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Profile of ACIAR Fisheries Projects Pacific Island Countries & Papua New Guinea

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Profile of ACIAR Fisheries Projects

Pacific Island Countries & Papua New Guinea

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Contents

Introduction to ACIAR Fisheries Program

The Australian Centre for International Agricultural Research (ACIAR) was established in 1982 under Australia's Overseas Aid Program to encourage and support collaborative research directed at solving key agricultural problems in developing countries.

ACIAR's definition of agriculture is a broad one, which embraces renewable natural resources: land, water, soil agriculture, forestry and fisheries. ACIAR aims to improve natural resource management through the study of relevant problems inhibiting sustainable development. Basic to the ACIAR approach of using scientific collaboration as a means of giving aid is the idea of working in partnership so that all parties derive mutual advantage. These benefits can come in a number of ways – as new food production technologies, improved natural resource management strategies, and through a strengthening of national research institutions.

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. Low input aquaculture and village level mariculture are areas of particular interest. All projects have involved collaboration with national fisheries divisions, and emphasis has been given to the enhancement of national capacity to assess and monitor exploited stocks, to adopt and refine suitable aquaculture technologies, and to prepare appropriate management advice for the consideration of policy makers. The scope of the research activities profiled in this paper emphasises the importance ACIAR ascribes to the Pacific Islands, a commitment reinforced in recent years by the adoption of a more flexible small project approach to the needs of the smaller countries, and by linking more effectively with regional technical agencies (SPC and FFA in particular) and the forging of a strategic research partnerships in the Pacific Islands with the WorldFish Center.

ACIAR's Fisheries Program spans a diversity of production strategies and environments, from wild capture marine and freshwater fisheries and issues related to their responsible management, to aquatic farming systems, mariculture and fisheries enhancement. Its major elements are:

1. **Fisheries and aquatic resource management**: the assessment and management for sustainability of wild harvest fisheries, including conservation and rehabilitation of the critical habitats which support them. The broad areas of research interest are:

- assessments of stock status/fishing impacts
- innovative fisheries management strategies
- critical resource/habitat/ecosystem linkages
- improved utilisation of existing harvests

2. **Aquaculture**: productive and sustainable aquatic farming systems, environmental impacts, low-technology mariculture and sea ranching, and resource enhancement. Broad areas of research interest are:

- domestication and breed improvement
- improved nutrition and aquafeed development
- disease diagnosis, control, prevention
- aquatic farming systems
- the reduction of adverse environmental impacts of and on aquaculture
- low technology mariculture and the potential for sea ranching

ACIAR Website: www.aciar.gov.au

List of current ACIAR projects in the Pacific Islands region and Papua New Guinea

Bilateral

ASEM/2001/036: Maximising the economic benefits to Pacific Island Nations from management of migratory tuna stocks
FIS/1997/031: Pearl oyster resource development in the Western Pacific
FIS/2001/034: Inland pond aquaculture in PNG—assessment of the industry and evaluation of smallholder research and development needs
FIS/2001/075: Sustainable aquaculture development in the Pacific Islands region and northern Australia
FIS/2001/085: Integration of broodstock replenishment with community-based management to restore trochus fisheries
FIS/2001/075: Sustainable aquaculture development in Pacific Islands region and northern Australia
FIS/2002/056: Biology and status of the prawn stocks and trawl fishery in the Gulf of Papua

Multilateral

FIS/1999/025: Optimal release strategies for restocking and stock enhancement of the tropical sea cucumber, sandfish (*Holothuria scabra*)

(Full details listed below)

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Bilateral

ASEM/2001/036: Maximising the economic benefits to Pacific Island Nations from management of migratory tuna stocks

