SOUTH PACIFIC COMMISSION

FISHERIES NEWSLETTER

28 January - March 1984

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(Photo: Nelson Polytechnic)

Students on the 1984 SPC/Nelson Polytechnic Pacific Fisheries Officer Course (see article on page 4). From left to right, back row: David Aldan (Northern Mariana Islands), Sikela Ulumutu (Tuvalu), Senior Nautical Tutor Captain Alastair Robertson, McCarthy Kotaro (Palau), Soane Seo (Wallis and Futuna); Middle row: Rooston Zeissig (Kosrae, Federated States of Micronesia), Andrew Firiam (Vanuatu), Naita Manu (Tonga), Matai 'Taumea' Kolinisau (Fiji), Ronald Alfred (Marshall Islands); Front row: Terakura 'Sonny' Tatuava (Cook Islands), Val Martin (Ponape, Federated States of Micronesia) Timon Bauro (Kiribati).

P.O. Box D5, NOUMEA CEDEX, New Caledonia • Telephone: 26.20.00 • Cable: SOUTHPACOM NOUMEA • Telex: 139 NM SOPACOM

SPC ACTIVITIES

Deep Sea Fisheries Development Project Notes

- Fiji

SPC Master Fisherman Paul Mead arrived in Fiji late in January to commence a country visit whose principal focus is on the development of small scale fishing techniques around fish aggregation devices (FADs).

In line with discussions held at the 15th SPC Regional Technical Meeting on Fisheries in 1983 (where it was noted that longer country visits were desirable in conducting gear development work of regional significance) Paul is scheduled to work in Fiji for a twelve-month period, the first six months to be based in Suva, the second in Labasa, on Vanua Levu.

Paul's work has started off with trials of both vertical longline gear and deep trolling using a variety of methods on six FADs deployed within reach of Suva by the Fiji Fisheries Division. Earlier work with vertical longlines in Niue (see SPC Fisheries Newsletter # 26, Jan-Mar 1983) emphasised the importance of absolutely fresh bait in this fishing technique, and in Fiji Paul will evaluate the relative effectiveness of live bait compared to fresh whole bait provided adequate supplies of the former can be obtained. For experimental purposes it is hoped to obtain live jack mackerel (*Decapterus macarellus*) from bouke-ami bait catches by the Fisheries Division's research vessel 'Tui-ni-Wasabula'. The fish will be transferred to water filled containers (plastic household dustbins) on the 28-foot dory being used by Paul and his counterpart officers, and kept alive by the use of a small battery-powered aerator, manufactured in the U.S. for sport fishermen and sold for US$25. Initial trials with a modified version of the Canadian 'cannonball' deep trolling rig used for salmon have also proved encouraging and will be continued.

- Wallis and Futuna

Master fisherman Pale Taumaia concluded his assignment to Wallis and Futuna late in March after a six month visit during which he worked on both islands. Pale spent the last three months of his visit based on Wallis Island where he conducted a training programme in deep-bottom droplining for local fishing groups, working from a number of fishing boats of various types.

Bottom catches were generally good with fairly high catch rates suggesting a productive resource which is not fished to any great extent at present. As in many small island countries, obtaining good bait was a major problem, and during February it was necessary to ship 90 kg of frozen skipjack from Noumea for bait, to maintain the impetus of the training programme. Tuna are seasonally abundant in the waters around Wallis, but very little local fishing activity is directed towards them, and as they are also a favoured eating fish, they can be difficult to come by for bait. However, the results of fishing using other types of fish for bait reinforce the superiority of tuna in this regard, and Pale continues to recommend it strongly. Catch rates in Wallis averaged 5.7 kg/reel-hour using skipjack or yellowfin, compared to 2.4 kg/reel-hour using other fish.

Pale left Wallis on March 22nd to travel to his next assignment in Kiribati.

- Papua New Guinea

Master fisherman Lindsay Chapman travelled to Papua New Guinea in mid-January to commence a program of work which will take him to three fisheries centres in that country. The first phase, completed in February, was a brief trolling survey of the Kimbe area to assess the potential for spanish mackerel (Scomberomorus commerson) trolling. Although trolling produced over a ton of fish during the month, only 60 mackerel were caught. The conclusion from the survey was that the mackerel season at Kimbe is probably short and well-defined, as was found to be the case during a similar survey carried out by Lindsay at Wewak under UNDP auspices in 1982.

The second phase, in which Lindsay demonstrated trolling and bottom fishing techniques at Manus Island, was curtailed to allow greater time to be spent in the third phase, based at Wewak, where Lindsay is assisting with trolling surveys, FAD deployments and the location of new deep bottom fishing grounds.

SPC "Coastal States" meeting draft agenda circulated

As noted in the last issue of the Fisheries Newsletter (# 27), the SPC has been directed to convene a meeting between Coastal States (of the SPC region) and Distant Water Fishing Nations to discuss future approaches to the assessment and conservation of Pacific tuna resources. The meeting, which will present an opportunity for all the parties with a legitimate interest in the fishery to discuss its future exploitation, is scheduled to be held in Noumea from 18-22 June 1983. The agenda proposed by the Commission and circulated to invited participants in April, is as follows:

1. Opening address
2. Appointment of Chairman and other office bearers
3. Approval of agenda and timetable
4. Review of background to the directive of the Twenty-third South Pacific Conference to convene this meeting.
5. Consideration of the objectives, achievements and future activities of the Tuna and Billfish Assessment Programme, including the uses of information generated by the Programme.
6. Consideration of the types of additional input required and possible sources:
   (a) Statistics for SPC area - and beyond
   (b) Scientific results from other sources for SPC area - and beyond
   (c) Financing of the Programme
7. Ways and means of obtaining the necessary input. This could include exploration of alterations to the operation of the Programme which would expedite obtaining the inputs identified in 6.
   (a) Possible arrangements countries or institutions can make to increase the data coverage
   (b) Possible initiatives to attract additional funding
8. Identification of the measures necessary to facilitate optimum use of the results of the Programme:
   (a) Where further development of fisheries is possible
   (b) If the need for conservation is identified
9. Other business
10. Adoption of the report.

SPC consultancies on shell resources completed

Two studies on shell resources of different types have been carried out recently under SPC auspices by consultant specialists.

The first, conducted by conchologist Brian Parkinson between 1st and 28th November 1983, focused on the specimen shell resources of Tuvalu. The consultant's terms of reference were to survey, assess and catalogue the shell resources of the country, advise on options for the promotion of a local shell industry, and provide information on suitable methods of shell collection and treatment. Specific items also addressed were conservation of shell resources, particularly those species regarded as endangered or threatened, and the use of nets or dredges to supplement the harvest normally taken reef-walking.

Brian's work broadly followed the lines of a similar survey he carried out for the Commission in Fiji in 1981 (Parkinson, B.J., 1982. The Specimen Shell Resources of Fiji: South Pacific Commission). The main collection technique used was diving, either with SCUBA tanks or snorkel, and collections were made on Nukufetau and Nukulaelae as well as the main island of Funafuti. Despite the limited time period of the survey and the fact that only three islands were visited, over 60 new records for Tuvalu were made, and this points to the presence of many more species not yet recorded but which may be found by more extensive survey work. Many shells popular with collectors were found in good numbers, and Brian also noted that some of the local cowries were brighter and more colourful than individuals of the same species coming from other countries. However, a number of families common elsewhere were found to be poorly represented in Tuvalu, and the overall seashell fauna is typical of the atoll environment in being less rich than that of a larger country.

The second consultancy, a feasibility study into the establishment of a trochus (Trochus niloticus) hatchery in Vanuatu, was carried out by aquaculture specialist Jean-Louis Martin of CNEXO (Centre National pour l'Exploitation des Oceans) between March 10th and 13th 1984. This study was originally scheduled for mid-1983 but was postponed due to difficulties in identifying a suitable consultant.

During his visit to Vanuatu, Jean-Louis held discussions with Fisheries Department personnel and others concerned with the revitalisation of the local trochus industry. A button-making factory, 'Trochus Vanuatu', has been forced to suspend its operations since late 1983 due to a shortage of shells and the hatchery is proposed to enable a seeding programme aimed at supplementing natural recruitment to Vanuatu's coral reefs. Jean-Louis' initial response to the proposal was positive as trochus hatchery technology is well advanced.

The reports of both studies will be released shortly.

SPC/Nelson Polytechnic Pacific Fisheries Officer Training Course commences

1984 is the fifth year in which this 18-week course, sponsored by the Commission and conducted at Nelson Polytechnic in Nelson, New Zealand, has been run. Funding for the course is generously provided by the New Zealand Government, with supporting contributions from the Commonwealth Foundation, the Commonwealth Secretariat and the United Nations Development Programme (UNDP), in addition to SPC. Participants are selected from nominations made by member governments, and are given training in the basic skills required by a fisheries extension or similar officer, working largely independently and with limited support. The 12 students attending this year's course are from 12 different island territories, and all arrived in Nelson in early February to commence their training. The course syllabus covers a wide range of practical skills, including welding, the use of fibreglass, outboard motor maintenance, chartwork and navigation, net construction and mending, and maintenance of refrigeration equipment. The students also spend 2 weeks at sea on commercial fishing vessels, and 3 weeks working in a fish processing factory, to gain first-hand industrial experience.

A fortunate combination of circumstances has made it possible to incorporate some additional training into the course this year. The course would normally end on June 6th, but generous assistance from the Government of Fiji and the United Nations Development Programme have made it possible to organise an extra months training in practical small-boat fishing techniques, under conditions similar to those found in the trainees' home countries. This is a subject area which it has not been possible to treat in New Zealand because geographical and climatic features prevent it. This year, however, the Government of Fiji has kindly offered the use of fishing vessels, hostel accommodation and other support facilities for four weeks in June and July. A formal funding commitment by UNDP, confirmed in mid-March, will enable the students to travel via Fiji on their return home, and to stay for a months intensive practical fishing training in Suva en route. Practical fishing will be supervised by SPC master fisherman Paul Mead who hopes to be able to cover some aspects of small-scale fishing around FADs in addition to deep-bottom fishing (see page 2). The students will also be accompanied by their senior tutor from Nelson Polytechnic, Captain Alastair Robertson, who plans to incorporate chartwork and navigation exercises and engine maintenance practice into the fishing trips, so that the students can put their 'classroom' training to use under true working conditions.

