

Small-scale Commercial Plant Harvests by Indigenous Communities



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Researcher Contact Details

Julian Gorman and Peter Whitehead
Key Centre for Tropical Wildlife Management
Blg 18, Northern Territory University
Northern Territory

Phone: 08 8946 6703
Fax: 08 8946 7088
Email: Peter.Whitehead@ntu.edu.au

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Joint Venture Agroforestry Program Manager

Dr Rosemary Lott
Phone: 02 6271 6671
Email: rosemary.lott@rirdc.gov.au.



Foreword

Indigenous people in remote Australia face many challenges in developing viable resource-based industries. Transplanting industries and practices from elsewhere will not necessarily provide workable solutions for these communities, which confront the hurdles of distance and scarce access to infrastructure, capital, land and training for new skills.

This research worked with Indigenous communities in northern Australia to explore the establishment of enterprises based on small-scale harvesting of plant material. It investigated the basis for selection of plant products and undertook case studies on selective harvests. The case studies looked at bushfoods, customary foods for sale within communities, live plant trade, arts and craft, as well as novelties and educational items for the tourism market. This Research Update provides a summary of the outcomes reported in the more comprehensive final research report.

Indigenous people have emphasised the need to succeed with small enterprises delivered and controlled by their own community members and progressively develop from there. The principles and practices outlined by this research will provide some guidance in supporting this development process.

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Peter O'Brien

Managing Director
Rural Industries Research and Development Corporation

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Merrepen Arts Centre, Nauiyu Community, Daly River; Northern Land Council; Jawoyn Association, Katherine; Bawinanga Aboriginal Corporation, Maningrida; Parks and Wildlife Commission of the Northern Territory; Balkanu Cape York Development Corporation; Street Ryan & Associates; Aboriginal and Torres Strait Island Commission, Darwin; Centre for Indigenous Natural and Cultural Resource Management, NTU; Acacia Larrakia Aboriginal Community; Kakadu National Park, Environment Australia; Greening Australia NT; Territory Health Services; NT Area Consultative Committee, Darwin; Wardaman Aboriginal Corporation, Katherine; Larrakia Nation Office, Darwin; Kybrook Farm, Pine Creek; Horticulture, Northern Territory University; Office of Aboriginal Development, Darwin; Mawalan (1) Gamarrwa Nuwul Landcare, Yirrkala; Laynhapuy Homelands Association, Yirrkala; Wonga Djakamirr Rangers, Ramingining Homelands Resource Centre; Northern Territory Employment and Training Authority; Joint Venture Agroforestry Program, Canberra.

Thanks are also due to the 128 **consumers** who completed a questionnaire relating to commercial plant sales and **distributors** who completed another relating to sales and supply of “bush food” products, including Marrawuddi Gallery, Jarraman Arts Aboriginal Corporation, Airport Retail Outlets, Mukmuk Trading, Nitmiluk Visitor Centre, Parap Fine Foods and Coles Palmerston.





Executive Summary

Indigenous people in remote Australia face many challenges in developing viable resource-based industries. Transplanting industries and practices from elsewhere will not necessarily provide workable solutions for these communities, which confront the hurdles of distance and scarce access to infrastructure, capital, land and training for new skills.

This research worked with Indigenous communities in the Northern Territory to explore the feasibility of developing small-scale enterprises based on harvesting of plant material in remote Aboriginal communities. The project investigated the basis for selection of plant products and undertook case studies on selective harvests, including evaluation of transport and collection costs, and potential markets. This Research Update provides a summary of the outcomes reported in the more comprehensive final research report.

Potential plant products were selected using both "expert" botanical advice (a database of plant uses and botanical advice) and consultation with Indigenous communities as to the products they were most interested in exploring.

The case studies looked at bushfoods, customary foods for sale within communities, live plant trade, arts and craft, as well as novelties and educational items for the tourism market. The main case studies and results were:

- Live plant trade with cycads *Cycas arnhemica* – harvest as an ornamental plant market appears biologically, socially and economically feasible. Better information on the size and value of the Australian market is required.
- Bush foods – Kakadu plum *Terminalia ferdinandiana* – Returns for bulk supply to this established bushfood market appear viable for some communities, but there is a risk of local over-harvest which may compromise customary use and have uncertain ecological impacts. Regulation may be best managed by local communities.
- Adding value to bushfoods – Lotus lily *Nelumbo nucifera*– The community chose to market this plant as samples sold with a pamphlet describing the customary use. This case study indicated that remote communities may best maintain a place in the market by connecting customers (e.g. tourists) with elements of traditional culture associated with the plants.
- Bushfoods for sale within communities – long yam *Dioscorea transversa*– There was a strong commitment by aboriginal women in the Nauiyu community to making customary foods more available to their communities for health reasons. The need for wider markets was not seen as important, but cultivation techniques and nursery facilities may assist usage of the plant.
- Harvest of *bombax ceiba* for carving – Use of this species is part of a well-established trade in carvings, but there was concern about sustainability of harvest and the capacity of the tree to coppice at a rate to meet expected increase in demand. Cut stems produced stems large enough for re-harvest within 20 years, however further work on a more detailed population model for the species is required.





Indigenous people emphasised the need to succeed with small enterprises delivered and controlled by their own community members. Consultation regarding enterprise development should be undertaken “on country” and engage relevant community members. Development is most likely to be successful if it occurs incrementally and involves the community - the community can progressively develop the enterprise as experience is gained. Government assistance in the short to medium term is recommended, as is further research on markets. Management for the risk of local over-harvest may be best undertaken by local indigenous communities in association with customary use, and in consultation with government regulatory authorities. Additional issues and principles outlined in the report, provide guidance in supporting this development process.





Introduction

The Indigenous people of Australia have a long history of using native plants as an essential part of everyday life. Use of plants and other living resources underpinned a vigorous traditional economy. On their own clan lands, individuals and families used plants for food, medicine and implements. Others gained access through various forms of trade. Use depended on intimate knowledge of the distribution and abundance of important species, their values, and the management of land – especially through skilled use of fire – to foster continued abundance. Today the customary economy continues to make an essential contribution to community well-being in many parts of northern Australia.

Despite long experience and knowledge and, more recently, formal ownership of large areas of land and their plant populations, few Indigenous people engage successfully in market-based commerce using native plants. The few exceptions mostly involve arts and crafts, where parts of plants are valued as a medium for creative expression of culture, rather than for their intrinsic properties.

In part, such failure is likely to be due to the low esteem in which non-Indigenous Australians have held Australian native plants and animals. Aside from timber production, local markets have rarely been developed for novel native plant products. However, views are changing and interest is increasing in exploring the use of native plants for food, food additives, botanical medicines and many other purposes. This project explores some of those options. In particular, we seek to identify opportunities that might be taken up by Indigenous people in remote north Australian locations.

Indigenous people in remote Australia have to face many challenges to develop viable resource-based industries. They confront the tyranny of distance, limited infrastructure, lack of capital, and difficulties in raising capital on land held under inalienable communal title. Gaining access to resources with well-developed markets, over which the state claims ownership and manages access through tradeable licences, is not usually feasible. Most such resources (like fish) are fully allocated and licences are expensive. Access to education, training and technical support is also limited. Servicing large capital investments demands intensive use, an approach inconsistent with the desire of many groups to manage resources for local purposes, including customary use, at low intensity. Trying to “step over” these difficulties, by transplanting industries and practices from elsewhere and hoping that local people will benefit, despite the obvious mismatch to their circumstances, has usually failed.

Being mindful of this history, we adopted a fundamentally different approach. We worked closely with Aboriginal people to find out what sort of opportunities interested them and the conditions they thought would be necessary to get real benefits. This bottom-up approach often identified modest (sometimes very modest) proposals for commerce. However, this very feature was viewed positively by all Aboriginal groups who worked with us. They emphasised the need to succeed with small enterprises carried out and controlled by community members and to advance from there. In line with this preference, we gathered much of the information presented here and elsewhere in collaboration with Indigenous communities through a number of small, and at the time of reporting, incomplete case studies. We use these experiences to explore the cultural, social, commercial and ecological implications of small scale use of native plants. We then propose some principles and practices for supporting efforts of Indigenous people to develop new opportunities or enhance existing commercial uses.





