

FRUITS OF



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Increasingly, urbanisation is threatening the traditional way of life of many indigenous communities. ACIAR has a mandate to improve the wellbeing of people in developing countries – and Australia – by lifting agricultural productivity to assure food supply. Some ACIAR research directly benefits indigenous communities across the Asia-Pacific, by helping adapt traditional practices and creating enterprises that ‘fit’ their culture.

These reports, compiled by Janet Lawrence, detail some of the imaginative approaches towards helping hill tribes in South-East Asia, island communities in the Indo-Pacific and Aboriginal communities in Australia. They show how indigenous groups are restoring and maintaining the plant and animal species on which they have traditionally depended, while developing skills for new industries.

Hill tribes in the upland regions of Thailand, Laos, Vietnam and other countries in the region, are eking out a precarious existence. These ethnic minorities have traditionally practised ‘slash-and-burn’ agriculture but that way of life has come under threat, blamed for causing severe environmental damage.

ACIAR has funded many initiatives to introduce more sustain-

able farming practices in hill tribe areas, and to help these people lift their living standards by growing crops that are more profitable than the low-yielding upland rice. Such alternatives also help to make opium growing less attractive.

A program has been running for the past decade to develop a sustainable temperate fruit industry – first in Thailand and more recently in Vietnam and Laos. The production of high-value ‘low-

chill' temperate fruits such as plum, peach, nectarine and persimmon is a definite prospect for hill tribe regions, and could generate two or three times more income than rice. The term 'low chill' describes a minimum exposure to cold to initiate flowering, rather than the hard chill needed for stone fruits grown in cooler climates.

Researchers have confronted many challenges in the project: identification of suitable orchard sites, selection of the best varieties, working out orchard management techniques, establishment of nurseries and tackling insect pests and diseases. Marketing strategies have also been needed to ensure the produce has a chance of being sold competitively in larger population areas.

Thailand initially received 2000 stonefruit trees. In the course of the most recent project, Vietnam and Laos received more than 1300 trees – different varieties of peach, plum, nectarine and persimmon. Researchers have compiled a management-decision package for growing temperate fruits in subtropical environments of Asia and Australia. The package includes basic and advanced manuals to help farmers and extension officers learn technologies such as deficit irrigation, mulching, tree training and management, and pesticide-free ways to control fruit fly.

In Thailand, fruit production has reached the commercialisation stage. Hill tribe villages near Ang Kang and Khun Wang are producing and marketing the peach 'Tropic Beauty', and have recently established cool-store facilities at Ang Kang. Refrigerated trucks transport the fruit to larger cities such as Chiang Mai and Bangkok.

The temperate fruit orchards have also become a tourist attraction. Affluent Thais enjoy driving to the hills to sample and buy premium grade fruit, further increasing local income.

In the central highlands of Vietnam, ethnic minorities (such as the hill tribes) have practised slash-and-burn agriculture for generations – clearing and burning patches of forest for cropping – leaving a legacy of deforestation, erosion and declining soil fertility. The farmers are being encouraged to settle in villages and adopt permanent agricultural practices, but they need to learn how to make this change long-term and sustainable.

An ACIAR project involves scientists studying large amounts of existing information about the region's soils and interpreting its constraints to productivity. From this process they are developing strategies to tackle erosion and degradation and provide a foundation for long-term productivity.

They are developing a soil capability classification training package for Vietnam, which initially is being used to train extension officers from Gai Lai Province and also World Vision. These officers will take the 'how to' knowledge to farmers.

Revitalising marine populations

Coastal communities across the Indo-Pacific have traditionally relied on the sea for food and income. Growing populations and more effective harvesting methods have led to serious declines in many marine species. The worst-affected communities have been those with few alternatives for generating income.

ACIAR has funded research to learn more about the life cycles of species on which these communities depend, investigating how to restore numbers and the possibilities for aquaculture.

Since 1995 ACIAR and the WorldFish Centre have undertaken a strategic research partnership to understand more about *bêche de mer* (a number of species commonly known as sea cucumbers or sandfish). The dried animals are prized in Asia and are therefore important for village income. Harvesting has been intense.

Bêche de mer studies have involved a threefold approach:

- population dynamics studies, contrasting trends in stocks between fished areas and adjacent marine reserves;
- fisheries management; and
- augmenting stocks by culturing then releasing juveniles to enhance natural populations.