Recent Fisheries Publications from SPC

Published this quarter were:

- SPC Handbook No. 23. A guide to the Common Tuna Baitfishes of the South Pacific Commission Area, by A.D. Lewis, B.R. Smith and C.P. Ellway.

- Report on the Deep Sea Fisheries Development Projects Visit to the Republic of Kiribati, by Pale Taumaia and Mark Gentle.

- Report on the Deep Sea Fisheries Development Projects Second Visit to the Republic of Vanuatu, by T. Fusimalohi and G.L. Preston.

NEWS FROM IN AND AROUND THE REGION

Seaweed grows on the Pacific

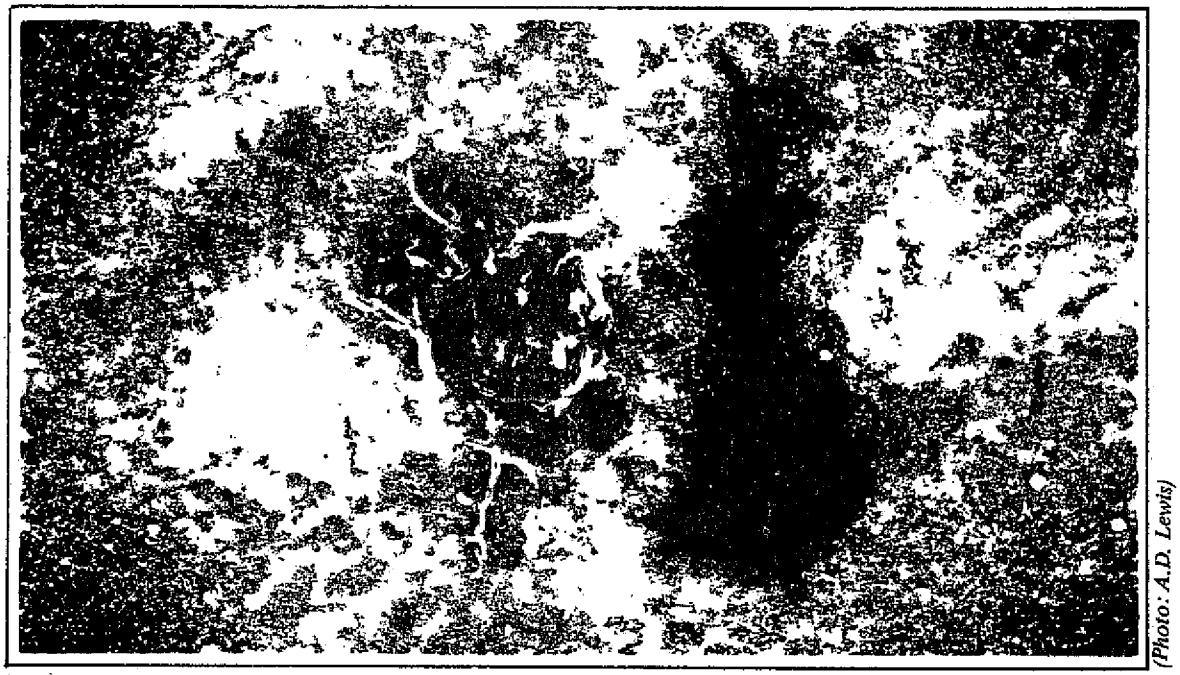
The potential of seaweed farming as a possible village-level money earner is now being investigated in several Pacific countries, as well as others outside the region, as awareness of this mariculture activity grows.

SPC Fisheries Newsletter No. 24 (January-March 1983) carried a brief report of growth trials of the red algae Eucheuma in Kiribati. This project is now going commercial after promising results from the 2-year experimental work, which indicated that a 200 gramme plant will grow to 2 kg in 2-3 months. The culture technique involves tying fragments of Eucheuma to lines stretched between stakes driven into the seabed in calm, shallow areas. After a suitable growth period, the plants are harvested and laid out to dry in the sun for several days on wire mesh racks. Once dry, the value of the product is greatly increased if the plants are washed and then re-dried, a process which removes unwanted salt and other impurities, and actually serves to increase the content or availability of usable compounds within the dried plant material. The value of the final product depends on the care with which it has been dried and packed, but indicative prices are A$300-500 per tonne for unwashed seaweed, increasing to A$1000-1300 per tonne for washed, top-quality product.

The Kiribati Fisheries Division have identified about 200 hectares of farmable area on the south Tarawa lagoon, where they hope to encourage about 30 families to set up seaweed farming ventures by the end of this year. Further

(Photo: A.D. Lewis)

Seaweed cultivation strings in Tarawa lagoon.



(Photo: A.D. Lewis)

The raw dried product (left), and after fresh water washing and re-drying (right).

sites and interested families are also being sought on other islands. Farming the seaweed is labour- rather than capital-intensive, with jobs such as planting out, harvesting, drying, and maintenance continually demanding the attention of the farmer. The Fisheries Division anticipate that a well-managed plot could yield an income of about A$40/week.

Similar experimental work on Eucheuma farming has been carried out at Ponape State in the Federated States of Micronesia over the past three years, and this too has entered the commercial phase, with the Government pilot project now supplying seedstock to a farming concern operated by a local youth group under sponsorship of the Economic Development Authority. The Government of Tonga has also embarked on an extension-oriented Eucheuma farming venture, with a commercial company, Coast Biologicals of New Zealand, providing technical backup in the areas of processing and marketing. Coast Biologicals is one of the few colloid manufacturers close to the SPC region. The company was originally considered a potential buyer of seaweed produced by Pacific Island countries, but is now becoming more closely involved in a number of current or proposed algae culture projects in the region. Coast Biologicals purchases most of its Eucheuma from the major producer, the Philippines, where production peaked at 15,000 tonnes in 1979, but is hoping to establish alternative sources of supply nearer home.

The commercial value of seaweeds lies mainly in their use as raw material for the manufacture of the colloids agar, alginate, carrageenan and furcellaran. Colloids are non-crystalline compounds used in the production of a variety of gelling and binding agent, gums, and coatings. The variety of end uses of these compounds is truly remarkable, ranging from photographic emulsions to pet foods, and from ice cream to welding rods. The Eucheuma species currently receiving attention in the Pacific are used in carrageenan production. The "INFOFISH Marketing Digest" No. 4/83 (p. 24) contains the following notes:

> "Carrageenan is used mainly as a stabilising and gelatinising agent in food. The food sector accounts for nearly 70% of the world market for carrageenan. The food industries in developed countries, where carrageenan is used as a suspending, thickening and gelling agent, account for nearly all of this global demand. Japan uses about 20% (some 2 200 tons annually), while Western Europe and North America account for 25% each of global utilisation. The remainder is spread over the rest of the world, mainly developed countries.
>
> As in food products, the use of carrageenan in non-food products, notably toothpaste, cosmetics and solid air fresheners, is based primarily on its thickening and stabilising properties. Air fresheners now account for the bulk of the market for carrageenan in the non-food sector, followed by toothpaste.
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> With regard to market expansion, the carrageenan industry depends heavily on new and more profitable applications. Its history has been characterised by the encroachment of substitutes. For example, its use in emulsion paints, a sizeable market 30 years ago, has now been completely replaced by carboxymethyl cellulose (CMC)."

Fiji's Ika Corporation commissions new pole-and-line boat

The Fiji Government-owned national tuna fishing company, Ika Corporation, took delivery of an addition to its pole-and-line fleet early in February. In a traditional Fijian ceremony of welcome, Mr Charles Walker, Minister for Primary Industry, took delivery of the Ika 8 on behalf of the Corporation. Ika 8 is the second of a new generation of locally-built small

pole-and-line boats (see SPC Fisheries Newsletter No. 27, p. 16-17) to be purchased by the Corporation. The boat cost F$500,000, accommodates 22 crew and has a capacity of 35 tonnes of fish.

After a long history of economic difficulties, the Corporation claims to be 'galloping away from the gloom' according to General Manager Malcolm McGregor. A number of steps have recently been taken to improve the companys economic prospects, including rationalising the fleet by selling off or scuttling unprofitable vessels, and involvement in other fishing methods, particularly purse-seining, to enable exploitation of the outer regions of Fiji's 200 mile EEZ currently not utilised. A critical assessment of the Corporations economic performance and future options was also carried out by Fijis Central Planning Office and SPC Tuna Programme Co-ordinator, Dr Robert Kearney. Mr McGregor reports that changes to the system of crew payments were recommended and crew now receive a percentage of the proceeds and sale of the catch. The Corporation's head office has been relocated in a position adjacent to the fishing jetty, enabling management and crew to meet and discuss problems more freely. The "team spirit" is being fostered, and crew members are said to have responded very positively, with great improvements in performance, productivity, self-discipline and morale. Ikas catches in the first three months of the current tuna season, which started in November, stood at around 900 tonnes, an encouraging start for the company's rationalised operation.

New Zealand reef blasting team to be disbanded

The New Zealand Coastal Works Programme, well known for its work in building or improving boat passages through the reefs of Pacific Island countries, is to disband in July 1984, after eight years service to coastal villages of the South Pacific.

In addition to blasting and clearing passages, the 'reef team' has undertaken a variety of other jobs, from the repair of wharves and water tanks to clearing coral heads dangerous to shipping. Since 1976 the team, which comprised five more or less permanent members plus short-term specialists, has worked in Tokelau, Western Samoa, Tuvalu, Kiribati, Vanuatu, Solomon Islands and Cook Islands. Lately in 1983 the team were based at Fakaofo atoll in Tokelau, where the task was to build a new channel 200 m long by 8 m wide to facilitate the transhipment of passengers and cargo across the otherwise virtually unbroken reef. Subsequently, they moved to Funafuti, Tuvalu, to assist in the construction of a new fishing wharf from prefabricated components. The team's last assignment, which commenced in February, is Kiribati. Here they are to build two canoe passages at North Tarawa, and improve channels at several other atolls, including Kiritimati (Christmas Island) where new fish ponds require a channel to the sea.

World's biggest marine park declared

The Federal Government of Australia has declared almost the entire Great Barrier Reef a marine park, making it the biggest marine conservation area in the world, with the declaration on October 30 of the final two sections of the park, whose area, off the Queensland coast, is about 68 000 km^2 (26 248 sq miles).