Background

Socio-economic

Northern Australia's Aboriginal people mostly live in remote locations where built and industrial infrastructure is scarce. Because lands held or regained are mostly those left after alienation by pastoral or other agricultural interests, soils are often infertile and highly erodible. Education systems have often failed and levels of literacy and numeracy are low. Options to raise capital are few, given that land, as the primary asset held by Aboriginal people, is held under inalienable title. Systems of Aboriginal land ownership and custodial responsibilities under customary law constrain mobility and reduce capacity to match labour availability to employment opportunities. Therefore, options for Aboriginal people to engage with the market economy are few. Many depend on welfare or "work for the dole" schemes, like the Community Development Employment Program (CDEP). The net effect is that Aboriginal unemployment in the Northern Territory is effectively about 84%.



Welfare dependence is regarded by many observers, including some Aboriginal leaders, as a social "poison" that perpetuates the marginal economic and social status of Aboriginal Australians. This view of the role of welfare is not universal. In northern Australia, the welfare system is also seen to contribute to a vital "hybrid" economy that supports Aboriginal culture and hence, many direct and indirect contributions of Aboriginal people to the national good. For example, Aboriginal arts and crafts retailed at around \$30 million are produced in the Northern Territory by several thousand artists and crafts-people. On average, individuals receive relatively small supplements to their income but make a major additional contribution to the Territory economy by attracting tourists. Most tourists say an important reason for visiting the Territory is to experience Aboriginal culture, including purchase of artworks.

Irrespective of views of the role of welfare and obligations of the state, most also accept that Aboriginal society could benefit from greater opportunity to engage with the market economy. Despite recognition of the obstacles, members of many Aboriginal communities and their resource management agencies actively seek to develop commercial enterprise. Motivations and expectations vary. They range from the search for incentives to reconnect people with management of their country, to proposals for privately-funded ventures to provide employment in roles typical of industrial Australia, as well as varying levels of community equity in major developments. Given a long history of failure of enterprise based on living resources in northern Australia generally and on Aboriginal land in particular, it is critical that a balance be struck between determination to develop regional enterprise and a realistic appraisal of the biophysical, social, cultural and economic realities of working in remote regional Australia.

Environmental and resource management

Failures in resource management are many. Some who have looked carefully at past performance and the array of social forces acting on resource management systems question whether sustainability is achievable at all. Looking at the history of post-colonial resource use in northern Australia provides no counter to pessimism, because efforts to impose developments have often ignored biophysical constraints and so damaged landscapes and social cohesion.

Ignorance of the biological systems in tropical Australia and influences on them has been an important factor in promoting unrealistic expectations. Despite great increases in research effort over the last few decades,



gaps in knowledge of individual species and the systems that support them continue to compromise our capacity to understand and appropriately manage the northern savannas. Even though exploitation of these environments has mostly been of low intensity, there is no doubt that substantial damage has already been done. Many animals are declining in range and abundance, through causes that remain obscure.

Nonetheless, for the reasons outlined earlier, contemporary political and socio-economic pressures on Aboriginal people to increase commercial use of the few resources available to them are likely to prove irresistible. Some communities reject large scale orthodox agroforestry ventures because they regard environmental impacts as unacceptable, but actively seek less intrusive alternatives. Moreover, there is growing realisation that one of the factors contributing to conservation problems in the north is the virtual depopulation of large areas, following the forced or facilitated movement of many Aboriginal people to townships and other settlements. Savanna lands without people are especially vulnerable to invasive exotic plants and animals, as well as uncontrolled wildfire. Enterprise that provides incentives for people to return to and actively manage their country can benefit conservation of natural values as well as generate economic and social returns.



However, little effort has been made to understand the values that Aboriginal people want to maintain in the environments for which they accept responsibility. An assumption that they are the same as those sought by urban Australians is likely to prove wrong, although there may be considerable overlap. Many in the orthodox conservation community regard the notion of sustainable development—as embraced by Australian governments—as a flawed concept because it assumes indefinitely continued growth in demand and hence, more pressures on already damaged ecological systems.

Aboriginal people also hold diverse views of good land and resource use practice. However, they pay much greater attention to the place of humans in landscapes and their roles in maintaining them. In the Aboriginal view, thinking about land and its resources independent of human interaction is meaningless. Consequently, use of native plants and animals to satisfy human needs does not confront the aesthetic distaste and automatic rejection that characterises the reaction of some mainstream conservation interests. Indeed, meeting customary obligations to land may be bound up in active use of plants and animals.

This issue is important, because current regulatory regimes for the conservation of biodiversity do not readily accommodate diverse views of acceptable practice. Present legislation is often more about preventing access to native species than about ensuring that use is sustainable or land is properly managed. Not only do enterprises need to satisfy local customary law, but satisfy a complex hierarchy of Territory, Commonwealth and international law that was not designed to deal with customary goals or other novel approaches to resource use.

Project goals

The core goal was to assess the feasibility of developing small-scale enterprise based on commercial use of native plants in remote Aboriginal communities, taking account of the context we have outlined above. Specific objectives are to:

1. Identify market opportunities for plant products suited to harvest in remote communities
2. Examine the cultural appropriateness of commercial harvesting of a range of native plants
3. Assess the ecological and other land management implications of potential and existing harvests
4. Develop community-based strategies for realising commercial opportunities.



Methods

Community Involvement

The project ultimately involved, to varying degrees, a substantial number of Aboriginal communities (Figure 1) and Aboriginal Resource Centres. These included: Merrepen Arts Centre, Nauiyu Community, Daly River; Bawinanga Aboriginal Corporation, Maningrida; Balkanu Cape York Development Corporation; Acacia Larrakia Aboriginal Community; Wardaman Aboriginal Corporation, Katherine; Larrakia Nation Office, Darwin; Kybrook Farm, Pine Creek; Mawalan (1) Gamarrwa Nuwul Landcare, Yirrkala; Laynhapuy Homelands Association, Yirrkala; Wonga Djakamirr Rangers, Ramingining Homelands Resource Centre. The Laynhapuy Homelands Association and the Yirrkala community were involved from the outset and initiated some of the ideas. Familiarity based on long term working relationships and related levels of trust strongly influenced participation. Nick Smith established connections with a number of communities in Cape York through his work with the Balkanu Cape York Development Corporation.

Projects requiring a high level of community participation must strike a difficult balance: between sufficient clarity of intent to provide direction, and the flexibility to permit genuine influence from participants on objectives and methods. We sought to achieve that balance through a series of more or less discrete steps (Box 1) which can be summarised as:

1. A desktop exercise identifying (i) potentially useful species from existing knowledge of markets, published accounts of traditional Aboriginal and other use, (ii) known barriers to commercial use, and (iii) ecological issues regarding harvest
2. Consultations with different communities, informed by this analysis
3. Agreement on candidate species for trial harvests
4. Collaboration on small-scale harvests and assessment of their commercial viability
5. Further examination of markets for species in trial harvests and other favoured options
6. Review in a workshop attended by representatives of communities, government agencies, and Aboriginal Land Councils, and
7. Synthesis of insights and implications for enterprise development.