Some of the results of the ACIAR and WorldFish studies are being implemented in community-based management arrangements for sandfish stocks.

The government of Papua New Guinea was eager to promote community-based management of marine stocks but had no suitable mechanism. An AusAID/World Bank Rural Development Sectoral Review recommended project assistance to develop and trial processes for establishing community-based resource management within areas of customary marine tenure.

Subsequently an ACIAR project provided the first attempt to establish community-based fisheries management by increasing levels of environmental awareness in target communities. The project also resulted in a process of benefit to the marine environment and one which is readily transferable throughout PNG.

The community initially selected to participate was Obulaku village on Kiriwina Island in the Trobriand Islands, where the proportion of sandfish exported had dropped dramatically. The shallow, easily harvested species had been overfished and the deeper, less accessible species comprised an increasing proportion of the catch. The project's goal was to develop community-based *bêche-de-mer* fisheries management plans that incorporated socio-economic considerations.

The project was based on the Facilitated Community Action Process (FCAP), used through a three-year AusAID project in Samoa. Obulaku village comprises 62 households, with a population of 298. The village contained six separate clans. The traditional leaders asked the team to work directly with individual clans. Separate meetings were held with clan leaders to gain their support and to encourage them to involve all their members. Initial participation in clan meetings involved people identifying pictures of key marine species and then providing the local name, and also by promoting discussion about posters depicting 'healthy' and 'unhealthy' marine environments.

The discussions generated concerns within the community about the existing situation and an awareness of actions that could be taken to improve the situation. Project staff then arranged meetings with clans to identify problems and their impacts on the community. After a clear identification of the problems, the gathering discussed causes and solutions and proposed the actions required to achieve the desired solution. The research team then compiled the information into 'problem and solution trees' for the whole village.

Some of the actions generated from the process included a set of precautionary measures such as size limits, a ban on the use of destructive harvesting techniques and bans on dumping rubbish in the marine area.

As part of the community-based management program in Obulaku, the community agreed to monitor their *bêche-de-mer* harvest. The project staff developed a simple diary for recording the daily catch. It was observed that the value of sandfish harvested by fishers from Obulaku was significantly higher than landings by fishers from other villagers, and there were fewer rejects. The researchers concluded that the community-management process led to fishers from Obulaku becoming more aware of the importance of harvesting the larger size classes of sandfish, from both a conservation and economic perspective.

A similar story has emerged from the study of trochus populations. Australia, Indonesia and some Pacific Island nations supply about

90 per cent of the world's trochus shell, which is used for high quality buttons and crafts. Falling production and increased scarcity of the trochus raised concerns of over-exploitation in areas where communities had fished for centuries. In Australia, concerned Aboriginal communities from King Sound in Western Australia approached the Northern Territory University, hoping to gain access to the hatchery production skills the NTU had developed for trochus.

Once a hatchery was established further help was needed to reseed coral reefs with hatchery-produced juveniles.

ACIAR funded the WA-based research and work in Indonesia and Vanuatu. Successful hatchery techniques emerged and reseeded trials started. The release of unprotected juveniles on to coral reefs worked for WA, but it was not the universal solution for enhancing trochus stocks. In Vanuatu and Indonesia, the young trochus needed to be caged to protect them from predators.

The success achieved with reef reseeded in WA by the King Sound Aboriginal communities led to the Aboriginal and Torres Strait Islander Commission (ATSIC) helping to set up the Kimberley Aquaculture Aboriginal Corporation (KAAC). In 2001, with the help of the WA government, KAAC established a \$3.2 million multi-species hatchery in which trochus would be cultured for reseeded depleted reefs.

A different approach was used in Vanuatu. Experiments with adult trochus on the islands of Tanna and Aniwa showed that the relocation of just 163 brood-stock trochus led to a rapid increase in juvenile trochus populations. The scientists concluded that the presence of the adults not only generated a larval supply of juveniles but also enhanced conditions for attracting other larval trochus to settle on the reef.

In another development, a wide-ranging project based on the theme of sustainable aquaculture in the Pacific and northern Australia got under way in 2004. The project is targeting promising research outcomes from past ACIAR and WorldFish Centre projects. Research topics include post-larval fish capture and culture, *bêche de mer* production and reseeded, the health status of black tiger shrimp in Fiji, feeds for tilapia and freshwater prawn in PNG and Fiji and integrated prawn-taro farming on Wallis and Fortuna.

