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TWENTY-FOURTH REGIONAL TECHNICAL MEETING ON FISHERIES
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**AN UPDATE ON ACIAR SUPPORTED FISHERIES RESEARCH
ACTIVITIES IN SPC MEMBER COUNTRIES**

B R Smith
Research Program Coordinator
ACIAR Fisheries Program

The Australian Centre for International Agricultural Research (ACIAR) was established in 1982 to encourage and support collaborative research directed at solving key agricultural and fisheries problems in developing countries. Basic to the ACIAR approach of using scientific collaboration as a means of giving aid is the idea of partnership in which both partners derive mutual benefits. These benefits can come in two ways — as new production technologies and management techniques; and a strengthened research institutions in all countries involved.

The ACIAR Fisheries Program has been active in the Pacific Islands since 1984, with activities directed principally at several key inshore resources of importance throughout the region, both as local food and cash earning commodities for rural populations. Emphasis has been given to the enhancement of national capacity within partner institutions to assess and monitor exploited stocks and to develop for the consideration of policy makers, appropriate management advice.

This document briefly outlines the aims and outputs of ongoing or recently concluded ACIAR activities in the Pacific, and comments briefly on several new initiatives which would be of interest to the participants to this meeting.

a) **RECENTLY COMPLETED PROJECTS**

i) **Giant clam mariculture (Fiji, Cook Islands, Tonga, Tuvalu, Kiribati)**

The James Cook University (Dr John Lucas) coordinated project "The Culture of the Giant Clam [Tridacnidae] for food and Restocking the Reef" concluded in January 1992, effectively ending a seven-year commitment by ACIAR to giant clam research. An earlier project [1984-87] demonstrated the technical feasibility of culturing these molluscs and provided more reliable data on the status of wild stocks. This Follow-on Project [1989-92] continued this work with a greater emphasis on the development of culture technologies appropriate to village farmers in SE Asia and the Pacific Islands. The Pacific countries involved in this were Fiji, Philippines, Tonga, Tuvalu, Cook Islands and Kiribati.

The major achievements of the second phase relevant to all participating countries can be summarised as follows:

Stock assessments were continued, and the status of giant clam stocks in many tropical Indo-Pacific countries is now well documented. Generally, stocks have been severely depleted, and the island countries are more aware of the need to manage and conserve their stocks. Management plans have been recommended in some countries, and juvenile clams have been reintroduced into some regions where they were once abundant but are now extinct.

The **biology of giant clams** is better understood. The anatomy, histology and pathology of the different species of clams have been comprehensively described for the first time. Genetic studies showed that there were little genetic differences between natural populations of clams on a local scale, but significant differences occurred between different regions of the Western Pacific. A new deeper water giant clam species, *Tridacna tevoroa*, was described from Fiji and Tonga.

Technological advances in the mariculture of clams have been made: these include simplified hatchery methods using flow-through tanks, artificial larval diets and selection of larvae. The production in the nursery phase of culture has been improved by nutrient enrichment and the use of herbivores. A variety of techniques has been developed for the culture of clams in the sea, including farming in the inter tidal zone. Measures to reduce predation on clams in the sea have also been investigated. Culture techniques appropriate to isolated, developing Pacific Island nations have been developed.

Training courses were conducted for various groups of people including overseas clam project staff being trained in giant clam mariculture techniques in Australia, in-country training for marine resources personnel, and training for prospective clam farmers.

Publications — over 240 articles have resulted from the project: these include conference papers, manuals, magazine articles, journal papers, hand-outs, theses, newsletters, monographs and technical reports. Practical manuals on topics relevant to giant clam mariculture and which are comprehensive and have an easy to follow format are in the process of being prepared. These include: A Hatchery/Nursery manual; an Ocean Culture Manual and a Giant Clam Atlas.

Final Country Reports have been prepared for each participating Pacific Island country in consultation with national project staff and senior fisheries officials. The reports summarise the work and major outputs of the research relevant to each country, and include clear recommendations for future action which are consistent with national potentials and priorities.

The **economics and marketing** of clam farming were investigated in conjunction with another ACIAR project led by Prof Clem Tisdell. These studies investigated potential markets for the meat, shell, and live specimens, and suggested markets exist in South East Asian Countries and among Pacific Island Communities living abroad.