"The Great Barrier Reef is now protected for all time by its inclusion within the Great Barrier Reef Marine Park," the Minister for Home Affairs and Environment, Mr Barry Cohen, said. "This park is by far the world's largest marine conservation reservation, covering an area of about 345 000 km^2 (133 170 sq miles)."

The director of the Great Barrier Reef Marine Park Authority (GBRMPA), Dr Geoff Mosley, said on November 1 that the Park was now the most significant marine conservation reserve in the world, and that the announcement should make conservation-minded people everywhere take heart. "It showed us that the struggle is often long, but that persistence pays off," he said. "Conservationists had been working to protect the reef against mining for over 16 years." It was only until very recently that the previous Australian Government and the GBRMPA had said that it was not wise to declare the marine park over huge sections of the reef as has now been done.

Four-year artisanal fisheries development scheme for PNG
(from a PNG Government press release)

A four-year village fisheries development project is to commence this year under the auspices of IFAD, the International Fund for Agricultural Development. IFAD is a United Nations Agency which provides low interest loans to support projects aimed at benefitting poorer, more isolated, or disadvantaged rural communities.

The IFAD Fisheries Project in PNG is a pilot village fisheries development scheme located in Milne Bay and the Delta area of Gulf Province. The main project objectives are:

(i) to increase incomes in remote fishing villages;

(ii) to improve food supplies from underutilised renewable fish resources;

(iii) to improve village fishing techniques and skills to create commercially attractive fishing and project operations;

(iv) to increase foreign exchange earnings through export of fish.

Specifically the project will upgrade the fish plants at Samarai, Kikori and Baimuru and will provide housing, new fish collection vessels and new fish handling and processing equipment. These major developments will be supported by the PNG Fish Marketing Corporation (marketing and improvement of fish quality), the PNG Development Bank (fishermen's credit), and Fisheries Department Headquarters, Kanudi (applied research on fishing vessels and gear and project co-ordination and monitoring).

Additional technical staff for maintenance and operation of equipment will be provided and a comprehensive training programme is planned for project staff. The main emphasis will be placed on increasing fish production and product quality and a strict cost benefit approach to project operations. Considerable effort will be aimed at developing new fishing gear and appropriate fishing boats leading to tried and tested 'credit packages' of fishing equipment for the fishermen.

The project has been allocated Kina 5.5 million over the 1984-87 period and will serve a total fishing population of about 14,300 people. Fish production is projected to increase from a present level of 270 tonnes per year to a maximum of 1,455 tonnes/year. The annual gross profit margin on sales has been estimated at K877,000/year by year 5 of the project.

Missing craft saga in Kiribati

The previous issue of the SPC Fisheries Newsletter (No. 27) carried an article about the ordeal of an I-Kiribati fisherman who drifted at sea for 36 days in his canoe after losing sight of land. Incidents of this kind are far from being rare, and the Government of Kiribati is now being assisted by New

Zealand in trying to counter the problem, as described in the following article reprinted from the December 1982 issue of 'Development':

> "The Kiribati Government is taking urgent action to stop fishermen going missing. In the first 10 months of 1983 a total of 48 fishing craft had gone missing, most of them from the main island, Tarawa. Search-and-rescue authorities can account for only about three-quarters of the craft. "It's an appalling record," said Marine Superintendent Beiaiti Highland. "We spent $50,000 on call-outs in 1982 and it looks as if we could top that this year."
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> The Government, he said, had decided on two main courses of action - to supply small-boat safety equipment including locator beacons and flares, and to run intensive courses in small-boat safety. New Zealand's bilateral aid programme in Kiribati is contributing about $20,000 towards the purchase of safety equipment, and in October the Tarawa Technical Institute began running evening classes in basic navigation, basic mechanics, small-boat safety and survival at sea. Organised into two-week courses, the classes were held at the three main centres on South Tarawa - Betio, Bairiki and Bikenibeu.
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> "Most cases of missing craft involve South Tarawa fishermen who're too busy trying to catch fish to notice they've lost sight of land," says Mr Highland. "They've usually got outboard motors and that makes them think they can go faster and further. But you don't need to go far from an atoll like this to lose your bearings. Turn your back and the land can disappear."

Fiji's "Fisherman Of The Year"

The winners of Fiji's "Fisherman of the Year" and "Fishing Group of the Year" competitions were announced by the Minister for Agriculture and Fisheries, Mr Jonati Mavoa, early in February. Organised by the Fisheries Division, the competitions were held for the first time in 1983, in an attempt to raise public awareness of the significant role that fishermen play in the national development effort and in local food production, and to show people that fishing is a worthwhile and profitable occupation.

The winners were judged on the basis of the competitors' history of fishing operations and success. Factors taken into account included the length of time the fisherman had been operating, their general progress, loan repayments, keeping of sales and catch records, maintenance of equipment, and future plans. The names of runner-up winners at the Divisional level were also announced.

Fisherman Of The Year was Mr Salim Mohammed of Nausori, near Suva. Mr Mohammed has been fishing since 1965, and currently owns two boats of 16.5 m and 15 m LOA respectively and employs four crew members. He is an experienced net fisherman who has established his own freezer and cold store in Nausori and has recently opened a fish retail shop in Suva. Mr Mohammed's prize is a return air ticket to New Zealand, where he will spend a month travelling extensively and observing the various aspects of New Zealand's fishing industry. Air Pacific and New Zealand based Nelson Fisheries are jointly donating the prize, with Mr Mohammed's visit being hosted by New Zealand's Fisheries Division.

Fishing Group Of The Year was Ratu Busa Fishing Group, of the Yasawa islands to the west of Viti Levu. The group was established in 1978 and in 1979 received a F$5,500 loan to purchase a 8.5 m fishing vessel. After fishing for two years, the loan was paid off in 1981, and during this year one member of

the group was selected to attend the rural fisheries training course held by the Fisheries Division in Lami, enabling the group to upgrade their fishing techniques and improve the overall operation of their business. In 1982 they purchased a second 8.5 m boat, and have since added two fibreglass punts and a large fleet of nets to their investments. The group has also been commended for its action in promoting youth activities in Yaqeta village by donating sporting equipment. The group's prize is a return flight to Levuka, Fiji, for one, and a 15 h.p. outboard motor, both donated by local companies.

Trochus tag developed in Palau

An effective tagging method is often an essential prerequisite to studies on growth, mortality, homing and migration of benthic marine invertebrates. A recent article in the journal Aquaculture (Heslinga, G.A., and O. Orak, 1984. A permanent tag for large marine gastropods. Aquaculture 36: 169-172) reports on the use of a cheap and exceptionally durable tag for commercial trochus shells. Developed by the staff of the MMDC laboratory in Palau, the technique makes use of individually numbered aluminium washers which are attached to the lip of the shell with a pop riveting tool. Once set, the rivet and tag are secure and virtually impossible to remove. After several days the trochus mantle secretes a smooth layer of shell over the nearly flat head of the rivet, further anchoring it in place.

(Photo: G. Heslinga)

A commercial trochus shell tagged through the lip with a pop rivet and numbered aluminium washer.

The tags cost about US four cents each and can be attached at the rate of 120 per hour. Trochus tagged and released in Palau more than two years ago are still readily identifiable, with no evidence of tag loss or defacement in a growth study involving over 1200 tagged specimens. The method works equally well on other large gastropods. Reprints and tag samples are available from the MMDC, P.O. Box 359, Koror, Palau, 96940. The work is being funded by the Pacific Fisheries Development Foundation and the Government of Palau.

Introduced Species Handbook in preparation

Professor Lu Eldredge of the University of Guam and Dr John Pernetta, Dean of the Faculty of Science, University of Papua New Guinea are working as part of the South Pacific Regional Environment Programme (SPREP) team to produce a handbook on introduced species of the Pacific region. SPREP is based at SPC headquarters in Noumea.

Introduced species are organisms which are found in areas where they do not naturally occur, having been brought, either intentionally or accidentally, by man. The results of 'introductions' are varied. In some cases there has been little impact on the new area, in others the introduced animal has become a valuable commercial and agricultural resource. However all too often, the effect has led to the extinction of existing native species.

Documentation relating to introduced species however is scant in this region. SPREP hopes to fill this gap with the proposed handbook which will record information on introductions of all terrestrial and marine animals (excluding insects); namely date of introduction, number and location of released specimens, impact on the surrounding environment, maps of animal movements and, where possible, photographs to assist in identification and serve as warnings for geographic areas where these species are not yet known.

Preparation of the handbook has already commenced and is expected to take about a year to complete. Further information from Dr L.G. Eldredge, University of Guam Marine Laboratory, UOG Station, Mangilao, Guam 96913.

Catholic church revives 'Fish on Friday' ruling

The new code of canon law of the Roman Catholic Church, which came into force at the end of November 1983, requires Catholics to abstain from eating meat on Fridays, unless the local bishops' conference in individual countries substitutes an alternative practice.

In countries where this ruling is adopted unchanged, it is likely to have an immediate and sustained impact on fish sales, particularly in its fresh form. This is likely to be especially true in those countries where Catholics form a majority of the population. In many European countries which have seen a steady decline in the sale of fresh fish since the abolition of the 'fish on Friday' rule in the mid-1960s, it is hoped that this move will provide a boost to the fresh fish trade. However it is not yet clear which countries will adopt the new ruling and which will opt for some other measure to meet the Vatican's requirements.

Whatever the decisions of the national bishops' conferences in individual countries, the Vatican is not insisting that all the new canon rules should necessarily be adopted immediately. This will allow local churches more time to prepare their followers for the introduction of whatever form of penance they finally choose to adopt.

Re-introduction of giant clams to Yap

As part of a programme aimed at re-establishing giant clams in Yap State of the Federated States of Micronesia the Yap Marine Resources Division has recently carried out an experimental planting of 1000 *Tridacna derasa*. The clams were reared at the Micronesian Mariculture Demonstration Center (MMDC) in Palau, and during their direct flight from Koror to Yap by scheduled carrier were out of the water for less than 3 and a half hours. The clams were 15 months old and averaged 84 mm in length at the time of planting. After three weeks at the new site there has only been one mortality.

