

An education for their children is one of the opportunities that the income from a mobile card can buy previously-poor smallholders.

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A MOBILE INCOME BENEFITS EVERYONE

FOR PNG'S SMALLHOLDER OIL PALM PRODUCERS, SOLUTIONS TO LABOUR SHORTAGES FOR MANAGING THEIR BLOCKS, AND DIVIDING UP THE INCOME FAIRLY, ARE BOOSTING HARVESTS, WRITES **WARREN PAGE**

Jenny, like many smallholder farmers throughout Papua New Guinea, has struggled to make a living from her oil palm block, especially since the death of her husband in 1990. She is not alone in having to manage a block without a husband, though in most cases this is due to the males of the family seeking work elsewhere.

Tom, a leaseholder of a six-hectare block growing oil palm, is part of this labour migration; working for a Malaysian logging company in Kikori, Gulf Province. His leaseholder block was left in the hands of his eldest son, David.

Jenny, Tom and David are all part of a land settlement subdivision at Hoskins in West New Britain Province. They have also confronted the most common problems of smallholder oil palm producers, managing with little or no labour and dividing up whatever income is earned fairly and without conflict.

Jenny, as a widowed owner of an oil palm block was unable to harvest much fruit after her adult sons moved away. Weeding and pruning, essential to maintaining productivity, fell away, as did the block's harvest potential. Jenny and her daughters relied on market gardening for their income.

For Tom, earning income from his block was dependent on the efforts of his son. David, who resides with his family, earns his income in part through harvesting oil palm. By diversifying his income sources through off-block activities, David increases the options and choices available to him and ensures food security is more likely and financial risk is reduced.

While away Tom gave his son access to his ATM card, to allow David to draw money out of the bank account into which income from selling oil palm is paid. This ensured an income for David and the rest of the family residing on the block. When the ATM card was damaged, however, David's motivation to produce oil palm declined.

Jenny, David and Tom all faced the same problem, how to continue to derive income from their oil palm blocks. The answer came through work by Australian project scientists, expanding a scheme first introduced by the Oil Palm Industry Corporation (OPIC) in 1997 to allow collection of loose oil palms.

Oil palm fruit is harvested in fruit bunches. During harvesting some ripe fruitlets are dislodged from the main bunch and scatter over the ground, where they are usually left. With under-harvesting a major cause of reduced productivity,

OPIC introduced the Lus Frut Mama scheme, where women were paid directly by the oil palm company for the collection of loose fruit.

Women benefited from a new income source in which they were guaranteed payment for work done; for most women prior to the scheme, payment uncertainty was high when they relied on their husbands to pay them for loose fruit collection. By participating in the Lus Frut Mama scheme women earned an average 1443 Kina a year (based on 2000 figures). Most of this income was subsequently spent on food, education for children and other family needs.

With up to 70 percent of the fallen fruit previously wasted, the introduction of the scheme also helped the industry. Almost all fallen fruit is now harvested. Many of these benefits were reported at the conclusion of an ACIAR project examining the scheme, with the aim of verifying the anecdotal evidence emerging from the scheme's introduction.

The project revealed that the Lus Frut Mama scheme was providing substantial benefits for approximately 3000 local women. Each received a 'Mama card' to record her own collection output, and from this it was found 'lus frut' collection represented approximately 25 percent of total production. These results were an encouragement to widen the scheme to other oil palm growing areas of the country.

Managers of OPIC believe that this project has already contributed to a change in industry attitudes. Benefits include increased yields from smallholder blocks, an increase in income for women and new small business enterprises run by women, such as the sale of used clothing and chicken businesses.

As a result of verifying the scheme's success, a new project to help widen the concept has been developed introducing a Mobile Card Scheme. Using the lessons learnt (see story next page) through the earlier project's examination of the Lus Frut Mama scheme, Gina Koczberski and George Curry of Australia's Curtin University of Technology began work in mid-2002 to introduce the Mobile Card.

