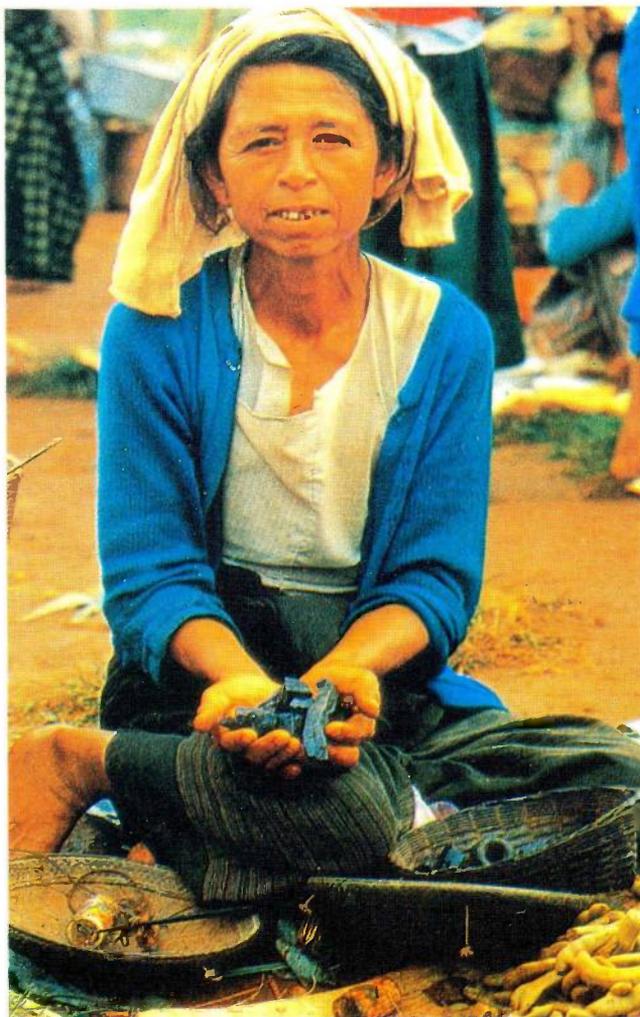




RAP Publication 1995/13

Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific

Proceedings of a Regional Expert Consultation
28 November - 2 December 1994
FAO/RAP, Bangkok



Food and Agriculture Organization of the United Nations
Regional Office for Asia and the Pacific (RAP)
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edited by
Patrick B. Durst
Ann Bishop



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FOREWORD

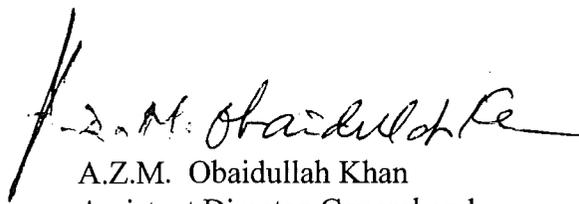
Foresters, ecologists, and other conservationists are increasingly recognizing the multiple values and benefits provided by the world's forests. New respect is emerging for the numerous ecological functions and economic possibilities offered by forests. This thinking is exemplified by recent reorientation of policies embracing holistic forest management, ecosystem management, ecological forest management, and other broad-based sustainable management concepts. Consistent with this reorientation is a renewed emphasis on non-wood forest products (NWFPs) and services.

Recognition and respect for the non-timber values of forests has long existed in the minds of people traditionally living in, and around, the forests of Asia and the Pacific. Non-wood forest products have been vitally important to forest-dwellers and rural communities in the region for centuries. Until recently, however, their use has been largely confined to meeting subsistence needs. The situation is now changing rapidly, as increasing attention is being directed toward the economic potential of non-wood forest resources.

As part of FAO's strategy to foster balanced and sustainable forest management, the Regional Office for Asia and the Pacific has recently expanded its support for the development of NWFPs by improving data collection, compiling case studies on successful management of non-wood forest resources, facilitating information dissemination, organizing workshops and consultations, and formulating new projects related to NWFP development.

In support of these efforts, FAO convened a regional consultation on non-wood forest products, in Bangkok, Thailand, in late 1994. The consultation was pivotal in looking beyond the biological and management aspects of NWFPs, traditionally considered paramount to forest managers. Notably, the meeting spotlighted the social, economic, and cultural dimensions of NWFPs that are so crucial to the people who live in, and around, forests. It was particularly successful in drawing together a highly diverse assembly of specialists from government agencies and non-governmental organizations, each reflecting unique interests, philosophies, and perspectives. The meeting produced a valuable set of recommendations and an extraordinary collection of papers highlighting social, economic, and cultural issues and experiences in NWFP development.

FAO is pleased to publish and disseminate these valuable papers along with a summary report of the regional consultation. These proceedings provide practical information and perspectives that will be useful to foresters, conservationists, and rural development workers in their efforts to improve forest management and enhance the benefits local people derive from forests.



A.Z.M. Obaidullah Khan
Assistant Director-General and
Regional Representative of FAO

ACKNOWLEDGEMENTS

Many organizations and individuals collaborated in supporting the "Regional Expert Consultation on Non-Wood Forest Products: Social, Economic and Cultural Dimensions," and the preparation of this publication. FAO provided the core funding and organizational support for the consultation, and travel funds for several participants. The United States Agency for International Development supported the participation of additional individuals from Indonesia, Nepal, and the Philippines. The Forestry Research Support Programme for Asia and the Pacific (FORSPA) funded participation from Fiji.

Several other organizations provided—at their own expense—resource speakers for the regional consultation. They include: the Regional Community Forestry Training Center, World Resources Institute, The Body Shop, USDA Forest Service, the International Network for Bamboo and Rattan, CIRAD Foret, the Biodiversity Conservation Network, the International Center for Agroforestry Research, the Asian Network for Medicinal and Aromatic Plants, the Forestry Research Support Programme for Asia and the Pacific, the University of Melbourne, the Innoprise Corporation Sdn DBHD-ICSB (Malaysia), and the Bandaranaike Memorial Ayurvedic Research Institute (Sri Lanka).

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Introductory Presentations

FRUITS OF THE FOREST: BEYOND TIMBER

A.Z.M. Obaidullah Khan

*Assistant Director-General and Regional Representative
FAO Regional Office for Asia and the Pacific*

It is a great pleasure for me to welcome all of you to the FAO Regional Office for Asia and the Pacific, and to this "Regional Expert Consultation on Non-Wood Forest Products: Social, Economic and Cultural Dimensions."

It is extremely heartening to see the outpouring of interest in this topic and this particular meeting. When we originally planned this consultation, we anticipated having approximately 20 to 25 participants. It appears that we have perhaps three times that number actually in attendance. And since I know that FAO's budget for the meeting was not increased, I can only conclude that a great number of you are here at your own expense, or under funds provided by other organizations. For this, we are very grateful and encouraged. It reinforces our strong belief in the importance of this meeting and the topics to be addressed.