Overseas Collaborating Countries	Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tuvalu, Vanuatu
Commissioned Organisation	La Trobe University, Australia
Project Leader	Dr John Kennedy
	Phone : (03) 94792313
	Email : j.kennedy@latrobe.edu.au
Collaborating Institutions	University of Queensland, Australia
	Secretariat of the Pacific Community, New Caledonia
	Forum Fisheries Agency, Solomon Islands
Project Budget	$577,585
Project Duration	01/01/2002 to 31/12/2005
Project Website	www.business.latrobe.edu.au/staffhp/jkennedy/ACIARTechPapers.htm

Project background and objectives

Shoals of tuna migrate through the exclusive economic zones (EEZs) of island nations in the Western and Central Pacific Ocean. This migratory characteristic means that no nation has control over the tuna stocks. Stocks in each EEZ depend on harvesting levels in each respective EEZ and on the high seas as well, thus each nation has special problems in managing harvesting effort within its EEZ. The member nations of the Forum Fisheries Agency (FFA) stand to gain the greatest total benefit if they unite to regulate fishing effort or catches by their domestic fleets or by distant water fishing nations. As well, the United Nations Fish Stocks Agreement seeks to set up Regional Fisheries Management Organisations for the conservation and efficient management of migratory stocks.

Against this policy background, this project is identifying and promoting strategies for Pacific Island Nations to maximise the economic benefits from their migratory tuna stocks. Researchers are gathering fishery data and undertaking economic analysis, bioeconomic modelling and policy development. They are updating biological and economic parameters of a model in order to use it for optimal year-by-year changes in access charges and fleet capacities. They aim to establish the economic negotiating positions of Pacific Island Nations (PINs) with rights to migratory tuna stocks, and of the Distant Water Fleet Nations (DWFNs) such as Japan, USA, South Korea, Taiwan and China interested in paying for access to the stocks.

Project progress

Year 2 (01/01/2003–31/12/2003)

An important model being used in the current project for modelling optimal harvesting decisions of the DWFNs is a bioeconomic model developed in a previous ACIAR project (ADP/1994/005: A bioeconomic analysis of tuna purse seining in the Pacific Islands region). In 2003 updating of technical and economic parameters continued as planned, and revised harvesting policies for different tuna species obtained. A technical paper on revised prices and costs, titled 'Tuna Prices and Fishing Costs for Bioeconomic Modelling of the Western and Central Pacific Tuna Fisheries' was released. A website was built to enable easy access to this and subsequent papers, and to present the aims of the project and the contact details of the project participants. The website has attracted overseas interest.

Solution times for the bioeconomic model are relatively long, for two reasons—the first is the detail in modelling the seasonal migration of tuna in the Western Central Pacific Ocean between 5 degree squares, and the second is the very basic algorithm used for obtaining optimal solutions. Because the algorithm simulating optimal negotiation requires many runs of the model, there is the need for a faster, albeit less detailed, model. As planned, work continued in 2003 to develop a smaller, more aggregated model using a different solution process. The large model will be necessary for calibrating parameters in the smaller model. Work also started on reprogramming the large model to obtain solutions with the new optimising routine.

The special problem of obtaining international agreement on efficient management of migratory fish has been recognised in the United Nations Fish Stocks Agreement. This has led to establishment of commissions to oversee the conservation and management of migratory stocks in various parts of the world's oceans. When the project proposal was written in 2001 it was expected that a commission would be set up for the management of the migratory tuna stocks in the Western and Central Pacific Ocean. After a series of annual preparatory conferences, held since 2000 and involving the PINs and DWFNs affected, the Commission is to be convened in December 2004. The formation of the Commission should focus attention on the benefits of coordinated action by the PINs to improve efficiency in managing stocks.

A key question remains: What measures should be introduced to reduce the overexploitation of yellowfin and bigeye tuna by purse seine and longline vessels? The updated bioeconomic model is being used to study this question.