For Jenny, who had relied on her sons to work the block while she and her daughters supplemented their income by collecting the loose fruit, the departure of her sons saw harvesting of fruit bunches cease and 'lus frut' income dry up. The women were forced into greater dependence on food production for household consumption and for generating an income.

Seeing the potential of her block to generate further income and help pay off debts, Jenny has, since late 2002, used the new payment initiative, developed by ACIAR in collaboration with OPIC and the Oil Palm Research Agency (OPRA), to facilitate the flow of labour between blocks. The Mobile Card guarantees payment of labour whereby the company pays the worker an agreed proportion of the value of the crop harvested.

Steven, a previously under-employed resident of a highly populated block, was contracted as the Mobile Card worker. In return for bringing the block back into production and harvesting fresh fruit, he receives 50 percent of harvest payments, with the other half paid to Jenny.

By August 2003, outstanding debts had been repaid and new investments to ensure the long-term viability of the block had been arranged. For Jenny, the increased production and associated returns have allowed her to do something she has never done before, save money for the future.

For David, the loss of income following the damage to his father's ATM card was replaced by a Mobile Card, provided

with his mother's consent in his father's absence. The card provided an 80:20 split to David for his work on the block. The 20 percent was paid to Tom's account and used to pay school fees. David's portion of the payment was used to support the family living on the block.

During this time production on the block was increased, and through the 'Mama card' David's mother, Ellen, and his sister also earned income collecting fallen fruit.

When David's father Tom returned from Gulf Province the Mobile Card contract was renegotiated, changing the income split to 70:30 in favour of Tom. As part of this arrangement Tom took over payments to other family members for their work, something David had done while earning the bulk of the income.

The renegotiation has allowed Tom to control the management of the block, a right he (and many other family patriarchs) believes is necessary for family harmony. For David, no longer reliant on Tom's assessment of the value of his work in determining his income, increases in productivity are reflected in increases in payments – the harder he works, the more he earns.

'Lus frut' lessons for card scheme

The complex interactions between family members, the need to ensure incomes are fairly divided and effort rewarded and labour utilisation is maximised, are all addressed in the Mobile Card scheme, thanks to the application of lessons learnt in evaluating the Lus Frut Mama scheme.

In 1999 ACIAR began a small project to evaluate the scheme, then only two years old. With the benefits attributed to the introduction of the Mama scheme growing, ACIAR supported the Australian National University, together with the Curtin University of Technology and PNG's Oil Palm Research Association, to verify the role of the scheme in these outcomes.

Two of the people responsible for drawing these findings out from the Lus Frut Mama scheme evaluation were Gina Koczberski and George Curry, from Curtin University, now leading the follow-on project introducing the Mobile Card scheme.

For Gina and George three key lessons emerged from the Mama scheme, and are being successfully applied in the introduction of the Mobile Card.

Direct payment to the labourers is vital, as womens' involvement in oil palm harvesting before the Mama scheme revealed. Low collection rates were the result of women lacking certainty of payment and they often missed out when their husbands were paid instead for the whole harvest, rather than dividing the payment to reflect harvested and collected (loose) fruit. The Mama scheme introduced the concept of a contract between the card holder and the processor, ensuring certainty of payment and an incentive to become involved.

Many block owners do not pay in cash, due to a range of social pressures and competing claims on cash. The Mobile Card and the Lus Frut Mama schemes circumvent this problem by allowing payments of labour to be made in oil palm fruit. A market in labour in oil palm production is therefore facilitated, providing labour and employment opportunities for women and under-employed youth.

Flexible labour practices and new payment arrangements substantially improve motivation to work and also reduce conflicts. The Mama card could be loaned to children to pay school fees and to fulfil customary obligations. Within households the existence of the Mama card has provided dual income streams, providing greater choices and options for families. For men it is possible to place fresh fruit bunches on the card to meet their domestic financial obligations.

Using these lessons Gina and George began work in May 2002 to design and trial the Mobile Card at Hoskins in West New Britain Province. ACIAR funds helped employ an OPIC officer to assist with the introduction of the card.