The clams are being on-grown on the wet (sheltered) site of Yap proper, on the shallow, sandy lagoon floor, using techniques developed at MMDC. The animals are being held on a gravel substrate in shallow fibreglass trays (60x50x5cm), at a density of 50 clams per tray. A strong lid of 3 cm plastic mesh is used to exclude large predators. The clams will begin to reach sexual maturity in about two years.

Society of Indo-West Pacific fisheries scientists proposed

A number of fisheries scientists and researchers from Asian and Pacific countries have expressed support for the proposal to establish a forum to facilitate a regular interaction among those dealing with fisheries and aquaculture research and development in the region. The forum is intended to be a gathering where broad issues and specific topics on fisheries can be discussed, where scientists can speak in their professional capacities in an apolitical atmosphere, and where contributions from the scientific community of the region are received and assessed.

The idea of a regular forum for fisheries and aquaculture scientists has been considered for some time but the problem of ensuring continuity has been daunting. Nevertheless, the growing enthusiasm around the region prompted the International Centre for Living Aquatic Resource Management (ICLARM) to distribute a forum proposal. On the basis of the many enthusiastic responses, a group of scientists met at ICLARM last May. That group endorsed the proposal and agreed that the geographic scope of such a forum should encompass the many countries within the Indo-West Pacific zone. However since this was not a cohesive name as far as communities of nations were concerned, the term Asian Fisheries Forum was chosen.

The forum proposal also called for the formation of a committee to begin planning forum meetings and various associated matters, one of which was the suggestion of forming a Society to further unite the region's fishery scientists and to ensure the Forum's permanency. The group that met in Manila became that committee, unanimously adopted the idea of a society, the "Asian Fisheries Society", and assumed the title "Foundation Council for the Proposed Asian Fisheries Society". The Foundation Council's functions are to organise the first Forum meeting, which has been proposed to be held in early 1986, and to seek funds for the Forum/Society and associated publications. The proposed Society's objectives are an extension of those of the Forum: to encourage interaction between scientists, exchange of information and publication of research; to strengthen co-operation between institutions; to focus attention on the importance of wise use of resources; and to create an awareness of the importance of fisheries in the region. In addition, the Society could play a variety of roles in co-operation with similar national and international societies and institutions.

Fish schools: an asset to corals (from Wallaceana: June 1983)

Schools of juvenile haemulid fish (grunts, family Pomadasyidae) feed in sea grass beds at night. By day they rest over coral heads, where they excrete substantial quantities of ammonium and particulate nitrogen and phosphorus into the nutrient-poor waters. The percentages of these nutrients contributed by the fish were comparable to those from other sources. Coral heads with resident fish schools grew faster than those without resident schools, indicating that fish may be more beneficial to the corals than has been assumed.
Meyer, J.L. et al. in SCIENCE 220: 1047-1048 (1983).

Traditional marine management in the Pacific - true or false?

The following thought-provoking article by Dr Gary A. Klee, (of the Department of Environmental Studies, School of Social Sciences, San Jose State University, USA), appeared in Volume 4 No. 7-9 (July/September 1983) of the "Bulletin of the International Union for the Conservation of Nature".

"THE WEALTH OF TRADITIONAL KNOWLEDGE

Many South Pacific islanders possess a wealth of environmental expertise, including traditional systems of resource management. Traditional conservation practices of many South Pacific cultures were once highly effective, and, if supported by or adapted to modern methods, could continue to be so.

Marine conservation in Oceania is more widespread than all other forms of traditional conservation practice - as one might expect of an area whose people mostly live along the margins of the sea. In most areas of the Pacific, fishing, the gathering of shellfish, the hunting of different kinds of sea mammals and the capture of turtles have long constituted an important source of protein to supplement a diet of terrestrial plants and animals. In the past, these aquatic resources were safeguarded by a variety of means: a high degree of environmental awareness; skilled conservation office-holders and master fishermen; a complex system of marine tenure; a variety of magico-religious taboos, enforced by strict fines and punishment, and a variety of methods to conserve a supply of sea foods.

Environmental knowledge was central to most forms of traditional conservation practice in Oceania. The native islanders lived of necessity close to nature and knew how to analyse the diurnial, monthly, and seasonal cycles of their environment. To the Polynesians, Micronesians, and Melanesians, the heavens and the phases of nature served as a clock or calendar. The position of the sun, the rising and setting of the stars, the waxing and waning of the moon, the ebb and flow of the tide, the changing wind directions, the height of the breakers on the reef, the natural smells within the village, the seasonal variances of terrestrial flora and fauna, and the aquatic cycles all served as a system of time reckoning, and, consequently, played a major role in the understanding of life histories, mating seasons, habitat requirements, and other basic knowledge of the plants and animals with which they shared their environment.

Thanks to this high degree of environmental awareness, many island cultures were able to regulate their harvest and use of wild plants and animals on a sustained yield basis. Daily activities were geared to the cycles of nature. Fishing, that most cyclical of human activities, was carried out according to the reading of the heavens as well as the phases of nature. The moon, tides, stars, and fish migrations had a direct bearing on the movement and activities of island fishermen.

WHAT CAN WE SAVE?

These older, long-standing systems of conservation and resource management have much to teach the modern-day resource manager. First and foremost, he can heighten his own awareness of the local environment by mentally combining two culturally different temporal frameworks. By using his own system of time-reckoning (the Swiss watch and the Gregorian calendar) with that of the indigenous culture's system (the movement of the sun, moon, stars, tides, and so on), the modern-day resource manager can see the phases of nature in a new perspective.

To be more specific, the western marine biologist can learn a variety of types of information, such as the lunar periodicity of the spawning of fish; the location and traditional regulation of marine preserves; the fishing grounds used by a particular village; the effect of rainfall, winds, currents and temperature on fishing conditions and the habits of certain fish; the times, places, and seasons offering optimum fishing conditions; the variations in fish habits and migration peculiar to different islands and different parts of the coasts of larger islands; the distribution of toxic plants that might render fish poisonous; the traditional regulations regarding fishing rights; closed seasons; specific identity; the optimum days for exercising particular fishing rights; the construction and proper use of traps and ponds for fish conservation; the various methods of fish preservation; the traditional conservation ethic and its enforcement by fines and punishment.

Little time remains to identify, record, and preserve some of these traditional systems of conservation management: they should be respected, emulated, and where possible preserved, not thoughtlessly replaced."

Shrimp stock assessment conducted in Northern Marianas

The January Monthly Report of the Southwest Fisheries Center's Honolulu Laboratory describes preliminary assessment work currently being undertaken on stocks of the deepwater shrimp *Heterocarpus laevigatus* in the Mariana Archipelago. The field work for the study, which consists of intensive fishing in a control area is intended to provide estimates of exploitable deepwater shrimp biomass. Dr Stephen Ralston, Chief Scientist on the NOAA ship *Townsend Cromwell* spent 15 days of intensive shrimp trapping totalling 300 trap-nights of effort on an isolated area of 1 square nautical mile in depths of 545-727 m (300-400 fathoms) north of Alamagan Island in the Marianas. Over the period of intensive fishing a statistically significant decline in catch rate from 3.4 kg/trap-night to 1.8 kg/trap-night was documented. A regression of catch rate on cumulative catch produced an estimate of 1,700 kg of exploitable shrimp biomass per square nautical mile at the start of intensive trapping. With this estimate of biomass, the estimate of catchability also obtained from intensive fishing, data on the systematic mapping of catch rates for deepwater shrimp, and bathymetric surveys which measure the total shrimp habitat, it will be possible to estimate the total standing stock of *H. laevigatus* in the Mariana Archipelago.

New fisheries projects for Tonga

Several fisheries projects financed by overseas aid are nearing completion in the Ha'apai and Vava'u island group in Tonga, according to a report in the January 27th issue of 'South Seas Digest'. A fisheries centre at Pangai in Ha'apai, costing $T200,000, and including offices, fish storage facilities and sleeping quarters, has been built with funds from the Australian Government. A boatyard and dockyard are also being built in Ha'apai and facilities will include materials for the building of fishing dinghies for local fishermen who will be financed by loans from the Development Bank of Tonga, financed in turn by the United Nations Capital Development Fund (UNCDF). Forty dinghies and a dockyard being built on the Neiafu waterfront in Vava'u are to be funded by the UNCDF through the United Nations Development Programme (UNDP) based in Suva. A 40-tonne fish storage facility, almost ready to operate, has been financed from a loan of $200,000 from the Asian Development Bank. Several areas in Vava'u have been chosen as potential sites for seaweed farming under a plan receiving financial backing from the Commonwealth Fund for Technical Co-operation with technical assistance from New Zealand (see page 5).

Construction of fibreglass boats without a mould

The following article appeared in the September 1983 issue of the 'South-West Indian Ocean Fisheries Bulletin'. The fibreglass boat-building technique described is simple, waste-free, requires no power tools, and could hold potential for one-off boat-building in remote areas.

"The normal method of construction of fibreglass boats involves lamination of fibreglass mat or cloth (roving) with resin inside a mould. While, through the use of a good mould, a perfect finish can be obtained in this way, the construction of the mould is a long and laborious process, and the cost of a mould is such that it is generally estimated that it should be amortized over at least ten boats.

A more recent method permitting 'one off' construction involves the use of fibreglass 'planks' (commercially known as C-flex), which can be laid up on batten moulds before wetting with resin. While this method is strong and can be used for complex curves, a major inconvenience is that the outer surface has to be ground smooth and painted after construction. This requires power tools, and it is difficult to obtain a perfect finish.

A third method of construction has recently been experimented with in the Seychelles, which offers the possibility of construction in limited numbers without the need for a mould. This method was used at the suggestion of SWIOP consultant naval architect Oyvind Gulbrandsen following a description in the magazine 'National Fisherman', but had previously also been used by a Florida boatbuilder.

This method involves the use of flat fibreglass sheets, and does suffer from one limitation: construction of compound curves is impossible, as a sheet of fibreglass, just as a sheet of paper or plywood, cannot be bent in two directions. Of interest to boatbuilders of the region, however, is that construction costs and wastage of materials is negligible, and that power tools are not essential.

The first step involves the construction of frames from any available wood having the required dimensions (in this case old packing cases were used). These frames are placed upside down on a building jig and held together with longitudinal battens at the sheer and between the chine and keel, leaving these two areas free.

