Agriculture, Fisheries and Forestry, said that granting of the trade license by Inland Revenue leaves "a large loophole for overseas sharks to enter the Kingdom and put lucrative seafoods such as trochus, lobsters, and giant clams at risk." Granting licenses to foreign vessels also seems in conflict with the development of artisanal fisheries, although incentives are being given to local fishermen and an infrastructure is being built to handle increased production.

Mr Wiliami Langi of the Fisheries Division said that allowing foreign fishing vessels to operate in Tongan waters raises a number of complicated issues. Paramount concerns are accurately measuring a resource before granting a license and then setting an equitable fee. The Kingdom's license issued to the Fijian vessel cost only \$5. No economic benefits come from licensing foreign fishing vessels other than the employment of the crew. "Until you are sure about the size of a fishery like lobster or giant clams, you risk depriving your own people of their livelihoods," he said, "by granting foreign vessels a license."

INFOFISH Tuna Trade Conference

(Source: SPC)

This conference, held in Bangkok from 25-27 February, was attended by more than 300 people from all sectors of the fishing industry. Among South Pacific Island representatives were Peter Hunt (Fiji), Murdo MacInnes (Kiribati), Ronald Kuk and Ekonia Mitir (Papua New Guinea), Doug Gibson and Tony Hughes (Solomon Islands), Richard Kaltongga and Mike Reipen (Vanuatu), Les Clark and Peter Philipson (FFA), and Bob Gillett (FAO). SPC was represented by Tuna and Billfish Assessment Programme Co-ordinator John Sibert, who provided the following report.

SPC made a presentation alongside two others in the first session on biological aspects of the world tuna resource. Dr Jim Joseph from IATTC discussed recent trends in the eastern Pacific tuna fisheries, and provided some useful insights into other areas, such as the Southern Ocean. The SPC presentation dealt with the significance of the 'highly migratory'

characteristic of tunas for their management. Jacques Marcille of FAO then presented a review of Indian Ocean tuna fisheries and, at the request of the chairman, also reviewed briefly the Atlantic Ocean. The general conclusion from these presentations is that the world tuna catch is below its potential. Some fisheries, however, may be fully exploited, such as certain longline fisheries for yellowfin and albacore, and fisheries in the Gulf of Thailand.

The second session of the Conference was devoted to surveys of current tuna markets. This session was not particularly encouraging since it would appear that most tuna markets (including Japanese sashimi and U.S. canned tuna) are well served. The general consensus seemed to be that the tuna industry needs to develop new markets for new products and persuade people to consume more canned product.

The third session of the conference was mainly concerned with reviews of the experience in different countries of tuna fishery development. A major theme which emerged from these sessions was the difficulty of achieving national goals through joint ventures with large overseas companies. All too often the goals of a company do not match those of the country.

In general, the conference was like a "good news - bad news" story. The good news is that the global tuna resource can sustain continued exploitation. The bad news is that it is difficult to market the product. In the short term, it will be very difficult for any Pacific Island country to create a profitable tuna fishing industry. Any proposal to invest heavily in tuna harvesting or construct canneries to produce tuna for export should be scrutinised very closely. At present it would seem more prudent to rely on revenue from access fees or to spread investment risk by charter agreements with existing fishing vessel operators. Those SPC countries currently contemplating major investments in tuna harvesting and processing facilities would be well advised to carefully analyse where they hope to sell the product.

Study of Fisheries Research Needs Underway

(Source: SPC)

Consultants Mike Shepherd and Semisi Fakahau have been touring selected Pacific Island countries during February and March in order to discuss and report on fisheries research requirements throughout the Pacific Islands region. The study is sponsored by the South Pacific Forum Fisheries Agency and will be formally presented at the Forum Fisheries Committee meeting, to be held in Ponape, Federated States of Micronesia, in late April.

Fish Base Planned in Majuro

(Source: Islands Business)

Majuro will soon be sporting a new fishing base to go with its recently completed new dock facility. Construction got underway in late October by the Japanese construction company Tokai Kogyo, and is expected to finish in March 1986. When complete, the new facility will include freezer storage for fish, a marketing area for local sales and office space.

Vo Ko Industries Ltd. -- Going On Line (Source: R. Elsy). The plant will produce about 100 mt of mackerel per month. Vo Ko Industries Ltd., a Fijian/South Korean joint venture company based in Lami, Fiji, is going on line during the first quarter of 1986 packing mackerel from Chile, Peru or Ecuador in head-off, cleaned form, for the domestic market.

The species to be canned, Scomber japonicus, is being purchased from Latin America in preference to New Zealand because the largest NZ suppliers cannot deliver more than 50 mt per month and the price ex-Chile is lower in spite of the difficulties of shipping.

Packing for the domestic market will be in natural oil and salt-and-water pack in tall and standard cans. Plans also exist for canning local fish species in 'lolo' (coconut cream) for export.

The Vo Ko plant includes 2 x 250 mt cold stores and an adjacent chill area of about half the capacity. The production line, still under assembly, includes 4 x 1,000 can retorts, and has an estimated daily throughput of 11,000 cans per 8-hour shift. A can fabrication plant with a capacity of 24,000 cans per 8-hour shift is sited immediately next to the production line. Next to the main buildings two bores have been sunk which are estimated to be able to supply 120 mt of salt and fresh water per day, which is twice the daily requirement of the plant. All of the plant is reconditioned, including the cold storage which, with the building, was purchased from Chemical Supplies Ltd.