FIS/1997/031: Pearl oyster resource development in the Western Pacific

Overseas Collaborating Countries Fiji, Kiribati, Solomon Islands

Commissioned Organisation	James Cook University, School of Marine Biology & Aquaculture, Townsville, Australia
Project Leader	Dr Paul Southgate Phone: (07) 47815 737 Email: paul.southgate@jcu.edu.au
Collaborating Institutions	Ministry of Fisheries & Marine Resources Development, Kiribati Ministry of Fisheries and Forestry, Fiji Ministry of Fisheries, Tonga WorldFish Center, Malaysia
Project Budget	$728,961
Project Duration	01/01/1998 to 31/08/2004 (Project extended from 01/01/2001 to 31/08/2004)

Project background and objectives

The black pearl oyster (*Pinctada margaritifera*) flourishes in atoll lagoons and is a major export earner for French Polynesia and the Cook Islands. This ACIAR funded follow-up project involving Tonga and Kiribati, as well as linked pilot pearl farm activity with the World Fish Centre (ICLARM) in the Solomon Islands, aims to further develop and refine grow-out and pearl culture techniques for this oyster. In Kiribati, investigations include nursery, juvenile and adult culture methods suitable for atoll and open reef systems, the development of a Pearl Industry Development Plan for Kiribati, and pilot community level pearl production trials. In Tonga, where the earlier spat collection study proved disappointing, the focus is on hatchery production of spat, nursery and early grow-out experiments.

Project progress

Year 6 (01/01/2003–31/12/2003)

The major highlight of project research during 2003 was the first harvest of cultured pearls at the Demonstration Pearl Farm at Abaiang in Kiribati. Continuing success in hatchery production of blacklip pearl oysters in Kiribati has supported expansion of project activities at the Demonstration Farm and at satellite farms on other islands in the Gilbert Group (Abemama, Butaritari, Onotoa). Spat collection trials have now been established at Kiritimati Island (Christmas Island). A hatchery run was conducted in Tonga in November/December 2003. Resulting spat will be graded in early 2004 and used for the establishment of experiments documenting growth rate and investigating optimal culture conditions in Tonga. Preliminary growth rate data for *P. margaritifera* spat produced in an earlier hatchery run in Tonga have been generated. Growth rates in Tonga compare well to growth rates recorded at other sites within the Pacific for *P. margaritifera.*

Progress against the three major research objectives of this project extension is summarised below.

1 Development towards a cultured pearl industry in Kiribati

The first harvest of cultured pearls from Kiribati took place at Abaiang in August 2003. About 200 pearls were harvested and a further 4000 oysters were grafted for pearl production. Appraisal of the pearls was undertaken by Mr. Rudy Zingg of Devino P/L (Sydney).

An experimental cultured pearl farm has been established at Tebunginako at Abaiang atoll. About 2000 pearl oysters are housed at the farm, which is maintained by three local people who have previously been trained in pearl oyster culture methods at the Demonstration Pearl Farm at Abaiang. Spat collectors were first established at Kiritimati Island in July 2003. A second longline with other collectors was established in August 2003. Both longlines were deployed and are maintained by MNFRD staff based at Kiritimati. Some pearl oyster recruits were recorded from spat collectors towards the end of 2003. However, these are still to be positively identified as *P. margaritifera*.

Longlines were established at Abemama, Butaritari and Onotoa in mid-2003. Pearl oysters were deployed to Butaritari and Onotoa at the end of June 2003 and to Abemama in September 2003. Each of the three islands has a 60 m longline (Butaritari has 2 lines) holding between 4000 and 5000

oysters. Growth rates of oysters at Butaritari and Onotoa have been excellent. Oysters were deployed with a dorso-ventral height (shell length) of 5–8 mm. By the end of 2003, they had reached 50–60 mm in shell length.
A draft Cultured Pearl Industry Management and Development Plan was developed through the Pearl Oyster Coordinating Committee (POCC) during 2003. The committee has been approved by Cabinet and will provide advice to the Minister on the development of a cultured pearl industry in Kiribati. The plan will be amended during the project on the basis of project outcomes.