Following the method described in the 'National Fisherman', templates were then cut from 'formica' (melamine) sheets, on which the FRP (fibreglass reinforced plastic) sheets were afterwards moulded. It was found, however, that formica breaks very easily when handled, and any tear or ripple in the template will be reproduced on the FRP sheets. It was therefore found preferable to make templates from 4 mm plywood or masonite sheets, and mark out the shape of the panels with a felt pen on a moulding 'table' having a perfectly flat, shiny surface (melamine-covered plywood, waxed masonite .....).

One side and bottom FRP panel was then made following the shape of the templates. The lay-up used was: gel coat, one 450 g mat, and two 600 g rovings. After these panels were removed, those for the opposite side were moulded on their shiny face to produce a 'mirror image'.

The side and bottom panel for one side of the boat were then tacked onto the frames with small nails, and, the chine having been adjusted (FRP can easily be cut with a hacksaw blade), stuck together with strips of fibreglass mat in the spaces between the frames. The second bottom panel was then stuck in the same manner along the keel line, followed by the second side (in this way

working inside the overturned hull was reduced to a minimum).

The assembled hull could then be turned over for building up the laminate to the required thickness in the same way as working inside a mould. It has to be held in the jig at this stage as it is still very flexible. When terminated, the sheer and keel lines have to be polished down and painted over with gel coat to fill slight gaps and give faired edges. The inner reinforcement and deck can then be made as normal.

Construction of two 7.5 m hulls for a trimaran totalled some 24 man-hours of carpentry and 48 man-hours of fibreglass work. These times could have been reduced if the technique was familiar, but are still minimal as compared with wooden construction. It has been proposed that this technique could be used to prepare prefabricated panels for shipping and assembly on site, but it is not likely that the saving in time and effort would compensate the additional cost of shipping boat-length panels."

Ecosystem modelling computer package developed

A general modelling package for coral reef ecosystems, 'ECOPATH', has been developed at the Southwest Fisheries Center's Honolulu Laboratory by research workers Dr Jeffrey T. Polovina and Mark D. Ow. A computer programme in BASIC has been written to enable the model to be used on microcomputers. A user's handbook, which contains the programme listing, is available from the laboratory as Administrative Report H-83-23.

The ECOPATH model is an analytical procedure to estimate a biomass budget for a box model of an ecosystem given inputs which specify the components of the ecosystem, together with their mortality, diet, and energetics value. The model produces estimates of mean annual biomass, annual biomass production, and annual biomass consumption for each of the user specified species groups. The species groups represent aggregations of species with similar diet and life history characteristics and which have a common physical habitat. The ECOPATH model is not a simulation model with a time component as are some more complex ecosystem models. It estimates a biomass budget for the marine ecosystem in a static situation under the assumption that the ecosystem is at equilibrium conditions. Since its input needs are relatively simple, ECOPATH can be useful in modelling ecosystems where detailed data are scarce, often true in studies of tropical ecosystems.

Interested users should contact the authors at Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, Honolulu, Hawaii 96812.

Sorry, our mistake

The editors shamefacedly confess full responsibility for a reporting error which occurred in the last issue of the SPC Fisheries Newsletter (# 27). The offending article, entitled New Japanese aid vessel for Kiribati, announced formalisation of an agreement by Japan to donate to Kiribati an A$2 million pole-and-line boat. Kiribati Fisheries Adviser Brendan Dalley put us right with the following telex message:

"RE FISHERIES NEWSLETTER OCTOBER DECEMBER 1983 PAGE 7 AID VESSEL FOR KIRIBATI THIS POLE AND LINE VESSEL REVOLUTIONARY DESIGN CARRYING 65 PASSENGERS PLUS 400 TONS CARGO PLUS 12 CADETS AS WITH NEI MOMI CATCH MOSTLY COPRA REGARDS DALLEY."

SPC Fisheries Newsletter No. 28 January - March 1983

THE TUVALU VAKA PROJECT

by

Steven A. Brown
Save The Children
Funafuti, Tuvalu

Small sailing canoes are a common sight on the lagoon islands of Tuvalu. However, the wooden logs used in carving the dugout hulls are becoming increasingly scarce.

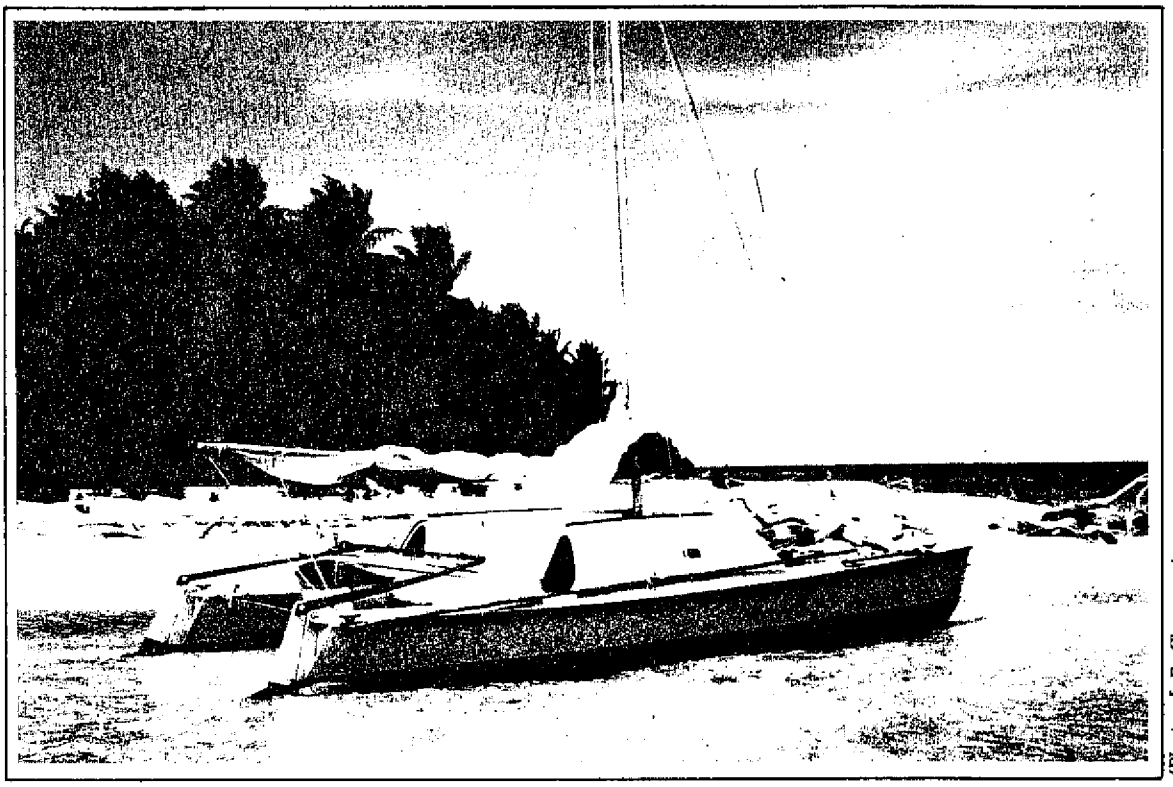
The "Vaka" Project, funded by Save The Children, began in April 1983, after 2 years of planning by Jack Lockett, Tuvalu Field Director for Save The Children, and Windworkboat consultant Jim Brown. This pilot project is intended to train Tuvaluans in the construction of efficient sailing craft needed for intra-lagoon trolling and transportation. The need arose as an alternative means of transporting people and harvesting coconuts out on the uninhabited motus dotting the large lagoon. In Funafuti, where petrol costs A$4 per gallon, transportation is an expensive problem, especially when, because of a dry-docked supply ship, fuel is not available.

Now, in Funafuti at least, tall sails can be seen crossing the lagoon. The boats are built using pre-laminated wooden panels formed in a curved, boat-like shape. After joining two 16 foot panels together with epoxy and a panel buttblock, the wooden sheet is trimmed with a power saw to a predetermined shape. A thin fibreglass template is made using the panel as a mould, then popped inside out to mark the mating half of the hull. Sheer stiffeners are glued on, wood sealed with clear epoxy, and now the halves are ready to be wired together down the keel and stems. Once the beam measurement has been determined, the overturned hull is set rigid with fibreglass "bandaids" every 3 feet. The glue becomes hard in half an hour, and the hull is turned upright. An epoxy-filler keel is then trowelled into the apex of the hull and fibreglass cloth tape laid in for strength. After this sets, the wire is removed, keel sanded and glassed, and a hardwood "reefcruncher" screwed in place. The advantages of this frameless hull are: reduced construction time (one 32 foot hull can be completed in 2 days with 3 trainees); epoxy coated and glued hulls are rot free; and also the ability to construct a variety of different boat sizes and shapes from the same material without the training complications of lofting, moulds, or frames. A major disadvantage however is the high cost of shipping from overseas to Funafuti. This drawback, common with most development projects is justified by the durability and longevity of the boats.

Our first prototype, built in 4 and a half weeks, is a 32 foot Windward Outrigger "Vaka" based on local designs. Isave (flying fish) as she is called, is modified with 2 daggerboards to increase windward performance. She also sports a sock sail (the cloth is sewn around the spar to form a wing shape) which enhances wind flow. In trials this craft proved very fast yet became hard to manoeuvre under steering paddle alone, due in part to her high prismatic underbody and also because of the local method of shifting the sail from one end to another to change directions. This problem was somewhat corrected by the twin daggerboards. Isave is fun to sail, and has now been

donated to the island of Nukufetau where the local sailors are skilled in handling this type of craft.

The second project, a catamaran, was originally designed as a fishing vessel. After close scrutiny it was decided that Funafuti really needed a sailing lagoon taxi capable of carrying many people and coconuts. This 33 foot cat has kick-up rudders and boards for beach landing and boarding of passengers, and two enclosed cabins with two berths each to provide shelter during the frequent rain squalls. She is equipped with 2 head sails, a light-airs genoa and a storm jib, companioned by a large main. All sails were sewn locally. In times of no wind, a 22 h.p. Volvo outboard helps meet a busy charter schedule. Groups embark early in the morning for a full day of sailing, fishing and coconut hauling. The other day, a local captain and crew sailed 30 people 4 miles to Funafala and returned with 35 gunnysacks full of coconuts. As the sun fell, everyone sang and slept while the cat loped along at 6 knots.