Mosquito Spraying Implicated in Fish Kills

(Source: Les Nouvelles). Residents of Noumea, New Caledonia, whose homes are close to standing bodies of brackish water, have begun to notice a correlation between visits by the municipal mosquito-spraying team, and the appearance of large numbers of dead fish in ponds and swampy areas.

As these deaths are always observed during the hot season, the tendency has been to attribute them to high water temperatures, low water levels, rapid bacterial growth, and oxygen depletion. However, since most of the swampy areas are connected to the sea, water levels do not drop especially during summer. Recent tests on some of the dead fish did not reveal abnormal bacterial growth, but were inconclusive, as the fish were not freshly dead.

Now local residents are noticing that the fish kills usually occur the day after the mosquito spraying vehicle goes by. The spraying is done using a product called K-Othrine, whose active ingredient is decamethrin, diluted in petroleum oil and sprayed into the air. Decamethrin can also be used to destroy aquatic larvae, and it is established fact that fish are sensitive to it.

The Noumea Municipal Bureau of Health acknowledges that if it rains during or shortly after spraying, the product could be washed into ponds, with possible harmful effects. Made aware of the fish kill problem, the Bureau of Hygiene will henceforth do its best to minimise the problem. For the time being, however, it seems that Noumea residents have to choose between mosquitoes and fish.

PNG Mine Threatens Fisheries and Reef

(Source: Bulletin of the Australian Littoral Society)

Development of the Ok Tedi mine in Papua New Guinea's Fly River Province began in 1981, initially along the "fast-track" approach, an approach often used for the development of mines in difficult or extreme conditions. This original plan involved starting production and thus cash flow as quickly as possible, and dealing with problems when and if they arose.

Expectations for the mine have been high. It is reputedly worth more than US\$10 billion; will become the world's third largest gold producer over the next few years; and will be a major revenue earner for PNG through windfall taxes and the government's direct equity in the mining company over the proposed 27 years of the mine's life.

However operations at what was originally labelled a "pot of gold" have been fraught with disaster. In 1983 the Fly River dried up during a severe drought, thus hampering the movement of equipment to the mine. In early January 1984, a massive landslide shifted some 50 million tonnes of earth and rock into the permanent tailings dam being constructed on the Ok Ma River. Critics in Port Moresby claimed that the disaster should have been foreseen and that clearing of jungle in the area enhanced the enormity of the slide.

The fast-tracking approach of development has since been abandoned, with each step of operations now purported to be researched solidly before plans are put into action.

With the destruction of the permanent tailings dam the PNG Government came under heavy pressure from Ok Tedi Mining Ltd (OTML), the consortium developing the mine, to permit the use of interim tailings schemes. Previously, the use of such schemes had been denied on environmental grounds. However with the mine already stretched to its economic limits, the PNG Government, under the threat of court action, finally gave temporary permission to deposit tailings at a site on the Ok Mani river. The interim scheme involved the detoxification of cyanide in the wastes and strict conditional approval. Conditions imposed included: (1) shutdown of the processing plant in the event of monitored chemicals exceeding defined limits in the river system, or evidence of environmental damage occurring, with the resumption of processing being delayed until environmental recovery; (2) continuation of building of a permanent site for wastes with strict monitoring of progress to ensure that the work was not being neglected; and (3) education, by government departments involved with OTML, of the people living on the mine area and along the rivers involved in the waste scheme concerning the environmental effects of the tailings.

The initial stage of operations has concentrated on starting up gold production, and with the approval of an interim tailing scheme, gold ore processing began in May 1984. Stage Two will see copper and gold mined together, while Stage Three plans involve copper mining alone.

The consortium of OTML shareholders have been concerned with the technical difficulties of maintenance and operation in an area of extremely rugged terrain which experiences some of the world's highest rainfall, and with economic problems compounded by the lowest copper prices for 40 years. There has been considerable difficulty in obtaining a loan to finance Stage Two of operations. In addition, a good deal of attention has now been focused on the effects of the mine and its pollution.

Environmental concern was concentrated initially on cyanide leakages reported from the mine and its operations into the tributaries of the Fly River, and the Fly River itself. On June 15, 1984, a barge containing sodium cyanide used in the processing of gold ore capsized in the Fly River estuary (see SPC Fisheries Newsletter No. 30). 182,700 drums, each containing 100 kgs of the substance, were lost overboard. By August last year some had been recovered by the mining company, but fears for the safety of the people of the Fly River Province and the traditionally rich fisheries of the area were nevertheless compounded as dead fish started floating onto the shores soon after the accident.

Five days after the barge capsized, 11,000 m³ of untreated tailings leaked into a tributary of the Fly River from the interim tailings dam. Government officials were notified of the leakage two weeks after the event, when dead crocodiles and fish began appearing in the river system. The effects of the toxins are believed to have extended some 870 km from the mine, where dead fish floated ashore at the mouth of the Fly.

The Papua New Guinea Government ordered an immediate shutdown of the gold processing plant with the Minister for Minerals and Energy, Mr. Francis Pusal, reportedly furious over the delay in receiving notification of the spillage. In addition, the people of the Fly River Province were angry at the pollution of their fishing grounds and Mr. Semai Aitowai, Fly River Provincial Premier, threatened that his people would interfere with mine operations if a compensation claim for \$393,374 was not paid. Fourteen people in a remote village were reported to have died after eating crocodile meat poisoned with cyanide.