2 Production of P. margaritifera spat through hatchery culture in Tonga

The first hatchery run conducted in Tonga in 2001 resulted in a significant number of spat. Unfortunately, many of these died as a result of Cyclone Waka in 2002. Surviving spat were used for limited growth trials begun in 2002 which have provided data on the growth rates of *P. margaritifera* juveniles under culture conditions in Tonga. More extensive growth trials will be conducted in 2004 with spat resulting from the most recent hatchery run conducted in November/December 2003.
Hatchery production of *P. margaritifera* spat was conducted in Tonga in November/December 2003. Unfortunately, unusually low water temperatures (22–25°C) resulted in an extended larval life. While *P. margaritifera* larvae would normally be expected to complete larval development in about 18–20 days, larvae were not removed from culture tanks into settlement tanks until Day 37. Nevertheless, the extended larval period provided good opportunity for training of local staff. Four local fisheries staff and a member of the Pearl Oyster Cooperative from Vava'u were trained in methods related to hatchery culture and feeding of pearl oysters. Approximately 50,000 larvae survived to be placed into settlement tanks, however, the number of spat produced will not be known until spat collectors are harvested in early 2004.

3 Production of up to date culture manual for P. margaritifera

New information relating to spat collection, spat identification, oyster cultivation and pearl quality has been written into the Culture Manual produced during the earlier project (FIS/1991/031). This process will continue as more relevant information comes to hand. The document will be completed by the end of 2004. Literature relating to pearl quality and oyster cultivation gathered from Polynesia and other sources with assistance from SPC, has also been included.

FIS/2001/034: Inland pond aquaculture in PNG—assessment of the industry and evaluation of smallholder research and development needs

Overseas Collaborating Countries	Papua New Guinea
Commissioned Organisation	University of Western Sydney, Australia
Project Leader	Dr Paul Smith
	Phone : (02) 4620 3329
	Email : pt.smith@uws.edu.au
Collaborating Institutions	University of Papua New Guinea, PNG
	Department of Agriculture and Livestock, PNG
	National Fisheries Authority, PNG
	Highlands Aquaculture Development Centre, PNG
Project Budget	$140,726
Project Duration	01/07/2001 to 30/09/2004 (Project extended from 01/07/2002 to 30/09/2004)
ACIAR Research Program Manager	Mr Barney Smith

Project background and objectives

Pond aquaculture is one of the fastest growing forms of agriculture inland in Papua New Guinea, and an important contributor to family nutrition and income in some of its more populous and protein-

deficient regions. At the commencement of the project scientists estimated there were 6000 fish farms active, making them of growing importance within sections of PNG's national planning process. This project is determining the status of inland pond aquaculture in PNG through a comprehensive survey of the industry and a desktop study of recent reports. At the start researchers held a training workshop for technical assistants, and towards the end presented a stakeholders workshop. Researchers and fisheries administrators are gaining a clearer picture of the structure of the industry and the areas in need of resources. The project is helping ACIAR and other research donors to determine the priority issues to target for developing a sustainable industry.

Project progress

Year 2 (01/07/2002–30/06/2003)

The team has completed all fieldwork and analysis. Members are currently completing the project report and preparing a proposal to be submitted to ACIAR for a follow-on project (FIS/2001/083). The findings of the project are to be published by ACIAR in its Working Paper Series.

The following is a brief outline of the findings.

In May 2003 at a Workshop in Goroka EHP the project team presented the findings of its study of inland pond aquaculture in PNG and received input from fish farmers, officers and other stakeholders. The initial estimate of 6000 farms had now moved to approximately 10,000 and the annual production of the aquaculture industry was valued at K5 million.

The survey of 313 farms, as well as hatcheries, institutions and markets revealed that there are three kinds of fish farmers:

new comers (NU PELA) who have not harvested yet, representing 45–55% of the industry;
established farmers (OLD PELA LIK LIK) who have harvested at least one crop and have less than 1000 fish in their ponds, representing 40–45% of the industry;
pioneer farmers (OLD PELA) who have harvested at least once, have more than 1000 fish stocked, have considerable infrastructure and are focused on selling to restaurants or exports and they represent 5–10% of the industry.