"Much of our initial work at Hoskins involved promoting the new Mobile Card among smallholders through radio programs, and visiting smallholders who were likely to benefit most from the scheme, such as elderly or disabled growers experiencing labour shortages and families with income disputes between father and sons. Once the trial was established we worked with OPIC to monitor the productivity gains and socio-economic benefits of the trial", says Gina.

The experiences of smallholders (see main story) has proved the Mobile Card can be invaluable in helping to negotiate problems that arise in the interactions between labour, income distribution and families working oil palm blocks. This initiative has the potential to increase smallholder productivity in other export crop industries.

PROJECT:

ASEM/2002/014: Improving productivity and the participation of youth and women in the Papua New Guinea cocoa, coconut and oil palm industries

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LIFTING COCOA QUALITY IN PAPUA NEW GUINEA

PNG IS GRADUALLY REBUILDING ITS REPUTATION AS A PRODUCER OF HIGH-QUALITY COCOA BEANS, REPORTS **JANET LAWRENCE**



Restoring reputations:

Traditional, homemade drying kilns, like this one for cocoa and copra in the Solomon Islands are widespread throughout PNG and the Solomons.

PHOTO COURTESY AUSAID
- THE AUSTRALIAN GOVERNMENT'S
OVERSEAS AID PROGRAM

Preparing chocolate may be the dream job of chocoholics worldwide, but it is the preparation of the essential ingredient, cocoa, that is threatening Papua New Guinea's reputation as a quality producer.

Cocoa beans are grown from three main varieties; forastero, providing 80 percent of the industry's global supply; criollo, a high-quality bean used in the best chocolate and accounting for five percent of supply; and trinitario, a mix of forastero and criollo.

Trinitario beans are prized for combining the quality of criollo with the robustness of forastero. As a major supplier of trinitario beans, PNG built a worldwide reputation based on the flavour of premium beans blended with the unique characteristics that infuse the beans grown in PNG soils.

But today it is a different set of characteristics threatening this hard-won and quickly lost reputation. The need to restore the industry's reputation has become an ongoing project since the

early 1990s, when the unfortunate reputation for characteristics such as excessive acidity, high shell content and smoky flavour (especially in the beans produced by smallholders) began.

Premium cocoa is bought under one of two categorisations; the 'fine or flavour' category, or the bulk category. (Cocoa suppliers are rated against both 'fine or flavour' and 'bulk' standards to assess the quality of the bean.) PNG cocoa used to be rated as 75 percent 'fine or flavour', attracting a premium quota. By the early 1990s the increasingly bad reputation of locally produced cocoa saw this cut to 25 percent.

The main reason for the decline was the emergence of smallholders after the breakup of the plantation-based industry. The smallholders, who contribute more than 80 percent of PNG's harvest, produce cocoa as a supplementary cash income to meet costs such as school fees and debt repayment, and have lacked the money to invest in long-term management. In part, the lack of high-quality cocoa from this sector has ensured incomes remain low, but also stable.



A lack of resources to spend on cocoa production extends to preparation. Before export, cocoa is fermented and dried. Many smallholders have taken to using fuelwood or diesel drying-kilns that often smoke the beans, replacing many of the desirable characteristics of PNG cocoa with an overwhelming smoky taste.

Combined with poor maintenance and a lack of investment in plants and new varieties, the reputation of PNG cocoa was going up in smoke.

Initial work, from 1992 and 1996, was undertaken by the PNG Cocoa and Coconut Research Institute (CCRI) and AusAID. This established the Cocoa Quality Improvement Project, which showed that quality could be restored with the use of suitable technology and shorter fermentation times (from seven down to five days). In particular, this project recommended the introduction of small-scale solar drying of cocoa in East New Britain Province.

When the project finished in 1996, ACIAR stepped in to support further research to follow on from the AusAID-funded activities. The new project's major task was to evaluate the effects of minibox (250 kilograms) fermentations and solar drying technology on cocoa quality in PNG.

Miniboxes allow growers to prepare smaller volumes of harvested cocoa beans for fermentation and drying, at a scale suited to household and village/family cocoa production. This solar drying technology lowers reliance on diesel and wood-fired kiln drying.