On August 10 last year the mine was once more shut down, again in response to an order issued by Mr. Pusal. The Government considered the interim tailings scheme to be functioning ineffectively, and doubted the integrity of the interim dam due to damaged filters and eroded sand piles.

A spokesperson for OTML suggested that these problems were minimal and readily repairable, that the company "considered the system was performing as designed", and that problems with the dam could be rectified while production continued.

Relations between the PNG Government and OTML have been strained throughout Stage One of operations, and a development dispute in March of this year caused closure of the mine for a month. The project that the PNG Government had hoped would gradually replace the declining Bougainville Copper as its largest economic entity is now barely breaking even, due to a US\$745 million debt.

With so many other problems it may be asked whether OTML has the time or the money to be seriously concerned with the environmental implications of the mine.

Because the runoff from the Fly River is enormous, making it the thirteenth greatest river in the world in this respect, it has the potential for carrying pollutants for very long distances. At a Torres Strait Fisheries Seminar in February, it was suggested that once copper mining is underway, significant quantities of heavy metals from the mine will be added to the sediment runoff in the Fly River, and the the sediment runoff may itself increase up to 40 per cent as a direct result of Ok Tedi mining.

It is possible that the heavy metals, thought to include copper, zinc, lead and cadmium, will not necessarily be entering the system in a biologically available form, but the increased silt loads alone would appear to justify concern. Participants at the Seminar "strongly recommended that a detailed programme of environmental monitoring be instigated as soon as possible in the Gulf of Papua and adjacent Australian waters." Such a programme would need to be financed by Australia.

Since the ratification of the Torres Strait Joint Management Treaty, any possible effects of the mine on Torres Strait become the responsibility of Australia as well as Papua New Guinea. In February of this year, Getano Lui, the Uam Island Community Council Chairman, asked Australia's Foreign Minister, Bill Hayden, to take urgent action concerning Ok Tedi pollution in Torres Strait and called for the Australian Government to immediately instigate an environmental impact study to assess that pollution and its effects.

The Australian Conservation Foundation and ALS have since been asked to approach Australian Government departments in an effort to instigate a monitoring programme as soon as possible, so that baseline data can be gathered before copper mining begins. However, to protect the people whose livelihood depends of Fly River and Torres Strait fisheries, as well as to protect the northern Great Barrier Reef, stronger action is needed.

'Dar Mad' Completes Familiarization Operation (Source: Les Nouvelles)

'Dar Mad', the 35-foot motor-sailing catamaran operated by the Fisheries Division in New Caledonia (see SPC Fisheries Newsletter No 35), has recently completed a series of fishing excursions aimed at demonstrating to fishermen possible methods of exploiting the fishery resources using simple bottom-fishing techniques. This round of visits included demonstrations at the Isle of Pines, Oundjo, Mare, Touho, and Hienghene.

The fishing has proved successful, with about 100 kgs of fish (deep snapper, emperors, blue grouper, etc.) taken on each outing. The next stage of this operation is for the Fisheries Division to provide further training to those fishermen who show an interest in utilizing these techniques.

'World Food Day' Promotes Fishing (Source: 'Ideas and Action')

The purpose of FAO's 'World Food Day', held on October 16th every year since 1981, is to arouse public opinion and foster creative initiatives in food production and related issues. In many countries worldwide, World Food Day has been marked by demonstrations and shows organised by national or local bodies involved in agriculture, fisheries, health, nutrition, and a number of other topics. These efforts are supported by FAO's WFD Secretariat who supply educational and publicity materials such as posters, brochures, stickers, etc.

In 1986 the central theme of World Food Day will be fisherfolks and fishing communities. At the same time, WFD 86 will strive to stress the link between food security and development in a peaceful environment, in line with the UN's declared International Year of Peace.

Information on the initiatives promoted for World Food Day and appropriate documentation and other materials can be obtained from the WFD Secretariat, Room B-564, FAO, 00100 Rome. And, information available through the "vignettes" series is also available. Particular attention is drawn to the series on "Livebait Pole-and-Line Trials in French Polynesia" which is a part of a series of publications on environmental management of fisheries. (Source: La Depeche)

Two Japanese experts have recently completed a two-week programme of livebait pole-and-line fishing trials in French Polynesia, based in the capital, Papeete. The trials involved modifying existing local pole-and-line vessels, or "bonitiers", for livebait fishing. Tanks for the livebait storage and a water spray system were added to enable fishing after the Japanese style, and 15 local fishermen participated in the trials, to learn the technique while carrying out experimental fishing. The more traditional Tahitian style of pole-and-line fishing does not use livebait, and is often carried out while the boat is slowly moving, the lures being effectively "trolled" astern.

The results of the trials were encouraging, according to the Japanese experts. Catch/bait ratios averaged about 8.5 kg of tuna per kilo of bait, as opposed to a much higher 18:1 ratio quoted for Japanese industrial vessels. The technique is nevertheless seen as a viable alternative to the present style of bonitier fishing, which is heavy on fuel consumption. French Polynesia's Fisheries Service, EVAAM, plans to undertake a programme aimed at promoting this and other alternative methods of tuna fishing. However, there will be several major obstacles, including difficulties in procuring adequate bait supplies, and a lack of storage facilities for surplus catches.