The median farm had two ponds with a total area of 60m^2. Some of the most relevant findings were that common carp was farmed in more than 90% of farms. Home consumption accounted for 40% of farmed fish, indicating that fish was an important source of protein for smallholder farmers and 70% of farmers have a high or very high intention of constructing more ponds. The three most significant areas for research identified in the survey were feed/nutrition, fingerling supply, and marketable species.

Feed: Garden vegetables, kitchen leftovers, worms and termites were the only food sources for most farms, though in 10% of farms, commercial pelleted feed was supplemented. The cost of pellet feed is a highly significant problem. No fertilisers were used in 59% of farms, 79% of farms used a flow through system and very few small-holder farms could be described as integrated.

Fingerling supply: Highlands Aquaculture Development Centre (HAQDEC) was the main source of fingerlings for PNG, though OLD PELA farmers generally had developed their own hatcheries. Nevertheless, fingerling supply was either a highly or very highly significant problem for 63% of farmers. Transport times for fingerling supply from HAQDEC ranged from a few hours to several days and transport-related mortalities were common.

Marketable species: NU PELA farmers grew common carp, while OLD PELA farmers cultured the greatest range of species, including carp, trout, tilapia, barramundi and crocodiles. Experienced farmers tended to search for the species that is most marketable and appropriate for their circumstances. The GIFT tilapia, an improved strain developed under the WorldFish Center's Genetic Improvement of Farmed Tilapia (GIFT) project, appears to be gaining in popularity in 2003. Nevertheless there is a strong push for trout farming by some highlands farmers and this is supported by research providers (Stirling University) and NGOs (ADP), even though it appears to be a non-economic species for farmers in PNG. On the other hand there is a strong desire, particularly in Western Province, for culturing native species (e.g. crayfish such as *Cherax* and *Macrobrachium* species, catfish and eel-tailed catfish).

FIS/2001/075: Sustainable aquaculture development in the Pacific Islands region and northern Australia

Overseas Collaborating Countries	Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu
Commissioned Organisation	Queensland Department of Primary Industries and Fisheries, Northern Fisheries Centre, Cairns, Australia
Project Leader	Dr Mike Rimmer Phone: 07 4035 0109 Email: Mike.Rimmer@dpi.qld.gov.au
Collaborating Institutions	Secretariat of the Pacific Community, New Caledonia WorldFish Center, New Caledonia
Project Budget	$762,855
Project Duration	01/01/2004 to 31/12/2006

Project background and objectives

Fisheries resources are important in the Pacific Islands, but require sustainable management. Aquaculture has considerable potential to alleviate pressures on fisheries, assist with and enhance food security and provide income and employment opportunities. The disease-free, good-quality waters, combined with low labour costs make aquaculture a potential success in Pacific communities. Northern Australia also shares many of the characteristics of unrealised aquaculture potential. The project team is working with the Secretariat of the Pacific Community (SPC) and Pacific communities to identify and implement targeted research extending the outcomes of past ACIAR and WorldFish Center projects. Post-larval fish capture and culture, and sea cucumber production and reseeding are focal points. Through these and related activities the technical and research skills of partner institutions will also be enhanced.

Project progress

First progress report is due in early 2005.

FIS/2001/085: Integration of broodstock replenishment with community-based management to restore trochus fisheries

Overseas Collaborating Countries	Samoa, Vanuatu
Commissioned Organisation	Kimberley Aquaculture Aboriginal Corporation, Australia
Project Leader	Dr Chan Lee Phone: 03 9670 0354 (in Vic) Phone: 08 9193 7138 (in WA) Email: clee8777@bigpond.net.au
Collaborating Institutions	Department of Agriculture, Forests, Fisheries and Meteorology, Samoa Fisheries Department, Vanuatu Department of Fisheries, Western Australia, Australia
Project Budget	$396,863
Project Duration	01/07/2002 to 30/06/2005