More information was also needed about what fermentation processes to use throughout the country, especially in wetter areas. Using computer simulation modelling, the project participants, CCRI, the Centre for Food Technology of the Queensland Department of Primary Industries, and the Food Science and Technology Department of the University of New South Wales, redesigned the solar dryers, based on investigations into cocoa's drying properties.

They also studied the effects of manipulating fermentations – such as changing the length of fermentation, washing beans prior to drying, and fermenting smaller quantities of beans at one time.

On sites too wet for satisfactory use of solar dryers, the project team investigated the feasibility of combination solar/kiln dryers and also provided support to convert existing wood-fired dryers to solar/fuel-fired dryers.

Another problem that substantially reduced cocoa quality was that many solar dryers, introduced to East New Britain (ENB) through the AusAID project, had fallen into a state of disrepair. Examining these old dryers led the project team to modify the design, resulting in greater efficiency and less need for recurring maintenance.

The new design has a concrete base and flat roof, good

performance and is easy to operate and maintain; a design that will now replace the earlier units installed in six locations around ENB province.

The state of disrepair of many old dryers revealed the importance of correct use and maintenance of fermentation and drying units.

The project worked to develop the skills and experience of extension personnel to help ensure the recipients of dryers are equipped to better use and maintain the equipment.

CCRI, the PNG Cocoa and Coconut Extension Agency (CCEA) and Cocoa Board staff took part in training and capacity-building activities, including the development and 'field-testing' of training materials and user guides that target both male and female smallholders.

One outcome of this and other project activity were revisions to the PNG Cocoa Inspectors and Assessors Manual, the PNG Export Regulations and the PNG Cocoa Act of 1982. The phasing out of kiln dryers in provinces and districts in which rainfall levels allow the use of solar dryers was one such recommendation. This will help address the issue of smoke contamination, still the single largest complaint regarding PNG cocoa.

At CCRI work has also been done on improving cocoa varieties. The quality attributes of cocoa lines selected from its breeding program were tested, including lines proposed for provisional release. Superior attributes sought included bean size, shell content and fat content that also reached the 'PNG flavour' standard.

The project made it possible for CCRI to be involved in a four-country undertaking (PNG, Venezuela, Ecuador and Trinidad & Tobago) through the International Cocoa Confectioners' Organisation – on cocoa fine/flavour quality evaluation. The task was to provide comparative documentation of PNG standard fine cocoa for use as a benchmark against the product from other countries.

The initial work was to determine the best fermentation times and roasting protocols for the samples of selected genetic material from the different countries, now largely completed.

The recipe for restoring PNG's reputation for fine cocoa and chocolate has been substantially refined through the project, a recipe that CCRI is increasingly keen to market abroad. Development on the production of a PNG brand name chocolate in Australia or PNG is under way with the help of the project and Mars Confectionery Australia, a major user of PNG cocoa.

A 'home grown' chocolate bar may well be at the forefront of re-establishing PNG's reputation as a cocoa and chocolate producer, with chocolate samples now in preparation. And that is something to warm every chocolate lover's heart.

Preparation: (Above left)

The correct preparation of cocoa impacts on the final taste.

New design: (Above)

Smilja Lambert, Neil Hollywood, Robert Driscoll, James Maora, Bernard Maladina and Paul Barker inspecting the solar cocoa dryer developed as part of the ACIAR project.

PROJECT:

PHT/1995/136: Cocoa fermentation, drying and genotype product quality assessment

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Feeding the chickens feeds the nation: top, Bougainville poultry farmer Helen Tatou, who sells chickens and chicken eggs at her local market, could soon benefit from the project; and above, a typical PNG poultry shed.

PHOTOS COURTESY AUSAID



NOT JUST CHICKEN FEED

DEVELOPING LOW-COST LOCAL FEED HAS IMPROVED THE OUTLOOK FOR PNG'S POULTRY FARMERS, REPORTS HELEN OLSEN

Village farmers of broiler chickens in Papua New Guinea have been finding it hard to make a living in recent years because of the high cost of feed. An ACIAR project to establish a local poultry feed facility that can supply farmers with a low-cost high-quality feed is aiming to solve this problem.

