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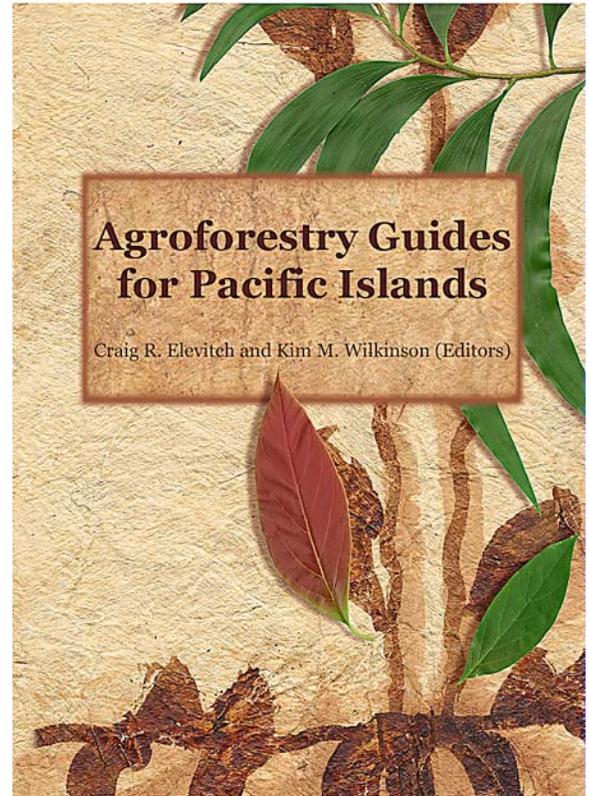
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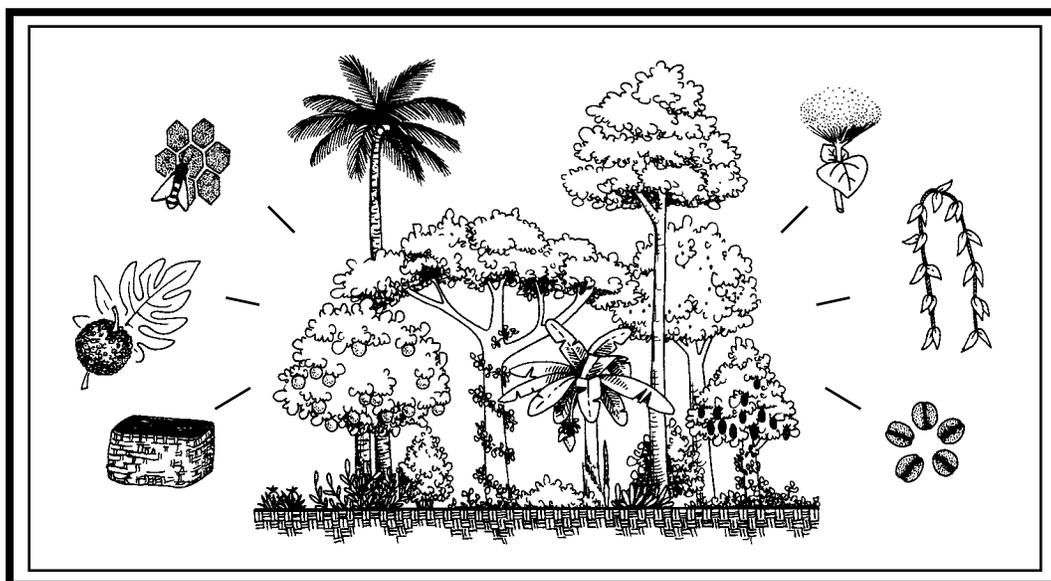
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# Nontimber Forest Products for Pacific Islands

An Introductory Guide for Producers

by Kim M. Wilkinson and Craig R. Elevitch



## Nontimber Forest Products for Pacific Islands: An Introductory Guide for Producers

**Abstract:** Nontimber forest products (NTFPs) represent an important aspect of sustainable forest management, economic growth, and conservation. This guide provides an introduction to nontimber forest products and the basics of planning an NTFP enterprise. A resource section with books, periodicals, and web links is included for further information. A species table of over seventy traditional Pacific Island nontimber forest products and their uses is provided.

**Keywords:** community forests, agroforestry, ethnobotany, specialty forest products, niche crops, nontimber, Pacific Island, rural enterprises

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# Part I: The Importance of Nontimber Forest Products

## Introduction

Nontimber forest products (NTFPs) are traditionally important in Pacific Island economies. In recent times, however, the value of nontimber forest products has been largely overlooked in favor of timber products. NTFPs provide important products for local, national, and international markets, and these markets are growing rapidly. Nontimber resources have great potential for enhancing sustainable rural development and diversified economic growth. At the same time, NTFPs represent a way to meet environmental objectives such as conservation of forests and biological diversity.

Interest in starting forest enterprises for nontimber products is on the rise. However, there has been a shortage of practical information for potential NTFP producers who want to develop their ideas. This guide is designed to provide an introduction to NTFPs, including the basics of planning and developing an NTFP enterprise.

NTFPs are a complex subject requiring resource management, business planning, and marketing skills, as well as an understanding of cultural and policy issues. Each of these subjects is introduced in this guide. Potential NTFP producers are encouraged to explore their subject in depth with a resource section of books, periodicals, and web links. For those researching potential NTFP enterprises based on traditional Pacific Island species, a table of over seventy NTFPs and their uses is included.

## What Are Nontimber Forest Products (NTFPs)?

There are many kinds of animal and plant resources that are derived from forests, including fruits, nuts, mushrooms, essential oils, florals, medicinal products, herbs and spices, dyes, resins, and animal products such as honey and wild game. Such products are known as NTFPs. NTFPs may also consist of certain wood products for nonindustrial uses, such as branches for carving or crafts.

NTFPs are often gathered from natural forests. Others may be produced with varying degrees of cultivation and domestication, either within a forest ecosystem or as part of a planted forest system such as a plantation or an agroforest.

NTFPs are traditionally important to peoples of many cultures worldwide. In many households in the Pacific Islands, NTFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and nonfarm income. These products are of vital importance to sustainable economic growth, cultural endurance, and environmental health.

NTFPs represent income opportunities from forests and forestry that do not involve cutting down trees for wood products. In forests with low timber production potential, NTFPs represent the major source of income. In most cases, management of a forest for NTFPs does not preclude the option to harvest some timber as well. Traditional management systems of forest peoples and modern scientific experience with multiple-use management suggest that, with careful planning and monitoring, forests can yield both timber and nonwood harvests on a sustainable basis (FAO 1995).

## Examples of Nontimber Forest Products

A wide array of goods are classified as NTFPs. They include both animal and plant products. Some involve little processing, serving local markets or family needs; others involve complex management and processing and are bound for national or international markets. The table below depicts some examples of nontimber forest products.

*Nontimber forest products* (NTFPs) consist of goods of biological origin other than timber that are extracted from forests (FAO 1995). NTFPs are also known as “nonwood,” “minor,” “secondary,” and “special” or “specialty” forest products.