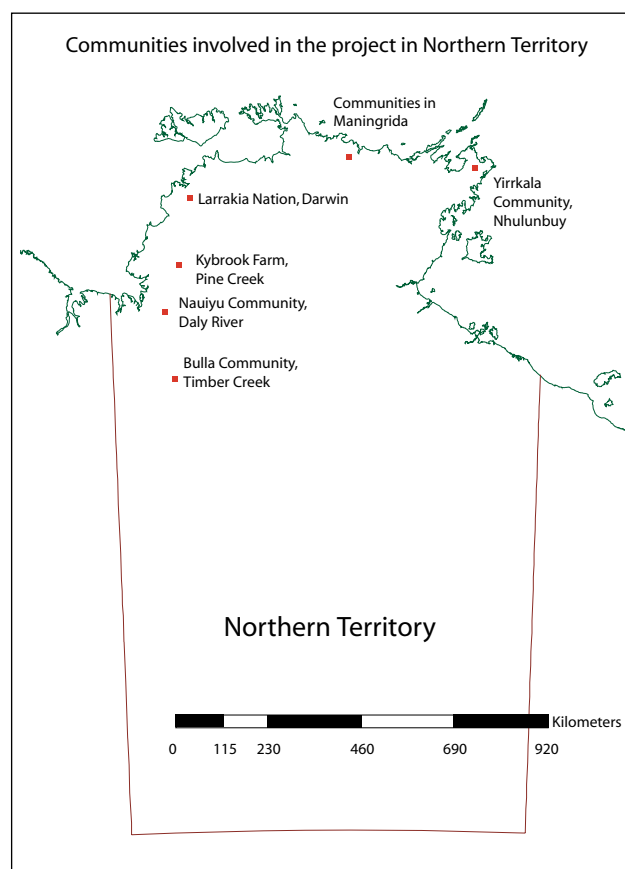
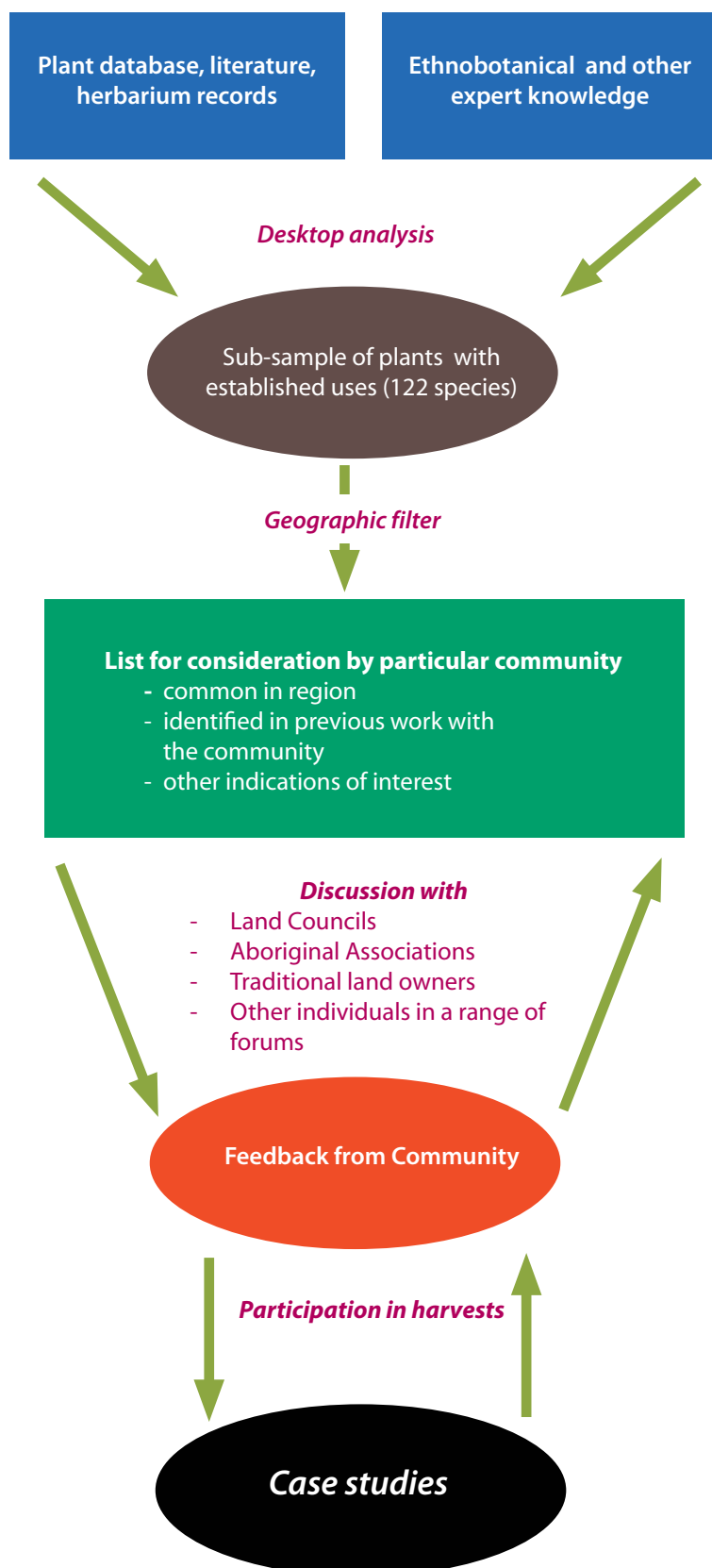


Figure 1: Map of the Northern Territory showing the location of communities participating in the project in various ways.



Box1. The process followed in the project for choice of candidate species for more detailed examination and ultimately trial harvests.



Plants of potential interest were identified initially by reference to a major ethno-botanical database maintained by the Parks and Wildlife Commission of the Northern Territory. The Plant Use database includes details recorded from some published ethno-botanical sources, plus unpublished observations of Glenn Wightman and Nick Smith.

A sample of candidates from this database was then filtered loosely through a set of criteria relating to markets and a range of influences on social, economic and ecological sustainability. Initial filtering was relatively crude and then more detailed assessments were made for higher-ranked plants. Weighting depended on cultural opportunity and issues affecting sustainability of harvest. Application of these criteria was supplemented by input from a number of botanical experts.

The list of options identified as described above was reviewed at various levels of comprehensiveness with relevant community representatives, land owners, and custodians of knowledge, to eliminate culturally unacceptable options or to assign priorities to acceptable options based on local circumstances. The process involved both individual and group consultations, including visits to a number of community resource centres and related outstations. We adopted no *a priori* criteria for determining when consultation was adequate.

After desk top analysis and discussion with communities that were interested in exploring commercial plant product options, the trial harvesting and value adding stages were discussed with land councils, the relevant Aboriginal resource centres and the permit regulations (PWCNT).

All consultations were facilitated by staff of the Key Centre Tropical Wildlife Management (TWM) and Centre for Indigenous Natural and Cultural Resource Management at the Northern Territory University, and the Caring for Country Unit of the Northern Land Council.

Case studies involved trial harvests under conditions determined by communities and with participation of their members (6), or collaborative research on established harvest about which there was community concern about sustainability.



Results

Ranking of options

We attempted to introduce some rigour to our ranking of options (Step 1 in Box 1) by specifying the process in detail so that it could be repeated when more or better information became available. Basically, plants were allocated “points” according to how well they matched criteria encompassing economic, social and ecological sustainability. The number of species in each ranking class is shown in Figure 2. Full details are given in the main report (Whitehead et al. 2006, RIRDC Publication No 04/149).

We suggest that the results are best treated as broadly indicative of the scope of commercial opportunities available from mostly common plants species in northern Australia, as well as the severity of constraints that are likely to confront the development of any particular option. High rankings indicated readily identifiable (often existing) commercial opportunities constrained by relatively fewer significant marketing, cultural or sustainability obstacles; low rankings indicated limited opportunities encumbered by sometimes substantial difficulties. More generally, plants familiar to Aboriginal communities, with established markets for products that can be harvested without causing the death of the plant, rated highly.

One important outcome is that the analysis equipped team members to interact with community members from a reasonably well-informed position, and to ensure that relevant issues were well-canvassed during consultations. However, it should be recognised that our procedure weighted cultural, commercial and ecological criteria approximately equally. This perhaps explains why our rankings did not closely match the options favoured by a number of communities. Views expressed during a workshop with Aboriginal participants from across northern Australia (below) showed that they gave much greater weighting to social issues.

Classes of use

The range of species selected in the desk top analysis is large enough to be confident that most potential commercial uses were considered. They can be conveniently subdivided into several classes. Table 1 lists the number of species in each class.