The project was initiated after a survey of about 400 chicken farmers in the Eastern Highlands and Madang regions found that the cost of feed, manufactured in PNG from expensive grains, was the main obstacle to them achieving a healthy profit margin.

Dr Phil Glatz, the project leader, is working with other researchers to promote the use of poultry feed made from locally-available materials or by-products of crop processing. This could increase the overall profit for farmers by A\$10 million in an industry that is already worth A\$54 million a year.

"We are now at the point in the project where we are testing a range of local feedstuffs, and evaluating the most economic and nutritional ones," says Dr Glatz. "Next year we will introduce the feedstuffs we consider the most suitable to the PNG farmers. By asking them to answer the survey again, we will see if they are using their local feed resources, and whether they think it is more profitable."

The project team has overseen the building of a poultry nutrition facility at the Labu National Agricultural Research Institute (NARI) Livestock Research Centre near Lae, on the east coast of the main island. The design is based on the poultry nutrition facilities operating at the Pig and Poultry Production Institute (PPPI) at the University of Adelaide.

The centre includes infrastructure to measure apparent metabolisable energy (AME) in feed, and a vermin-proof, temperature and humidity controlled feed storage unit.

Using the AME technology, researchers have found so far that cassava, sweet potato and palm kernel meal are highly nutritious locally-produced feedstuffs.

As part of the collaboration, staff from NARI have come to Australia to be trained in poultry management and nutrition of broiler chickens. Researchers from the PPPI have also travelled to PNG to help establish procedures on site and train the local people.

Future plans for the project are to expand the range of chicken feeds and diet options available, and to increase the training.

"Many women, in particular, going through university in PNG are interested in poultry management – an expansion of our training capabilities would cater to these students," says Dr Glatz.

Janet Pandi, a PNG junior research scientist working with NARI, is currently doing Masters studies at the PPPI in Adelaide. "I'm looking at the effect of high-fibre feeds on the intestinal health of chickens, with the aim of working out the most beneficial feedstuffs."

With the benefit of her training, undertaken as a John Allwright Fellow, Janet is planning to return to her home in 2006 to supervise the running of the poultry feed facility.

Chicken meat and eggs hold a central part in the PNG diet, being the main – possibly only – high-quality protein sources for the majority of people, particularly for those who have no access to fish.

The two-way collaboration on the project has benefited Australia, through the establishment of a free-range chicken facility at PPPI, based on the examples of chicken farming in PNG.

"With the increasing popularity of small-scale, free-range farming in Australia, we have taken the opportunity to learn from our PNG neighbours," says Dr Glatz.

The emphasis is on developing high-fibre pasture or hay feeds that reduce the physiological stress on the birds by slowing their growth and reducing the cost of feeding.

Although the current project is due for completion in June 2005, the legacy of the ongoing education and infrastructure in place both in Papua New Guinea and in Australia will be far more lasting.

PROJECT:
AS2/2001/077 Poultry feeding systems in PNG

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MARKETING PRODUCE TODAY AND TOMORROW

PNG'S HIGHLANDS GROW FRESH FRUIT AND VEGETABLES ALL YEAR ROUND. THE CHALLENGE IS TO FIND WAYS TO SELL IT, WRITES **WARREN PAGE**

Horticulture producers in the Highlands of Papua New Guinea have an unusual advantage over producers elsewhere in the country, an advantage provided by its deep black soils and year-round production. Unlike most horticulture industries that operate seasonally, highland producers have a year-long season.

Farmers grow a variety of produce: cabbage (English and Chinese), taro, cassava, tomatoes, pumpkin, sweet potato, broccoli, capsicum. The potential of these producers to supply fresh produce year round represents a valuable income stream. And for PNG the constancy of supply would add significantly to food security.