This is the second time that the FAO Regional Office has organised an expert consultation on non-wood forest products. Three years ago, specialists from 11 Asian countries also met here to discuss forest products other than timber. That consultation focused primarily on the biological resources themselves and management aspects of non-wood forest products. While it did a good job of elucidating basic information on non-wood forest products, it was largely a meeting of *foresters*.

While I have nothing against foresters (some of my good friends are foresters), we must acknowledge that interest in non-wood forest products transcends the narrow field of forestry. In this meeting, therefore, we hope to look beyond the biological aspects of non-wood forest products, toward the *social, economic and cultural* dimensions. In this respect, we are happy to have a wide range of specialists joining this meeting. In addition to foresters, we have sociologists, economists, marketing experts, buyers of non-wood forest products, researchers, product development specialists, rural development officials, pharmacists, and even a lawyer!

Although foresters never completely ignored non-wood forest products, these products usually received only secondary or tertiary attention relative to timber management. Traditional foresters, all too often, have been mesmerised by timber production and wood prices. It is the modern conservation-minded foresters, scientists, and development workers who seem to have "rediscovered" the non-timber products of the forest.

Historically, forest products which had no immediate commercial consequence, were lumped together as "minor forest products," in spite of their sometimes considerable subsistence value to local communities. The perception of these products is changing rapidly, however. As the late Dr. Y.S. Rao, former FAO Regional Forestry

Officer, pointed out a few years ago, "these products have been relabelled as non-wood forest products for reasons with more potent logic than simple addiction to semantic nuances."

To the developing countries of Asia and the Pacific, non-wood forest products provide considerable opportunities for local employment and income generation. Local communities collect, process and market bamboo, rattan, beedi leaves, resins, gums, lac, oil seeds, essential oils, medicinal plants, and tanning materials. Rural people also draw heavily upon the forest for food such as honey, mushrooms, fruits, nuts, tubers, leaves, bush meat, and numerous other non-wood forest products. Recent *international* interest in non-wood forest products has been driven by the recognition of their immense commercial and industrial possibilities, and their potential to offer alternatives to destructive timber harvesting.

Serious questions remain, however:

- Will this broadened interest in non-wood forest products truly benefit local people?
- Will rural communities retain control over the vast genetic resources with which they are familiar and which they have been utilizing for centuries?
- Will increased attention on non-forest products reduce the rate of deforestation and enhance the sustainability of forest ecosystems?

There are reasons to fear that the answers to these questions will not be positive. It is quite possible that access to timber and non-timber forest resources by local communities may even be curtailed. International patent laws favor those with resources, scientific know-how, and

lawyers. As Alan Durling points out in *State of the World*, "Under prevailing laws, forest dwellers in much of the world own neither their land, nor their knowledge of that land."

The economic value of plant-based medicines, for example, is staggering — an estimated US\$ 43 billion a year. But if a traditional healer knows how to cure a disease with a herbal remedy, it is folklore. If a pharmaceutical company isolates and markets the active chemical, it is protected with a patent or rewarded with international monopoly. In the absence of tenure for forest dwellers both over land and indigenous knowledge, biodiversity prospecting, or the current "gene rush," is likely to yield the same results as the past resource booms in the tropics — more poverty, less forest. This is the devastating result that we must guard against if we are to successfully promote commercial development of non-wood forest products.

Placing local people at the center of attention prompts the question, "What kind of forests and forestry will be needed in the future?" The time has come for forestry policies to be reoriented and redesigned to transform forest-based activities into more efficient agents of socio-economic change. Such policies should contribute to effective integration of the marginalised rural poor into the mainstream of society by increasing the opportunities for them to conserve and utilise the forest resources around them.

More and more, the world is being driven by market forces. There are precious few groups of people, or regions of the world, content to maintain subsistence lifestyles. Increasingly, people yearn to enter the cash economy. For many rural people, forests and forest resources offer the best, or only, opportunities to enter the cash economy.

And because timber interests have long been dominated by the rich and powerful, it is the non-timber forest products that often provide the only practical means for rural people to earn cash.

The key to successful development of non-wood forest products lies in the people themselves — and in their empowerment. Local people must control development programs themselves, based on their own priorities. Most importantly, assurances must be made that local people will, in fact, benefit from the forests. Sustainability can be achieved only when communities using the forest resources recognise the benefits of their conservation efforts.

Some encouraging examples are emerging to illustrate these principles. Here in Thailand, in the province of Prachinburi, for example, a highly successful industry based on growing, harvesting, processing, and marketing of bamboo shoots has developed. Rural people grow and harvest the succulent young shoots on a regular basis and sell them to local canning factories. Chopped, dipped in salt solution, packed in cans, and labelled "Product of Thailand," these bamboo shoots find their way to the dining tables of Chinese restaurants all over the world. The dollars that flow in help Thailand in its drive to become a newly industrialised country, and the baht which the canning factories pay local people help propel the rural population into the cash economy that they so desire.

During this consultation, I understand we will learn more about other encouraging non-wood forest products development, including forest nuts in the Solomon Islands, ecotourism in Fiji, forest fruit preserves in the Philippines, and medicinal plants in Sri Lanka, India, and Indonesia. These cases all have one thing in common:

local people receive direct, tangible, and immediate benefits from their efforts.

These examples are encouraging, but more systematic support is needed to achieve major results. Much is still unknown about these products, their management, and their long-term market prospects. A determined effort is needed to shape forestry policies and strategies to spearhead effective programs for promoting these products. Foresters, biologists, and researchers have an important role to play in providing data and in advising policy makers and planners on how to accelerate the development of non-wood forest products. Economists can help assess the short- and long-term feasibility for specific product development. The advice of marketing and trade specialists is needed to enhance the profitability of products. Sociologists and development specialists are needed to formulate programs that effectively involve local people. Legal specialists and empathetic legislators must help protect the rights of the powerless and ensure that maximum benefits reach the rural poor. Public officials with strong political will and ethical fortitude are required to create a favorable environment for non-wood forest products development.

This consultation embraces a large number of these groups of people. We look forward to learning from your experience and expertise, and we hope that you will help us form a sound framework for the sustainable and sound development of non-wood forest products.

Finally, lest we lose sight of the deep-rooted and critically important cultural aspects of non-wood forest products, I would like to conclude with another quote from the late Dr. Y.S. Rao, one of the most eminent Asian foresters of recent times:

"Our quest should be directed toward discovering and rediscovering the cultural memory and the nature of dependence of forest communities on forest resources, and how we can foster a new and shared consciousness about wise use of these resources. If we assume that the relationship between these forest

cultures and nature around them is governed solely by the exigencies of need, such understanding could be characterised as shadowy and partial. For at least some of these communities, the forests and the sacred trees they contain, serve as images of the cosmos, symbols of the inexhaustible source of life's force."



The key to successful development of NWFPs lies in the people themselves - and in their empowerment.

OPENING ADDRESS

Pong Leng-Ee
Director-General
Royal Forest Department, Thailand

Mr. Assistant Director-General and FAO Regional Representative for Asia and the Pacific, distinguished delegates, ladies and gentlemen,

It is indeed my great honour to make a brief opening statement at the Regional Expert Consultation on Non-Wood Forest Products: Social, Economic, and Cultural Dimensions this morning.