Table 1. Examples of traditional Pacific Island and other tropical NTFPs

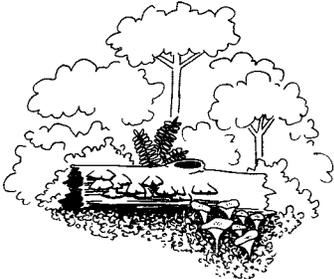
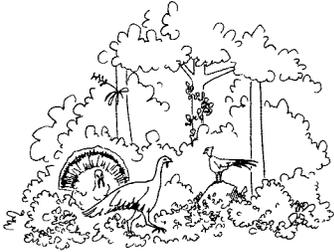
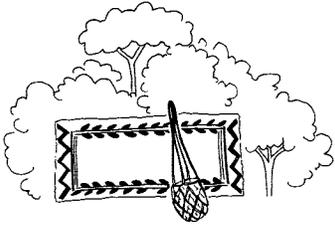
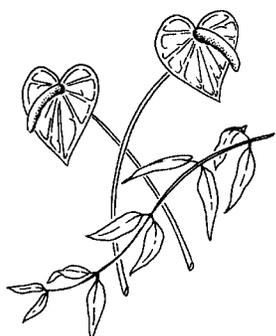
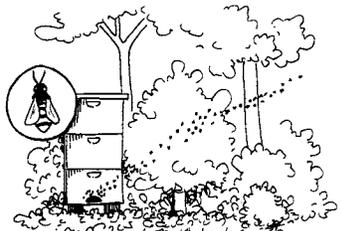
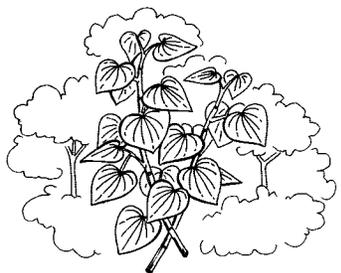
	Traditional Pacific Island Examples of NTFP	Example NTFPs from other Tropical Regions
<b>Food crops</b> 	<p><b>Fruits:</b> banana, breadfruit, Dyer's fig, ficus, Malay apple, mango, red mangrove, wax apple</p> <p><b>Nuts:</b> coconut, nipa palm, pili nut, screw pine, Tahitian chestnut, tropical almond</p> <p><b>Root crops:</b> marsh taro, taro, ti, yam</p> <p><b>Leaf vegetable:</b> Indian mulberry, pisonia</p> <p><b>Fodder:</b> Hawaiian tree fern, ti, marsh taro, leucaena</p>	<p><b>Fruits:</b> pineapple, annona species, guava, avocado, jackfruit, sugar plum, peach palm</p> <p><b>Mushrooms and fungi:</b> many culinary and medicinal mushrooms</p> <p><b>Nuts:</b> Brazil nut, cashew, pine nut, pili nut</p> <p><b>Root Crops:</b> taro, arrowroot, yams</p> <p><b>Beverages:</b> coffee, tea, cacao (chocolate)</p>
<b>Wild game/animal products</b> 	<p>Pigs, sheep, goats, game birds feathers for decoration</p>	<p>Wild deer, wild birds, iguanas, grasscutters (cane rat), rabbits, agouti, other game. Feathers, bones, teeth, tusks for decoration or weapons.</p>
<b>Handicrafts</b> 	<p><b>Weaving:</b> coconut, screw pine</p> <p><b>Beads (necklaces):</b> portia tree, screw pine</p> <p><b>Wood handicrafts:</b> coconut, common bamboo, Pacific rosewood</p> <p><b>Fiber:</b> banana, beach hibiscus, coconut, Hawaiian tree fern, Pacific rosewood, paper mulberry</p> <p><b>Minor wood products:</b> acacias, beach cordia, beach hibiscus, beach scaevola, betel-nut, Borneo teak, breadfruit, casuarina, coconut, Indian mulberry, leucaena, mango, pisonia, portia tree, red mangrove, screw pine</p>	<p><b>Wood handicrafts:</b> bamboos, rattan, palms</p> <p><b>Fiber:</b> fan palms, sennit, banana, yucca, hemp, ferns, sisal</p> <p><b>Minor wood products:</b> acacias, rosewoods, leucaena, palms, bamboos, teak, mangrove, pine, many other species of regional native woods.</p>

Table 1. Examples of traditional Pacific Island and other tropical NTFPs

	Traditional Pacific Island Examples of NTFP	Example NTFPs from other Tropical Regions
<b>Floral products</b> 	<p><b>Flowers (garlands):</b> portia tree, pua tree, ylang-ylang</p> <p><b>Cut greens:</b> coconut, ti</p> <p><b>Garlands:</b> maile</p> <p><b>Food wrapping:</b> banana, Indian mulberry, ti, wild ginger</p> <p><b>Thatching:</b> banana, nipa palm, sago palm, screw pine</p> <p><b>Organic matter/mulch:</b> ferns, tree leaves</p>	<p><b>Cut flowers:</b> anthurium, heliconia</p> <p><b>Cut greens:</b> salal, ferns</p> <p><b>Other floral/ornamental uses:</b> moss, barks, lotus pods, lotus seeds, pepper berries, rhododendrons, Spanish moss</p> <p><b>Food wrapping:</b> banana, palm fronds</p> <p><b>Thatching:</b> palms, bamboos</p> <p><b>Organic matter/mulch:</b> leucaena, gliricidia, sesbania, erythrina, other nitrogen fixing trees</p>
<b>Plant Oils/Extracts</b> 	<p><b>Vegetable oils:</b> candlenut, coconut</p> <p><b>Dyes, tannins, colorant:</b> candlenut, Indian mulberry, Java cedar, Pacific rosewood, red mangrove</p> <p><b>Essential oils:</b> paperbark, pili nut, sandalwood, ylang-ylang</p> <p><b>Soap:</b> coconut</p> <p>Herbs, Spices, Flavorings: vanilla</p>	<p><b>Vegetable oils:</b> African oil palm, caranuba wax (<i>Copenica prunifera</i>)</p> <p><b>Dyes, tannins, colorant:</b> annatto, black wattle, jackfruit</p> <p><b>Essential oils:</b> lemon grass, vetiver, patchouli, tea tree oil, cedarwood oil, rosewood oil, eucalyptus oil</p> <p><b>Herbs, spices, flavorings:</b> cinnamon, cassia, sassafras, vanilla, black pepper</p>
<b>Insects</b> 	<p><b>Bees:</b> honey, pollen</p>	<p><b>Bees:</b> Honey and pollen, royal jelly, apitherapy</p> <p><b>Insect dyes:</b> lac dye, shellac, kermes</p> <p><b>Food insects:</b> sago grubs, palm grubs, grasshoppers, agave worms, termites, snails, etc.</p>
<b>Medicinals</b> 	<p><b>Traditional medicines:</b> banana, beach cordia, beach heliotrope, beach hibiscus, beach scaevola, betel-nut, breadfruit, candlenut, casuarina coconut, Dyer's fig, Indian mulberry, Java cedar, kava, mango, marsh taro, oceanic lychee, Pacific rosewood, portia tree, red mangrove, sandalwood, screw pine, wild ginger</p>	<p><b>Medicinals and pharmaceuticals:</b> cascara sagrada, Saint John's wort, yerba santa, plantain, passionflower, ginseng, saw palmetto, senna extract, guarana, turmeric, black pepper, cat's claw, quinine, ginkgo, wild ginger, purslane, watercress, wild mint, yucca, fiddlehead fern, amaranth</p>

## Environmental, Economic, and Cultural Importance of Nontimber Forest Products

Nontimber forest products have been essential for subsistence and commercial activities all around the world. NTFPs are also among the oldest and most long-standing of internationally traded commodities, dating back thousands of years to ancient times and continuing in the present day (FAO 1995). In the Pacific Islands, NTFPs have been basic cash and subsistence commodities for millennia.

According to the United Nations Food and Agriculture Organization (FAO 1997, as cited in Valentine and SPC/UNDP/AusAID/FAO 1999), it has been estimated that:

- Eighty percent of the population of the developing world use NTFPs to meet some of their health and nutritional needs;
- Several million households worldwide depend heavily on NTFP products for income; and
- The estimated total value of world trade in NTFPs is approximately US\$1,100 million.

Recently, the importance of NTFPs is being rediscovered. Forests are being valued not simply for their timber, but as intricate systems capable of sustained generation of a great diversity of resources and services. NTFPs have substantial environmental, economic, and cultural impacts.

### Environmental

Nontimber forest products represent a way to meet environmental objectives such as conservation of forests, watersheds, biological diversity, and genetic resources. A growing body of scientific research suggests that NTFPs can help communities meet their needs without endangering forest ecosystems (FAO 1995).

By complementing timber-based management, NTFPs offer a basis for managing forests in a more sustainable way. NTFP activities hold prospects for integrated forms of development that yield higher rural incomes while conserving the forest and its diversity.

Recognition of the value of diverse NTFP species may also improve the conservation of forest genetic resources that might otherwise be overlooked.

### Economic

Timber products have overshadowed NTFPs as major forest commodities in modern times. However, the important contribution of nontimber forest products to food and resource security and to financial well-being is gaining increasing recognition. The growing appreciation for NTFPs stems from an understanding that diverse investments and diverse ecosystems are a strong foundation for sustainable economic development (Hammet and Chamberlain 1998).

In some areas, the financial impact of NTFPs may be even greater than that of forestry. For example, a study in Zimbabwe revealed that small-scale NTFP-based enterprises employed 237,000 people, compared to only 16,000 employed in conventional forestry and forest industries in the same year (FAO 1995).

In local, urban, national and international markets, forest foods and medicines contribute substantially to national economic growth. The NTFP sector is being estimated in over a billion dollars US, and is growing rapidly, perhaps faster than the timber industry. For example, the market for NTFPs has grown by nearly 20% annually over the last several years, and the related herbal medicine market at a rate of 13-15% annually (Hammet 1999). Future development of NTFPs offer good potential for increasing income, expanding opportunities, and diversifying enterprises in rural areas (Hammet and Chamberlain 1998). An important

concept in realizing these prospects is adding value locally, usually through some form of rural processing, to ensure that a fair portion of a product's market value accrues to the people who manage the forest resource (FAO 1995).

### Cultural

NTFPs are also of great cultural importance. Nontimber forest products are basic cash and subsistence commodities in many cultures. Many local Pacific Island populations continue to have a fundamental reliance on NTFPs. In many cases these products are of far greater importance than the irregular cash income gained from commercial logging. The preservation of NTFPs is fundamental to the maintenance and continuation of many traditional ways of life (Valentine and SPC/UNDP/AusAID/FAO 1999).