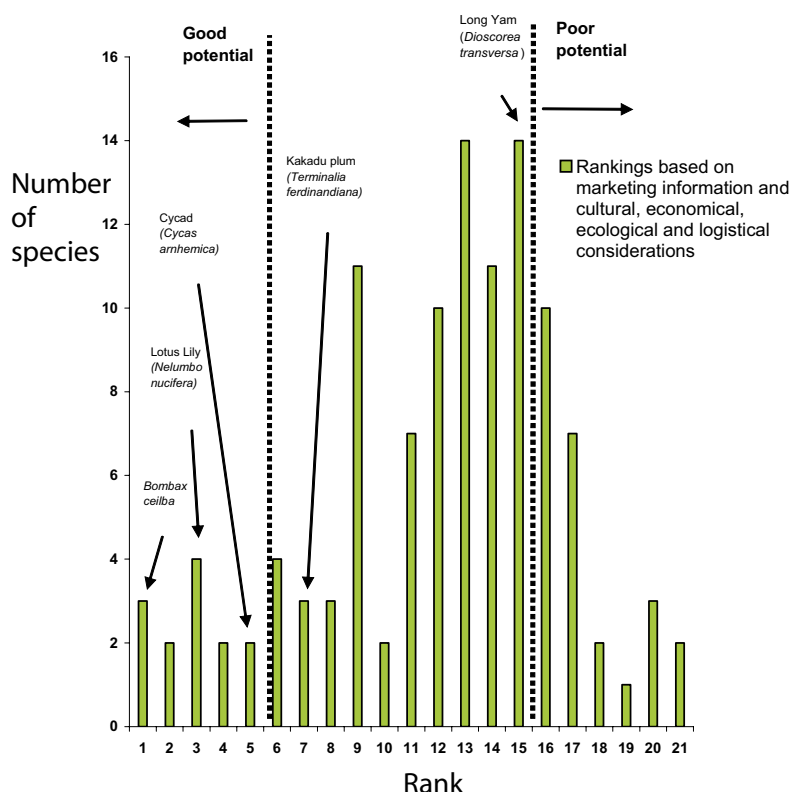


Figure 2: Number of species given each *a priori* ranking of species overall “suitability” based on the initial desktop analysis. Rank 1 has highest *a priori* potential and rank 21 the least. Positions of species examined in case studies are also shown.



Table 1: Categorisations of uses for 122 species

Categories of Plant Product	Number of species
Bush- or native foods	43
Traditional foods for sale and consumption within communities	7
Live plant trade	38
Arts and crafts based mostly on woody plants	7
Timber extraction	8
Botanical medicines	3
Volatile oils	3
Novelties or education items directed at the tourist trade	6
Complements to other existing community activity	2

Following consultations with individuals, representatives of Aboriginal Associations and communities, a number of species were selected for trial harvests or more detailed study. The experience of doing these harvests brought many issues into clearer focus, as summarised below.



Members from the Gamardi community assist in the wild harvest of cycads.



Case studies

Here we describe a number of the individual trials agreed with communities and their organisations and implemented during the project.

Case Study 1: Live plant trade - Cycads

Background

Cycads belong to an ancient family dominant during the greater part of the Mesozoic period. Fossil records date back over 250 million years. There are approximately 200 species of living cycads, restricted to tropical and subtropical regions. Cycads play an important role in Aboriginal ceremonies and spiritual beliefs. They are also popular in the wider society as ornamental plants.

Bawinanga Aboriginal Corporation (BAC), which supports many of the Aboriginal outstations around Maningrida, was interested in the feasibility of wild harvesting a number of native plants, including *Cycas arnhemica*. Accordingly, BAC facilitated a trial harvest at an outstation at the centre of *C. arnhemica* distribution.

Objectives

Our goals with this study were to provide an estimate of the availability of the plant for harvest, estimate the costs of harvest and subsequent monitoring, and generate a supply of plants for testing markets.

Regulatory issues

All Northern Territory cycads are listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This imposes a number of obligations on Australia, implemented through the Federal *Environmental Protection and Biodiversity Conservation Act 1999*. The obligations to observe this national legislation in turn influences the Northern Territory's Cycad Management Plan made under the *Territory Parks and Wildlife Conservation Act 2000*.

The present plan provides that harvests of whole plants (as distinct from seeds and leaves) will be assessed case by case. The Parks and Wildlife Service agreed that a limited harvest of *Cycas arnhemica* was appropriate and the Federal Minister for Environment and Heritage also gave approval for such a trial. A condition of the trial was that BAC provide information on the ecological and population effects of the harvest.

Methods and results

A wild harvest was conducted around a small community, Gamardi, about 90km south east of Maningrida. Community members and the Djelk rangers assisted in both harvest and post-harvest care of plants at the BAC Nursery in Maningrida.



Mature female *Cycas arnhemica*



The trials tested a range of post-harvest treatments (potting mixes, use of fertiliser and fungicides). Tests included the effect of leaving bare stems (leaves and roots removed) un-potted for 2 months, to simulate conditions for transport to international markets, given that many countries, including the US, do not allow entry of plants in soil.

Survival rates of plants potted immediately after harvest were sufficiently high to indicate no threat to either economic or ecological sustainability. Variations in potting mixes, fertiliser and fungicide application produced no significant variation in survival. Deaths of stems stored for 2 months before potting were, however, unacceptably high. Further studies will be needed to identify alternatives.



Djilk ranger and Key Centre staff measuring cycad height in monitoring plots

At the minimum prices likely to be achieved in the marketplace, costs of harvest and post-harvest treatment were within the range necessary to provide returns to harvesters at least equivalent to basic wages. However, the monitoring system initially required doubled these costs, reducing returns to harvesters to marginal levels. This situation may change in the future, if more relevant monitoring systems are established: Within the current study, the monitoring system implemented took advantage of the fact that the project was funded by state and federal government and allowed additional measurement. Further consideration of who is responsible for funding the monitoring associated with harvest is warranted. Further work is required on the size and other features of markets for these unique plants.

Ecological impacts

The population at this site occupies an area of about 8,600 ha and contains several million cycads. At the present rate of extraction of 300 stems p.a., each harvested plot could be rested for more than 5,000 years before being re-harvested. This should in itself be regarded as sufficient evidence of sustainability.

Nonetheless, the monitoring system required by regulatory authorities involved measurement of survival and growth rates of stems remaining in harvested plots and unharvested (control) plots. Whilst these data will be useful over the long term to assess variation in survival and growth rates with density—and hence to produce population models for the species—they provide no relevant information on the status of the regional population. A more relevant monitoring arrangement is presently under consideration by the Parks and Wildlife Service.

Implications

Harvests of cycad stems for an ornamental plant market are biologically, socially and economically feasible. Better information on the size and value of the Australian market is required. Whatever the market, returns to landowners can be severely compromised by onerous regulatory requirements that appear unwarranted by either the status of the species or impacts of harvest. Further consideration of the appropriate level of monitoring associated with harvest and who is responsible for funding this monitoring, is warranted.



Case Study 2: Bush foods - Kakadu plum

Background

The Kakadu plum *Terminalia ferdinandiana* (family Combretaceae) is restricted to the Top End of the Northern Territory and the Kimberley region of Western Australia. It is a small to moderate-sized semi-deciduous tree which flowers at the end of the dry season (September–November) and fruits from the middle of the wet season to the early dry (January–June). It occurs in open woodland and produces smooth fleshy ovoid drupes, 1.5–2.5 cm long and with a short beak. The fruits are yellow green when ripe.



The fruit, fresh or frozen, is sought by bushfood wholesalers in Darwin and elsewhere in Australia. The Australian native food industry identified *T. ferdinandiana* as one of thirteen native plants warranting commercial development. Fruits are added to jams and chutneys based primarily on other fruit and used fresh by restaurants as a garnish or flavouring in a range of dishes. The fruit has been incorporated in cosmetics.

In addition to eating the fruit as snacks, Aboriginal people also eat the pale, tasteless gum that oozes from the trunk of the trees.

Objectives

Our goals in this study were to provide estimates of distribution and abundance of the plant and variation in its density, costs of harvesting fruit (including time or effort) at favourable sites, and returns to harvesters at prices available from major buyers.

Regulatory issues

The *Territory Parks and Wildlife Conservation Act 2000* specifies that collectors taking native plant products for commerce must obtain a permit (Sections 55–57). If property in that wildlife is vested in the Territory (e.g. plants on public and leasehold land), they must also pay royalties (Section 116). The royalty for *T. ferdinandiana* fruit is \$1.00 kg⁻¹ (*Territory Wildlife Regulations*). On Aboriginal land, traditional owners wishing to use plants commercially also require a permit, but are not subject to royalties.