(Photo: L.B. Chapman)

The second boat built by the project, a 33-foot motor-sailing catamaran.

While building these two boats, local fishermen kept insisting they would buy smaller paddling canoes. So again, after a few prototypes, we settled on 2 styles. Flat bottom and rounded V bottom. The flat bottom model is built with 3/16" plywood throughout, with an 8" wide dory-like bottom. These 16 footers are all made from 2 sheets of plywood. The completed canoe, frameless, weighs around 40 lbs. Some fishermen appreciate being able to stand on the bottom, which makes hauling fish easier. The rounded V bottom is built using 1/8" plywood. Two halves are wired down the keel and spread open at a wide angle. An epoxy-filler keel is buttered in and left to set at this angle. Then the sides are bent up or "tortured". The stems are glued, the wire clipped off, and the thin rounded hull is glazed with 7 and a half oz. cloth. This makes a very light, aesthetically pleasing canoe.

This has become the most successful side of the project so far. Of the 7 canoes built, most have been sold. Over a period of 7 months our crew of 4 trainees have become proficient in running power tools, handling epoxy fibreglassing, but most of all, naturally, sailing.

(Photo: R.D. Gillett)

The author with one of the projects popular canoes.

Our most recent project, a 24-foot cat, is being built for an egg producer who lives on Falefeke, a motu 5 miles from market. This craft, near completion, required little supervision. All profits are reinvested into materials and maintenance.

The goal here is to provide a service that is self perpetuating and self reliant, offering Tuvalu people an option beyond petrol dependant transport. The sea-borne culture of Tuvalu, given their ancestoral heritage, seems well suited to absorbing their old principles of sail combined with the new methods of sail technology. This is apparent by the gratification beaming from the Polynesian builder's face as his sleek creation hits the water at launching or when sailing over steep swells, the exhilarating ride inspiring passengers to sing and shout while schools of dolphin guide them home.

SPC Fisheries Newsletter No. 28 January-March 1984

DEEP-BOTTOM FISHING IN VANUATU: INITIAL RESULTS

by
Francois Brouard and Rene Grandperrin
Office de la Recherche Scientifique et Technique d'Outre-Mer
Port Vila, Vanuatu

Introduction

As Vanuatu has been actively developing the fishing of deep bottom species since 1982, it seems the time has come to draw preliminary conclusions and endeavour to determine what degree of fishing pressure this resource would be able to sustain.

The Vanuatu archipelago comprises eighty islands and lies between 13°S and 20°S approximately. The outer reef slope is relatively steep, so that the area of water that can be fished (depth between 100 and 400 metres) is fairly narrow. For the whole archipelago, the area of the sea bottom between 100 and 400 m deep is estimated at 736,000 ha and the slope has an average gradient of 10%; the total length of the 100m isobath is 1,400 nautical miles (2,600 km).

The Fishery: data collection and findings

Around Efate, a large portion of the deep bottom fish catch intended for sale in Port Vila is made by the Fisheries Department, and it is to that Department that we owe the major part of the information we have to date. (Several fisheries development operations are also under way in the other islands of Vanuatu and we have developed a simplified system of data collection from them in order to obtain information for the whole of Vanuatu).

At Port Vila, when the catch is landed, catch and effort data are carefully recorded; all the fish are identified, measured and weighed; sex and sexual maturity are noted and gonads are weighed; the sagittal otoliths and some scales of the medio-dorsal area are taken as samples. After coding, this information is transferred to log-sheets for data processing (Grandperrin and Brouard, 1983).

Beyond 100 m, sixty different species are caught, almost all of which are sold without any risk of causing fish-poisoning. Three genera make up about 80% of the catch by weight. In 1982 and until the beginning of 1983, Etelis spp. (deep-water red snappers) represented 52.4%, Pristipomoides spp. (jobfish) 5.1% and Epinephelus spp. (groupers) 23.1%. This particular distribution is a result of the depths at which fishing was commonly carried on during this period (more than 250m). In March 1983 fishing began in shallower waters, and it is already clear that the 1983 figure will show an increase in the relative abundance of Pristipomoides.

Around Efate, during the year 1982 and the first months of 1983, six tonnes of deep bottom fish were caught using the wooden hand-reels common throughout the Pacific. The fishing effort was 1,600 reel hours. The average catch per unit of effort over a period of 16 months was 3.49 kg/reel hour. The fishing effort having been irregular, it is not possible with the data

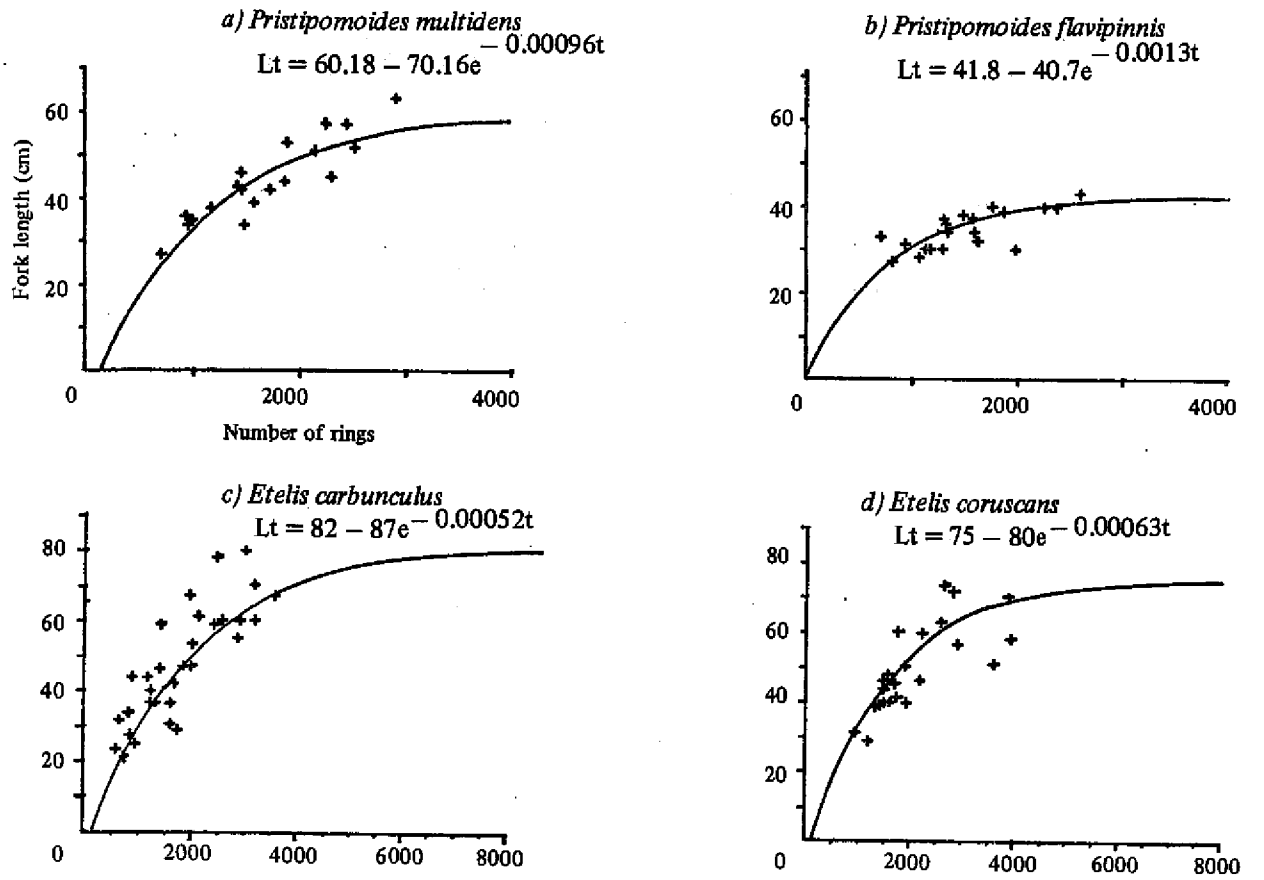


Figure 1: Relationship between number of daily growth rings and caudal fork length.