For farmers like Jonah Waiphek, who supplies fresh pro-

duce to Kutubu Mine (in Southern Highlands) once a week, tapping into this potential may soon become a reality.

As President of the South Waghi Vegetable Producers Association, Jonah and around 70 other farmers gather together each Thursday to assemble their produce and sort it for quality, prior to the regular Friday pickup for delivery to the mine. Such a regular market is, however, uncommon, with the marketing system overall a fragmented one.

Jonah and his colleagues are faced with the problem of what to do with the remainder of the fresh produce provided from the rich soils. The association, according to Jonah, has enough produce for marketing during the rest of the week, but no markets to deliver it to. A logical avenue is supermarkets,

Plentiful offering: but too few markets for the Highland producers.

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however many of them source fresh produce offshore.

Professor John Spriggs, of the University of Canberra, says the reason for the supermarkets' reluctance to source highland produce is reliability. "The ad-hoc nature of marketing systems in the highlands, together with a range of perceptions held by buyers – some real and some out of date – combine to reduce the options for highland producers like Jonah."

Jonah and his fellow farmers in the association agree with Professor Spriggs. This common ground was established when Professor Spriggs travelled to PNG as part of an ACIAR-supported project to improve the marketing systems for fresh produce in the highlands.

During these discussions the issue of reliability was raised. Jonah and the other farmers are acutely aware of the need for reliability, but believe some genuine barriers are holding them back from impressing their reliability to buyers. The lack of a cool storage room to store produce means much is picked before or after it is ready, to meet the Friday deadline. Infrastructure problems relating to transport and communications also exist.

But Jonah does not believe the perception, still widely held by buyers, that clan warfare is a problem. The South Waghi Vegetable Producers Association, Jonah says, is made up of members from a number of tribes, based on the recognition that cooperation is vital to the association's success. To some extent this perception remains, based on the occasional problems elsewhere, and it can and does affect transport routes.

Earnest Natera, a Food Produce Development Corporation post-harvest specialist, and Angela, a village extension worker in Minj, are both working to help the association. Earnest would like to test shipments using data loggers and modern packaging, but is hampered by a lack of resources. Angela helped provide information and communications through the use of her phone until her house burned down. But with no communications, few storage options and expensive transportation costs, options are limited.

Since the project began in 2003, Professor Spriggs has met a number of groups like Jonah's and heard similar stories in focus groups and discussions. But doing so has helped create a more complete picture of the current marketing systems that do exist and the barriers to their expansion, a first step on the road to change. The project team, led by Professor Spriggs and involving others from the University of Canberra, the Food Produce Development Corporation and PNG's National Agricultural Research Institute, has begun to use this knowledge, gathered from Jonah, Earnest, Angela and many others to map the marketing systems.

This knowledge has also been essential in targeting key stakeholders throughout the system with a concept paper, outlining what is possible. The presentation of such a paper, with a vision of a better future and strategies to achieve this, has been widely adopted by stakeholders in the marketing chains. The Government has endorsed it, recognising the potential to source food domestically, increase food security and reduce the flow of income out of the country.

For Jonah and the South Waghi Vegetable Producers Association, the future may be one of more secure markets and perhaps a cool storage room. Produce can then be picked when ripe and stored, rather than too early or late to meet the weekly shipment. And for the first time the association, and others like it as well as individual farmers, could reap the full benefits of selling produce almost every day of the year, rather than once a week.



PROJECT:
ASEM/2001/037 Improving the marketing system for fresh produce of the highlands of PNG

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SAVING VALUABLE FISHING RESOURCES

ALTHOUGH GEOGRAPHICALLY THEY SIT AT THE EASTERN AND WESTERN ENDS OF PAPUA NEW GUINEA, THE FISHERIES OF MILNE BAY AND THE FLY RIVER ARE BOTH BENEFITING FROM ACIAR-SUPPORTED RESEARCH TO ENSURE CATCHES OF MARINE RESOURCES, VITAL TO FISHER FOLK, REMAIN SUSTAINABLE. BY WARREN PAGE



BARRAMUNDI

The Fly River, in Western Province, is an important fishery to around 200 small-scale fisher folk; with barramundi their most important catch. Barramundi are found in coastal regions and rivers west of Port Moresby, with the Fly River having a once-large population.