Project background and objectives

Earlier ACIAR research has shown that it is feasible to use broodstock seeding of marine sites as a tool to replenish populations of trochus. Community involvement is essential for successful restocking

with broodstock and this new project will employ community-based management strategies to extend and apply the results of the earlier research. Communities and researchers from Australia, Samoa and Vanuatu are attempting to enhance the trochus populations on selected reefs owned by communities in their respective countries. The ultimate goal is to provide a simple framework that allows the agencies responsible to implement a nationally coordinated and strategic stock management plan for establishing sustainable trochus fisheries through broodstock reseeding, the application of customary marine tenure (CMT) and/or the establishment of marine protected areas (MPAs).

Project progress

Year 1 (01/07/2002–30/06/2003)

Establishing a framework for community consultation and involvement in enhancement activities

In Australia, initial meetings were held in September and December 2002, between trochus fishers, traditional reef owners, the Bardi Council and Gudumul outstation, the project leader and the Australian community coordinator, and identified areas that were socially relevant to the project. At these meetings negotiations were held to close the reefs involved in the project to trochus fishing for the duration of the project. Four research sites in King Sound were selected, with reefs designated for seeding and control.

In Samoa, the broodstock seeding and site selection activities commenced in January 2003. Prior to this project, the country has a well established community based fisheries resource management program. After consultations with communities, three sites for broodstock seeding, from the 51 declared MPAs, were selected. The sites are Papa-i-Puleia (on Savaii Is.), Tafitoala and Saleapaga (on Upolu Is.).

In Vanuatu, preliminary contacts with communities were established through national radio announcements inviting interested communities to be involved. Between July and December, 2002, project staff met with and finally selected the communities to be involved. The three seeding sites are in the Malampa (Malekula Is.), Penama (Pentecost Is.) and Shefa (Epi Is.) provinces. All sites have depleted trochus stocks.

Conducting broodstock enhancement field trials and verifying success of broodstock seeding

In Australia, four hundred broodstock trochus were collected, tagged, measured and stocked into corrals on each selected seeding reef. Prior to enhancement in August, adult and juvenile census areas were identified on all reefs, permanently marked and surveyed for trochus density. The second density survey scheduled for the year was completed in March 2003. Overall, there was little change in the density of trochus on the sites over this period.

Due to difficulties in getting broodstock from Fiji (as trochus are not endemic in Samoa) only one site was stocked in Samoa; the other two sites will be stocked with broodstock as soon as they are available.

Four hundred broodstock were collected, tagged and released into corrals at each of the three Vanuatan sites.

Field survey and site selection training was conducted for the Samoan project staff. Evaluation done during the first annual project meeting showed that communities in all three research nodes of the project were highly supportive of the broodstock trials and the concept of using CMT and MPAs to sustain the fishery.

FIS/2002/056: Biology and status of the prawn stocks and trawl fishery in the Gulf of Papua

Overseas Collaborating Countries Papua New Guinea

Commissioned Organisation	CSIRO Marine Research, Australia
Project Leader	Dr Neil Loneragan
	Phone : (07) 38267255
	Email : neil.loneragan@csiro.au
Collaborating Institutions	National Fisheries Authority, PNG
	University of Tasmania, Australia
Project Budget	$399,930
Project Duration	01/07/2003 to 30/06/2006
ACIAR Research Program Manager	Mr Barney Smith

Project background and objectives

The Gulf of Papua prawn fishery is one of the most valuable fisheries in PNG, with an annual catch from all prawn species approximately 1000 tonnes and value of K10 million ($A5 million). But as new and more efficient vessels replace the ageing fleet, the industry's capacity to catch prawns will increase. Scientists need to measure the fishing power of the industrial fleet so that the National Fisheries Authority (NFA) can prepare to manage an increase in effective fishing effort. This project is assessing the current status of the prawn stocks and the fishery in the Gulf of Papua, examining the levels of effort in the fishery and the current management regime, and consulting with NFA managers and the industry about the best management options. The project is helping to ensure that the Gulf of Papua prawn fishery is managed in ways that are sustainable, efficient and profitable in the long term, minimising any risk of collapse. Bringing NFA scientists, economists and managers together to collaborate on a single fishery should enhance management of this and other fisheries in PNG.