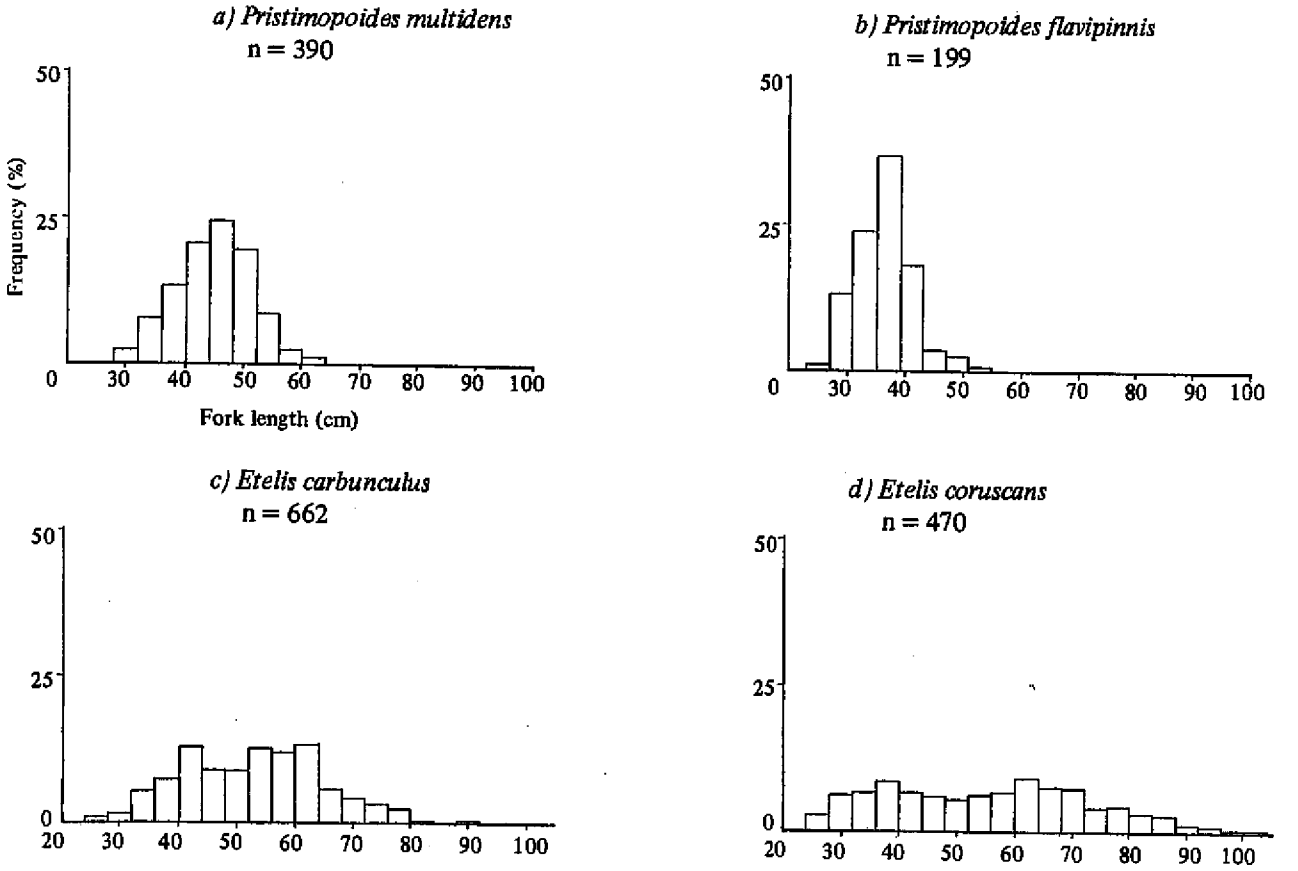


Figure 2: Length – frequency distributions.

currently available to pinpoint any seasonal variations that there might be in abundance or in catchability of fish.

Growth and size frequency of Etelidae

The technique of reading daily growth rings of otoliths that was proposed by Pannella (1974) and later used by several authors for tropical fish (Ralston, 1976; Uchida et al., 1982, Uchiyama, T.H., personal communication), was used in Vanuatu to assess the age and growth of Etelis carbunculus, E. coruscans, Pristipomoides flavipinnis and P. multidens (Brouard et al., 1983). Figure 1 shows the growth curves that have been plotted; size frequency distributions are given in figure 2. The von Bertalanffy parameters that have been obtained have made it possible to assess natural mortality using Pauly's formula (1980) (Table 1).

Table 1. Parameters of growth and natural mortality of four Etelidae

	E. carbunculus	E. coruscans	P. multidens	P. flavipinnis
L (cm)	82	75	60.2	41.8
L_o(cm)	-5	-5	-10	1.1
K(a^{-1})	0.19	0.23	0.35	0.47
M(a^{-1}) (1)	0.38	0.44.	0.66	0.89

(1) according to Pauly's formula (1980):

$$\log(M) = -0.0066 - 0.279 \log L + 0.654 \log K + 0.463 \log T$$

(where T = average temperature of the water expressed in ^{o}C).

Estimating the potential yield of deep bottom fish in Vanuatu waters

There are not yet of course enough catch and effort data from Vanuatu to be able to make any kind of model at this stage. However, it is possible, as has already been suggested (Welcomme and Gulland, 1980; FAO, 1980), to determine orders of magnitude of potential yields in comparison with other regions with similar ecology in respect of which yields are already well defined. Hawaii, which, like Vanuatu, is situated in the tropical zone, has been used as a reference (Ralston and Polovina, 1982).

Both archipelagoes have the same structure in that there is no lagoon and the outer reef slope is very steep. The physico-chemical features and primary organisms are similar (Brouard and Grandperrin, 1983) and the fish species found very similar also. In the Hawaii islands, the main species caught at depths between 80 and 240 m are: Pristipomoides filamentosus, Epinephelus quernus, Seriola dumerili, Pristipomoides zonatus. Between 200 and 350 m the most common species are Aphareus rutilans, Pontinus macrocephalus, Etelis coruscans, E. carbunculus, Pristipomoides sieboldi. With the exception of Pontinus macrocephalus (Scorpaenidae) these species (or closely related ones) are found in Vanuatu. P. filamentosus, which makes up the greater part of catches in Hawaii would be rather less abundant in our area where P. multidens and P. flavipinnis predominate. According to our data and those of Uchida et al. (1979, 1982) catches per unit of effort are of the same order of magnitude in the two areas. There does not therefore appear to be any great difference in abundance.

If one applies the figures obtained in Hawaii to the whole of Vanuatu the estimated maximum sustainable yield (MSY) is between 147.0 and 380.8 tonnes/year. Around Efate, the MSY would be between 13.7 and 35.4 tonnes/year. As the Hawaiian catches are underestimated for certain islands because recreational fishing is not taken into account, it seems permissible to increase figures slightly. For the whole of Vanuatu, the MSY would be about 300 tonnes/year, i.e. 0.4 kg/ha/year. For Efate it would be 30 tonnes/year.

With a view to correcting our data, we examined the results obtained by Munro (1973) in the Caribbean zone. The author demonstrates that the abundance of fish on the outer reef slope (deeper than 100 m) is ten times smaller there than it is on the "continental shelf" (less than 100 m). He estimates the yield for the "continental shelf" to be between 11.3 and 15.1 kg/ha/year, which gives an estimated MSY of 1kg/ha/year for the outer reef slope in the Caribbean tropical zone. Marten and Polovina (1982), making a general analysis of yields of the different tropical ecosystems, in which they include consideration of primary productivity and depth, find similar orders of magnitude. Assuming that our MSY of 0.4 kg/ha/year could be multiplied by 2 or 3, it is still probable that it would hardly exceed 1 kg/ha/year. This being so, the number of vessels (of the alia catamaran type) that would lead to maximum sustainable exploitation would be between 50 and 100 for the whole of Vanuatu (MSY: 300 to 600 tonnes/year) and between 5 and 10 in the waters around Efate (MSY: 30 to 60 tonnes/year). These figures should help development planners in selecting their objectives. The bottom fish resources of the outer reef slope appear fairly limited and this means that very great vigilance must be exercised in fishing these waters.

Acknowledgement

The authors wish to thank the Fisheries Department, and in particular its Director, Mr Crossland, for their continuous close co-operation.

References

BROUARD, F. et R. GRANDPERRIN - 1983 - La peche aux poissons demersaux profonds a Vanuatu : etude preliminaire. Mission ORSTOM de Port-Vila, Notes et documents d'oceanographie no. 7, 22 p.

BROUARD, F., R. GRANDPERRIN, M. KULBICKI et J. RIVATON - 1983 - Note sur la lecture des stries journalieres observees sur les otolithes des poissons demersaux profonds a Vanuatu. Mission ORSTOM de Port-Vila, Notes et documents d'oceanographie no. 8, 9p. (Editors note - English translation available from Southwest Fisheries Center, National Marine Fisheries Service, NOAA, Honolulu,, Hawaii 96812).

FAO - 1980 - Quelques problemes scientifiques sur les pecheries multispecifiques. Rapport de la Conference d'experts sur l'amenagement des pecheries multispecifiques, Rome, Italie, 20-23 septembre 1977. FAO Dec. Tech. Peches, 181, 46 p.

GRANDPERRIN, R. et F. BROUARD - 1983 - Etat d'avancement des recherches conduites par l'ORSTOM en matiere de peche a Vanuatu, Mission ORSTOM de Port-Vila, Notes et documents d'oceanographie no. 6, 19 p.

MARTEN, G.G. et J.J. POLOVINA - 1982 - A comparative study of fish yields from various tropical ecosystems, p. 255-289. In Pauly, D. and G.I. Murphy (eds). Theory and management of tropical fisheries. ICLARM Conference Proceedings 9, 360 p.

MUNRO, J.L. - 1973 - The biology, ecology, exploitation and management of Caribbean reef fishes. Part I. Coral reef fish and fisheries of the Caribbean Sea. Research Reports from the Zoology Department, University of the West Indies no. 3, 43 p.

MUNRO, J.L. - 1974 - The biology, ecology, exploitation and management of Caribbean reef fishes. Part III. The composition and magnitude of line catches in Jamaican waters. Research Reports from the Zoology Department, University of the West Indies no. 3, 27 p.

PANNELLA, G. - 1974 - Otolith growth patterns: an aid in age determination in temperate and tropical fishes. Proc. Int. Symp. on the ageing of fish (T.B. BENGAL Editor) - Unwin Brothers, Surrey, England : 28-39.

PAULY, D. - 1980 - On the interrelationships between natural mortality, growth parameters, and mean environmental temperature in 175 fish stock. J. Cons. int. Explor. Mer, 39 (2): 175-192.

RALSTON, S. - 1976 - Age determination of a tropical reef butterflyfish utilising daily growth rings of otoliths. Fish. Bull., U.S., 74: 990-994.

RALSTON, S. et J.J. POLOVINA - 1982 - A multispecies analysis of the commercial deep-sea handline fishery in Hawaii. Fish. Bull., 80 (80): 435-448.

UCHIDA, R.N., B.M. ITO et J.H. UCHIYAMA - 1979 - Surveys of bottom fish resource in the north western Hawaiian islands. SPC, 11th Regional Technical Meeting on Fisheries, Working Paper 4, 17 p.

UCHIDA, R.N., D.T. TAGAMI et J.H. UCHIYAMA - 1982 - Results of bottom fish research in the north western Hawaiian islands. SPC, 14th Regional Technical Meeting on Fisheries, Background Paper no. 2, 14 p.

WELCOMME, R.L. et J.A. GULLAND - 1980 - Methods for assessing the resources available to small-scale fisheries. FAO, IPFC/80/SYMP/SP/7, January 1980, 10 p.

SPC Fisheries Newsletter No. 28 January - March 1984

A MARINE RESOURCES INFORMATION SYSTEM FOR THE PACIFIC?

by

Bess Flores
South Pacific Commission
Noumea, New Caledonia

This paper uses a proposal for the establishment of a marine resources information system as a background for examination of the appropriateness and viability in the South Pacific Commission area of single - disciplinary information systems.