The recognition of intellectual property rights is another important cultural issue for many NTFPs. The fields of herbal medicine and biomedical research are growing rapidly. Often the plants, their uses, and techniques for harvesting and processing were studied over generations by people who used them traditionally. As these discoveries blossom into lucrative industries, an equitable share of the benefits is due to the people, communities, and countries from which they originate.



**With careful planning and monitoring, forests can yield both timber and nontimber products on a sustainable basis.**

## Part II: Introduction to Planning a Nontimber Forest Product Enterprise

### Opportunities for Rural Entrepreneurs

Nontimber forest products are already important in many rural areas, and represent opportunities for diversifying and expanding income (Thomas and Schumann 1993). For small-scale farm foresters, nontimber products can also provide an earlier and sustained source of revenue that allows the grower to make a living before timber trees are harvested. Although starting a NTFP enterprise is a high-risk proposition, it is an appealing challenge for many rural entrepreneurs.

Consumer demand for sustainable or “green” products of all kinds is increasing rapidly, as is consumer interest in medicinal herbs and traditional products. Sales of NTFPs are expanding quickly, gaining attention in mainstream media including the New York Times and Wall Street Journal (Chamberlain et al 1998). Opportunities for a variety of rural enterprises involving not only growing and harvesting, but also value-added processing, packaging, and transport are available in the NTFP trade.

NTFP entrepreneurs may also be attracted to the prospect for reasons other than strictly financial gain. For example, indigenous peoples may use the opportunity to create cash income while maintaining and practicing a more traditional way of life. Other NTFP entrepreneurs simply value the opportunity to remain in a rural area and earn a livelihood. In some cases, this lifestyle value is a higher priority than financial gain. Some NTFP entrepreneurs, even in developed countries, choose their trade over other employment based on lifestyle or other personal benefits (Thomas and Schumann 1993).

### Risks and Barriers

Starting an NTFP enterprise involves a high level of financial and personal risk for the entrepreneur. Many of the risk factors are related to the shortage of technical and practical information about NTFPs. At almost every phase in the process, from management and cultivation to marketing, harvesting, and processing, the NTFP entrepreneur may be in unknown territory. Unlike well-known commercial crops, there are usually few experts or sources of public support for NTFPs. Even where information is available, it may be difficult to apply to a new set of circumstances (Australian New Crops Newsletter 1998).

Marketing information is also in short supply for most NTFPs. Price, the volume required by the market, and quality standards for the product are difficult to access (FAO 1995). For some NTFPs, such as essential oils or some medicinal products, buyers may have exacting specifications for the end product. Even after a crop is successfully harvested, it may not be marketable. For these reasons, many NTFP enterprises tend to be high risk ventures into the unknown.

Before investing time, money, and resources in a potential new venture, entrepreneurs should understand all the potential pitfalls. Thorough research and careful planning as outlined below is essential to minimize risks and develop a viable NTFP enterprise.

Successful NTFP enterprises generally share the following characteristics (after FAO 1995):

- Able entrepreneur: a resourceful and capable manager can overcome many obstacles.
- Marketable product: the entrepreneur must continually assess the future of the product’s market: will price trends for the product cause its market to grow or decline? What new products threaten to replace it?

- Reliable supply of materials: processors and traders need a predictable and stable supply for maintaining markets.
- Favorable infrastructure and access to credit: access to transportation, utilities, and credit for capital investment influence an enterprise's chances for success. Small enterprises can overcome the conditions that favor larger operations by grouping together.

## Elements in Planning an NTFP Enterprise

People considering an NTFP enterprise often begin simply by exploring their options. A preliminary assessment of the resources available from the forest can determine potential products. A casual market survey of potential buyers for the product, such as local businesses or shops that use medicinal, fruit, craft, herb, or floral materials can create some ideas for marketing (Freed 1999). However, a good idea alone does not guarantee that the enterprise will be successful. After narrowing down the options, NTFP entrepreneurs should develop a plan for their business.

Many small-scale enterprises fail because they lack adequate information and planning. Small enterprises can start selling NTFPs relatively easily, but only a small portion of these survive in the long-term (FAO 1995). Consistent planning and good management is essential for a viable, sustainable enterprise.

Prospective NTFP entrepreneurs should complete four evaluations before investing in a new venture. These include a personal evaluation, a resource evaluation, a market evaluation, and a project feasibility evaluation.

### Personal Evaluation

A personal evaluation identifies and prioritizes the personal outcomes needed or wanted from the venture. These include the level of income necessary from the venture, acceptable levels of risk, and an inventory of the personal and family resources available for the enterprise (Thomas and Schumann 1993).

### Resource Evaluation

Understanding the capacity of the forest resource is essential in developing a viable NTFP forest enterprise (FAO 1995). It is impossible to manage the resource wisely or profitably without knowing about its natural growth and production, and the human environment that affects it.

Many people assume that harvests of NTFPs have less impact on a forest than logging. However, this assumption is unfounded. Forest ecosystems have such complex interrelationships that harvests of some nonwood resources can affect plant and wildlife populations as negatively as logging. Without a sound knowledge of the resource and regular monitoring, harvests of certain nontimber resources can have a disastrous impact that is not noticed until it is too late to remedy.

For example, overharvesting of fruits or seeds of a tree species can drastically reduce regeneration to the point of local extinction without any visible effect. Large individual trees may remain and the system might appear undisturbed. Only years or decades later, when the large trees die and no younger individuals replace them, will the damage become evident (Peters 1994).

Steps must be taken to understand and inventory the area's nontimber resource. Based on this, a community or enterprise can begin to prepare a plan for management.

Four key principles of management apply (Vantomme 1995):

- 1 Wood and nonwood resources should be managed in an integrated way to meet subsistence and market needs.
- 2 Harvests should not exceed the resource's ecological carrying capacity, and should be planned to maintain the diversity of local biological resources.

- 3 Planning is a continuous, dynamic process. Planning should be engaged in frequently to respond to new opportunities and conditions, including improved data collection.
- 4 The process for making resource management decisions should be understandable and fair to all who share the resource, in order for decisions to be effective.

### **Market Evaluation**

A market evaluation is critical to the success of the project, and one of the more difficult aspects of research into NTFP enterprises. It should identify the targeted markets and locate prospective buyers. The exact specifications required by the potential buyer must also be determined, including quality, quantity, price, timing of the harvest, and other specifications. Some products have very exacting specifications. The NTFP entrepreneur must plan to meet or exceed these requirements, as well as those determined by government regulations if applicable (Thomas and Schumann 1993).

NTFPs are sold in various markets: local, urban, national, and international. In a discerning marketplace, quality control is an important element in producing and marketing NTFPs. Steps should be taken to ensure that the product is not compromised during harvest, handling, processing or transport.

The price for the product is a complicated issue. From the buyer's point of view, the product includes not just the physical product but also the economic, moral, aesthetic, and other values associated with it. These values vary depending on how the product is marketed (FAO 1995).

### **Project Feasibility Evaluation**

The project feasibility evaluation examines both the technical and financial workability of the potential enterprise (Thomas and Schumann 1993). At a minimum, the financial evaluation includes a fully developed budget itemizing fixed and variable costs, and expected gross and net revenues. The amount of resources (time, money, labor, land) needed for growing, harvesting, handling, processing, transporting, and marketing the product must be accounted for (Estes 1996). The expected yield, probable price at harvest, and quality of the end product should be determined. On the technical end, the location of harvest sites, leases and permission if necessary, timing of operations, and methods of management must be addressed. For NTFPs from natural forests, special attention should be given to the sustainability of harvesting the resource. The NTFP entrepreneur should be able to document that she or he is managing in a responsible manner (Thomas and Schumann 1993).

## **Starting an NTFP Enterprise**

After careful evaluation and planning, the producer is ready to begin developing the NTFP enterprise. It is recommended to start small, and improve and expand over time.

There are many advantages to starting a small, pilot-scale enterprise before investing in a larger venture. Most importantly, starting small helps to minimize risk. On a large scale, one mistake or miscalculation could jeopardize the forest resource, or the finances of the producer. It is easier to recover quickly from a mistake made on a small scale.

Starting small also allows for the extra time necessary to develop good management and harvesting techniques and other effective habits of running a business. On a small scale, the impact on the environment can be observed carefully, and monitoring strategies for the future can be planned.

This strategy also enables the producer to create a realistic time-line for future development. As each aspect of harvesting, documenting, and marketing are developed, the producer can gauge how much of a work load is reasonable and expand in appropriate increments (Elevitch and Wilkinson 1998)

Experience with small enterprises suggests the following recommendations (Clay 1995 as cited in FAO 1995):

- 1 Start with one product and gradually diversify. First, choose the easiest product that yields a good revenue for the time involved. Invest profits in the process required to produce a second market item. The income from the first product can also leverage credit for a larger operation.
- 2 Start with products for which a local market already exists. Entering an existing market allows producers to start repaying costs immediately, but creating markets for new products takes time.
- 3 Adopt a simple strategy. Complex production/marketing strategies permit more unforeseen difficulties. Simpler management strategies are advantageous for most rural entrepreneurs.