PFDF Active in Palau Shellfish Research

(Source: Micronesian Mariculture Demonstration Center)

Fiscal year 1985 marked the fourth consecutive year that the Pacific Fisheries Development Foundation (PFDF) has supported research and development on commercial shellfish resources in the Republic of Palau. Funding during this period has shown a steady annual increase, and in 1985 stood at \$153,000, including in-kind contributions from the government of Palau. The program is based at the Micronesian Mariculture Demonstration Center (MMDC).

Efforts in 1981 and 1982 focused on the development of mariculture technology for trochus seed production and the establishment of trochus sanctuaries for conservation purposes. In 1983 and 1984 the scope of the program was broadened to include hatchery production of giant clams. In 1985 a regional approach was adopted, and the MMDC began offering training and shellfish seed stock to personnel and governments throughout the Pacific Basin.

The MMDC's production of giant clam seed totaled more than 500,000 in 1985, an increase of 400 per cent over 1984 production. The aggregate weight of laboratory-reared clams in the MMDC nursery now exceeds 10 tons. Clam broodstock were spawned on a year-round basis, confirming that hatchery production in Palau is not limited by seasonal reproductive cycles. Successful shipments of clam seed were made to Philippine Islands, Marshall Islands, Pohnpei, Yap, Guam, and Hawaii. Training in hatchery was

extended to personnel from Palau, Philippine Islands, Marshall Islands, Hawaii, Pohnpei, Australia, Yap and Truk. On-site consulting work was done in Palau, Australia, Hawaii and Marshall Islands. New diesel and solar powered seawater pumps were installed at the MMDC hatchery, and Palau's ocean-based giant clam nursery was expanded by fourfold, to 2,000 culture cages. Project results were presented at the Fifth Coral Reef Symposium at Tahiti, as well as in seven technical reports, including five publications in scientific journals. The program is continuing in 1986, with training and clam shipments scheduled for Palau, Guam, Kosrae, Saipan, Marshall Islands and Philippine Islands.

Report Series on Fishery Statistics

(Source: National Marine Fisheries Service)

A report series has been designed for easily distributing and sharing summary fishery information among fishery agencies in the western Pacific. This report series was designed in response to a need for such summaries expressed by agencies participating in the Western Pacific Fishery Information Network. The first volume in the series, "Fishery Statistics of the Western Pacific," has been completed and submitted for printing. This volume contains monthly and annual summaries by species for American Samoa (1982-84), the Commonwealth of the Northern Mariana Islands (1979-84), and Hawaii (1979-84), plus a variety of graphs for some of the most important fish species and groups from each area. The second volume which will be completed by the summer of 1986 will contain summaries for Guam (1979-84) and possibly the Republic of (Palau) Belau (1983-84). Volume three will contain 1985 data from each of these island groups and is tentatively scheduled for release by September 1986.

Constraints of Coastal Fishing in PNG

(Source: Development)

In the past 10 years, New Zealand's development co-operation programme in Papua New Guinea has contributed cash grants, equipment and expertise towards coastal fisheries projects on Papua New Guinea's mainland and outer islands. The assistance includes a 20-metre motorised barge, ice-making equipment, generators, cold stores, and advisers in the form of a refrigeration engineer who was based in West New Britain from 1979 to 1982, and a fish marketing specialist who was appointed for two years in 1983 to develop a network of markets for fish landed at coastal stations around the country.

Inshore commercial fishing in PNG achieved a modest breakthrough last September when a new retail fish shop opened for business at Kimbe, capital town of the West New Britain province. This enabled Kimbe residents to have access to a regular supply of fresh fish. In a wider context, though, the occasion underlined the struggling nature of commercial fishing in PNG. Markets for the local catch remain elusive despite the concerted fisheries development programme.

In the opinion of the Chief Fisheries Resource Officer with the Department of Primary Industry, Cliff Radcliffe, the industry faces major constraints -- social as well as economic. "You cannot separate the social and economic considerations. Any external encouragement to village people to increase fishing catches must take heed of competing communal interests -- market days, garden days, church days, working bees, men's fellowships, women's fellowships and so on. Then there is the question of traditional

fishing rights and fishing grounds. In some villages, anyone who fishes more than is traditionally acceptable will be ostracised. Indeed, traditional fishing grounds -- jealously guarded -- may not, as entities, support a commercial venture." Mr Radcliffe says most village-level fishing is a subsistence supplement and not a full-time occupation. Only 100-200 people are employed in the sector and it is a very small industry. The industry is not profitable and is not a priority for the government. The industry is not profitable and is not a priority for the government.