The achievements of this project owe much to the active support and collaboration of Dr John Munro, Director of ICLARM/CAC.

ii) Underwater visual assessment of reef fish stocks (Fiji)

This two-year project involved collaboration between QDPI and Fiji Fisheries Division and in this first phase, was essentially a method development study. The initial research, further trials, and validation of the method took place on the Northern Great Barrier Reef, primarily on reefs off Cairns, with two subsequent one-month periods of field research in Fiji. This study terminated in March of this year and is now undergoing formal evaluation.

The project developed an effective underwater visual census (UVC) method to measure fish numbers and lengths on tropical reefs. Various dimensions of strip transects and stationary point counts were tested for five families of fish that form the basis of fisheries in the South West Pacific. Both strip transects and point counts showed little difference in their estimates of fish density, in terms of accuracy and precision. The ability to detect changes in fish density with UVC data was reasonably powerful for most species groups. Estimation of fish lengths after training on wooden models was accurate to within 5cm size classes, for fish lengths up to 70cm forklength. Fish larger than 70cmFL were more difficult to measure visually: estimates were accurate to within 10cm size classes.

The UVC technique was validated by comparing point count data with independent unbiased estimates of density and biomass from explosive samples. Reasonable levels of accuracy in density estimates were indicated for some species groups (70–105%), while other species groups were underestimated by approximately 50%. Those species not well censused by the UVC methodology used here, were small and cryptic Serranidae species, and some of the larger serranids which are rare and diver shy.

Having evaluated the UVC method, visual census surveys employing stationary point counts, were conducted on five reefs in Fiji, and seven reefs on the Northern Great Barrier Reef. Fish abundance and biomass differed significantly between some reefs. Differences in species composition were also detected. A poor relationship between the derived index of fishing

pressure and stock density was obtained. It is likely that this was because the information used to derive the fishing pressure index was too imprecise.

The potential for using UVC data for fisheries stock assessment was demonstrated using the production model. To fully incorporate UVC data in stock assessment theory to predict maximum sustainable yields, the relationship between stock density and catch per unit of effort needs to be evaluated. This forms the basis of the next phase of our project.

The study results have established the value of UVC as a quick and effective means of obtaining a preliminary assessment of a coral reef fishery, especially in situations where catch and effort time series data are unavailable. UVC generated population density data can be used to monitor stocks over time, or to compare stocks spatially. Visual surveys can also incorporate measurements of habitat for environmental monitoring, or sedentary fauna of other fisheries such as clams or beche-de-mer. Independent estimates of fish stock density are also useful for testing hypotheses developed in fishery assessment models. Predictions of stock density from assessment models based on fishery statistics can be tested using usual survey of the populations.

Subject to a successful review of the project, a second phase is proposed to use UVC methods in stock assessment programs, to assist management of the shallow water reef fisheries in the South West Pacific. Fiji and the Solomon Islands have expressed interest in this second phase project should it proceed.

b) ONGOING PROJECTS

i) Tuna baitfish research (Fiji, Kiribati, Solomon Islands)

The CSIRO/ACIAR Tuna Baitfish Research Project, under Dr Stephen Blaber, began in November 1986 and involved collaboration between CSIRO Division of Fisheries in Cleveland and the Fisheries Divisions in Solomon Islands and Maldives. The work was extended to include Kiribati during 1988. A new project was started in 1990 that continued the work in Kiribati and Solomon Islands and involved Fiji for the first time. The first project addressed problems of trophic interactions between the baitfishery and the subsistence reef fish fishery. It also undertook detailed analyses of baitfish fisheries biology and ecology in each country to enable the participating countries to develop appropriate management strategies. The results of these studies were presented at a workshop sponsored by ACIAR on tuna baitfish that was held in Honiara, Solomon Islands in December 1989. The proceedings of the workshop were published as ACIAR Proceedings No. 30.

Field research on baitfish in Kiribati finished in February 1991 and was geared towards attempting to assess the potential yield of the baitfishery and to understand the factors that contributed to the wide fluctuations in baitfish abundance observed in the baitfishery. These results will be published soon as ACIAR working paper No. 36. Project scientist, Mr Nick Rawlinson, also made observations on the commercial pole-and-line tuna fishery during his time in Kiribati and has made suggestions on technical improvements to the fishery that have been included in the report. The incorporation of these suggestions will, it is hoped, improve the viability of the industry.

More recently, most project activities have been directed towards Fiji, where the question of possible trophic interactions between the baitfishery and subsistence reef fish fisheries is also a problem. Other work includes examining baitfish potential in areas of the country where available bait grounds are not being used. If the project finds adequate supplies of baitfish in these areas, it will enable the industry to spread their bait fishing effort and hopefully allow

them to exploit tuna resources in new areas. Initial results have been good with pole-and-line vessels starting to baitfish in bait grounds north-west of the main island, Viti Levu, where project staff recorded high catch rates.