Given the wide distribution of the species, considerable abundance, and modesty of the total harvest to date, regulatory authorities have not required harvesters to monitor the status of harvested populations.

Methods and results

Demand for the product was assessed by:

1. Contacting a number of retail outlets for details of sales of products containing Kakadu plum, compared with other bushfood items.
2. Seeking indications of the total volumes of raw product sought by a number of wholesalers and retailers.
3. Collating data held by the Parks and Wildlife Commission on permits issued and royalties paid by harvesters and landholders in the Northern Territory.

Harvest trials were conducted with the assistance of people from the Larrakia Nation, who selected participants and coordinated their activity. Larrakia people also identified suitable harvest sites in the Darwin region. The trials extended over two fruiting seasons.

Measures of the availability of harvestable Kakadu plum trees in the wider landscape were made on Aboriginal land south of the Maningrida Township in central Arnhem Land. Djelk Rangers, supported by



the Bawinanga Aboriginal Corporation, the project team and a group of botanists from the Brisbane and Darwin Herbaria conducted a broad scale vegetation survey for preparation of a vegetation map as well as conducting these quantitative surveys for Kakadu plum.

At each harvest site, pickers worked for a predetermined time and recorded the number of trees from which they took fruit. They picked by hand without ladders, and shook trees to drop ripe fruit and/or focused on fruit within reach from the ground. They used no destructive methods or equipment to reach inaccessible fruit. They sought to remove as much fruit as practicable from each tree before moving to the next. Harvest times were those during which participants were actively picking and include no rest periods or other breaks.

We determined an average rate of collection per harvester for each sampling occasion. Variation in rate of collection could be related statistically to numbers of trees harvested (and hence the amount of fruit available per tree) and tree density (average for transect) at the site of collection. Harvesting rates were, unsurprisingly, higher when trees carried more fruit and trees were at higher densities and hence closer together.

Demand – The collective annual demand in Australia was estimated at about 10 -12 tonnes.

Wholesale price – At the time of writing (2002) prices paid to harvesters ranged from \$12 to \$20 per kilo, the latter price from a major buyer and processor for whole fruit delivered frozen or chilled to Melbourne.

Harvest rates – Trials indicated that on average, relatively inexperienced pickers, operating in a non-destructive manner with minimal equipment, were able to collect Kakadu plum at a rate of 1.0 kg ha⁻¹ at sites they identified as relatively favourable. However, this average figure varied considerably between sites and picking periods.

Tree density – In the Maningrida area the average tree density (height > 2m) calculated over all the sites was 14.4 trees ha⁻¹. There were 2 areas that had considerably higher numbers than average; the coastal strip (82 trees ha⁻¹) and on some sites on clay soils that were 40km inland (31.3 trees ha⁻¹). At the smaller and obviously highly favourable harvest site in Darwin the density averaged 272 stems ha⁻¹.

Economics – For supply of raw Kakadu plum to Melbourne we estimate a net return of at least \$10 kg⁻¹ (and hence \$10 ha⁻¹) is achievable at good (high density sites) in remote areas. Returns could be considerably better at sites closer to Darwin, provided accessible sites are not overharvested.

Seasonality – Fruit is produced over an extended period, peaking in May–June. Costs of harvest will be higher outside the peak period.

Ecological sustainability – There is little risk of widespread, uniform over-harvest of fruit, based on anticipated demand relative to abundance of the tree and quantity of fruit produced. Based on consistently conservative assumptions about tree density across the species range and yields per tree, the annual production of fruit in the wild is many tens of thousands tonnes annually. However, there is substantial risk of localised over-harvest at accessible high density sites.

Implications

Returns for bulk supply of fruit for this established bushfood market appear sufficient to attract and maintain interest from some communities. However, favourable sites close to communities where densities are sufficient for good returns may be harvested intensively. Ecological effects are uncertain but repeated intensive harvest at accessible sites will compromise customary use. Managing local over-harvest presents a challenge for centralised regulatory agencies and may be best managed by local communities, using strategies like allocating some sites exclusively to customary use.



Kakadu plum tree



Case Study 3: Adding value to bushfoods - Lotus lily

Background

The Lotus lily, *Nelumbo nucifera*, is a perennial aquatic herb, which grows in permanent and semi-permanent lagoons and billabongs from submerged creeping rootstock. Aboriginal people eat the roasted tubers, the raw or soaked seeds, and the inner leaf stalk. In addition to being consumed unprocessed, the seeds may also be ground into flour or roasted. The tubers are sweet tasting and fibrous. The root is also used to treat constipation.

The plant occurs seasonally in high densities in billabongs close to the small community of Nauiyu at Daly River, approximately 160 km south-west of Darwin. The Ngan'gikurunggurr (one of the local language groups) name is *Miwulngini*.



Harvested lotus lily pods before seed has been removed.

Objectives

Our objectives were to:

1. Determine the time (effort) required to harvest *Nelumbo nucifera* at favourable sites.
2. Estimate costs of collection, including transport and handling.
3. Examine sources of variation in collection rate.
4. Relate costs and effort incurred in harvest and handling to wholesale (raw product) and retail prices (value added product).

Methods and results

Sites suitable for harvest were chosen by traditional owners. The criteria they used included the potential for substantial harvest and use of areas which would raise no cultural issues regarding the presence of non-Aboriginal observers and extraction of fruit for commerce. All participants were experienced in harvesting resources from wetlands for food. We conducted four trial harvests in the late dry season.

Harvesters returned to the perimeter of the billabong to remove seeds from pods. This was done by breaking the capsules apart with fingers. Pods were discarded and seeds stored in cloth bags.

A number of treatments were examined in a superficial way to extend the life of lotus lily seed before obvious deterioration. These included sun drying, oven drying, freezing, and vacuum packaging.



One side of the pamphlet which is sold with a small sample of lotus lily seed. The product is sold, not primarily as food, but to complement a wider experience of Aboriginal culture.

A pamphlet—with details of cultural significance and traditional use of this plant product as well as formal botanical information—and a postcard with local artwork were produced. This pamphlet was packaged with a dried sample of the fruit for sale in the local Arts Centre.

To gain some information about potential demand, visitors to the Merrepen Arts Festival 2000 in Daly River and the Garden Fair 2001 in Darwin were asked to complete a questionnaire about their interest in this product and the price they would be prepared to pay. A total of 148 questionnaires were completed. In summary, responses indicate that a useful market exists at somewhere between \$10 and \$15 per pack.

Raw Product – At a rate of wild harvest of 0.8 kg h^{-1} , prices exceeding $\$14 \text{ kg}^{-1}$ would be necessary to provide a net return of $\$10 \text{ h}^{-1}$ on bulk product sold as food or a food additive. Prices of similar products available from local suppliers of Asian foods are much lower than $\$14 \text{ kg}^{-1}$.

Value adding – Lotus lily seed is one of a number of items that local people at Nauiyu consider could be packaged with information about customary use and significance. Although approaches to pamphlet design and content and packaging techniques have been examined, more work is needed to properly assess markets.

Seasonality – At many locations, harvest would be feasible between the mid-dry season (August) and start of the wet season (January) when the fruit is available. Other species fruiting at other times during the year might provide commercial opportunity to extend the period of commercial activity in participating communities.

Ecological sustainability

The sustainability of the subsistence harvest presently practised in the billabongs of the Daly River region has been demonstrated. However, there is some potential for unsustainable commercial practice, if large additional quantities of bushfoods are collected. The distribution of this resource is highly clumped, as is inevitable with a wetland plant. Risks of over-harvest are reduced by marketing small quantities of the product as an experience of Aboriginal culture linked to literature regarding its uses and significance, rather than as a bulk food item.