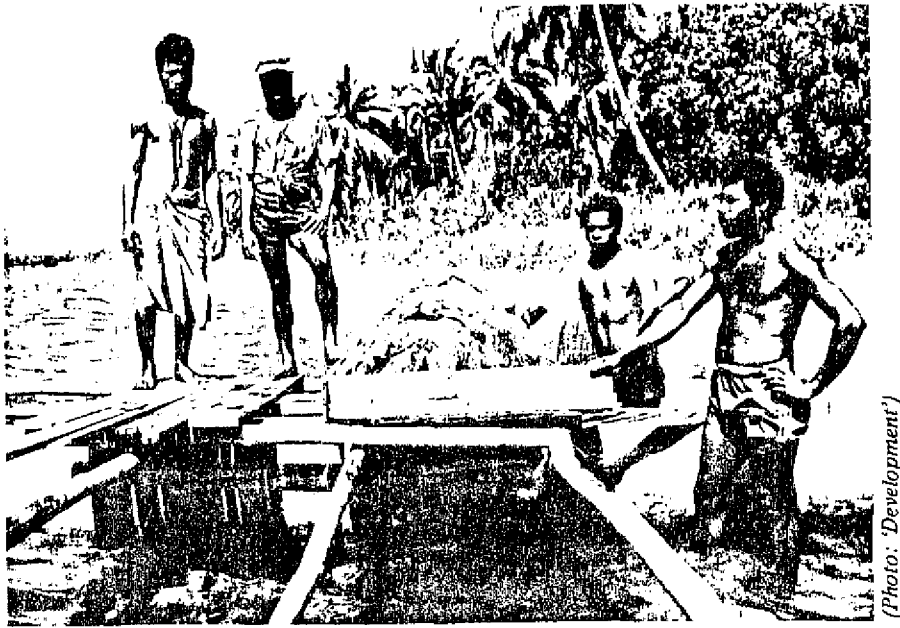
(Photo: 'Development')

Landing a catch of yellowfin tuna at Kimbe.

On the economic side, distance from markets and main centres, high transport costs, and the maintenance burden of refrigeration and fishing equipment and the vessels themselves, were all limiting factors. At one time, Mr Radcliffe said, the national government planned to establish 20 coastal fisheries stations as a mean of increasing production and embracing village co-operatives. Only six had been set up and these were in the process of being handed over to provincial authorities.

Kimbe's fisheries station has been through a cost-cutting and rationalising exercise in the past year under the management of a contracted British expert, Chris Mee. The station now uses its 10 dories more for fishing than for the collection of village catches. As a result, landings at Kimbe -- trevally, red emperor and deep-water snapper mainly -- are up from 53 tonnes in 1983 to about 80 tonnes last year. The Kimbe-based dories are now beginning to pay their way. Snapper catches work out at an average of 5.9 kg per line per hour.

Four villages in the Kombi district, a 90-minute drive from Kimbe, account for over half the fish processed at the Kimbe station, which sends a truck to a collection point once a week.



Fishermen load nets aboard an outrigger canoe at Gaongao village.

Mr Mee believes the new fish retail shop will help keep the economics of the project on an even keel. In the past the project has tried flying out frozen and chilled fish to the larger mainland towns of Lae and Mount Hagen, but it was a battle to keep prices competitive with imported frozen and canned fish, including New Zealand barracouta and Japanese mackerel. Now the emphasis is on serving local markets by road, including the communities working on the oil palm blocks along the north coast of West New Britain. The idea is to build up a market based on chilled fish for which flake-ice equipment is required. New Zealand is supplying one such machine this year at a cost of about \$12,000. A new line of insulated glass-fibre fish boxes is being manufactured on a trial basis to assist the new marketing approach.

Hecto-Pascal to Replace Millibars (Source: Les Nouvelles)

In the weather bulletins of New Caledonia, the hecto-pascal has recently replaced the millibar as the measuring unit of atmospheric pressure. The hecto-pascal and the millibar are equivalent measurements, but according to the meteorological office the decision to adopt the new term of reference was made several years ago as part of an international plan to develop a world-wide common language.

Outside of New Caledonia, the adoption of hecto-pascal (in reference to a celebrated French philosopher, mathematician and physicist) has given rise to some disagreement between those who are for and against the change.

Cookies for Conservation

(Source: Marine Turtle Newsletter)

A new kit has been introduced by HEART (Help Endangered Animals - Ridley Turtles). It includes a sea turtle-shaped cookie cutter, a recipe for delicious "Raisin" Ridley sugar cookies," a brochure from HEART and a form to return showing that you are "helpin' raisin' ridleys," the world's most endangered sea turtle. Proceeds from the sale of the cookie cutter kits go towards the purchase of food for turtle hatchlings at Galveston. Each sale provides HEART with the funds necessary to feed a hatchling for a year. The cookie cutter and accompanying materials can be obtained for US\$5.00 (add \$1.00 postage, domestic USA; \$2.00 postage overseas) from HEART, Box 681231, Houston, Tx 77268-1231 USA. Make checks payable to "HEART OF PWWS". Upon receipt of your order, a small red heart bearing your name will be posted in the Turtle House of the National Marine Fisheries Service in Galveston, Texas (USA).

Pearl-Culture Video Available from French Polynesia

(Source: EVAAM)

French Polynesia's Fisheries Service, the 'Etablissement pour la Valorisation des Activités Aquacole et Maritime' (EVAAM), has recently announced the commercial availability of its documentary video-cassette on pearl culture techniques.

The cassette, which was shown to delegates of SPC's 17th Regional Technical Meeting on Fisheries in August 1985, was filmed both on EVAAM's own experimental stations and on private pearl farms. The 40-minute programme covers all technical aspects of pearl culture, including spat collection, transfer to growing ropes, grafting of pearl nuclei, harvesting, grading and sale of the pearls. The cassette goes into the subject in considerable detail and contains valuable information for anyone involved in pearl culture. The cost of the video, which is only available in SECAM colour system at this time, is CFP 20 000 (about A\$210). Orders or enquiries to EVAAM, B.P. 20, Papeete, Tahiti.