Ongoing work in Solomon Islands has involved re-examining length-frequency data collected during the earlier field work (1987-1989). These analyses have revealed that it is extremely difficult to accurately estimate growth from modal progression in length-frequency samples of these multiple-spawning tropical fishes. A scientific paper identifying the problems with these type of analyses is currently being written with view to submission to 'Asian Fisheries Science' in the near future. The project has produced a total of 37 publications and reports, any of which are available upon request.

c) **NEW ACTIVITIES**

i) **Billfish study (Papua New Guinea, Solomon Islands, Vanuatu)**

A study submitted "Seasonal Distribution and Abundance of Billfish Species Around the Coral Sea Rim (Papua New Guinea, Solomon Islands, Vanuatu): Gamefishing Potential in the Region" is now in progress under the supervision of Dr David Williams (AIMS), with support and assistance from the TBAP/SPC as required. The project arose from an initial request from the Solomon Islands to ACIAR for assistance in the development of gamefishing tourism, with emphasis on billfish.

The aim of this study is to produce a document that will provide a detailed background on the seasonal distribution of billfishes in the region, together with information on what is known of surface currents and bathymetry, that will permit experienced gamefishermen to locate areas and season that are most likely to provide the basis for new gamefishing bases. The presentation of the publication will emphasise graphical and mapped information.

ii) **The processing of novel tuna products in small Pacific island communities for the domestic and export market (Kiribati, Tokelau, Tuvalu)**

This initiative is under joint development by ACIAR and the SPC, and follows and builds on the successful pilot tuna jerky production project in Tokelau. As a first step, two linked desk studies were funded by ACIAR to identify promising product formats warranting further investigation, and to undertake a preliminary evaluation of market opportunities and potentials.

The product format study by the University of New South Wales (UNSW) identified three formats which met criteria for production in remote island locations and appeared to have greatest potential for further development: a dried minced snack food; a sliced jerky style, and a petfood "treat" product. The marketing study by a private consultant indicated good regional niche market potentials, and other opportunities for the tuna product concepts, and emphasised the need to target product texture, flavour, and packaging to market requirements.

Additional product research has recently been commissioned through the UNSW and the QDPI International Food Institute of Queensland to further develop these three formats, working in collaboration with the SPC Post-harvest Fisheries Adviser, the Tokelau pilot project, and involving other interested countries as appropriate. The results of this work will be available by the end of this year, at which time countries will be consulted to decide on further research action as appropriate.

iii) Study of trochus fishery in Aitutaki (Cook Islands)

The concept of this two year pilot study was developed during the SPC Workshop on Trochus Resource Assessment (Vanuatu, May 1992) and subsequently formally endorsed by the 23rd SPC/RTMF. The study was funded by ACIAR in response to a joint approach from the Cook Islands Ministry of Natural Resources and the South Pacific Commission.

The study coordinated through the SPC takes advantage of the unique experimental situation existing with the Aitutaki trochus fishery and, will involve an eight-member field survey team, comprising six Pacific Island scientists, and Australian scientist, Mr Warwick Nash, from the Tasmanian Division of Sea Fisheries, and Dr T Adams from SPC. A four-week intensive field study will be undertaken by this team in association with the next trochus harvest in mid-August. Subsequent monitoring of population response to this harvest event will be undertaken by the Ministry of Marine Resources at three monthly intervals. The major outputs anticipated from this study are:

- 1) the development of a population model which will predict trochus population response to harvesting, thus enabling catch levels and harvest strategies for the Aitutaki fishery to be optimised. The data generated on trochus biology and population dynamics will have general application in Australia and in Pacific Island countries where trochus fisheries exist.
- 2) the investigation and comparison of the accuracy and utility of several survey and stock assessment methodologies for marine molluscs: the results of this work will further advance the goal of establishing standard approaches to the survey and assessment of marine resources, suitable for broad application in developing countries.
- 3) training – the active involvement of scientists from five Pacific Island countries at all stages of the study, from project design through to analysis and final reporting of results, will provide a valuable training experience, and ensure rapid spillover of the research results to their home countries.

iv) Pacific Island pearl oyster resource development

The stimulus for this project proposal came from a series of country requests to the SPC seeking research assistance with specific problems related to pearl oyster mariculture (genetics, health management). This led to the development of a research project involving SPC, James Cook University (JCU), Queensland Dept of Primary Industries (QDPI) in partnership with Kiribati, Cook Islands and possibly other interested Pacific Island countries.