I would like to take this opportunity to inform you about the background and current conditions of forests in Thailand. As you know, the persistent depletion of Thailand's forests is quite evident. In 1994, the forest coverage was 26.02 percent of the country's land area compared to 60 percent in 1961. Thus, over 33 years, we have lost approximately 111 million rai, or 17.8 million hectares. Therefore, the main emphasis in implementing national forest policy now is to ensure full-scale protection of the remaining natural forests while allowing appropriate utilization by local people who live close to the forests. The Royal Forest Department is still facing 3 major problems, namely:

1. Deforestation or illegal cutting, which is mainly the result of forest encroachment and is very harmful to proper management of forests and conservation of natural habitats
2. Land-use conflicts and poor agricultural practices by landless farmers engaged in shifting cultivation

3. Scarcity of wood supplies. Local people living in the hills consume 1.23 cubic meters of fuelwood per person per year for cooking and heating; domestic wood consumption totals approximately 58 million cubic meters per year.

The current policy of the Royal Thai Government is to cover 40 percent of the country's land area, or about 20 million hectares, with forests, which are classified into 3 different zones:

1. Conservation zone (Zone C). This encompasses an area of 85 million rai, or about 14 million hectares. It consists of national parks, wildlife sanctuaries and watershed areas found in the existing natural forests in Thailand.
2. Economic zone (Zone E). This encompasses an area of 55 million rai, or about 9 million hectares which are planned for commercial plantations and reserved areas for landless farmers. However, bigger patches of rich natural forests are considered part of Zone C.
3. Agricultural zone (Zone A). This encompasses an area of 7.2 million rai, or about 1.2 million hectares of deforested areas suitable for agriculture which have been given to the Office of Agricultural Land Reform in order to allocate them to landless farmers.

Concerning this consultative forum, I believe the governments in various developing countries must help their people

earn more income to ensure better living conditions. However, development can lead to deterioration of forestland as well. In addition, agroforestry should be considered for those local people living close to the forest.

Non-wood forest products can play a vital role in serving the needs of human beings and nature. In Thailand, we have 7 important non-wood forest products. These are medicinal plants, edible plants, rattan, bamboo, bee products, lac and pine resin. These all have a potential for earnings in both the local and overseas markets. About 85 percent of bamboo, for example, is consumed within households, while rattan furniture exports have declined because of the cane export ban imposed by the major producing countries in 1989. Therefore, I would like to propose that distinguished delegates take serious consideration of the above-mentioned matters, which I hope will lead to future mutual cooperation among our member countries in this region.

Before I end my opening address, I would like to convey His Majesty the King's statement regarding general welfare of the

people and project development which is as follows:

"Development of the nation must be carried in stages, starting with the laying of the foundation by ensuring the majority of the people with their basic necessities through the use of economical means and equipment in accordance with theoretical principles. Once reasonably firm foundation has been laid and is in effect, higher levels of economic growth and development should next be promoted. If we were to concentrate only on fast economic progress without allowing the plan of operation to harmonize with the condition of the country and the people, an imbalance in various aspects would be caused and may bring about failure in the end, as witnessed the serious economic crises currently faced by many a developed country."

Finally, I wish this consultative meeting every success.

Thank you for your attention, ladies and gentlemen.

REGIONAL EXPERT CONSULTATION ON NON-WOOD FOREST PRODUCTS: SOCIAL, ECONOMIC AND CULTURAL DIMENSIONS

*Patrick B. Durst
Regional Forestry Officer
FAO Regional Office for Asia and the Pacific*

It is my pleasure to join Mr. Dong, Deputy Regional Representative, in welcoming you to the FAO Regional Office for Asia and the Pacific. It is especially gratifying to finally meet face-to-face with so many of the people that I have been corresponding with by fax, mail, and telephone over the past several months as we put this consultation together! Some of the participants here today are my long-time friends; others, I am looking forward to getting to know better during the course of this week. For all of you, I wish you a productive and enjoyable stay in Thailand.

As mentioned in Mr. Obaidullah Khan's opening address delivered by Mr. Dong, the interest expressed in this meeting has far exceeded our expectations. From the beginning, we had many more requests from people wanting to join the consultation than we had funds to cover. The fact that so many people are here today is attributable to the fabulous support that we have received from a number of collaborating organizations.

I want to very publicly express my thanks to USAID for supporting participants from the Philippines and Indonesia; to the Forestry Research Support Programme for Asia and the Pacific (FORSPA) for funding the participant from Fiji; to CIRAD Foret for bringing participants from Malaysia, and the USDA Forest Service for supporting participants from Nepal and Indonesia.

I also want to acknowledge the contributions of several organizations that have provided out of their own budgets resource speakers to join us this week. They include: the World Resources Institute, the Regional Community Forestry Training Center, The Body Shop, USDA Forest Service, the International Network for Bamboo and Rattan, CIRAD Foret, the World Wildlife Fund, and the International Center for Agroforestry Research. I also don't want to forget my several colleagues here in RAPA who have so graciously put time and energy into preparing presentations for this meeting.

Finally, I would like to offer special recognition to Michael Jensen, Associate Professional Officer, with FAO/RAPA who is responsible for the excellent display of non-wood forest products, and to Berenice Muraille, former FAO staff member and current consultant, who did much of the initial organization for the consultation.

CONTEXT OF THE MEETING

This consultation comes at a very good time. Never before has the concern for the future of the tropical forests and the world's biodiversity been at such high levels. The world's natural resource managers are desperately searching for ways to stop the degradation and loss of forests. Simultaneously, development officials are

struggling to devise strategies that meet the ever-rising demands of modern societies without jeopardizing the integrity of the natural resource base.

Emerging from the Brundtland Commission, and the more recent UNCED conference, is a consensus that environmental protection and development are mutually reinforcing. Reaching that consensus, and putting it into practice, however, are two different things.

In the forestry sector, non-wood forest products have increasingly been viewed as offering opportunities to "practice what we preach." Non-wood forest products are seen by many people as offering new alternatives to large-scale timber extraction, land conversion, and more destructive forms of forest exploitation, while at the same time providing solid economic benefits to rural communities.

Many questions remain, however. What is really known, for example, about the economics of non-wood forest products production and marketing? How do the values of non-wood forest products really compare with timber values? What is the demand for non-timber forest products now, and what is it likely to be in the future? What are the potential benefits and risks for forest-dependent people as non-wood forest products become more commercialised? Who will have access to non-timber forest resources now, and in the future, when they become more valuable?

And finally, what about the sustainability of non-wood forest products? Non-timber forest products can be over-exploited just the same as timber resources. Is there any reason to believe that we will do a better job of managing non-wood forest products than we have done with timber?

From the development perspective, we are particularly interested in learning what prerequisites are necessary for successful development of non-wood forest products. What can be done by national forest management agencies, NGOs, and communities themselves to enhance non-wood forest products development? What research would be most beneficial at this time? What can FAO and other international organizations do to help?

As one of the consultation organisers, I am licensed to ask these questions without being forced to provide the answers! It is the job of this consultation to, at least partially, answer these questions.