Project progress

First progress report is due in September–October 2004.

FIS/1999/025: Optimal release strategies for restocking and stock enhancement of the tropical sea cucumber, sandfish (*Holothuria scabra*)

Overseas Collaborating Countries	Papua New Guinea, Solomon Islands
Commissioned Organisation	International Centre for Living Aquatic Resources Management, Coastal Aquaculture Centre, Solomon Islands
Project Leader	Dr Warwick Nash Phone : + 604 641 4623 Email : jbell@cgiar.org
Collaborating Institutions	Australian Institute of Marine Science, Australia Ministry of Agriculture and Fisheries, Solomon Islands
Project Budget	$785,060
Project Duration	01/04/2000 to 30/06/2005 (Project extended from 01/04/2004 to 30/06/2005)

Project background and objectives

In 1995 ACIAR and ICLARM commenced a strategic research partnership to develop, assess and transfer the technology for propagating and releasing tropical sea cucumbers. Three separate stages were defined: (1) development of cost-effective methods for producing juveniles; (2) identification of strategies for optimising survival of released juveniles; and (3) evaluation of mass releases of juveniles to existing fisheries. ACIAR funded the first phase, during which work concentrated on sandfish (*Holothuria scabra*), a high-value species of significant commercial importance. The research established that *H. scabra* is suited to restocking and stock enhancement, due to its high value, wide distribution, relative ease of culture and rapid growth at high densities on simple, low-cost diets. Scientists also found that sandfish larvae can be reared *en masse* in hatcheries on micro-algal diets, and the juveniles grown out in simple land-based nursery systems with minimal input of food. This follow-on project is undertaking the second phase of the research, to determine how, when and where to release juveniles for optimum survival, and to identify the most cost-effective stocking densities.

Project progress

Year 3 (01/04/2002–31/03/2003)

This project was originally located at the WorldFish Coastal Aquaculture Centre in Guadacanal, Solomon Islands. With the destruction of the centre and all its facilities and violence to staff members during the ethnic tensions of 2000, the project was moved to New Caledonia in consultation with ACIAR, and collaborations with local agencies developed. WorldFish recruited new international and local staff co-located at the SPC Headquarters in Noumea. The project continued to focus on the development of technologies for all developing countries of the Pacific region.

The project has encountered three main problems in operating in New Caledonia. First and foremost, the high cost structure has been debilitating and significantly reduced what can be achieved in all areas. The team has taken on additional projects such as breeding black teatfish (*Holothuria nobilis*) and stock assessments of sea cucumber for each of the Provinces in a bid to bring in additional funding. Second, the breeding season for sandfish in New Caledonia is seasonal (approximately October to February) which reduces the capacity of the hatchery to produce juveniles and restricts ecological studies. These contrast with the situation in the Solomon Islands where there is year-round spawning and juveniles could be produced for much of the year. Lastly, the sea cucumber hatchery and production facilities previously available in the Solomon Islands had to be re-established in New Caledonia. This has required additional resources and greater time than was identified in the original proposal. Meeting these challenges has also required a shift in the balance of the project, with more

emphasis given to production systems than was the case in the original proposal, which emphasised release strategies.

Since relocation of the project, a small but serviceable hatchery has been established; sandfish juveniles are being produced; research into genetic stock identification is being progressed; new tagging methods have been developed; and a number of scientific publications have been produced. Other areas of research making good progress include the development of transportation methods, and polyculture of sea cucumbers with shrimp. Preliminary studies into release strategies using enclosures and small numbers of sandfish have provided encouraging results. The challenge is now to undertake larger-scale ecological studies that are more relevant to stock restoration.