## Improving Management and Resource Productivity

Understanding and managing currently available nontimber forest resources is an essential place to start. However, demand for the NTFP product and/or pressure on the forest resource could increase. Management systems that once were environmentally sound must be adapted in order to sustainably meet needs for livelihood and income. These adaptations may include (FAO 1995):

- improving productivity;
- domesticating and/or cultivating key species; and
- reducing waste in harvest and post-harvest treatments.

Plant productivity in forests can be improved in several ways. For example, selective weeding around valued species can improve the plant's growth and yield. Enrichment plantings of the key NTFP species in the forest can boost existing populations in order for supply to keep up with demand. In some cases, selective felling of trees may be used to open the canopy and stimulate seedling growth. Propagating seeds or cuttings from plants known to have superior growth and yields can also improve the productivity of the resource over time.

For NTFPs in high demand, domesticating and/or cultivating these species can help to reduce pressure on wild populations. Rather than being extracted from natural forests, certain NTFP species can be cultivated in the understory of plantations or in agroforestry systems. Cultivation of NTFPs in agroforestry systems is an ancient practice in the Pacific Islands. NTFP crops such as kava, garland materials, and traditional medicines are often found in traditional agroforests (Clarke and Thaman 1993). Such agroforestry systems can improve the sustainable supply of the resource, as well as providing multiple income and employment opportunities in rural areas. Additional wild trees, shrubs, and vines could also be rapidly domesticated for agroforestry and to improve income sources for farmers (Leakey 1999). Although it is not a substitute for preserving the genetic variation found only in wild sources, farm-based agroforestry can also help to maintain some portion of this diversity by selecting genetic resources from a range of wild sources (FAO 1995).

Harvesting techniques can be improved to increase the effectiveness of harvesting, storage and transport operations, and to reduce waste. Increasing knowledge of the species, technical options for harvest, and simple improvements in equipment can make significant differences in production levels (FAO 1995).

## Improving and Expanding Commercial Options

Over time, NTFP producers can improve and expand their operations in a number of ways, including (after FAO 1995):

- 1 Increasing a product's competitiveness by reducing costs of production, creating a niche market, or improving management of the resource for better yields or easier harvesting.
- 2 Diversifying the markets for each product. Before expanding from local to regional or national markets, the added costs and benefits should be estimated. Staying current with research on new products and on changes in markets and preferences is important.
- 3 Adding value locally, usually through processing.
- 4 Studying the available technology for potential new improvements.
- 5 Knowing the quality standards required by buyers, and planning to meet or exceed those requirements.
- 6 Organizing with other producers for collective strength. This helps to reduce each producer's costs for transportation, storage or materials, and also helps in negotiations with manufacturers in downstream processing.
- 7 Demonstrating the ecological viability of the enterprise. Results of regular harvest impact assessments help appeal to environmentally-minded consumers.

## Part III: Key Issues that affect NTFP Producers

### Political, Legal, Cultural and Economic Issues

NTFP producers should stay abreast of certain key issues that impact their business. A brief discussion of some of these key issues follows (after FAO 1995):

#### Public Opinion

A first obstacle to improving the prospects of NTFPs is a widespread negative view about traditional rural ways. Because many nonwood forest products are linked to customs that have conflicted with "modern" development, they are often considered "backward." This bias can influence institutional responses at all levels: field foresters, government officials, credit institutions, politicians and development agencies. Public-awareness campaigns stressing the cultural and economic importance of NTFPs can change these negative views.

#### Market Changes

People's involvement in nonwood forest enterprises changes as economies grow (Arnold 1995). Small processing enterprises predominate in rural conditions where factors favor them. However, as an NTFP market sector grows and urban demand increases, unmanaged commercialization tends to work against small enterprises. As the value of trade grows, urban traders seek to gain more control over supplies, often by-passing rural gatherers (Arnold 1995). Competition intensifies. Small enterprises find themselves unable to obtain credit and other services, which often favor larger operations. Growth in forest-product trade increases pressure on a resource and tends to restrict traditional rights of access to that resource.

In some cases, however, communities have reinforced traditional common property systems in the face of intensifying pressure. Conditions that help community groups maintain collective control against mounting pressures include (Arnold 1995):

- a legal system which is able to help the group enforce its rights;
- strong social institutions;
- well-defined rights of use;

- small homogeneous groups of users; and
- rapid returns to investment in collective management.

Some NTFPs attract international markets that tend to experience a boom-bust pattern. This can have particularly damaging long-term effects. In the Amazon in the 1890s, for example, rubber from natural forests experienced a tremendous growth in trade before ultimately being replaced by domesticated sources elsewhere. This short-lived, unmanaged exploitation proved to benefit only urban-based traders. In the forest areas where rubber was native, land use conflicts ravaged the resource and caused many deaths among Amazonia's indigenous population (FAO 1995b). A sound policy framework could have promoted balanced growth.

### **Intellectual Property Rights**

In recent years, intellectual property rights (IPR) have emerged as an important mechanism for ensuring that the benefits from forest activities are shared fairly. For example, many NTFP products such as herbal medicines were discovered, developed, and used traditionally by certain cultures. If this medicine becomes a lucrative enterprise, an equitable share of the benefits is due to the community and/or country where the product originated.

Particularly with the dramatic growth of forest-based medicines and biomedical research, securing intellectual property rights is a priority issue. The International Convention on Biodiversity protects property rights of developing countries to native plants and other species. Signed by more than 160 countries, the Convention calls on national governments to create a framework for regulating biological resources, IPR and environmental protection. It also calls on governments to harmonize commercial laws with local goals and the equitable sharing of benefits from sustainable resource management (Sittenfeld and Lovejoy 1994).

NTFP entrepreneurs should understand the issue of intellectual property rights, to ensure that fair compensation is secured for the appropriate communities or countries.

### **Resource Productivity and Supply**

When harvest rates outstrip natural regeneration rates to satisfy growing market demand, the resource in the natural forest is jeopardized. Ideally forest use is well-coordinated and well-documented, to ensure sound ecological practices. NTFP producers should document their activities and monitor their impact, assisted wherever possible by university programs, extension offices, or other sources to help ensure that the resource is used sustainably.

Timber harvests in natural forests will likely disrupt harvests of nonwood products in the absence of coordination. This disruption can be compounded by policies that favor timber production. Complicated license requirements or other problems in gaining access to the resource or to management decision processes may affect the welfare of an NTFP enterprise.

### **Policies and Management Control**

In many countries, policies governing NTFPs are scattered over many sectors: agriculture, forestry, health and industry. Because these policies were often not formulated to address nonwood forest enterprises or rural livelihood, they often fail to provide adequate incentives. In fact, many rural and small-scale entrepreneurs find that existing policies often provide disincentives, conflicting in ways that hinder development.

Policy reorientation may be the first step in improving management of NTFPs. For example, in the formulation of land-use policies, the impact on NTFP resources and their potential role in the economy needs to be considered. Policy changes can help to ensure that nontimber as well as timber assets of forest land are valued, conserved and developed (Valentine and SPC/UNDP/AusAID/FAO 1999).

Furthermore, some experts (Wickens 1991) advocate vesting the ownership, or management control, of forests in the communities that inhabit or surround them. The aim would be to renew the incentive for conservation and sustainable management of the resource - once present but now often weakened by insecurity of tenure and external threats to the resource base (Valentine and SPC/UNDP/AusAID/FAO 1999).

NTFP producers should research ways to secure continuing access to and control of the resources they need. Producers should also ask themselves if other communities/organizations or individuals claim access to the resource, and if so, determine how the enterprise will share benefits with them.

### **Future Development: Information and Research**

NTFP entrepreneurs may be limited in the development of their businesses by a lack of knowledge about the NTFP resource itself (Valentine and SPC/UNDP/AusAID/FAO 1999):

Ideally, sustainable management requires knowledge of the complete life cycle of the species concerned and their interaction with other species, as well as an understanding of their present roles and future potential in community development. Unfortunately, little or nothing is known about the interrelationship between the majority of nontimber forest species and their surrounding environment. In addition, nutritional values for most wild foods and the active principles for the majority of medicinal plants are noticeably lacking (Wickens 1991).

Therefore, increased research on NTFPs—their abundance, distribution, variation, ecology, reproductive biology; traditional and new methods of propagation, cultivation and use; identification of market and nonmarket value; etc.—is crucial for future development.

NTFP producers should keep records of their activities and monitor their impact on the forest resource. Assistance in research, development, and documentation may be available from university programs, extension offices, nonprofit organizations, or other sources.