This meeting comes almost exactly three years after another FAO-organised regional meeting on non-wood forest products held here in Bangkok in 1991. That meeting focused on the biological and production aspects of non-wood forest products. From that meeting, we learned considerable basic information on the status of non-wood forest products in 11 countries of the region.

Building on that information, we would like this consultation to delve into greater detail on other issues related to non-wood forest products development, the questions I raised above and others. In particular, we would like to focus on the social, economic, and cultural aspects of non-wood forest products development that were only superficially addressed during the last meeting.

It is important to note that since the meeting three years ago, FAO has considerably expanded its emphasis on non-timber forest products. A new Non-Wood Forest Products and Wood Energy Branch has been created within the Forest Products Division in FAO Headquarters; the organization is now publishing a new newsletter on non-

timber forest products, called *Non-Wood News*; several new Technical Cooperation Programme proposals dealing with non-wood forest products have been drafted; and a major Global Expert Consultation on Non-Wood Forest Products will be convened by FAO in Indonesia in 1995.

OBJECTIVES OF THE CONSULTATION

We have four principle objectives for this meeting:

- Review the status of non-wood forest product development throughout the Asia-Pacific region, with particular emphasis on the social, economic, and cultural aspects.

- Facilitate the exchange of information and sharing of experiences on non-wood forest product development among participating countries.
- Develop a base of information and specific recommendations for use by Asia-Pacific representatives at the upcoming Global Expert Consultation on Non-Wood Forest Products.
- Develop specific proposals and action recommendations for supporting non-wood forest products development at regional and national levels.

From FAO's perspective, the last of these is very important. We very much want and need your collective advice on how to better support non-wood forest products development.



Non-wood forest products provide essential materials for everyday life.

NON-WOOD FOREST PRODUCTS: A REGIONAL OVERVIEW

S.D. (Dennis) Richardson
Independent Forestry Advisor

INTRODUCTION

Apart from a short market study of copal gum from Irian Jaya in the 1960s, and literature reviews relating to China, I have never written anything on the subject of non-wood forest products (NWFPs). The invitation to present this review, therefore, came as both a surprise and a challenge.

I have had recourse to a strategy which comes easily to the old. That is, comparing the paradigms of the early years of my forestry career with the state-of-the-art as it appears to be at present.

The second part of my task is made easier by the availability of country papers presented to the Expert Consultation on Non-Wood Forest Products organised by the FAO Regional Office in November 1991. I shall review the material arising out of that consultation, together with additional papers on countries not represented, and other material which relates to the rapidly changing economic and cultural dimensions. I propose then to reflect upon some "matters of moment" which illustrate changes in public perceptions of forestry (and of foresters) since the 1940s when I began my studies.

At the outset, let it be said that in the urban culture of my youth in England, my only direct exposure to NWFPs (it was quite literally that) was to a species of rattan! Times and customs have changed.

BACKGROUND

In the present context, two memories dominate my recollection of the formative years of my forestry education. The first is of the remarkable annotations of the uses of non-wood tree products contained in "Silva: or a discourse of forest trees together with an historical account of the sacredness and use of standing groves," presented by John Evelyn to the Royal Society in London in 1662 (the like of which, I believe, has never been matched). The second, in a different era, is the series of catalogues representing the useful products of plants in tropical countries, collated sometimes by anonymous priests and by humble and dedicated public servants, which was one of the least reprehensible features of colonization. For India, there was the "Dictionary of Economic Products..." begun in 1884 and completed 9 years later, and selectively updated as "Commercial Products of India" in 1900. For Malaysia and much of Southeast Asia, Burhill's (1935) four-volume "A Dictionary of the Economic Products of the Malay Peninsula," published in London, aptly describes the NWFPs. In the Philippines, W.H. Brown's (1918, 1921) "Minor Products of Philippine Forests" - two volumes, published in Manila, is the major work. In the Pacific, it is E.D. Merrill's (1945) "Plant Life of the Pacific World." In China (see Richardson, 1966, 1990), the anecdotal treasuries of the 19th Century

plant hunters and the French missionaries such as David, Delavy, Soulie and Ducloux are important (see also Cox, 1945, and Wilson, 1913). A recent account of tropical ethnobotany (Joyce, 1994) includes brief histories of the eccentric Richard Spruce (the Victorian finder of quinine) and Richard Schultes (the American expert on hallucinogens). There were doubtless many more, but these are memorable for their dedication.

It must be noted that none of the early reporters is referenced in the country papers presented to the 1991 Consultation; yet there is not one natural plant product noted in the consultation proceedings that is not documented - usually in far greater detail - in these earlier writings. I am on less sure ground in speaking of herbals and pharmacopoeia. But my medical colleagues assure me that there is no proven therapeutic plant substance - whether in what we call traditional or alternative healing, that is not documented in the early English and French Herbals, the Ayurveda of the Indian Sub-continent, and the many provincial pharmacopoeia of China (excluding the immunosuppressant *Cyclosporin*, the anthelmintic agent *Invermectin*, and some other antibiotics, because they derive from fungi, which arguably are not plants).

A notable feature of the early catalogues is their objectivity, which stands in contrast to the special pleading of many present-day advocates of particular non-wood forest products. Although they used the term "economic," it was not intended to imply "commercial" but, rather, "amenable to use." As we shall see, the consultation papers are heavily weighted in favour of products which are either commercially viable or have some commercial potential. Inevitably, the social and cultural dimensions are under-played.

The 1991 Consultation has been described and the proceedings summarised by Rao (1991) in *Forest News*. A table indicating the importance of non-wood forest products in the eleven countries which submitted country papers is reproduced in this overview since it takes the place of extensive narrative (table 1). The table is a remarkable synthesis and checklist of commercial priorities which bears testimony to the knowledge and industry of the late Dr. Rao. Rao makes the point that the forests of the world and the people living near them form a natural ecosystem, the sustainability of which is realizable only when local communities perceive and benefit from conservation and the utilization of the resources around them. Only by achieving security of tenure will the users recognise a vested interest in their perpetuation. To this extent, foresters and conservationists form a natural alliance. It is woefully in need of consummation.

The Conclusions and Recommendations of the Consultation may appropriately be paraphrased here. A classification of NWFPs was proposed comprising 6 categories: fibre products and food products (plant food products and animal food products); medicinal and cosmetic products; extractive products; animals and animal products other than food; and miscellaneous products. It also recommended that governments should consider implementing specially designed NWFPs programmes having nationwide coverage. Characteristically, perhaps, it is implied that state-controlled organizations would assume the dominant responsibilities (despite the fact that successful development of NWFPs depends, in virtually all countries, on the private sector). The consultation recommended consultation with a wide cross-section of people, and for FAO to

catalyse national action to carry out comprehensive surveys.

The Consultation suggested zonation of "protected" NWFP forests (to compensate forest dwellers for employment foregone by logging bans), the development of holistic management systems, plantations of various kinds, and noted a potential role for tissue culture. Research issues were discussed and projects of particular concern to China, India, Malaysia and Thailand were noted. Some NWFP species were said to be on the verge of extinction "due to over-exploitation," although this claim is nowhere documented and will be contested later in this paper. Equally contentious are the suggestions that bureaucrats become involved with marketing.