Implications

Many plants used by Aboriginal people, like the lotus lily, are widely distributed outside Australia and are common in Asia. Products for use as food are available at prices and in volumes with which local harvesters could not compete. The option pursued by the Daly River people - to market contact with and information about their culture with the lotus lily as a focus - is an important one, despite initially modest volumes and returns. Remote communities will rarely be able to compete as suppliers of items in bulk, and may be best able to maintain a place in the market by emphasising a range of products that connect customers to elements of their culture that they are willing to share.



Removal of lotus lily seed from the pods and sun drying.



Case Study 4: Bushfood for sale within communities - Long yam

Background

The true yams, genus *Dioscorea*, are restricted to higher rainfall areas of the wet-dry tropics. The yam, a subterranean tuber, is often found deep in the soil. Large specimens commonly reach 50 cm in length and occasionally reach 100 cm. For coastal Aboriginal groups in northern Australia, yams are a staple. A number of different types of yam are eaten, but the long yam *Dioscorea transversa* and the round or cheeky yam *D. bulbifera* are probably the most common in the landscape and also most consumed. Long yam is usually collected by women using a long digging stick. First the vine is located, and the stem carefully followed and soil excavated using the digging stick until the tuber is revealed. Tubers become progressively more difficult to locate further into the dry season as the stem of the vine tends to dry and break off.



Objectives

Objectives of the trial harvest of long yam were to:

1. Determine the effort required to harvest *D. transversa* at favourable sites.
2. Estimate costs of collection, including transport and handling.
3. Examine sources of variation in collection rate, including densities of plants and soil types.
4. Relate costs and effort incurred in harvest and handling to wholesale and retail prices.

Regulatory issues

On Aboriginal land, traditional owners wishing to use plants commercially require a permit under the *Territory Parks and Wildlife Conservation Act 2000*, but are not subject to royalties. Owners of Aboriginal or other freehold land may allow others to harvest from their lands under permits issued to the land owner.

Australian *Dioscorea* species are not listed as threatened under relevant Territory, State or Federal legislation.

They are not listed under the Convention on International Trade in Endangered Species (CITES).

Methods and results

In the dry season of 2000 we observed four wild harvests of long yam by the traditional owners of the Daly River area. Aboriginal women from the Nauiyu community at Daly River did the harvesting. They chose the most appropriate areas for collection and extracted yams using customary methods. We observed the procedure and measured the times taken to find and dig the yams.

Yams varied in size from approximately 0.05 to 1 m in length. The average rate of harvest of long yam was 0.42 kg h⁻¹. Inclusion of travel time to and from settlements reduced average volumes to about 0.30 kg h⁻¹.

Potential buyers were unfamiliar with these native yams. Despite a considerable effort to



Digging yams



extract specimens, the amount of material available did not permit a comprehensive offering of samples. We sent small samples to bushfood users in Darwin and Victoria to get a preliminary indication of interest regarding use in the restaurant trade. Wholesalers suggested that prices of more than \$10.00 kg⁻¹ were unlikely, because superficially similar Asian yams sell at about this price in local supermarkets.

The major harvest cost (additional to labour) we measured was transport of harvesters to and from harvest sites. In these trials, suitable sites ranged from a few kilometres to up to 35 km distance from residences of the harvesters. Travel costs averaged \$7.66 kg⁻¹ of harvested yam. Additional costs of several cents kg⁻¹ would be incurred in getting crops to markets outside settlements. Meeting these costs plus wages equivalent to CDEP would require prices of about \$25 kg⁻¹. Such prices appear unlikely to be achievable in existing markets.

Implications

Aboriginal women in the Nauiyu Community particularly wished to explore opportunities to make these and other customary foods more available to their communities for health reasons. They were unconcerned that wider markets may not exist.

The strong commitment to making customary foods more available to community members is an issue that we did not clearly identify at the commencement of this project. The interest in yams was a clear expression of that commitment, which justifies greater effort to explore options for cultivation, especially in those communities where nursery facilities have already been developed or are proposed.



A young boy holding a freshly-harvested long yam



Case Study 5: Arts and crafts – Harvest of *Bombax ceiba* for carving

Background

This report differs from others in that it does not record the involvement of the project team in implementation of a trial to bring use of a native plant into commerce. Rather, we report studies of a well-established use, namely the harvest of stems of the monsoon forest tree *Bombax ceiba*. Stems are taken for use in production of carvings for the arts trade.

Bawinanga Aboriginal Corporation (BAC) expressed concern that the potential for expanding demand could threaten the status of regional *Bombax* populations and compromise the sustainability of this regionally significant industry. We therefore focus on issues of ecological sustainability and the factors that might influence it, rather than market and related issues.

Bombax ceiba is a tall erect deciduous tree with distinctive woody thorns on the trunk and branches. In Australia, *B. ceiba* occurs mainly in wetter, fire protected sites, growing to 20 m with stems up to 100 cm in diameter. The species is relatively common in coastal and riparian monsoon rainforest patches, and vine-thickets on rock outcrops in open woodland across the Top End of the Northern Territory, Western Australia and Queensland.

Aboriginal people in the region use *Bombax ceiba* for a range of purposes: the trunk for making canoes; the bark for making twine; and the tap roots of young plants for food. Despite the cultural and potential economic importance of *B. ceiba*, little formal documentation is presently available on its ecology and population dynamics.

Objectives

The objectives of the project were to:

1. Measure availability of *Bombax ceiba* stems in the Maningrida region.
2. Determine contemporary usage of *B. ceiba* in the region.
3. Assess likely changes in demand for *B. ceiba* stems.
4. Analyse implications of these observations for the status of *B. ceiba* in the region and the sustainability of arts and crafts production.

Regulatory issues

Under the *Territory Parks and Wildlife Conservation Act 2000*, once taken under a valid permit, ownership of harvested items passes to the permit holder. The Parks and Wildlife Service requires no permit for movement of wild harvested native plants into other jurisdictions, but those jurisdictions may seek evidence that the material was obtained lawfully. *Bombax ceiba* is not listed as threatened under relevant Territory, State or Federal legislation. The species is not listed under the Convention on International Trade in Endangered Species.

Methods and results

Eighteen localised monsoon rainforest patches were sampled within a 62 km radius of Maningrida. At each patch, the density and population structure of *B. ceiba* were estimated using 10 m wide transects placed 50 m apart and running roughly parallel through the patch.

In each transect, the stem diameter or diameter-at-breast height (DBH) of every individual *Bombax ceiba* was measured (using a diameter tape or forestry callipers), as well as the distance of that individual from the start of the transect (m). These data were recorded for all unharvested and harvested stems. In addition, evidence of regrowth of previously harvested stems was recorded as the number of coppiced stems and their DBH.



Fourteen of 18 surveyed vine-thicket patches (or 15% of total number of patches in the study area), contained *B. ceiba* and it had been harvested in 10 patches. The average density of *B. ceiba* from the 14 patches sampled was approximately 105.1 stems ha⁻¹.

Using existing spatial data from the Maningrida region, we estimate that rainforest patches in the study area cover a total area of 1215 ha, comprising 95 individual patches with a mean patch size of 12.8 ha. *Bombax ceiba* occurred in 60% of these rainforest patches in the study area. Using these figures, we estimated the total population of *B. ceiba* in the Maningrida region approximately 77,000 stems. Adult density (trees DBH >10 cm) was estimated at a mean of 43.4 stems ha⁻¹ or a regional population of about 31,600 stems.

Field observations of harvested stems indicated that 6% of the total standing population and 19% of the adult population had been harvested over about 20 years. In some locations, up to 67% of adult stems had been harvested while at many other sites there had been no or very little harvest. Independent calculations based on Arts Centre records returned similar estimates of stems harvested.



Example of harvested *Bombax ceiba* showing multiple coppicing.

Implications

The study illustrates a number of important points regarding the wild harvest of *Bombax ceiba*. The first relates to relatively high level of usage. If cutting of adult stems caused the death of trees and there was no recruitment, the existing rate of harvest could be sustained for about 60 years. However, the capacity of the majority of *Bombax ceiba* to coppice following harvest (at least 80% of cut trees) means that a smaller proportion of the standing adult population is actually lost from the regional population each year. We observed re-coppicing trees that produced new stems large enough for re-harvest, apparently in less than 20 years. Moreover, the stand structure of harvested and unharvested populations indicates healthy levels of recruitment. Work to produce a detailed population model for the species has begun.