## Traditional Pacific Island NTFPs

(after Valentine and SPC/UNDP/AusAID/FAO 1999)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Acacia sp</i>	Acacia	Wood—Fuelwood	Tonga
<i>Agathis vitiensis</i>	Fiji kauri	Resin—Glaze for pottery and may be lit as torch	Fiji
<i>Aglaja psilopetala</i>		Flowers—Garlands	Wallis and Futuna
<i>Aleurites moluccana</i>	candlenut	Seeds—Candles/Oil	Cook Islands
		Bark—Medicine	Wallis and Futuna
		Seeds—Dye and fragrance	Hawaii
		Bark—Medicine, dye Seeds—Candles/Oil, relish, medicine	
<i>Alyxia elliptica</i>		Leaves and bark—Garlands	Cook Islands
<i>Alyxia olivaeformis</i>	maile	Leaves and bark—Garlands	Hawaii
<i>Alyxia stella</i>		Leaves—Fiber for garlands Stems—Carving	Niue
<i>Areca catechu</i>	betel-nut	Fruits—narcotic, dye, cultural role Leaves—baby cradle, food wrapping, medicine, roofing, weaving, grass skirts Trunk—Construction, canoe masts Roots—Medicine—stops bleeding	FSM
		Fruit—Astringent and stimulant Trunk—Fencing materials and flooring	Guam
<i>Artocarpus altilis</i>	breadfruit	Flowers—Mosquito repellent Fruit—Food (human and animal), compost Leaves—Food wrapping, personal fans Sap—Glue Trunk—Canoes, paddles, construction, bowls	FSM
		Fruits—Food Sap—Glue, bird catching, chewing Bark—tapa Trunk—Canoes	Hawaii
		Fruit—Food, medicine Terminal bud—medicine Leaves—Mulch	Kiribati
		Fruit—Food (human and animal), compost Leaves—Compost, food wrapping Sap—Bird lure (hunting at night) Trunk—Canoes, general construction, firewood Roots—Tobacco (occasional use)	Marshall Islands
		Fruits—Food Sap—Glue	Wallis and Futuna
		Fruits—Food	Palau
<i>Artocarpus incisus</i>		Fruit—Food Trunk— Canoe	Guam
<i>Artocarpus mariannensis</i>		Fruit, seeds—Food	Guam
<i>Bambusa spp.</i>		Culm—Rafts, house construction, fencing, fish traps, irrigation and water pipes, rat traps Leaves— Sap to stop bleeding	FSM
<i>Bambusa vulgaris</i>	common bamboo	Bamboo—Fishing rods and beautification	Cook Islands
<i>Barringtonia asiatica</i>	fish-poison tree	Seeds/leaves—Medicine/Fish poison Timber—Firewood	Cook Islands

## Traditional Pacific Island NTFPs (continued)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Bischofia javanica</i>	Java cedar	Bark—Traditional medicine Leaves—Handicrafts (dye) Wood—Fuelwood Branches—Climbing support for yam	Tonga
		Bark—Dye, medicine	Wallis and Futuna
<i>Broussonetia papyrifera</i>	paper mulberry	Bark—Tapa	Hawaii
		Bark—Tapa, traditional ceremonies	Samoa
		Bark—Tapa	Wallis and Futuna
<i>Calamus sp.</i>		Stem—Rattan furniture and other products, cordage	Solomon Islands
		Stem—Rattan furniture	Solomon Islands
<i>Calophyllum inophyllum</i>	portia tree	Leaves and fruits—Medicine	Fiji
		Flowers—Garlands Fruits (nuts)—Human and bird food Leaves—Medicine, dye Sap—Glue for canoes Trunk—Firewood, construction, canoes, bowls	FSM
		Fruits (nuts)—Necklaces, oil, toys, whistle Trunk—crafts, calabashes	Hawaii
		Flowers—Garlands Fruits (pods)—Necklaces Leaves—Medicine (external parasites) Trunk—General construction	Marshall Islands
		Flowers—Oil and perfumes	Solomon Islands
<i>Cananga odorata</i>	ylang-ylang	Flowers—Garlands	Wallis and Futuna
		Flowers—Garlands Timbers—Furniture	Cook Islands
		Sap—Fragrance	Wallis and Futuna
<i>Canarium indicum</i>	red canarium	Nuts—Food and oil for cooking, lighting	Solomon Islands
<i>Casuarina sp.</i>	casuarina	Bark—Medicine Wood—Fuelwood, construction materials	Tonga
<i>Cibotium spp.</i>	Hawaiian tree fern	Trunk and leaf base—pillow and mattress stuffing Fronds—soil enrichment and mulch Fiddleheads—food Trunk starch—pig food and famine food for humans	Hawaii
<i>Cocos nucifera</i>	coconut	Leaves—Roofing Fruits—Drinks/food Timber/Roots—Posts/Fish traps	Cook Islands
		Shells—Kava bowls, handicrafts, ornaments Husks—Sinnnet	Fiji
		Leaves—Baskets, roofing, fencing, shade, handicrafts, fish traps, broomsticks Fruit—Drink, oil (for skin, oil for candles and cooking), copra, rope, firewood, handicrafts Trunk—Construction, tools, spears, handicrafts Roots—Medicine, fish traps, string, handicrafts	FSM

## Traditional Pacific Island NTFPs (continued)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Cocos nucifera</i>	coconut	Fruit—Copra, oil, soap Leaves—Baskets, brooms Trunk—Construction materials Root—Rope	Guam
		Fruits—Food Nut husks—Rope Seed coat—utensils, musical instruments	Hawaii
		Fruit—Food, cups Flowers—Toddy Leaves—Thatch, mats Trunk—Construction, firewood	Kiribati
		Flowers—Garlands, air freshener, toddy Leaves—Mats, hats Fruit—Food and drink, pig food, firewood, spoons and cups Trunk—General construction	Marshall Islands
		All parts—Multiple uses	Niue
<i>Cordia subcordata</i>	beach cordia	Fruits—Food Bark—Medicine Leaves—Baskets Oil—perfume Nut husks—Rope	Wallis and Futuna
		Leaves—Medicine Timber—Carvings/furniture Bark—Medicine	Cook Islands
		Stem—Wood carvings Branches—Wood carvings	Fiji
		Trunk—Carving and handicrafts	Hawaii
<i>Cordyline terminalis</i>	ti	Trunk—Carving and handicrafts	Solomon Islands
		Leaves—Food wrapping, cold compress Root—Fermented beverage	Hawaii
<i>Cycas circinalis</i>		Leaves—Fodder, traditional clothes	Wallis and Futuna
<i>Cyrtosperma chamissonis</i>	marsh taro	Fruit, pith—Food	Guam
<i>Decussorcarpus vitiensis</i>		Corm—Food (human and animal) Flowers—Medicine Leaves—Pig food	Kiribati
<i>Dicranopteris linearis</i>		Resin—Used to start fires	Fiji
<i>Dioscorea alata</i>	yam	Stem—Weaving	Palau
<i>Eugenia javanica</i>	wax apple	Root—Food	Hawaii
<i>Eugenia malaccensis</i>	Malay apple	Fruits—Food	Palau
<i>Eugenia syzygiurn</i>		Fruits—Food	Palau
<i>Fagraea berteriana</i>	pua tree	Fruits—Food	Palau
<i>Ficus sp.</i>	figus	Flowers—Garlands	Wallis and Futuna
<i>Ficus tinctoria</i>	Dyer's fig	Fruits—Food	Palau
<i>Flagellaria indica</i>		Fruit—Food, medicine Leaves—Pig food	Kiribati
<i>Fragraea gracilipes</i>		Stem—Weaving, fish traps	Palau
<i>Freycinetia arborea</i>		Bark and leaves—Medicine	Fiji
		Leaves—Weaving Shoot—Medicine Stem—Cordage	Hawaii

## Traditional Pacific Island NTFPs (continued)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Garcinia pseudoguttifera</i>		Fruit—Edible Leaves—Medicine Oil—Aromatic oil	Fiji
<i>Gardenia taitensis</i>		Flowers—Garlands Sap—Medicine	Niue
<i>Hibiscus tiliaceus</i>	beach hibiscus	New branches—Hula skirts Timber—Carvings/furniture Leaves—Umu cover	Cook Islands
		Bark—cordage Branches—canoe booms, floats, fire sticks, firewood Sap (inner bark)—medicine, lubricant	Hawaii
		Bark—Clothes, kava filter and rope	Wallis and Futuna
<i>Inocarpus fagifer</i>	Tahitian chestnut	Fruits—Food (Nuts)	Palau
<i>Intsia bijuga</i>	Borneo teak	Stem—Clubs, spatulas, kava bowls	Fiji
<i>Leucaena sp</i>	leucaena	Leaves—Fodder Wood—Fuelwood, local construction materials	Tonga
<i>Lygodium circinatum</i>		Leaves—Weaving	Palau
<i>Mangifera indica</i>	mango	Fruits—Food	Palau
<i>Melaleuca quinquenervia</i>	paperbark	Bark—Hut walls and roofs Leaves—Oil for pharmaceuticals	New Caledonia
<i>Metroxylon salomonense</i>	sago palm	Leaves—Thatching for houses Nuts—Children's toys Starch—food	Solomon Islands
<i>Metroxylon vitiense</i>	sago palm	Leaves—Roofing	Wallis and Futuna
<i>Morinda citrifolia</i>	Indian mulberry	Leaves—Wrap food for cooking Fruits—Local medicine Roots—Local medicine	Cook Islands
		Leaves, fruit, bark and roots—Medicine	Guam
		Fruit—medicine Root—dye Leaves—medicine, food Bark—medicine	Hawaii
		Fruits—Food, medicine Root—Medicine Terminal bud—Food Trunk—Firewood	Kiribati
		Leaves—Fodder, medicine Roots—Carving Fruits—Medicine	Niue
		Leaves, pods and stem—Medicine	Samoa
		Leaves, bark and fruit—Traditional medicine	Tonga
		Fruits and leaves—Medicine	Wallis and Futuna
		Fruits—Medicine	Solomon Islands