Research into policy, legislation, economic and social aspects was recommended. The point was stressed that these are research areas unfamiliar to the conventionally oriented forest research institutes: "It is necessary for foresters to seek the assistance of institutes outside their system." It is equally necessary, of course, that foresters involve non-foresters within their system. The extension of research received emphasis. Finally, the Consultation strongly recommended the funding of a regional program on NWFPs under the sponsorship of FAO for at least five years, involving NWFP surveys; research monographs; technology transfer; study tours; regional seminars; meetings of subject matter task forces; and information exchange.

THE COUNTRY PAPERS

The Country Papers vary in depth of coverage and in their approach to the

"opportunities and constraints" relating to non-wood forest products. Since they were all prepared by, or for, senior public servants, they reflect official interpretations of available data. They concentrate on projects for which traditional forestry institutions are responsible (through the issuing of permits or collection of royalties) and which reflect the constraints of increasing forest depletion, rather than opportunities which may be provided by changing perceptions of social forestry and integrated resource management.

Several papers provide no statistical data; others illustrate discrepancies (acknowledged or not) which call into question the conclusions deriving from them. Thus, the submission from the Philippines notes that in 1990, 19 million linear meters of rattan were cut, but 139 million linear meters were exported! Similarly, from 1981 to 1990, no Manila elemi (*Canarium resin*) was produced, but 3 million kilograms were exported. Revenues accruing to government from sales of NWFPs were US\$ 63,000 — purportedly 10 percent of the market value. Yet, another agency, reports 250,000 people to be involved in forestry and hunting, 150,000 in backyard furniture making and 100,000 in rattan manufacture - from which 1990 exports yielded US\$ 121 million! Other papers are much less frank about discrepancies in data but a few non-credible statistics cast doubt upon all the rest.

The quality of bibliographies attached (or not) to the Country Papers is variable and may also be interpreted as indicating the mind-set of the authors. Some reflect awareness of regional, and even global, developments; others, largely confined to unpublished departmental reports, imply parochialism.

Such considerations add interest to the approach adopted for the present workshop, calling for submissions along thematic and issue lines, rather than traditional country reports. The themes, covering economic, socio-political, and cultural dimensions of NWFPs, call for broader and more innovative approaches and involvement from beyond the public services.

The involvement of the private sector with NWFPs is a minitheme in several country reports. But there are few realistic suggestions as to how it might be achieved, and no case studies of success. Bangladesh suggests links with participatory forestry projects, but gives no indication of the *modus operandi*. The China submission does not mention the variety of agroforestry management incentives and the exciting experiments in land tenure and management systems which are taking place there. India has attempted to organise marketing through the Tribal Development Federation but, with State-level Federations and Forest Development Corporations becoming involved in the marketing of NWFPs procured from tribals, and the establishment of marketing federations (MARKED) and large-scale multi-purpose Co-operative Societies (LAMPS), appears to be increasing bureaucratic involvement rather than lessening it. In India, too, there are proud claims of having nationalised forest contractors and of substituting "middlemen" with Forest Corporations. However, there appear to be no studies of the cost-effectiveness or the relative success or failure of different systems in different States. The submission from Pakistan notes excessive State control and the need for a free market in NWFPs, but makes no reference to free markets which do exist (e.g., in medicinal products and silk cocoons). Against the trend of the country submissions - but in line with political

changes - the Philippines commends the role of middlemen, arguing that excessive regulation is responsible for much illegal harvesting. Thailand, too, remarks on the extent of illegal collection of NWFPs, but implies that monitoring and regulation are made difficult by the practice of allowing product collection for personal use - an unenforceable control. Vietnam reports extensive corporatisation (which is regarded as semi-privatization) and realistic approaches to rights of usufruct with respect to the settlement of shifting cultivators, but it may be too early to evaluate success. These models have much in common with some Chinese practices which have produced good results.

All country reports express or imply concern over the low returns which accrue to NWFP collectors, but the figures presented vary from 10 percent of the market price for resin in Nepal, to three times that level in India, and much, much, more for illegally-gathered items (especially wildlife). Hard data are hard to come by and prices are distorted in some cases by the need to provide gratuities for government officials. The whole question of profit distribution within marketing chains is one that urgently needs detailed and fearless analysis. In the case of rainforest timbers this is being done, but non-wood forest products do not have high priority. In any event, studies are unlikely to appear on programmes of forestry departments in the near future. Perhaps there are universities with the necessary courage.

All country papers express interest in artificial propagation of species yielding NWFPs. Some countries, indeed, have a long and honorable history of growing rattan and bamboo in plantations and others (e.g., Malaysia, Sri Lanka) are skilled in raising economic plants in home gardens. It

seems probable that studies in other countries would reveal similar expertise which may be unrecorded and unrewarded.

Undoubtedly, considerations of space impose restrictions on the contributors to country papers. Perhaps for this reason, the emphasis is perceived to be on commercial prospects which implies levels of organization and intervention which may not be appropriate to many forest-dependent communities. This remains an issue to be addressed. Similarly, lack of specialist knowledge (and, perhaps, the reluctance of departments to seek it outside) prevents the adequate treatment of medicinal products. Since formal proposals have been made to establish phyto-chemical screening facilities ("chemical prospecting") in areas rich in genetic resources, such problems should be addressed by this workshop (see e.g. Eisner, 1992). It may be noted in passing that although all 1991 country reports make a brief reference to medicinals and to the value and importance of traditional medicine, there are no references whatever to health.

FURTHER BACKGROUND INFORMATION

Only 11 countries are represented in the contributions to the 1991 Consultation. Given the burgeoning interest in non-wood forest products in the region, there have been a number of other publications which are important, and there are countries with experience to contribute which were absent in 1991. In all countries there are communities of "highlands, islands and margins" with special needs that tend to be neglected. They can teach the rest of us many things if only about the constraints which ecology imposes on human society.

The following paragraphs present an essentially personal selection of perceived relevant information.

Trade

A paper by Iqbal on "International Trade in Non-Wood Forest Products : An Overview" issued by FAO in 1993, presents trade statistics derived from official sources (the limitations of which are acknowledged by the author). Some 120 non-wood forest products are covered, including 26 essential oils and a limited list of medicinals, from which it may be inferred that some 500-600 plant derivatives enter international trade. With respect to medicinals, the paper relies heavily on a WWF International Plant Programme/IUCN Review of Imports into Europe by Lewington (1993). Since China alone uses more than 5,000 species in its various traditional medicine systems, the recorded trade value of some \$1 billion is a mere trifle. Iqbal's compendium is valuable for its bibliography and for practical recommendations relating to information, dissemination and research. He notes that the statistics available provide a starting point for data collection, not the end of it.