Those proposing such a system argue that -

(1) marine resource specialists, planners, educators, businesses and the public at large need access to marine resource information produced inside and outside the SPC area;

(2) no existing institution or system successfully fulfils this need;

(3) the need could be fulfilled by the development of a network of marine science specialists, institutions, governments, and libraries reporting to a central marine sciences body whose responsibility it would be to collect, organise and disseminate the information.

Such arguments are explicit in the following statements extracted from the 1982 "information" issue of the ICLARM Newsletter(1):

"The major information-handling institutions in the area, i.e. the University of the South Pacific, the Forum Fisheries Agency and the South Pacific Commission, have few serious problems in identifying or obtaining relevant marine resource publications produced or held outside the SPC area. The real problem lies in the identification, collection, organisation and dissemination of relevant publications produced in or about the SPC area.

"There is no Aquatic Sciences and Fisheries Information Service (ASFIS) input centre in Australia, Hawaii or New Zealand, nor in any country of the SPC area, and this world-wide source of fisheries information receives only incidental input from the South Pacific. It is not that this information does not exist, but that, with too few notable exceptions, library, publishing and distribution facilities are poorly funded, staffed and organised.

"It is often difficult for a Government officer to find within his department a complete range of his own department's publications, let alone relevant publications from other departments and countries, and this is repeated on a national scale. The South Pacific Commission, for example, produces useful fisheries documents, every one of which is sent to fisheries and other offices in each country throughout the region. These documents may not reach the offices to whom they would be most useful, and may not be

retained for future reference. Documents can be lost, destroyed, abandoned or taken into protective custody by itinerant experts.

"Expatriate workers and extra-regional organisations consistently have larger, better-organised and hence better-used collections of publications relating to South Pacific fisheries than exist in the countries themselves. South Pacific countries not only do not control their own fisheries information resources, but also are largely dependent on extra-regional countries to provide and disseminate the information which they need", and which they themselves originally produced.

The desirability of an information system is clear. It is also clear that direct contact between specialists is, at least in the short term, the most efficient means of information transfer. However the type of 'information network' usually proposed at specialist group meetings usually fails because of insufficient attention to the information infrastructures on which the projected network must depend. The success of networking depends on a careful choice of collaborators, careful timing and setting-up plus continuing supervision and upkeep. These in turn depend on good organisation, good communication and adequate financial support.

Since 1982 there have been several developments in the establishment and upgrading of information systems and infrastructures:-

(1) The Pacific Information Centre (PIC), formerly the Regional Bibliographic Service, received IDRC funding to establish a multi-disciplinary bibliographic information and document delivery service, and published the South Pacific Bibliography, 1981.(2)

(2) The South Pacific Regional Environment Programme (SPREP) established focal points and published, through PIC and with SPC Library assistance, a bibliography of environmental issues related to natural resources(3), a directory of research workers in national resources, and is preparing a directory of marine research institutions.

(3) The Commonwealth Regional Renewable Energy Resources Information System, working through SPEC, established focal point for the collection and dissemination of energy information.

(4) FAO provided a consultant to discuss with governments and regional bodies their possible input into the International Information System for the Agricultural Sciences and Technology.

(5) A number of other networks have been proposed, usually without reference to existing systems.

These developments were discussed at the meeting of the PIC Advisory Committee where several recommendations of interest to marine resources information systems were made.(4) One recommendation was that funding be sought from ESCAP, and other potentially interested agencies, to hold in the SPC area in 1984 a meeting to discuss existing and proposed national and regional information systems, and to identify the needs of governments and organisations wishing to develop or participate in information systems.

Later in the year the UNESCO Conference on school library development (Suva, November 7-11, 1983) brought together participants, observers and consultants from Australia, Cook Islands, Fiji, Kiribati, Papua New Guinea, Tonga, Tuvalu, Vanuatu, the British Council, CIDA, SPC, SPEC, University of Hawaii, University of the South Pacific, UNESCO and FAO. It offered opportunities to discuss the educational and information policies of

governments, and to reactivate the Standing Conference of Pacific Libraries (SCOPAL). As a result, the meeting also expressed its support for an information policy meeting, and directed SCOPAL to liaise with UNESCO and other agencies in this regard.

Interest in marine resource information was shown at the Twenty-third South Pacific Conference in Saipan, October 1983, which directed the Secretary-General to identify available reports relating to the development management and control of maritime natural resources in the SPC area. Identification will be facilitated by the PIC/SPREP bibliography on environmental issues(3), in which approximately 25% of the references relate to marine resources. When, however, marine resource information is seen as part of the total information relating to the Pacific, the proportion drops sharply. Analysis of SPC library holdings and information activities shows that marine resources account for 10% of the total holdings, 10% of the current intake and 17% of the information requests, against, in agriculture, 17% of the total holdings, 10% of the current intake and 33% of the information requests. On the other hand, marine resources staff account for more than 12% of SPC headquarter's total staff, and if their personal information collections and activities were taken into account, both holdings and demand would obviously be higher. However, the same trend is seen in catalogues of other collections. In the 1981 South Pacific Bibliography (2) marine resource information accounts for 7% of the total. In the 1981 Papua New Guinea National Bibliography (5) it is 6%, while in the total holdings of the Kiribati National Collection (1981)(6) it is slightly more than 10%.

Unless systematic attempts are made to identify, seek, record and conserve government documents and consultant reports, marine resources information - like development information in other fields - will remain under-collected, under-recorded and often unknown, filed and forgotten in the office of origin. If it were not for the annual SPC fisheries technical meetings and tuna, billfish and deep sea fisheries programmes, and the programmes of the FFA and of the Universities, the known Pacific marine resources literature would be meagre indeed.

In marine resources and in the inclusive fields of natural resources and environment (which account for between one third and one half of the SPC library's holdings and intake and more than one half of the library's incoming information requests) it is necessary to take into account the interaction between people and resources, and to widen the fields of interest into economics, anthropology, nutrition, demography, history, politics, etc. The means by which information is or should be transmitted and collected include therefore oral and audio-visual means (audio cassettes, videos, film and radio).(7) Most agencies, however, support specific programmes and projects rather than attempt to meet the needs of a multi-disciplinary system, and few, if any, governments in the SPC area have any coherent policy on information resource management. These two factors result in a proliferation of single-disciplinary information system projects and proposals which do not necessarily, or even usually, include support to the (usually weak) information infrastructures of governments or regional bodies.

Yet the equipment and technical processes associated with the collection, organisation and dissemination of information are similar regardless of the subject fields in which the information is collected, and to some extent regardless of the size or form of the collection. A microfilm camera, for example, costs as much whether it is bought to record 1,000 marine resource reports or 5,000 natural resource reports, and so does a typewriter or micro-computer. On the other hand, taking the microfilm example further, one organisation may decide to record on 16 mm film and another on 35 mm. If their reading or reproducing equipment is not compatible, they will not be able to

exchange the documents they film. The same is true of micro and mini-computers which are increasingly used in the SPC area and for which no standard bibliographic software exists.

The lack of standardisation, inherent in a proliferation of separate, sometimes competing systems adds to costs and limits information exchange. To avoid this, co-operating bodies should formulate joint policies regarding areas of specialisation (subject fields, form of material, scope of operations) and compatibility of equipment and processes of information transfer. While acknowledging the importance of marine resource activities in the SPC area and the necessity to record and make available for general use relevant library, government office and personal collections, I therefore question the cost-effectiveness of establishing a purely marine resource-oriented information system which could divert funds and time from other equally important fields.

The ideal would be for agencies interested in Pacific development information to provide need-related support to an integrated multi-disciplinary and multi-media Pacific bibliographic data base and document delivery service, such as is now beginning operation at PIC with the co-operation of SPC, SPEC, national libraries and other national and international bodies (UPNG; NLA; FAO; ESCAP; IDRC, etc.). This does not imply that the collection and dissemination of information is or should be the exclusive preserve of a library system. It is the business of a library-based information system to identify, collect, organise, describe, evaluate and make available relevant and reliable information, in all its recorded forms, to specialists, planners, educators, the mass media, the business community and the general public. It is the business of those people and organisations to evaluate the information for their own individual purposes, to reject or to apply it and to generate new information which eventually goes back into the cycle. As, in a tree, the quality and quantity of its fruits depend largely on the quality and quantity of nourishment received by its roots, so, too, a multi-disciplinary system would strengthen the collection, organisation and dissemination of information, both in the donor's special field and in related fields, to government planners, scientific and technical workers, educators and the population at large.

Practical actions by governments, institutions and aid agencies could include:-

(1) support for the concept of an integrated multi-disciplinary multi-media information system based on the Pacific Information Centre, with input from SPC, SPEC and Pacific governments and output back to governments, regional bodies and to systems established elsewhere in the Commonwealth;

(2) direct assistance to countries and organisations who are already co-operating in the system and who could present a coherent joint programme and costings;

(3) support for holding in the SPC area, a meeting of government planners, scientific workers, librarians and international bodies, to identify the needs of governments and organisations wishing to participate in the development of integrated national and regional information systems and services;

(4) encouragement of research and co-operative efforts in ensuring compatibility of information processing and recording equipment and programmes;

(5) assistance in identifying and approaching potential donors and co-operators.

There is therefore wide scope for co-operative action.

References

(1) Flores, Bess. "Fisheries information in the South Pacific". ICLARM Newsletter, 5 (2) 1982: 20.

(2) South Pacific bibliography 1981. Suva: Pacific Information Centre, 1982 - (Input from libraries in Cook Islands, Kiribati, Solomon Islands, Tuvalu, Western Samoa, SPC, USP).

(3) Environmental issues in the South Pacific: a preliminary bibliography. Suva: Pacific Information Centre/Noumea; SPREP, 1983 - (Input from SPC Library, USP Library; Fiji College of Ag. Library; Fiji Min. Ag. Fish Library; USP Library; USP institute staff).

(4) "PIC advisory committee meeting". University of the South Pacific Bulletin, 16 (29) July 1983: 6.

(5) Papua New Guinea national bibliography 1981. Waigani: National Library Service of Papua New Guinea, 1981.

(6) Kiribati national collection 1981, compiled by Richard Overy. Tarawa: National Library and Archives, 1982.

(7) See for example: Rahnema, M. The sound library: a simple but revolutionary tool for development. UNESCO journal of information science, librarianship and archives, 4 (3) 1982: 1511-58.