## Traditional Pacific Island NTFPs (continued)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Musa spp.</i>	banana	Fruit—food, medicine Leaves—food wrapping Trunk—fiber, clothing Leaf sheaths—thatch	Hawaii
		Fruit—Food, medicine	Kiribati
<i>Neocallitopsis pauchaii</i>		Wood—Oil extraction	New Caledonia
<i>Nypa fruticans</i>	nipa palm	Leaves—Roofing	Palau
		Fruits—Young fruits edible Leaves—Leaves for roofing and walls	Guam
<i>Palaquium vitilevuense</i>		Sap (latex)—Chewing gum	Fiji
<i>Pandanus amiriikensis</i>	screw pine	Leaves—Weaving	Palau
<i>Pandanus dubius</i>	screw pine	Leaves—Mat weaving, bags, edible seeds	Guam
<i>Pandanus fragrans</i>	screw pine	Leaves—Mat weaving, bags, edible fruit	Guam
<i>Pandanus kanehirae</i>	screw pine	Leaves—Roofing, wall insulation	Palau
<i>Pandanus sp.</i>	screw pine family	Leaves—Weaving, mats, hats	Palau
		Leaves—Traditional ceremonies	Samoa
		Leaves—Mats	New Caledonia
		Leaves—Weaving Roots—Medicine uses	Niue
		Leaves—Mats, baskets and clothing	Solomon Islands
Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Pandanus tectorius</i>	screw pine	Leaves—Handicrafts/House Fruits—Necklaces Timber—Posts	Cook Islands
		Flowers—Medicine, decorations in dancing Leaves—Baskets, mats, handicrafts, canoe sails Fruit—Food (humans and pigs) Trunk—Construction (underwater), fish traps Roots—Medicine, rope, handicrafts	FSM
		Leaves—hats, mats, baskets, jewelry, thatch Fruit—garlands, famine food, crafts Root fibers—garland string Trunks—wood products Roots and flowers—medicine	Hawaii
		Fruits—Food, medicine Leaves—House thatches	Kiribati
		Leaves—Handicrafts, mats, sails, foodwrapping Fruit—Food, medicine, firewood New shoots—Medicine during pregnancy Trunk—House construction, drums Roots—Medicine, fish traps	Marshall Islands
		Fruits—Necklaces Leaves—Roofing and mats	Wallis and Futuna
		Leaves—Mats and woven handicrafts	Fiji
<i>Pandanus thurstonii</i>	screw pine	Leaves—Mats and woven handicrafts	Fiji
<i>Parinari glaberrima</i>		Fruits—Oil for perfume	Wallis and Futuna

## Traditional Pacific Island NTFPs (continued)

Botanical Name	Common Name	Plant parts—Uses	Area of use
<i>Piper methysticum</i>	kava	Roots, stem—traditional drink	Hawaii
		Root, leaves—medicine	
		Stem, roots—Traditional drink (kava)	Fiji
<i>Pisonia grandis</i>	pisonia	Seeds—Dancing costumes	Cook Islands
		Timber—Carving/furniture	
		Timber—Canoes	Hawaii
		Leaves—Vegetable	
<i>Pometia pinnata</i>	oceanic lychee	Bark and leaves—Medicine	Fiji
<i>Rhizophora stylosa</i>	red mangrove	Flowers—Children's sweet (sap), toothpaste	FSM
		Fruit—Food	
		Roots—Handicrafts, dye, canoes, combs	
		Trunk—Firewood, general construction	
<i>Santalum austrocaledonicum</i>	sandalwood	Heartwood—Oil for perfume, pharmaceutical and cosmetic uses	New Caledonia
<i>Scaevola sericea</i>	beach scaevola	Leaves—Medicine, compost	Marshall Islands
		Trunk—Canoes, firewood, posts	
<i>Tacca leontopetaloides</i>		Bulb—Processing starch	Niue
		Flower stem—Weaving	
<i>Terminalia catappa</i>	tropical almond	Fruits—Food (Nuts)	Palau
<i>Thespesia populnea</i>	Pacific rosewood	Seed/leaves—Medicine	Cook Islands
		Young branches—Rope/twine	
		Timber—Crafts/furniture	
		Wood—canoes, crafts, dishes	Hawaii
		Fruit—dye	
		Fruit—Dye	FSM
		Bark—Medicine, fishing goggles	
		Trunk—Construction, handicrafts	
<i>Touchardia latifolia</i>		Stem—Cordage	Hawaii
<i>Tournefortia argentea</i>	beach heliotrope	Leaves—Medicine, compost	Marshall Islands
		Trunk—Firewood	
<i>Turrillia vitiensis</i>		Stem, branches—Food bowls	Fiji
<i>Vanilla vitiensis</i>	vanilla	Beans—Vanilla essence	Niue
<i>Zingiber zerumbet</i>	Wild ginger	Roots—Medicine	Hawaii
		Leaves—Food wrapping	

## Species index by common name

a'u (Cook Islands)	<i>Hibiscus tiliaceus</i>	fadang (Guam)	<i>Cycas circinalis</i>
acacia	<i>Acacia sp</i>	ficus	<i>Ficus sp.</i>
ara (Cook Islands)	<i>Pandanus tectorius</i>	Fiji kauri	<i>Agathis vitiensis</i>
awapuhi	<i>Zingiber zerumbet</i>	fish-poison tree	<i>barringtonia asiatica</i>
babai (Kiribati)	<i>Cyrtosperma chamissonis</i>	ich (FSM)	<i>bambusa spp.</i>
banana	<i>Musa spp.</i>	'ie'ie	<i>Freycinetia arborea</i>
banana (Kiribati)	<i>Musa spp.</i>	Indian mulberry	<i>Morinda citrifolia</i>
bangarnguis (Palau)	<i>Flagellaria indica</i>	itouch (Palau)	<i>Dicranopteris linearis</i>
bau (Fiji)	<i>Palaquium vitilevuense</i>	Java cedar	<i>bischofia javanica</i>
beach cordia	<i>Cordia subcordata</i>	kafu (Guam)	<i>Pandanus fragrans</i>
beach heliotrope	<i>Tournefortia argentea</i>	kamani (Hawaii)	<i>Calophyllum inophyllum</i>
beach hibiscus	<i>Hibiscus tiliaceus</i>	kauceuti (Fiji)	<i>Turrillia vitiensis</i>
beach scaevola	<i>Scaevola sericea</i>	kava	<i>Piper methysticum</i>
bero (Kiribati)	<i>Ficus tinctoria</i>	keam (Palau)	<i>Inocarpus edulis</i>
betel-nut	<i>Areca catechu</i>	kidel (Palau)	<i>Eugenia malaccensis</i>
bob (Marshall Islands)	<i>Pandanus tectorius</i>	kikiri (Solomon Islands)	<i>Morinda citrifolia</i>
borneo teak	<i>Intsia bijuga</i>	kiron (Marshall Islands)	<i>Tournefortia argentea</i>
breadfruit	<i>Artocarpus altilis</i>	ko'e (Cook Islands)	<i>bambusa vulgaris</i>
buabua (Fiji)	<i>Fragraea gracilipes</i>	koka (Tonga)	<i>bischofia javanica</i>
bulu (Fiji)	<i>Garcinia pseudoguttifera</i>	konnat (Marshall Islands)	<i>Scaevola sericea</i>
buuk (Palau)	<i>Pandanus kanehirae</i>	kou (Hawaii)	<i>Cordia subcordata</i>
buw (FSM)	<i>Areca catechu</i>	kukui (Hawaii)	<i>Aleurites moluccana</i>
calitau (Solomon Islands)	<i>Calamus sp.</i>	lada (Guam)	<i>Morinda citrifolia</i>
candlenut	<i>Aleurites moluccana</i>	laufala (Samoa)	<i>Pandanus sp</i>
casuarina	<i>Casuarina sp.</i>	lemae (Guam)	<i>Artocarpus incisus</i>
chedebsachel (Palau)	<i>Eugenia syzygium</i>	leucaena	<i>Leucaena sp</i>
chertochet (Palau)	<i>Pandanus amiriikensis</i>	lukwej (Marshall Islands)	<i>Calophyllum inophyllum</i>
chia (FSM)	<i>Rhizophora stylosa</i>	ma (Marshall Islands)	<i>Artocarpus altilis</i>
coconut	<i>Cocos nucifera</i>	mai (FSM)	<i>Artocarpus altilis</i>
common bamboo	<i>bambusa vulgaris</i>	mai (Kiribati)	<i>Artocarpus altilis</i>
dakua makadre (Fiji)	<i>Agathis vitiensis</i>	maile (Niue)	<i>Alyxia stella</i>
dakua salusalu (Fiji)	<i>Decussorcarpus vitiensis</i>	maire (Cook Islands)	<i>Alyxia elliptica</i>
dawa (Fiji)	<i>Pometia pinnata</i>	Malay apple	<i>Eugenia malaccensis</i>
dilo (Fiji)	<i>Calophyllum inophyllum</i>	mango	<i>Mangifera indica</i>
dokdok (Guam)	<i>Artocarpus mariannensis</i>	marsh taro	<i>Cyrtosperma chamissonis</i>
Dyer's fig	<i>Ficus tinctoria</i>	meduu (Palau)	<i>Artocarpus altilis</i>
fa (Niue)	<i>Pandanus sp.</i>	miich (Palau)	<i>Terminalia catappa</i>
fach (FSM)	<i>Pandanus tectorius</i>	miro (Cook Islands)	<i>Thespesia populnea</i>
		molemole (Solomon Islands)	<i>Pandanus sp.</i>