Recent field surveys undertaken by the SPC Inshore Fisheries Research Project and other agencies have generally found relatively low population levels of blacklip pearl oysters in most of the Pacific Island atoll and high island lagoons surveyed. Responding to this, the main thrust of this project will be the investigation of simple technologies (in-situ lagoon rearing systems, land-based flow through culture) which can provide regular and adequate supplies of oyster juveniles to permit the rehabilitation of impoverished wild stocks, and to help establish and sustain pearl culture operations. Assistance with stock surveys, disease diagnosis, health management, and the genetic description of oyster populations will also be included. This activity will involve a three way partnership between Australian research expertise, collaborating countries and the SPC, with the latter providing assistance to countries in the survey and assessment of wild oyster stocks, and responsible for the extension of research findings to other interested countries.

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UNDP'S STATEMENT

FOR CONSIDERATION AT THE 24TH REGIONAL TECHNICAL MEETING ON
FISHERIES - 3 TO 7 AUGUST 1992

During the formulation of the 5th cycle 1992-96 UNDP Regional Fisheries Programme, UNDP has consulted with governments and regional institutions on numerous occasions. This close consultation with governments is a testimony of UNDP's commitment to formulate development assistance programmes which address the priority needs of countries.

UNDP remains committed to providing assistance to the priority sector of fisheries. This is evidenced by the fact that we have maintained the level of funding of \$3 million for fisheries in the 5th cycle even though the total regional programme allocation has decreased from approximately \$36 million in the 4th cycle to \$26 million in the 5th cycle.

However, because of the conflicting messages received from governments, regional institutions and SPOCC on the institutional arrangements for the UNDP Regional Fisheries programme, we have been unable to make progress in designing a programme of support for the whole of the assistance which has been earmarked for the fisheries sector on the regional level:

- a) In a letter which UNDP received from the FFA on behalf of governments, following the FFC Meeting held in Niue from 4-7 May 1992, Governments strongly recommended that the

FAO/UNDP Regional Fisheries Support Programme, which is administratively independent of the regional organisations, be given the highest priority for UNDP fisheries funding in the next cycle.

- b) At the same time, representations have been made to UNDP by SPOCC members, drawing on the decisions of Pacific island Government leaders in the 1991 Forum Communique, which expressed strong concern over "the extent to which UNDP was effectively utilizing the existing regional infrastructure" as implementing agencies for regional programmes. Several Governments echoed this concern at the Mini-MAC meeting held in Noumea last year. Following the April 1992 SPOCC meeting, these concerns were conveyed to UNDP with specific reference to the future Regional Fisheries Programme.

UNDP is governed by its own set of mandates and policy directives with regard to the formulation of the 5th cycle regional programmes :

- 1) UNDP is committed to continue its capacity building assistance to government institutions in order to secure the long-term sustainability of development programmes.
- 2) UNDP is directed to moving toward national/regional execution of projects, where there exist institutions with a demonstrated technical and management capacity in the area of the proposed programme.
- 3) UNDP is required to programme assistance in such a way as to ensure a focused, impact oriented result.

- 4) UNDP, especially in these times of tight funding, must responsibly coordinate its assistance with other donor and government efforts in order to reduce expensive overlap and strive to improve the efficiency of service delivery.

Given the lack of consensus in regard to UNDP's Fisheries assistance in the coming cycle, UNDP has decided to proceed in the following manner in order to facilitate the development of a sustainable fisheries programme which is responsive to the needs of governments:

- 1) Immediate approval of the Offshore Fisheries Development Project for SPC execution at the level of US\$700,000 with support for activities to commence in August 1992. This will be the first step toward the institutionalization of the full project which is to follow.
- 2) Completion of activities under the 4th cycle RAS/89/039 Regional Fisheries Support Programme by the end of August 1992.
- 3) Consultation with FAO and Regional Fisheries Institutions to programme the remaining US\$2.3 million in support of regional fisheries development.

UNDP will strive, with your cooperation, to finalize the programme design and implementation arrangements for the full regional fisheries development project which would aim to work closely with both SPC and FFA so that project activities can begin in early 1993.

At this time we request member governments to direct Regional Institutions to work with UNDP in programming the US\$2.3 million remainder of UNDP's fisheries assistance in the 5th cycle to address the priority needs of Governments in this sector.

Signed : Somsey Norindr
Resident Representative

Date : 24/VII/92

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