Indonesia, Malaysia and Thailand

In 1989, the Dutch Committee for IUCN, together with WWF, commissioned a report by de Beer and McDermott to provide an economic, as distinct from commercial, evaluation of non-timber forest products in Southeast Asia. Since the approach is rather different from the Consultation Country Reports, it is worth some consideration during this workshop. The starting point for the study is the claim that at least 29 million people (the approximate number of forest dwellers in Southeast Asia) are critically dependent on non-wood forest products, but

many others derive benefits amounting to several billion dollars in annual world trade. Despite this magnitude, the authors argue that ultimately, the rural populations within the forest and its surrounds may be important in contributing to sustainable forest management, and thus counter incentives for deforestation. Moreover, without traditional access to NWFPs, the welfare of forest-dependent peoples will suffer and unique cultures may disappear. There are, thus, conflicting interests, the resolution of which will not be achieved by neo-classical economics. It is argued that there is an ethical as well as an economic dimension here (see also Borman et al., 1992; Richardson, 1994) and a responsibility to adopt policies which both conserve and restore the natural resource base, building on traditional management systems; to supplement the natural resource base with smallholder cultivation of presently or potentially over-exploited forest products; to implement measures to improve the harvesting, processing and marketing of non-timber forest products; and to retain more added value at the rural level. Few would disagree with these objectives - or that the policies are more easily stated than achieved. Nonetheless, the report makes a rare (and much needed) attempt to document household economies among forest-dependent peoples - both non-market aspects as well as trade in the household economy. Further research of this kind may at least enable some improvement in accuracy of the statistical data which underlie policy decisions. The report is, perhaps, naive in some of its assumptions relating to land tenure and rights of usufruct. The variety of "adat," or custom, and its legal implications are generally poorly understood despite its particular significance in Melanesia.

de Beer and McDermott have also undertaken studies of non-wood forest products in Vietnam, Laos and the Philippines (Palawan). Value rests in their documentation of early published records (e.g., Petelot, 1952; Maurnd, 1943; Crevost and Lemarie, 1924; and the classic encyclopaedic volumes published by Heyne in 1913, in Dutch, and translated into Bahasa in 1947).

In all countries, the cultural dimension is particularly difficult. It is seldom in the interest of forest dwellers to remain in non-market economies, nor is it the policy of any government to classify their cultures. The commercialization of NWFPs may ease the transition from non-market to market economies which, however much it may be deprecated by naturists, is an inevitable part of socio-economic development. Architects of change need to understand the significance of NWFPs and the opportunities they may offer. Usually this does not call for large commodity volumes (as is the case with timber) and, given purposeful protection, sustainability is easier to achieve and harvesting is more ecologically friendly than is the case with other wood products.

Compared with the amount of research that has gone into identifying and measuring technical properties of lesser-known species, with a view to their exploitation, little has been done by foresters to identify and record their other uses. It is time to rectify that deficiency, not only from anecdotal history, but from specific case studies subjected to rigorous scientific and economic analyses. de Beer and McDermott emphasise *caveats* to the effect that acceleration of commercialization of NWFPs may not always be in the interests of rural welfare if it attracts too many "outsiders." Their

recommendations are well intentioned and unexceptional. But there is a tacit assumption behind many of them that bureaucratic intervention and regulation serve the interests of conservation in forest dwelling communities. Unfortunately, the track record in Asia is far from exemplary. Joint initiatives of public and private sectors may better serve those interests.

India

Recent developments in India may overtake the country report presented to the 1991 Consultation. A UNDP-assisted project aims to strengthen and develop the work of the Indian Council of Forestry Research & Education (ICFRE). Some innovative proposals have been made with respect to NWFPs and research priorities. A proposal has been made to establish a Centre for NWF within the Tropical Forest Research Institute at Jabalpur, to be staffed by a multi-disciplinary team of researchers co-opted from existing divisions of Non-Wood Forest Products, Chemistry of Forest Produce, Forest Resources, Economics and Forest Botany.

The goals to be set for this Centre include the establishment of an international collaborative research group on NWFPs with divisions of bamboo, canes and fibres; edible plants; rare and endangered plants; medicinal plants; oils, gums, resins, tannins and dyes; and other products. The model would be the International Research Group on Wood Preservation, established 30 years ago, and which now has a Permanent Secretariat and membership from over 40 countries.

The Centre would develop technology "packages" for the cultivation of selected non-wood forest products, along the lines developed at Jabalpur for agroforestry.

They relate to fruit and leaves; rhizomes; flowers; and aromatic grasses. Cultivation of bamboos, medicinal plants, etc. are also included. The most innovative proposal is that joint public/private sector-funded research co-operatives be established to work on projects identified by the private sector and carried out by scientists recruited to the co-operatives on short-term, performance-based, contracts. Since they would lose the security of tenure which the State now provides, their emoluments would be high, but seniority would play no part in determining salary. It remains to be seen whether this innovation proceeds. But in a country the size of India, there is scope for experimentation in the privatization of research and development and the close involvement of the private sector in government research.

Other less developed countries (LDCs)

The writ of the Regional Office of FAO extends through the Pacific, as well as Asia. Ecological, ethnic and cultural differences are readily identified, both between and within the two sub-regions. In the present context, it is highly desirable to include an independent representative of Melanesia. Within any Melanesian country, there is enormous diversity of custom and of culture, deriving from original rights of usufruct and inheritance. The impact of forest harvesting in these circumstances has, more often than not, been devastating. And nowhere is there a clearer demonstration of the impacts of NWFPs on the course of history than the havoc caused by the search for sandalwood to satisfy the demands of China and India. It is no part of this workshop to identify - let alone resolve - the manifold legal and cultural problems of customary usufruct, but it is appropriate to acknowledge an awareness that they are real

and no less traumatic because of their confinement to island States.

There have been extensive ethno-botanical studies in Papua New Guinea, and uses are recorded for over a thousand species within the rainforests, including over 250 gathered or cultivated for food (Powell, 1976). Hamilton and King (1983) identified 32 generic uses of forest products in Papua New Guinea based on work by Lea (1975), ranging from contraceptives, beverages and condiments to fish intoxicants and musical instruments. Holdgate (1993) makes the point that hunters and gatherers, and shifting cultivators who establish forest gardens of useful species, form an ecosystem with a comparable structure to that of the natural forest, but with a grossly modified proportionality of species. Some would argue that even very drastic modification of forest ecosystems is relatively neutral with respect to the diversity of tree species. I have for a long time taken issue with the prophets (profiteers?) of doom who claim that annually, thousands of species are lost permanently from the global rainforests. I have on two occasions offered a prize of US\$ 100 to anybody who can document the extinction of a single tree species through the activities of man. If thousands of species are driven to extinction, most of them must be spiders, other insects, viruses etc. with a very short life cycle and rapid mutation - together with edible animals and a few herbs. The only records we have of extinct trees relate to cataclysmic prehistoric volcanic activity and climatic change. This is not surprising. Trees are large, long-lived, and throughout their lives subjected to many environmental vicissitudes. It will take more than the worst excesses that man may contrive to achieve their doom.

It has been noted that the Country Papers for the Consultation appear to avoid serious

discussion of medicinal plants as non-wood forest products and that health is nowhere discussed. It is pleasing to note, therefore, a superbly produced book from one of our Region's smallest countries, Brunei Darussalam, forming Part I of the illustrated "Medicinal Plants," together with an index of traditional prescriptions. Some 300 species are said to be used in traditional medicines in Brunei Darussalam. In this first volume 100 are presented. The project is under the direction of a professional forester, who is also Director of Agriculture.