moto oi (Cook Islands)	<i>Cananga odorata</i>	sago palm	<i>Metroxylon vitiense</i>
nawanawa (Fiji)	<i>Cordia subcordata</i>	sandalwood	<i>Santalum austrocaledonicum</i>
ngali (Solomon Islands)	<i>Canarium indicum</i>	santal (New Caledonia)	<i>Santalum austrocaledonicum</i>
ngidech (Palau)	<i>Lygodium circinatum</i>	sao (Solomon Islands)	<i>Metroxylon salomonense</i>
ni (Marshall Islands)	<i>Cocos nucifera</i>	screw pine	<i>Pandanus species</i>
niaoulin (New Caledonia)	<i>Melaleuca quinquenervia</i>	sialemohemohe (Tonga)	<i>Leucaena sp</i>
nii (Kiribati)	<i>Cocos nucifera</i>	such (Palau)	<i>Pandanus sp</i>
nipa (Guam)	<i>Nypa fruticans</i>	Tahitian chestnut	<i>Inocarpus edulis</i>
nipa palm	<i>Nypa fruticans</i>	tatangia (Tonga)	<i>Acacia sp</i>
niu (Cook Islands)	<i>Cocos nucifera</i>	te kaina (Kiribati)	<i>Pandanus tectorius</i>
Niu (Fiji)	<i>Cocos nucifera</i>	teuechel (Palau)	<i>Nypa fruticans</i>
niu (Hawaii)	<i>Cocos nucifera</i>	ti	<i>Cordyline terminalis</i>
niu (Niue)	<i>Cocos nucifera</i>	tiale (Niue)	<i>Gardenia taitensis</i>
niyog (Guam)	<i>Cocos nucifera</i>	toa (Tonga)	<i>Casuarina sp.</i>
non (Kiribati)	<i>Morinda citrifolia</i>	tou (Cook Islands)	<i>Cordia subcordata</i>
nono (Cook Islands)	<i>Morinda citrifolia</i>	tropical almond	<i>Terminalia catappa</i>
nonu (Niue)	<i>Morinda citrifolia</i>	tui tui (Cook Islands)	<i>Aleurites moluccana</i>
nonu (Samoa)	<i>Morinda citrifolia</i>	ua (Samoa)	<i>broussonetia papyrifera</i>
nonu (Tonga)	<i>Morinda citrifolia</i>	uaua asi (Solomon Islands)	<i>Cordia subcordata</i>
nu (FSM)	<i>Cocos nucifera</i>	uhi	<i>Dioscorea alata</i>
oceanic lychee	<i>Pometia pinnata</i>	ulu (Hawaii)	<i>Artocarpus altilis</i>
olona	<i>Touchardia latifolia</i>	uosech (Palau)	<i>Ficus sp.</i>
Pacific rosewood	<i>Thespesia populnea</i>	utu (Cook Islands)	<i>barringtonia asiatica</i>
pahong (Guam)	<i>Pandanus dubius</i>	vanilla	<i>Vanilla vitiensis</i>
pandanus	<i>Pandanus species</i>	vanilla (Niue)	<i>Vanilla vitiensis</i>
paper mulberry	<i>broussonetia papyrifera</i>	vesi (Fiji)	<i>Intsia bijjuga</i>
paperbark	<i>Melaleuca quinquenervia</i>	voivoi (Fiji)	<i>Pandanus thurstonii</i>
penno (FSM)	<i>Thespesia populnea</i>	wauke (Hawaii)	<i>broussonetia papyrifera</i>
pia (Niue)	<i>Tacca leontopetaloides</i>	wax apple	<i>Eugenia javanica</i>
pili nut	<i>Canarium harveyi</i>	yaqona (Fiji)	<i>Piper methysticum</i>
pisonia	<i>Pisonia grandis</i>	ylang-ylang	<i>Cananga odorata</i>
portia tree	<i>Calophyllum inophyllum</i>		
pua tree	<i>Fagrea berteriana</i>		
pugua (Guam)	<i>Areca cathecea</i>		
puka (Cook Islands)	<i>Pisonia grandis</i>		
rebotel (Palau)	<i>Eugenia javanica</i>		
red canarium	<i>Canarium indicum</i>		
red mangrove	<i>Rhizophora stylosa</i>		
rekich (FSM)	<i>Calophyllum inophyllum</i>		
sa'osa'o (Solomon Islands)	<i>Cananga odorata</i>		

# Resources and Recommended Reading

## Local Assistance

This guide provides an introduction to NTFPs and basic aspects of NTFP enterprise development. However, there is no substitute for direct, locally appropriate information.

Potential NTFP producers are encouraged to research their subject in depth, and to seek local assistance. Support for NTFP enterprises may be available from a wide range of sources. Public agencies committed to an area's rural development include forest service staff, county extension agents, local and regional economic development organizations, small business development centers, conservation organizations, and local universities and community colleges (Thomas and Schumann 1993).

## Further Reading on NTFPs

### **Income Opportunities in Special Forest Products: Self-Help Suggestions for Rural Entrepreneurs (Agriculture Information Bulletin AIB-666)**

Authors: M.G. Thomas and D.R. Schumann, 1993

Publisher: USDA Forest Service, Washington, DC

In depth discussion of temperate special forest products (nontimber forest products) that represent opportunities for rural entrepreneurs to supplement their incomes. Order from Southern Research Station, USDA Forest Service, Blacksburg, Virginia; or download at:

<http://www.sfp.forprod.vt.edu/pubs/pubs.htm>

### **FAO Technical Papers: Non-Wood Forest Products Series**

- 1 Flavours and Fragrances of Plant Origin, 1995
- 2 Gum Naval Stores—Turpentine and Rosin from Pine Resin, 1995
- 3 Report of the International Expert Consultation on Non-Wood Forest Products, 1995
- 4 Natural Colourants and dyestuffs, 1995
- 5 Edible Nuts, 1995
- 6 Gums, Resins and Latexes of Plant Origin, 1995
- 7 Non-Wood Forest Products for Rural Income and Sustainable Forestry, 1995
- 8 Trade restrictions affecting international trade in nonwood forest products, 1995
- 9 Domestication and commercialization of nontimber forest products in agroforestry systems, 1996
- 10 Tropical palms, 1998
- 11 Medicinal plants for forest conservation and health care, 1997
- 12 Non-wood forest products from conifers, 1998

Authors: various, 1995-1997

Publisher: FAO, Rome

ISBN: various

An excellent twelve volume series on non-wood forest products and their role in integrated forestry, agroforestry, and conservation. Provides useful information on the various products, and also the basics of non-wood forest products enterprises for those products for practitioners, policy makers, and scientists. Available electronically at: <http://www.fao.org/forestry/FOP/FOPW/NWFP/pubserie.stm> or order from FAO at FAO Sales, Viale delle Terme di Caracalla, 00100 Rome, Italy; E-mail: [publications-sales@fao.or](mailto:publications-sales@fao.or)

**The major significance of ‘minor’ forest products (Forests, Trees and People, Community Forestry Note 6)**

Editor: C.R.S. Koppell, 1990.