FISHERIES SCIENCE AND TECHNOLOGYClosed Season for Spiny Lobster Investigated

(Source: National Marine Fisheries Service)

In response to a suggestion by lobster fishermen that a closed season may protect reproduction of spiny lobsters in Hawaii, Drs Robert Skillman and Gary L. Kramer have been analysing research and commercial catch data. Available data indicate that reproduction in spiny lobsters occurs throughout the year in the main Hawaiian Islands and at least as far north as Necker Island and Maro Reef. Seasonality in reproduction does become more apparent with increasing latitude so that at Necker and Maro, reproductive activity is greatest during the summer months and evident only during the summer at Midway Islands and Kure Atoll. Based on this analysis and other information, the Crustacean Plan Development Team of the Western Pacific Regional Fishery Management Council concluded that a closed season would provide limited conservation of reproductively active spiny lobster

while it would have discriminatory economic impacts on segments of the industry. It was felt that other conservation tools, such as use of escape vents, were needed more.

Gillnetter Trials In Seychelles

(Source: SWIO Fisheries Bulletin)

In September, a Taiwanese gill-net vessel began trials in Seychelles waters. The TAISHING NO.1 is a Chinese-built gillnetter with a crew of 16 Taiwanese. The vessel has an overall length of 26.5 metres, 220 tonnes GRT, a 1050 HP engine with two auxilliary engines, and a cruising speed of eight knots. The fishroom consists of a four tonne capacity blast freezer at -40°C and five fish holds with a total capacity of 150 tonnes at -30°C .

The gear consists of nets 14 metres long and 10 metres deep, with a stretched mesh size of 20 centimetres, joined together 500 at a time over a distance of seven kilometres. To facilitate the skipper in locating the beginning of the net, a radio beacon is set.

Fishing is practised only at night. While setting the nets, buoys are placed on every third net. The nets stay adrift for about seven hours. The tuna captured are immediately placed in the blast freezer, where they are kept for eight hours. They are then transferred to the cold store, where they are kept until transshipment. The technique is very labour intensive. The crew works on two shifts, sleeping while changing fishing grounds and spending any remaining time mending the nets.

The vessel spent 22 days at sea, catching a total of about 15 tonnes, consisting mostly of skipjack with some shark, billfish and bonito. Very few yellowfin were caught. The highest catch per day was 2.5 tonnes, with an average of 0.7 tonnes per day.

The results of the trial were not encouraging. Difficulties were encountered with the nets, which were not weighted on the ground rope and were therefore always set at the surface. The echo-sounder was not in working order and good fishing grounds were difficult to locate. Nevertheless, if the technical problems can be overcome, with more experience this method of fishing may prove to be economically viable in Seychelles waters.

Dorsal Aorta Parasite in Yellowfin Tuna

(Source: National Marine Fisheries Service)

Preliminary RNA-DNA analysis has been completed on tissue samples taken from small yellowfin tuna that were infested and not infested with the dorsal aorta parasite. This biochemical analysis technique allows determination of instantaneous growth rates of fishes. The objective of this work is to determine if the parasite has any significant effects on yellowfin tuna growth rates and natural mortality rates. Preliminary analysis of the data indicates that the parasite does not affect growth rates. This is a somewhat surprising conclusion because of the extent of infestation seen in yellowfin tuna and the importance of the blood vessel (dorsal aorta) that the worms often appear to almost completely occlude. Analysis of the data is continuing.

Since discovery of the dorsal aorta parasite in Hawaiian yellowfin tuna several years ago, the Tuna Behavior and Physiology Task has also been attempting to identify it. The parasite appears to be the larval form of a pleuroceroid cestode (tapeworm), but the lack of adult characteristics has prevented any further taxonomic classification.

Collection of the parasite is in progress.

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1. Information Resources for Corals and Coral Reefs, by L.G. Eldredge, 1985.

This is the title of a major article in the September 1985 issue of the Coral Reef Newsletter, which attempts to draw together the names of the major information sources on coral-reef-related subjects, as well as giving a brief description for each. Information resources noted in the article include organisations and associations, meetings and symposia, special meetings and workshops, special courses, key publications, handbooks, directories, journals, newsletters, films, and data bases for computer users. 'Information Resources for Corals and Coral Reefs', while not claiming to be complete or fully comprehensive (the author requests users to provide any supplementary information they may have), will be of use to anyone involved in research on corals and coral reefs, or in assessment and development of reef-based resources.

CONTACT ADDRESS: Graduate School, University of Guam, UOG Station, Mangilao, Guam 96923, U.S.A. (The newsletter is free, but the publishers suggest that a voluntary contribution of US\$2 would assist them to cover their costs.)

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2. Report on a Visit to Vanuatu to Conduct Iced Storage Trials on Fish Species of Commercial Importance, by G.R. Ames and C.A. Curran, 1985.

This report gives details of iced storage trials which were carried out in Vanuatu on three of the more important fish species caught off the islands. Attention was concentrated on two species of deep-water snapper, Pristipomoides mutidens and Etelis carbunculus, which, it is hoped, could be exported frozen to Australia or Japan.

Samples of the two deep-water snappers were stored in ice and some of the fish were taken each week for examination. The appearance, odour, and texture of the fish were assessed, and measurements made of the acidity, volatile bases, and bacteria both on the skin and in the flesh of the fish. Fillets were also cooked for assessment by a taste panel.