"Industrialised" Oceania and Asia

Nowadays, we frequently read of "one world forestry." And we should expect, therefore, submissions to this workshop from the industrialised and rich countries of our Region, exemplified by Japan, Australia and New Zealand. I am embarrassed to admit that I know virtually nothing about the NWFPs of Japan. I do know that in the 1920s, Japan was active in ethno-botanical studies in the Asia-Pacific region, and in the study of food plants within the Pacific. I cannot believe that there is not an extensive literature of NWFP in Japan, and I would be delighted if there is someone at this workshop who can tell us a little about it.

I do know a little of the growing interest in Australia in traditional Aboriginal uses of trees for artifacts and (particularly) their seeds for food in the dry heart of Australia. Dry zone acacias have a particular importance and are being tested in Sahelian countries (House and Harwood, 1992).

Studies of non-wood forest products in New Zealand have recently taken on a new lease of life. A significant industry has developed in the harvesting, processing and export of sphagnum moss from the moist forests of the West Coast of the South Island, which

are now virtually closed for logging. It helps to provide for another kind of forest-dependent people. And there is renewed interest in research into the utilisation of bark residues and wastes from the greatly increased logging of the exotic pine plantations. Research is sponsored by private industry and seeks to isolate chemical extractives and to employ pyrolysis technologies using bark, to produce liquid fuels and/or chemicals. Steam explosion of radiata pine bark offers a new technology for sterilising bark and binding its phenolic compounds, preventing leaching. It is also being tested as an absorbent of viral protein.

MATTERS OF MOMENT

The rest of my paper lays no claim to originality: it has all been said before - most of it by me. There have been three fundamental and inter-related changes during my professional lifetime which have influenced the personal and professional lives of all of us - and which may at first appear to have no conceivable connection to NWFPs.

The first is the disillusionment with science and technology, reflected in the explosion of concern about environmental deterioration and the overuse of resources; and it stems from the apparent irrelevance of science to society. In a lecture to the Royal Society in 1971, Eric Ashby invoked the paradox that disillusionment with science and technology reached a peak at the precise time at which successful moon landings were demonstrated; and the significant feature of the criticism was that it was aimed not at the scientific skills deployed but at the goal itself. The essence of the criticism is contained in the question: "If going to the

moon represents the power of science and technology organised on so grand a scale, why was it mobilised at such enormous cost for a purpose so socially irrelevant?" This became known as the "moon-ghetto factor:" we can go to the moon but we cannot solve the problems of the ghettos or, indeed, of forest ecosystems.

It is this challenge which drives the armies of protest against the foresters' failure to achieve sustainability and the conservation of biodiversity, and to which our stakeholders' pre-occupation with NWFPs is a response.

The second seminal change is the broadening base of stakeholders. At one time, forestry was about managing resources for the provision of goods and services for people within particular (and limited) constituencies. It required skills, but they were skills that had been practised for centuries, and they were not particularly difficult to learn. Now, it is otherwise. The sciences we have to learn and the technologies we have to use, the models we build, and the sheer breadth of expertise that is applied in forestry, call for multi-disciplinary inputs and cooperation between men and women experienced in, and with interests beyond, anything I could have imagined 50 years ago. Again, these demands come from the fact that the number of stakeholders has multiplied as the issues of forestry have globalised. If forestry agencies are not to be overtaken and swamped by their burgeoning constituency, we have to increase our concern for non-technical issues in forestry, involve others from a wide range of disciplines in forest policy-making and management, and renew our commitment to a professional ethic that transcends our immediate loyalties. These imperatives, too, are reflected in our workshop programme.

The third change is far from complete, and its effects are yet to be experienced in many countries. I refer to the move from command to guidance planning in economies, sometimes extending to privatisation, and calling for innovation and experiment in organisations which often are without experience in either.

I now want to offer particular comment on three items of our programmes: medicinal plants; land tenure; and "economics and ethics."

Medicinal plants and intellectual property rights

The growing demand and increasing value of pharmaceuticals enlivens the debate about "plant rights" and the intellectual property which rests in indigenous knowledge. In the industrialised countries, there is growing acceptance that engineered or improved geno-types may be patented, and their products obtain commercial gain without sharing it with countries in which the parent material may have originated. There is a distinction in patent law between "discovery" and "invention." Thus, unlike inventions, discoveries are not regarded as the unique property of the discoverer, whatever their potential for development.

As with the economic evaluation of natural forests vis-a-vis plantations, science is a "free good" but technology is not! Sedjo (1986), with others, has argued that since technological innovation now makes possible the clear and unambiguous definition of plant species, it should allow for the allocation of property rights to naturally occurring geno-types. This would allow poor countries to profit directly from the ownership of genetic resources and would, provide a financial incentive to

protect ecosystems in which rare and as yet unknown species might be found.

The proposal, of course, runs counter to the 1983 FAO International undertaking (resolution 8/83) which argues that plant genetic resources in nature are a "common heritage." Sedjo argues that property rights in natural germplasm could be reserved by the State (as is often the case with minerals) or could be assigned to the owners of the land on which they arose. And the possibility of discovering a previously unknown resource with commercial potential would provide some incentive to preserve the habitat.

Recently, (Raynor, 1993) the drug company Merck, persuaded Costa Rica's Institute of Biodiversity (INBIO) to undertake the role of a shaman, testing plants for drugs. Ten percent of the initial subscription of US\$ 1 million, plus 50 percent of any royalties, will go directly to conservation activities.

In New Zealand, the issue is highly controversial since there is a wealth of endemic species and an economy based entirely on exotic introductions! There are no native mammals; everything that is grown commercially has been introduced. What should rule? The accident of Tangate Whenua (the first immigrants), or the ecological democracy presented by the prodigious planters of European settlement?

The patenting of germplasm is an issue that goes well beyond conservation, and the economic anomaly of distinguishing between discovery and invention is not merely academic. Whatever the solution, we should perhaps work to provide non-altruistic, self-interested incentives for the preservation of biodiversity (Cairncross, 1991), which at present are absent from most conservation appeals. And it is

perhaps time that FAO re-visited the high-sounding, but discriminatory, resolution No.8 of 1983.

Land tenure and usufruct

The distinction between "right to own" and "right to use" seems useful. As far as lands and forests are concerned, it is the right to use that is important: ownership merely confers a right to disposal and implies cessation of usage.

When I first worked in Irian Jaya 30 years ago, I assumed (naively, as it turned out) that recognition of usufruct, as distinct from possession, offered a simple solution to most land conflicts. After all, the government had nationalised the land and "the people" therefore were the owners. But such actions need not interfere with the recognition of traditional rights of use. In most of Irian Jaya, it did not, since there was an abundance of land and some rights of usufruct were recognised. I suspect that in many simple societies, usufruct is still very important and claims to "own" land are bewildering.