Publisher: FAO, Rome

Contains a global survey of NTFP’s that are garnered by local people both for home consumption and sale.

**Agro-Forestry in the Pacific Islands: Systems for Sustainability**

Editors: W.C. Clark, R.R. Thaman, 1993

Publisher: United Nations University Press, Tokyo

ISBN: 92-808-0824-9

Very thorough treatment of agroforestry practices in the Pacific. Includes tables and descriptions of many traditional agroforestry species.

**The Hidden Harvest—Wild Foods and Agricultural Systems**

Authors: I. Scoones, M. Melnyk and J.N. Pretty

Publisher: The Sustainable Agriculture Project, International Institute for Environment and Development, 3 Endsleigh Street, London WC1H 0DD, UK.

A literature review and annotated bibliography of close to one thousand references relating to wild foods.

**Sustainable Harvest of Non-timber Plant Resources in Tropical Moist Forest: An Ecological Primer**

Author: C.M. Peters, 1994.

Publisher: Biodiversity Support Program, Washington, DC

Introduces in detail concepts in sustainable harvest of NTFPs from natural forests in the tropics: <http://www.bcnet.org/learning/primer/eng1.htm>

**Further Reading on Pacific Island NTFP Species**

Clarke, W.C., and Thaman, R.R. 1993. *Agroforestry in the Pacific Islands: Systems for Sustainability*. United Nations University Press, Tokyo.

Facciola, S. 1998. *Cornucopia II: A Source Book of Edible Plants*, Kampong Publications, Vista, California.

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- Whistler, W.A. 1991. *The Ethnobotany of Tonga: The Plants, Their Tongan Names, and Their Uses*. Bishop Museum Press, Honolulu, Hawaii.
- Verheij, E.W.M., and R.E. Coronel, Eds. 1992. *Plant Resources of Southeast Asia No. 2: Edible Fruits and Nuts*. PROSEA, Bogor, Indonesia.

## NTFP Periodicals

**Hoa `Aina** is the newsletter of the `Ahahui Malama I Ka Lokahi, focused on conservation and cultural resource use in Hawaii. Address: `Ahahui Malama I Ka Lokahi, P.O. Box 61578, Honolulu, Hawai`i 96839-1578; Tel: 808-524-5141; E-mail: aml@lava.net; back issues available at: <http://www.brouhaha.net/aml/>

**Non-wood News** is an information-rich newsletter produced by FAO's Wood and Non-wood Products Utilization Branch, providing readers with current information on nontimber forest products and their contribution to the sustainable development of the world's forest resources. Address: Non-Wood News, Forest Products Division, Forestry Department, FAO, Viale delle Terme di Caracalla 00100 Rome, Italy; Tel: +39-06-570 52746; Fax: +39-06-570 55618; Web site: <http://www.fao.org/forestry/FOP/FOPW/NWFP/newsle-e.stm>

**The ntfp-biocultural-digest** is a free, international internet mailing list promoting knowledge about worldwide NTFP use: <http://www.ifcae.org/ntfp/digest/>

## NTFP Web Links and Organizations

**`Ahahui Malama i ka Lokahi (AML)** is a non-profit organization created by native Hawaiians who recognize that Hawai'i's unique native plants, animals, and ecosystems represent a vital cultural resource in danger of extinction. AML focuses on Hawaiian cultural values, rights, and practices toward ecosystem protection. <http://www.brouhaha.net/aml/>

**The Directory of Information Resources for Non-Timber Forest Products** by Conservation International contains many useful publications: <http://www.conservation.org/library/books/ntfp.htm>

**People and Plants Initiative** carries out applied research projects, community workshops, exchanges and training courses with young ethnobotanists from developing countries who are interested in conservation and community development: <http://www.rbgekew.org.uk/peopleplants>

**Non Timber Forest Products in the United States** by the Institute for Culture and Ecology has extensive reference information: <http://www.ifcae.org/ntfp/>

**Non-Wood Forest Products** by the Food and Agriculture Organization of the United Nations (FAO) Forest Products Division has extensive information including organizational database and a broad range of publications in electronic form in English, French and Spanish: <http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfp-e.stm>

**Rural and Agricultural Incomes with a Sustainable Environment (RAISE)** features technical, market and regulatory information, and commercial contacts for eco-friendly products <http://www.raise.org>

**Special Forest Products** web site, a cooperative effort by the Center for Forest Products Marketing and Management, Virginia Polytechnic Institute and State University, and the Southern Research Station, USDA Forest Service focuses on the use and markets for special forest products:

[http://www.sfp.forprod.vt.edu/special\\_fp.htm](http://www.sfp.forprod.vt.edu/special_fp.htm)

**The Tropenbos Foundation** develops policy- and management-oriented research strategies on specific themes such as biodiversity, nontimber forest products (NTFPs) and criteria and indicators for sustainable forest management.

<http://www.tropenbos.nl/tropenbos/tropenbos-home.html>

**Washington State University's Special Forest Products** page offers articles for rural entrepreneurs on marketing of NTFPs:

<http://hulb80153.cahe.wsu.edu/forest/index.html#special>

## NTFP Links to Web Links

**The Institute for Culture and Ecology** lists many NTFP related web sites:

<http://www.ifcae.org/ntfp/databases/links/>

**The Special Forest Products** web site has an excellent list of related links:

[http://www.sfp.forprod.vt.edu/sfp\\_link/sfp\\_link.htm](http://www.sfp.forprod.vt.edu/sfp_link/sfp_link.htm)

**The FAO Forest Products Division** maintains a list of NTFP related sites, complete with descriptions:

<http://www.fao.org/forestry/FOP/FOPW/NWFP/links-e.stm>

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# Agroforestry Guides for Pacific Islands

**Nontimber Forest Products for Pacific Islands: An Introductory Guide for Producers** is the third in a series of eight Agroforestry Guides for Pacific Islands, published by Permanent Agriculture Resources with support from the U.S. Department of Agriculture's Western Region Sustainable Agriculture Research and Education (WSARE) Program. The guides can be downloaded from the internet free of charge from <http://www.agroforestry.net>. Master copies are also available to photocopy free of charge from Pacific Island offices of the Natural Resources Conservation Service (NRCS) or the Cooperative Extension Service (CES) of the University of Hawaii.

Each guide includes a resource section with books, periodicals, and web links for further information on the subject.

## **1. Information Resources for Pacific Island Agroforestry**

Provides an introduction to agroforestry, followed by descriptions and contact information for books, guides, periodicals, organizations, and web sites useful to practitioners of agroforestry in Pacific Islands.

## **2. Multipurpose Trees for Agroforestry in the Pacific Islands**

Introduces traditional Pacific Island agroforestry systems and species. Provides a species table with over 130 multipurpose trees used in Pacific Island agroforestry, detailing information on uses (food, fodder, timber, etc.) and tree characteristics such as height, growth rates, and habitat requirements.

## **3. Nontimber Forest Products for Pacific Islands: An Introductory Guide for Producers**

Discusses the environmental, economic, and cultural role of nontimber forest products. Provides planning suggestions for those starting a nontimber product enterprise. Includes a species table of over 70 traditional Pacific Island nontimber forest products.

## **4. Integrating Understory Crops with Tree Crops: An Introductory Guide for Pacific Islands**

Introduces planning considerations for planting crops with forestry, orchard, or other tree-based systems. Examples of understory intercropping systems in the tropics are included, as well as a species list of over 75 trees, shrubs, and vines used as understory crops in the region.

## **5. Introduction to Integrating Trees into Pacific Island Farm Systems**

Presents eight Pacific Island agroforestry practices that integrate trees into farm systems. Includes silvopasture (trees and livestock), windbreaks, contour hedgerows, live fences, improved fallow, woodlots, sequential cropping systems, and understory cropping.

## **6. Choosing Timber Species for Pacific Island Agroforestry**

Discusses seven steps for choosing timber species that meet the project goals, product requirements, and environmental conditions for a farm forestry or agroforestry project. Includes a species table of over 50 Pacific Island agroforestry species that provide quality wood products, detailing environmental tolerances and multiple uses.

## **7. Economics of Farm Forestry: Financial Evaluation for Landowners**

Introduces strategies for determining the financial returns of small-scale forestry and farm forestry projects. Includes a discussion of the advantages and disadvantages of investing in farm forestry, and the steps in determining the costs involved, estimating returns, and comparing farm forestry with other land uses. Also explores the potential of improving economic picture through value-added strategies or agroforestry practices.

## **8. Multipurpose Windbreaks: Design and Species for Pacific Islands**

Covers information on windbreak design, followed by a discussion of planning considerations for multiple-use windbreaks for timber, fruit/nut production, mulch/fodder, or wildlife habitat. Includes species table of over 90 windbreak species for Pacific Islands, detailing environmental requirements and uses/products.

Agroforestry Guides for Pacific Islands  
from: <http://www.agroforestry.net>