The taste panel scores and other tests showed that Pristipomoides multidenis was still just acceptable after five weeks storage in ice. Etelis carabunculus was still acceptable after four weeks storage, when the last of the samples were examined. This is an extremely long storage life compared to temperate and many tropical fish species, and will make it very much easier to develop commercial exploitation of these fish. Provided reasonable care is taken when the fish are caught, and they are chilled fairly soon after capture, a few days delay in getting them to market will not effect the quality significantly.

A parallel iced storage trial was also carried out on several species of parrotfish (Scarus spp.). These developed an unpleasant odour and became dull in colour and soft in texture in 2 to 2.5 weeks. This shorter storage life is not unexpected for a smaller reef fish, but it means that if they are exploited commercially then the handling must be both rapid and careful.

These results are relevant to fisheries development not only in Vanuatu but also in other parts of the Pacific where the same or closely related species are caught.

CONTACT ADDRESS: Tropical Development and Research Institute, Overseas Development Administration, 127 Clerkenwell Rd., London, EC1R 5DB, England.

3. A Photovoltaic Seawater Pumping System for Giant Clam Mariculture, by S.J. Winter, G.A. Heslinga and L.D. McCleary, 1985.

This report describes the technical details of an installation designed to use solar power to pump seawater through giant clam (family Tridacnidae) hatchery tanks at the Marine Mariculture Demonstration Centre (MMDC) in Palau. Solar power is especially suitable for this purpose, say the authors, because giant clams only require seawater pumping during the daytime. The solar system gives a number of advantages over the conventional diesel-generator or direct drive diesel pumps used at many aquaculture stations. These systems embody a number of well-known disadvantages, being heavy, noisy, dirty, and generally limited to an overhaul lifespan of only 4,000 hours or so.

The authors describe in detail the technical specifications of a system designed to meet the MMDC's needs. The report is illustrated with several photographs and will provide useful background data for anyone contemplating a similar installation.

CONTACT ADDRESS: Water and Energy Research Institute of the Western Pacific, University of Guam, Guam.

4. A Summary Report of the Fisheries Resource Survey of the Northern Line Group of Kiribati, compiled by C.C. Mees, 1986.

This document presents a summary of the methods, results and recommendations of a survey of the fishery resources of Fanning and Washington Islands carried out by the Kiribati Fisheries Division in April-June 1985. The survey techniques included gill netting in the lagoon, observation by free diving, deep bottom fishing on the outer reef, trolling the reef edge, and lobster collecting. No attempt was

made to survey oceanic stocks as some surveys of these resources have already been carried out. Each method of fishing conducted during the survey indicated that fish stocks were only very lightly fished at both islands. Catch rates were substantially better at Fanning Island, which is considered to have more potential for development than Washington. At both islands, trolling shows the greatest development potential, because of high catch rates and the fact that almost all the fish caught are readily saleable or acceptable for substantial use.

The report goes on to note the constraints which will bear upon future fisheries development activities in the group, and makes recommendations as to possible strategies and activities which can be considered in the short term.

CONTACT ADDRESS: Fisheries Division, Ministry Natural Resource Development, P.O. Box 246, Bikenibeu, Tarawa, Kiribati.

5. Freshwater Prawn Farming: A Manual for the Culture of Macrobrachium rosenbergii, by M.B. New and S. Singholka, 1985 (FAO Fisheries Technical Paper 225, Rev. 1).

This manual has been prepared on the basis of M. rosenbergii farming in Thailand. It has a practical orientation, as it was written for fishery extension officers as well as for practising aquaculturists wishing to start freshwater prawn farming. It contains some general information on the biology of the species and much more detailed information on larval rearing and pond culture. The Thai practices forms the core of the manual but reference to other alternative techniques used elsewhere is given, as well as additional literature references relevant to each topic dealt with in the text. Annexes on water filtration, nutrition of larvae, description of the various larval stages, pond feeds, seine net design, stock elimination, and management strategy for continuous culture technique are also provided.

CONTACT ADDRESS: Publications Division, FAO, Via delle Terme di Caracalla, 00100, Rome, Italy.

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FRESHWATER ECOLOGY:
A NEGLECTED SCIENCE IN THE PACIFIC ISLANDS

by

Satish C. Choy
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Wales, United Kingdom

A quick look at the geography of the Pacific Islands will show that apart from atolls and uplifted limestone islands, most of the other islands (volcanic) have surface freshwater habitats in the form of lakes, rivers or streams (some of which may be temporary while others are permanent). Despite frequent hydrological analyses of river discharge rates and the quality of water for consumption very little is known about the ecology of freshwater ecosystems in the Pacific Islands. Most studies carried out so far have been in relation to dam construction (e.g., Yate in New Caledonia, Sepik in Papua New Guinea, and Monasavu in Fiji).

Until recently, the primary source of protein in the diet of the inhabitants of the inland areas of large islands (Papua New Guinea, Viti Levu and Vanua Levu in Fiji) was freshwater crustaceans and fish (tinned fish and beef have now taken over). Some subsistence fisheries based on freshwater species still exist even in coastal areas. In addition, a limited commercial fishery is evident. In Fiji the prawns of the genera Macrobrachium ("ura") and Palaemon ("moci") are commonly sold in the markets as are freshwater clams of the genus Batissa ("kai").