Self-managed woodlands

Tropical woodlands have significant biological and environmental importance in the tropics, including northern Australia, and demands on these woodlands have increased substantially as other ecosystems have become fully committed or exhausted.

In northern Australia, European-based farming has replaced traditional Aboriginal practices in many tropical woodland areas. In Africa, the extensive miombo woodlands (a type of deciduous woodland that covers a vast area of southern Africa) are under pressure because of increased clearing for fuel wood and the conversion of marginal grazing lands for crop production. The increasing demands that are being placed on these ecosystems must be balanced against their limitations.

An ACIAR project sought to improve the framework for resource planning in these woodlands by enhancing the capacity of resource managers (farmers in particular) to identify, plan and implement sustainable natural resource management options. Researchers used the techniques of 'action research' (or 'learning by doing') so that local participants could involve themselves in the research.

In Zimbabwe, the project was hampered by the political climate,

particularly in regard to land-planning issues, but outcomes have still been encouraging.

A Zimbabwe-based NGO, the Communal Areas Management Program for Indigenous Resources (CAMPFIRE) Association, generated local interest and enthusiasm with a series of pictorial news sheets on land-use and planning issues. Critical to local acceptance and participation in the project was to accord the local chief and his headmen equal authority with government agencies. Through this project, the government planning institution has shown it is willing to collaborate with NGOs in the land planning process and engage in constructive dialogue to overcome perceived community inertia towards land-use planning on communal lands.

Similarly, in Australia, project people working with the Aurukun Aboriginal community took great care to abide by the community's established protocols. Aurukun is in the western region of Cape York in northern Queensland. It is one of the larger communities in the Cape, with about 1200 people. Participatory decision-making in resource management in this tropical savannah environment was a new concept for the community, but eventually the people started to express their own opinions and make their own decisions. Enthusiasm for, and within, the project increased through time. The local Aurukun Council became enthused about the prospects for such work and made natural resource management a key employment and education issue for the shire.

Opportunities from the forests

As natural rainforests dwindle, largely due to unsustainable logging practices and/or the encroachment of shifting and permanent agriculture, harvesting high-value rainforest products from plantations on previously degraded land has emerged as a viable, long-term option. Such an industry also offers long-term employment opportunities, export earnings and environmental advantages for many countries in the Asia-Pacific.

Previous research supported by ACIAR demonstrated that widespread, severe nutritional deficiencies were limiting establishment and productivity of high-value timber species in many of the soil types available for plantation forestry in north-east Australia and the south-west Pacific.

An ACIAR project developed fertiliser strategies for plantations in Fiji and the Solomon Islands and established a training program in partner countries.

On Kolombangara Island in the Solomon Islands, researchers developed a potting medium for plantation species, using decomposed coconut shells. This medium was superior to forest soil, and seedlings grew much faster. Producing the medium has created a small industry for village women, who grate the composted coconuts through a metal screen to produce the final product. The women are also paid to plant the seedlings in the composted mixture and transplant them to the plantations. Because the coconut medium is lighter than soil, the women can carry and plant more seedlings in a day, increasing their earnings.

There is also potential to domesticate and commercialise some of the indigenous trees and shrubs that produce edible fruits and nuts in PNG and the Solomon Islands. Already many of these provide nutritious foods and also an extra income source at local markets. ACIAR is funding a feasibility study of *Canarium indicum* (which produces a nut called the galip nut in PNG and ngali in the Solomons) as a pilot to determine the place of the nut in household diets, and its income potential.



Another valuable crop is sandalwood. Vanuatu already harvests the tree for its aromatic oils. A similar opportunity exists with native sandalwood resources on Cape York, but a lack of information about the local species is limiting industry growth. A study is determining prospects for establishing plantations of elite varieties of sandalwood.

Portable sawmills are, in theory, an ideal enterprise for small-scale operators. They have been around for some time and can undertake high-quality milling that adds value to milled forest products. They are cheaper to use than conventional mills and are less damaging than conventional harvesters. However, less than 20 per cent of mills seem to be operating efficiently, due to a lack of technical expertise and poor maintenance. Limited opportunities to market the product also contribute to the problem. ACIAR hopes to give the portable sawmill industry a boost through improving the design to make the mills more effective and reliable.