Since 1990, catches in the River have dramatically collapsed, due mainly to unregulated commercial fishing. By the late 1990s, catches of barramundi had fallen to around 10 tonnes a year, 60 percent of which were juvenile fish.

Such high catches of juvenile fish indicate that a fishery is dangerously close to collapse. Removing juveniles in large enough numbers breaks the life-cycle.

In 1996 ACIAR supported research to undertake a one-year study of fishing data, using catch logbooks. This revealed significant knowledge gaps in the origin, spawning, age structure and genetic makeup of Fly River barramundi. Such knowledge is vital to a full understanding of the life-cycle of the fish, essential in the development of effective management plans to rehabilitate the collapsed fishery.

ACIAR-supported research, led by Dr Steve Blaber of CSIRO Marine Research, working in conjunction with PNG's National Fisheries Authority and Department of Environment and Conservation, the Ok Tedi Mining Ltd (Environment Division), and Australia's James Cook University, adopted a two-pronged approach to gathering the knowledge needed.

The first part of the research examined barramundi biology, including genetics, spawning and migration, the second worked to develop a fuller socio-economic picture of the fishery, including utilising local knowledge.



The results revealed the Fly River barramundi population as genetically comprising a single stock, with a territory extending into West Papua, part of Indonesia. Migratory patterns were less clear, with no set migratory dynamics emerging.

A key finding was that the use of large mesh nets was responsible for killing adult females, especially the bigger fish. The need to restrict these nets to conserve females and ease pressure on the breeding population was clear.

Combining this data with the socio-economic findings allowed the development of a computer-based model of the fishery. This was used to test the most efficient management practices, including determining size limits on netting mesh, fishes and where and when to close off fishing to help migration and breeding.

The management options investigated led to the development of a Barramundi Fishery Management Plan. Developed with consultation from stakeholders, including the National Fisheries Board, the plan was accepted by all parties. This acceptance cleared the way for the plan to be formally gazetted into law in April 2003 under the Papua New Guinea Fisheries Management Act.

BECHE-DE-MER

A common experience in PNG fisheries, and beyond, is achieving a balance between sustainability of catches and incomes, especially when rising commodity prices increase the income on offer.

The beche-de-mer fisheries of Milne Bay Province, in PNG's east, were out of balance, with short-term profit out-

weighing long-term sustainability. As the country's largest provincial producer of beche-de-mer, this imbalance threatened to have a detrimental effect on local fisher folk and export income. Rising international demand for beche-de-mer species such as sandfish and black teatfish had seen the number of species exported rise from 14 to 18 since 1990. This was in part due to a fall in the number of premium value species being taken as a percentage of the total catch.

The National Fisheries Authority was keen to break the boom-bust cycle of over-fishing, followed by under-fishing to allow some level of recovery – which was immediately exploited again to meet the growing demand and profits on offer.

Working with CSIRO Marine Research and Conservation International PNG, under an ACIAR-supported project, the Authority initiated research to help develop a more effective management approach.

By undertaking surveys of stock numbers and size for commercially important species the project scientists were able to determine appropriate catch levels.

The project revealed the need to change the total catch levels that were creating the boom-bust cycle of fishing. Total allowable catch was exceeding the total sustainable catch level by more than 30 tonnes a year.

Without the management measures the project recommended, which are now being adopted by Fisheries Authority managers in Milne Bay, the tide of over-fishing would not have been turned. For local fisher folk, commercial fishermen and those reliant on both industries, the new management plan has greatly enhanced the balance of sustainability.

Keeping an industry afloat: Research offers a more certain future for PNG's fishermen.

PROJECT:
FIS/1998/024: The biology, socioeconomics and management of the barramundi fishery in the Fly River and adjacent coast of Papua New Guinea
FIS/2001/059: Research for sustainable use of beche-de-mer resources in Milne Bay Province, Papua New Guinea

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