A second critical point relates to the importance of this harvest to the economy of Maningrida. Arts and crafts based on native plants are among the most successful of Aboriginal enterprises in north Australia. It is essential that harvests supplying raw materials be ecologically and socially sustainable. We suggest that the total harvest of *B. ceiba* is sustainable at the regional scale, but there is potential for significant local over-harvest at accessible sites. Results from the more detailed studies of population dynamics presently underway are required to assess the seriousness of this problem. However, management responses will be best handled at the local level, and the community is presently establishing monitoring systems to provide the information needed to implement local control, perhaps incorporating customary management based on the authority of traditional land owners.



Major conclusions from case studies

The seven trial harvests (five are presented here) included bushfoods, customary foods for sale within communities, live plant trade, arts and craft, novelties/educational items directed to the tourism market, and various complements to other activities. The species and uses examined were not necessarily those that would have been chosen had commercial viability been the sole objective. Most trials are incomplete in that significant quantities of product have yet to enter markets. Nonetheless, developing and implementing the trials raised many issues critical for understanding opportunities and constraints. Some of the most important are:

1. At prices considered plausible, supplying bushfood items in bulk by wild harvest often generates relatively low rates of return on effort. Achievable rates of return for supply of bushfoods may be less than CDEP wages. Additional costs, associated with isolation and limited infrastructure, depress returns.
2. Exceptions to generally poor returns arise when price is influenced by connection to traditional Aboriginal practice and lands, or the bushfood is an additive rather than bulk ingredient. Returns on harvest of Kakadu plum appear to have benefited following the decision of Coles-Myers to actively promote a product line including Australian native foods explicitly connected to Aboriginal people.
3. Many community leaders are more interested in supplying food for consumption by their members than satisfying larger markets. This strongly influenced selection of favoured items. We did not anticipate the level of interest in supplying "healthier" customary foods for local or regional consumption.
4. Value-adding within communities is important, especially to supply items to the tourist trade, and can greatly increase returns. Direct connection with an ancient culture with profound knowledge of Australian plants may itself be a marketable commodity. In north Australia, Aboriginal entrepreneurs may do better to exploit such links, in preference to acting as anonymous suppliers of bulk products.
5. Focus on widespread and abundant species reduces risks of general over-harvest, because present and anticipated demand is mostly too small to significantly impact species or populations at regional and larger scales. However, "clumped" distributions create risk of localised impacts, especially close to settlements. Thus management problems will most often have to be resolved at fine (local) spatial scales. Centralised management and compliance regimes are incapable of dealing effectively with localised problems, so devolution of responsibility to community organisations is desirable.
6. Many groups wish to match initiatives to local conditions and issues. As a consequence, supplies may be small and supply irregular. This may create problems in maintaining market interest. The utility of cooperative ventures was discussed in workshops and elsewhere but ideas were not significantly advanced. The roles of existing Aboriginal organisations in coordinating and facilitating activity across communities require more consideration.
7. Engagement of relevant community members in the trials set in train a sequence of important checks and balances. For example, traditional land owners, even if they were not directly involved in the trials, raised issues to which participants were obliged to respond. Twice these were issues of sustainability and risk of over-harvest. Customary approaches to resource management may be able to complement, reinforce or replace some formal statutory requirements.
8. Formal regulatory provisions are complex and difficult to understand, even to those who have been exposed to the mix of forces that shape them. To those less in tune with bureaucratic process, they may appear without a logical purpose. Apparently arbitrary decisions about acceptable forms of use and species that require special monitoring, and a resultant uncoupling of costs from risks (to sustainability), invite non-compliance.
9. Social benefits unconnected to income generation can derive from such ventures. These include engagement of children in activity on country and transmission of customary knowledge, a significant and hence respected "regulatory" role for traditional land owners and resource custodians, and the more general benefits of engagement in meaningful employment where reward, albeit potentially modest, is directly dependent on effort and skill.



Perspectives of Aboriginal people

Much of the foregoing reflects the conclusions of the project team, or their interpretation of issues raised by Aboriginal participants. The views of Aboriginal people in the Top End were more directly heard in a workshop, facilitated by an employee of the Northern Land Council, and held at Nauiyu on the Daly River. A summary of important issues and suggested guidelines for enterprise development raised by Aboriginal participants are:

- Planning for developments should always be carried out “on country” to ensure that all relevant people have an opportunity to participate
- Traditional land owners (as distinct from and additional to other residents) must be involved at all stages
- Benefits should be shared equitably (and in accordance with customary practice) among traditional owners and those working directly on enterprises
- Developments must be designed to respect plants, sites and culture
- Community leaders should provide cultural and operational guidance
- Steps should be taken to involve more young people in all aspects of such projects
- Opportunities for people of all ages to work together on country should be facilitated to encourage inter-generational transfer of cultural and biological knowledge
- Communities seeking involvement should identify and pursue sources of support to establish nurseries on communities, and
- Training and accreditation should run in conjunction with business development.

Questions raised in the workshop on which people sought information were:

- How can intellectual property be protected so that ideas and knowledge are not abrogated and exploited by others?
- Can systems of authentication be developed to verify production by Aboriginal people and how much benefit will such certification bring in the marketplace?
- Will a coordinated and cooperative approach to marketing and harvest be feasible and produce benefits for Aboriginal people?
- How can permit and product tracking systems be designed to ensure sustainability?

Some of these questions are presently under study by members of the project team and post-graduate students.



Additional issues and principles

Based on the experiences outlined above, we had proposed to write strategies for developing enterprise in regional Australia based on native plants. However, Aboriginal participants considered that it was too early to develop detailed statements of strategy or tactics. This caution arose because some communities had little or no exposure to the ideas and even those involved in the trial harvests have yet to experience fully all the issues likely to arise. We were also sensitive to the difficulties of proposing 'one-size-fits-all' solutions, given the relative poor match of our "objective" assessments to the interests expressed by Aboriginal communities and individuals.

Nonetheless, we thought it useful to provide a statement that we think captures the most significant issues and some possible responses to them. Many of these issues and responses have already been recognised and are being implemented by active resource management agencies working with Aboriginal people in enterprise development. However, they may be of some additional value to those with less direct experience and to those with an interest in commercial use of plants in partnership with Aboriginal people.

Context

Commercial

- Cost structures are inherently adverse
- Capital is limited and capacity to raise capital on assets is constrained
- Business skills are in short supply
- Infrastructure to support commerce is limited
- Existing enterprise is most often dependent on other non-commercial support
- Local markets may be small
- Global and national markets for novel plant products are poorly understood and require exploration and/or development
- Failure of enterprise in Aboriginal communities has been frequent
- Comparative advantage is confined to uses involving clear expressions of culture and access to plants limited in availability or entirely unavailable to other users.

Resource availability

- Plant communities are often diverse and relatively intact, including some species found nowhere else
- Useful plants are often widespread and abundant
- Distributions are often spatially clumped.

Ecological

- Many species are highly resilient to those levels of harvest tested, but some items of greater market value (e.g. cycads) are much less so
- Product availability is often highly seasonal



- Supply is variable from year to year
- Quality of wild product may be variable
- Risk of general, widespread over-harvest is low, but there may be substantial risk at the local level
- Management regimes promoting sustainability will be technically straightforward for most uses, and are most likely to be effective if community support is achieved and regulators match requirements to local conditions, capability, and customary practice.

Social

- Culture remains strong in many north Australian locations
- Knowledge of plant ecology and uses of plants for food and medicine remains strong
- Conflict between commercial and customary use is likely at some sites
- Few objections to plant use are likely provided all interests are consulted and involved in decision-making so that conflict with customary use and obligation is minimised
- Customary rights and obligations for resource management differ from assumptions underpinning statutory regimes
- Distribution of income from enterprise will require consideration of customary practice as well as normal commercial practice
- Formal education may be limited
- English may be 2nd or 3rd language
- Literacy and numeracy are not universal
- Expectation among many participants that enterprise developments will directly address key social problems
- Expectation that local people will determine options and control implementation.