The relative importance of both these forms of fishery to that of the marine based one is not known mainly because little distinction is made during recording. This is due to difficulties in species identification and the presumption that its economic contribution is insignificant. In a recent study it was found that the so-called freshwater prawns in Fiji consisted of eight Macrobrachium species, two species each of Palaemon and Atya and about a dozen species of the genus Caridina (including several which were new to science). To the west, in countries such as Papua New Guinea, New Caledonia, Vanuatu and Solomon Islands, even more species exist, the number decreasing as one goes eastwards.

Another problem is that most of the freshwater prawns and fish are catadromous, some even relying on saline water for reproduction and larval development. However, others such as gobies, tilapia and atyid shrimps can live entirely in fresh water and thus be easily catalogued.

The importance of freshwater to marine species is less known. Some groups are anadromous, but it is not clear why they are so. Is it only for reproduction or feeding? Examples include some species of sharks, groupers, and snappers. Juveniles of crustaceans such as penaeid prawns

may move into the bank vegetation of rivers and streams which serve as nurseries before the prawns migrate downstream to reproduce.

The effects of introduced species for biological control (e.g., mosquito fish, carps, and tilapia) or for aquaculture (e.g., tilapia, bass, and the prawn *Macrobrachium rosenbergii*) are quite well known. Apart from the hazard of disrupting the balance or even eradicating some local species, the introduced organisms may bring with them unwanted parasites and diseases (see SPC Fisheries Newsletter No. 34). During a freshwater survey (1979-80) on the Nadrau Plateau (Fiji) for the proposed hydroelectric scheme we found a new species of shrimp above the waterfalls at an altitude of about 800 m. This species was very abundant, contributing to over 50 per cent of the total number of organisms (most of which were insect larvae). Below the falls it was less abundant. One of the major factors contributing to high abundance above the falls was the lack of an effective predator; the only ones found were eels (*Anguilla* sp.). Eels are olfactory feeders and do not appear to be efficient at feeding on shrimps. The main predatory organisms below the falls were two species of fish (*Kuhlia* spp.) which occurred in large numbers and, being visual feeders, kept the total invertebrate fauna numbers relatively low. Soon after the dam construction and stream diversions, tilapia (*Oreochromis mossambicus*) appeared in the reservoir and the number of shrimps and other invertebrates above the falls rapidly declined and these were found in appreciable numbers only amongst vegetation and in riffle areas. In 1982 we recorded an abundance of very small tilapia and so the species had established itself in the reservoir. It is hoped that a typical prey-predator relationship will be established, but this is doubtful as tilapia can switch to a herbivorous diet to sustain itself.

IV Studies on the freshwater zooplankton strongly suggest that these organisms not only form part of the food chain of the freshwater community but also contribute to that of estuarine as well as marine communities.

The effect of pollutants on aquatic organisms is relatively well known but to what extent this is prevalent in the freshwater habitats of the Pacific Islands is not. With the increasing use of agricultural, industrial and household chemicals there is a pressing need to monitor levels.

Thus, despite their social and economic importance, freshwater ecosystems in the Pacific Islands have been largely neglected in terms of their ecology. There is a need for research to successfully manage this important if not vital resource.

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PROGRESS REPORT ON THE VANUATU COCONUT CRAB PROJECT

by

Rick Fletcher
Department of Primary Industries
Queensland, Australia

The coconut crab, Birgus latro, was once common throughout the Indo-Pacific region. In recent years a decline in the stocks of this, the world's largest land crab, has been noted in many countries, with some places virtually "fished out". Vanuatu is one place where this species has been promoted as a culinary delight, being especially popular with tourists. As a result of this demand, collections of the crabs have been extensive in some areas and declines in their numbers were evident. Realising that there was a strong need to manage this valuable resource, the Vanuatu government proposed that a project be carried out to determine the growth, population dynamics and general life-history of the crab, for which little or no previous data were available. The project, funded by the Australian Centre for Internal Agricultural Research, subsequently commenced in August 1985 with the aim of providing a rational plan for management of the coconut crab resource. The project, headed by Dr Rick Fletcher, is based at Luganville on Espiritu Santo, and will continue to December 1987.



A culinary delight — the coconut crab, *Birgus latro*.

(Photo: A.C.I.A.R.)

In 1985, enclosures were built to house adult crabs so that growth and moulting behaviour could be observed. A "wet-lab" was also built to rear the larvae of the crabs to provide clearer descriptions of their almost unknown juvenile stages. If a number of juveniles are obtained this should facilitate obtaining information on the rates of growth of these stages which are rarely observed in the field. In addition, experiments between these juveniles and those of other coenobitids (hermit-crabs) may be possible.

Field studies of the population dynamics of adult populations, including density, size structure and reproductive status, were also begun at many sites around Espiritu Santo, with additional studies performed at the more isolated Torres and Banks islands. These indicated that the size, density and behaviour of the crabs differ markedly between areas. In some areas the crabs are generally large in size, are at high density and move about during the daytime. At other areas the crabs are at low density, are mostly small and come out of hiding only at night. Such differences are likely to be a result of differences in the intensity and duration of collection of the crabs. Extensive market surveys support this conclusion. A more complete progress report on this project will be presented at the forthcoming SPC 18th Regional Technical Meeting on Fisheries in August.