Better quality cattle, and a chance for horticulture

In the Weipa region of Cape York in northern Queensland, cattle production is one of the few economic enterprises that fit the lifestyle of the local traditional owners. Through the 1980s and 90s, the mining company Comalco leased a cattle property to provide pastoral work for local Aboriginal people and fresh meat for the mining town. After the loss of the market for fresh meat in Weipa, and a downturn in the live export trade for cattle during the Asian economic crisis, the company decided to sell the property. This decision was made with the traditional owners' agreement.

But there was still the opportunity to accommodate a grazing enterprise using improved pastures established on the Comalco mine site through its mined land rehabilitation program. Beef cattle production could provide meaningful employment and income for the traditional owners post-mining.

Comalco began trials on the use of leucaena along with suitable grass to provide improved cattle feed. This work was linked to an ACIAR project in West Timor, Indonesia, where the scientists developed a management package to improve the dry season supply of forage from high-performing leucaenas that had been identified from earlier ACIAR projects.

In consultation with Comalco and the traditional owners, the project team identified management strategies for the sustainable use of the leucaena/grass areas as holding pastures for cattle prior to live export. The leucaena that had been introduced during rehabilitation of the mine site was inappropriately managed and had subsequently become a weed problem. The project scientists studied the impact of cattle grazing on leucaena, weed control and the animal productivity of leucaena-infested rehabilitated land. They found that the deep-rooted leucaena trees accessed subsoil moisture and produced high quality forage well into the dry season.

Cattle grazing leucaena continued to gain weight, whereas cattle grazing native pastures rapidly lost weight at this time of year. The productivity of the leucaena/grass pastures could be further enhanced by using improved leucaena varieties (with lower weed potential) and the intensively managed hedgerow system developed in central Queensland. Comalco is undertaking productivity trials of this system in 2006.

Other communities on Cape York, and a community in Samoa, stand to benefit from the establishment of horticultural industries. Project researchers are undertaking rapid rural appraisals to gather data and then construct a tailored information system that lists key

Working with NGOs

In May 2004, the ACIAR Board adopted a strategy to increase the emphasis on practical implementation of the results of ACIAR-supported research projects. The new strategy shifts the balance of ACIAR's investment towards a greater proportion of projects that deliver tangible benefits to end-users in the near-to-medium timespan – of between five and 10 years.

ACIAR's Annual Operational Plan 2005-06 outlines changes to the Centre's project development processes and approaches (see the April 2005 edition of *Partners*).

Partnership has been the key. From its inception, ACIAR has set benchmarks for working with research partners in Australia and developing countries. Partnerships with organisations that can help deliver research results to indigenous and other communities have seen ACIAR endeavour to increase opportunities to work with non-government organisations (NGOs) and forge links that will help ACIAR more effectively target the most disadvantaged communities.

Large-scale community development is long-term and costly. ACIAR is focusing its support on community-level activities at a pilot scale, entrusting the community development partner with responsibility to carry out subsequent 'scale out' of the work to other districts and provinces in the partner country.

ACIAR is most attracted to partnerships with NGOs and others that will foster technology adoption where the NGO partner has had an on-going presence in the target community.

This may involve the design and funding of a project activity that follows on from an earlier ACIAR-funded project. A single technical intervention is only part of the development picture – farmers are looking for livelihood/income solutions and these are only possible through partnering with groups that are there for the longer haul.

commodity interests for each community. This process will help the communities to determine the most suitable crops to grow and to assess financial and technical aspects of growing them, and determine their market prospects. Following this process will raise the chances of success and profitability in their enterprises.

From the viewpoint of the Australian component, the project team has held discussions with a range of groups in Aboriginal communities and with commercial growers near Cooktown. They met key stakeholders in the Aboriginal community of Mapoon and members of other communities of Napranum near Weipa and Lockhart River.

The Mapoon community is the main focus in the initial stages of the project. In Mapoon, they have recently established a community farm to supply local fruit and vegetables to the community store. In the longer term, they want to grow yams and taro and cultivate local bush foods that are not readily available in mainstream marketing. The community is also interested in amenity plantings of local and introduced ornamental and fruiting plants.

Weipa cattle, thriving on leucaena/grass pastures.