Legal and policy settings

- Limited or no protection for traditional knowledge or uses deriving from it
- Developments on Aboriginal land require informed consent which in turn demands detailed and comprehensive consultation
- Government approaches to novel (non-forestry) use of native plant species are invariably cautious and variable across jurisdictions
- Claims of state ownership or control conflict with customary law and practice
- Regulatory regimes influenced by poorly-informed conservation categorisations or other arbitrary decisions may impose constraints.



Implications

- Orthodox approaches to identifying and exploring options for wildlife-based enterprise raise many difficulties for Aboriginal communities.
- Rapid change in the mix comprising the present hybrid economy is unlikely: capacity to manage substantial and rapid entry to the market economy is constrained by weaknesses in social and built infrastructure needed to manage the demands of markets.
- Critical constraints will rarely involve inadequate knowledge, skills or capacity to ensure biological sustainability, but derive from poor understanding of markets and social issues, including community governance.
- Criteria for useful or successful enterprise should extend beyond the narrowly commercial to consider social implications, especially building capacity through experience.
- Ideas for novel plant use originating in Aboriginal communities and based on customary practice and traditional knowledge enjoy little or no legal protection, and so can be displaced from markets by imitators less constrained by geographic, social and other limitations.
- Options offering durable "comparative advantage" for remote Aboriginal communities will most often involve close links to culture that cannot be easily imitated or abrogated by others, access to plants unavailable outside Aboriginal lands, and the attractiveness of products grown in "clean and green" remote lands free of pollution.
- Enterprises that draw heavily on customary skills and knowledge are most likely to capture this comparative advantage, as has happened with the arts and crafts market.
- Local markets for novel products are limited and likely to be slow to develop, suggesting that initial focus on the few existing substantial markets, or on products that can be linked closely to existing markets is the "best-bet" strategy.
- Exploiting areas of comparative advantage despite numerous commercial constraints may be facilitated by linkage to such business infrastructure (eg. arts and crafts) as is already available.
- Large overseas markets for products of the sort that Aboriginal groups might develop and fill (e.g. botanical medicines) are poorly understood and investment risky until the necessary research has been completed.
- Options involving modest initial investment are most realistic given the substantial risk of failure of new products.
- "Scaling up" of enterprise is constrained by the small size of individual groups, short (seasonal) periods of resource availability and variation in resource availability and may be best overcome by Aboriginal groups forming cooperatives.
- Developments that make significant contributions to capacity-building are especially valuable. Building this social benefit into enterprise will be considered mandatory by most communities.
- Capacity-building will require time. Support for communities, families or individuals in enterprise development should be offered incrementally and iteratively, so that activity and capacity reinforce each other.
- An incremental strategy will in turn require creative use of existing social welfare and commercial programs to maintain support while additional markets, skills and infrastructure are developed.



- More ambitious and independent enterprise may follow from modest initial success and the increase in confidence and capacity that flows from it.
- An initial focus on options positioned at the modest end of the range of plant uses that are feasible in remote communities, will minimise the risk of debilitating failure.
- Management of resource use to achieve sustainability is most needed at small spatial (local) scales and a key issue will be management of conflict between commercial and customary use, so management regimes will most logically involve local people and a large measure of local control.
- Developing co-management arrangements that devolve statutory power to local groups should also be seen as an important capacity-building measure.
- Enterprise based on plants will not in itself resolve the social and economic disadvantage faced by most Aboriginal communities, but it could be a useful component of a larger solution.

Potential responses

Selection of options

1. Look for comparative advantage, including uses that are buffered from takeover by non-Aboriginal groups
2. Embrace other options particularly if they build relevant skills and experience
3. Promote uses that can be productively linked to other activity and enterprise
4. Expand assessment beyond strictly commercial to include (*inter alia*) a contribution to capacity building
5. Consider the role of the selected use as a platform for additional future activity

Operational

6. Consult widely and comprehensively to elicit ideas and concerns, including working "on country"
7. Ensure that all relevant "rights-holders" and especially traditional land owners are involved in deliberations
8. Clarify the objectives and expectations of all participants early in the process, including the non-commercial expectations
9. Avoid creating excessive or unrealistic expectations
10. Apply local knowledge and traditional skills to design of harvests and monitoring systems, as well as formal technical information
11. Clarify and document benefit-sharing arrangements early in the process
12. Determine and document statutory regulatory requirements as part of the assessment process and certainly prior to initiation of harvests
13. Involve CDEP coordinators and other administrators in project development so that productive linkages and optimal use of available infrastructure can be achieved
14. Design linked training and education programs as integral parts of enterprises



15. Identify individuals who are prepared and equipped to act as local “champions” for chosen projects
16. Build processes for certifying authenticity of origin
17. Be realistic about timelines
18. Where possible, conduct pilot projects before committing significant capital or other resources

Strategic

19. Promote research into markets that exploit comparative advantage for Aboriginal enterprise, especially relating to recognition and application of traditional knowledge
20. Build relationships with regulators so that management frameworks can be adjusted to local circumstances and the demands of sustainability
21. Investigate feasibility of developing cooperatives to improve continuity of supply and diversity of offerings to markets, especially for bushfoods

Further research

It will be clear, from this summary of issues and responses, that we consider that improved engagement of Aboriginal people in enterprise based on native plants will require additional support from Government in the short to medium term. Constraints inherent in remoteness, diseconomies of scale, lack of infrastructure and capital, and social disadvantage are likely to be overcome only if assistance is provided to realise potential comparative advantage, mostly relating to consumer interest in Aboriginal culture.

In addition to building of human, social, economic and physical capital in remote northern Australia, there are a number of areas where focused research would be most useful. Specifically, we recommend that:

1. Markets for botanical medicines in Asia, Europe and the US are systematically investigated.
2. The market value of a direct, demonstrable and authenticated connection of Aboriginal people with the harvest and processing of native plant products is examined.
3. The commercial value of Aboriginal knowledge and documentation of long-standing customary use of botanical medicines, foods and food additives be determined by reference to the registration processes of Australia and other nations with major markets.
4. Benefit-sharing arrangements of the type for which draft regulations have been prepared by the Commonwealth Government (under the *Environmental Protection and Biodiversity Conservation Act* 1999) be adopted by the Northern Territory and other north Australian jurisdictions.
5. Regulatory requirements at the Federal and State/Territory levels should be better matched to the scale of use and implications for sustainability, rather than being based on apparently arbitrary categorisations.

The full report from this project is also available from RIRDC:

Whitehead, P.J., Gorman, J., Griffiths, A.D., Wightman, G., Massarella, H. and Altman, J. (2006). *Feasibility of Small Scale Commercial Native Plant Harvests by Indigenous Communities*. A report for the Joint Venture Agroforestry Program. RIRDC Publication No. 04/149. \$21.



Joint Venture Agroforestry Program

The Joint Venture Agroforestry Program (JVAP) was established in 1993 and is a partnership between three Australian government agencies which fund research: Rural Industries Research and Development Corporation (RIRDC), Land & Water Australia (LWA) and the Forest and Wood Products Research and Development Corporation (FWPRDC). Funding is also provided for some activities by Australian Government Department of Agriculture, Fisheries and Forestry, the Natural Heritage Trust, the Department of Environment and Heritage Australian Greenhouse Office, the Murray-Darling Basin Commission and the Grains Research and Development Corporation.

The JVAP recognises the dual roles of agroforestry and farm forestry – development of an industry, and integration of trees within farms and catchments to bring improved natural resource management. It funds research covering a wide spectrum from tree breeding, wood products, whole-farm economics, farm and landscape design issues, valuation of ecosystem services, and screening native species for new products and farming systems to suit low to medium rainfall zones. JVAP's objective is to build the knowledge to underpin profitable, sustainable and resilient agroforestry within Australian farming systems and landscapes.



RIRDC Contact Details:

RIRDC Level 2,
15 National Circuit
BARTON ACT 2600
PO Box 4776
KINGSTON ACT 2604
Ph: 02 6272 4218
Fax: 02 6272 5877
e-Mail: rirdc@rirdc.gov.au
Web: www.rirdc.gov.au