Following a review, the project has been extended to capitalise on the investments in facilities and trained personnel. The emphasis of the ongoing work is on the development of practical measures for the production of large numbers of juveniles at reasonable cost, and on release strategies for optimal survival.

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Projects under development
at 30 June 2004

Bilateral

ADP/2002/105: Economic and market analysis of the live reef fish food trade in Asia-Pacific

ASEM/2004/011: Evaluating domestic tuna fisheries projects

FIS/2003/070: Market opportunities for seaweed in the Pacific (Fiji, Vanuatu, Tonga, Kiribati)

FIS/2001/083: Inland aquaculture in PNG: improving fingerling supply and fish nutrition for smallholder farms

Multilateral

FIS/2003/051: Improving sustainability and profitability of village sea cucumber fisheries in Solomon Islands.

ACIAR publications

This list is a selection of titles from ACIAR's range of scientific publications that are relevant to the agricultural research and development sector of the Pacific island countries. Hard copies are available by emailing comms@aciar.gov.au. Titles marked with an asterisk may also be downloaded from ACIAR's website, www.aciar.gov.au.

Monographs

09 Giant clams in Asia and the Pacific
14 The giant clam: an anatomical and histological atlas
15 The giant clam: a hatchery manual
16 The giant clam: an ocean culture manual
18 Giant clams in the sustainable development of the South Pacific
28 The economics of Papua New Guinea tuna fisheries
29 Stock assessment of coconut crabs
35 A survey of the subsistence and artisanal fisheries in rural areas of Viti Levu, Fiji
38 Protected area assessment in Vanuatu: a socioeconomic approach
94 Survey Toolbox for Aquatic Animal Diseases: A Practical Manual and Software Package*

Proceedings

20 Management of wild and cultured sea bass/barramundi (*Lares calcarifer*)
30 Tuna baitfish in the Indo-Pacific region
47 The biology and mariculture of giant clams
52 Tuna baitfish in Fiji and the Solomon Islands
78 Mud crabs
79 Trochus: status, hatchery practice and nutrition

South Pacific consultations

9-10 December 2003

Priorities for collaborative agricultural research between ACIAR and its Pacific Island country partners (Fiji, Samoa, Solomon Islands, Tonga, Vanuatu and Kiribati) were discussed on 9–10 December 2003 in Suva at a consultation with representatives of Regional Organisations (including SPC and University of the South Pacific), relevant Government Ministries and Agencies, NGOs and CGIAR centres active in the region.

ACIAR's strategy in these Pacific island countries addresses the significant challenges of WTO accession, quarantine- and biosecurity-related issues, product quality, scale of production, and remoteness of export markets. We will maintain a mixture of research on cash-generating crops, fishing and forestry with emphases on supply chain issues (including value-adding and marketing) and production sustainability. Projects will emphasise technologies that are appropriate to smallholders, and address institutional issues affecting technology uptake. The limited research capability in the region, especially in individual nations, is an ongoing constraint. ACIAR will therefore work closely with regional organisations, especially the Secretariat of the Pacific Community (SPC), in executing projects. ACIAR also supports collaboration by Pacific Island countries with International Agricultural Research Centres such as the WorldFish Center and the International Plant Genetic Resources Institute.

Agreed priorities are listed below.

Fisheries and livestock

- Stock status assessment and management planning for the sustained use of vulnerable inshore fisheries resources, with an emphasis on increased community-level management and co-management approaches
- Economic and marketing analyses of key aquaculture commodities (initial focus to be seaweed) to better inform producer decision making and to identify opportunities for regional cooperation in marketing and processing
- Regional studies of import risks associated with the movement of live aquatic organisms and the definition of appropriate quarantine measures and strategies
- Investigation of new opportunities for inland aquaculture, including the domestication of promising indigenous species and integration of aquaculture into existing farming systems
- Utilisation of locally-available materials (including waste products) to develop cost-effective feed formulations which improve nutrition in pigs, poultry and aquaculture species.

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