I was reminded of this when I came across a remarkable speech by His Majesty, the King of Thailand, delivered in 1973. In it, the King appears to be delivering a gentle reprimand to his Legislature, when he directed his audience (the University Law Faculty) to address what must surely have been a moot point. He said:

"In forests designated and delineated by the authorities as reserved or restricted, there were people there already at the time of the delineation. It seems rather odd for us to enforce the Reserve Forest Law on the people in the forest, which became reserved

only subsequently by the mere drawing of lines on pieces of paper. The problem arises inasmuch as, with the delineation done, these people became violators of the law. From the viewpoint of law, it is a violation because the law was duly enacted; but according to natural law, the violator of the law is he who drew the lines, because the people who had been in the forest previously possessed the rights of man, meaning that the authorities had encroached upon individuals and not individuals transgressing the law of the land.

"Squatters are supposed to have violated the law, but what is really amazing is that when the reserved forests are declared open by the authorities for occupation, these squatter should turn out to be trespassers on land which now has owners, when they, as previous occupants earning their living there in a normal way, should have acquired rights.

"You may say that it is not quite the role of the Faculty of Law to amend the law, but that it should be left to the Legislature. However, the Legislature, in normal circumstances, is made up of people's representatives and may number some lawyers among them, but are mostly professional Parliamentarians or Politicians voted into Parliament under Party banners. They are not really technicians for which there is a need, meaning those who make a real study of the law. If such technicians are not interested in real problems, but are preoccupied with mere legal theories, no benefits can be derived."

It may be appropriate to take heed of His Majesty's thoughts during the coming week.

Economics and ethics - the broken circle

Anomalies of neo-classical economics which stem from market imperfections, and the fact that ordinary people do not behave like economists, increasingly affect the ways in which problems of environment and development may be addressed. The need for new approaches to escape the constraints of short-term time horizons has led to the development of "Safe Minimum Standards" analysis, a new field of "ecological economics," sustainable development paradigms, and the holistic approach which views ecology, economics and ethics as part of a whole and inter-connected circle which at the present time appears to be broken. The inclusion of an ethical dimension, even if only humanistic, may be important.

In a recent note, which is both light-hearted and profound, Fri (1992) posed three questions: Is sustainable development more likely to thrive under some particular set of political and economic institutions than under others? Should the values that underpin this development become part of mainstream ethical systems? And, if the answer to these questions is 'yes' are we prepared to live with the results? He concludes that the political, economic, and ethical setting in which sustainability (including sustainable forestry) is pursued will determine success or otherwise.

CONCLUSION

Finally, may I conclude with two anecdotes which highlight the benefits of cultural

exchange and the inter-dependence of all of us-rich or poor, north or south, ancient or modern.

In the jungles of Ecuador, there are *fer de lance* snakes, the bites of which are fatal, and for which there appears to be no botanical cure. The way the natives of Ecuador save the life of a victim is to give him several large and dangerous electric shocks from the jump-leads of an outboard motor. This de-natures the venom protein in the wound and renders it harmless (Joyce, 1994)!

The other relates to what is perhaps the most important non-wood forest product in Oceania - kava or "yaqona," an extract of the root of *Piper methysticum*, which is drunk ceremoniously and induces what has been described as "a happy state of complete comfort and peace, with ease of conversation and increased perceptivity, followed by restful sleep." It was reported by James Cook in 1768, and has been subject to much scientific study and its consumption is increasing. The rituals associated with its use vary from the elaborate, governed by strict protocol, to its substitution for the European habit of taking morning tea in government offices. A feature of recent Oceanic history has been the involvement of Christian missions in education, and in particular, endeavours to stamp out the consumption of alcohol (which, it must be agreed, has been damaging). It is of interest that even the fundamentalist sects which in the early days categorised kava as similar to alcohol, now accept kava as a desirable substitute!

Table 1. Important NWFP in Selected Countries of the Asia-Pacific Region

Very Important:1

Moderately Important :2

Less Important:3

S.No	NWFP	BGD	GPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
1.	Fiber Products											
1.1	Bamboos	1	1	1	2	3	3	3	1	1	1	1
	<i>Bambusa arundinacea</i>											
	<i>Bambusa polymorpha</i>											
	<i>Bambusa tulda</i>											
	<i>Dendrocalamus hamiltonii</i>											
	<i>Dendrocalamus strictus</i>											
	<i>Melocanna baccifera</i>											
	<i>Ochlandra travancorica</i>											
1.2	Rattans	3	3	3	1	1	3	3	1	1	1	2
1.3	Leaf and Stem Fibres	1	2	1	2	2	2	2	1	2	2	2
	<i>Abroma augusta</i>											
	<i>Abutilon spp.</i>											
	<i>Agave sisalana</i>											
	<i>Ananas cosmosus</i>											
	<i>Antiaris toxicaria</i>											
	<i>Boehmeria nivea</i>											
	<i>Bombax ceiba</i>											
	<i>Borassus flabellifer</i>											
	<i>Cannabis sativa</i>											
	<i>Ceiba pentandra</i>											
	<i>Cordia dichotoma</i>											
	<i>Cordia rothii</i>											
	<i>Girardinia heterophylla</i>											
	<i>Grewia elastica</i>											
	<i>Grewia glabra</i>											
	<i>Grewia sp.</i>											
	<i>Hibiscus spp.</i>											
	<i>Malachra capitata</i>											
	<i>Marsdenia tenacissima</i>											
	<i>Marsdenia sp.</i>											

Important NWFP in Selected Countries of the Asia–Pacific Region

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	GPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Oreocnide integrifolia</i>											
	<i>Phormium tenax</i>											
	<i>Sesbania bispinosa</i>											
	<i>Sida rhombifolia</i>											
	<i>Sterculia foetida</i>											
	<i>Sterculia urens</i>											
	<i>Sterculia villosa</i>											
	<i>Themeda arundinacea</i>											
	<i>Trema orientalis</i>											
	<i>Typha elephantina</i>											
	<i>Urena lobata</i>											
1.4	Grasses											
1.4.1	Grasses for paper making	3	3	1	3	3	1	1	3	3	3	2
	<i>Eulaliopsis binata</i>											
1.4.2	Fodder grasses	2	3	1	3	3	1	1	3	3	3	3
	<i>Andropogon</i>											
	<i>Bothriochloa intermedia</i>											
	<i>Bothriochloa sp.</i>											
	<i>Bothriochloa pertusa</i>											
	<i>Bromus spp.</i>											
	<i>Cenchrus ciliaris</i>											
1.4.3	Grasses for matting	2	3	1	3	3	1	1	2	2	2	2
	<i>Arundo spp.</i>											
	<i>Cyperus corymbosus</i>											
	<i>Phragmites spp.</i>											
	<i>Saccharum munja</i>											
	<i>Typha elephantina</i>											
1.4.4	Grasses for ropes	2	3	1	3	3	1	1	2	2	2	2
	<i>Desmestachya bipinnata</i>											
	<i>Eulaliopsis binata</i>											
	<i>Saccharum munja</i>											
	<i>Saccharum spontaneum</i>											

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	CPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Themeda arundinacea</i>											
1.4.5	Thatching grasses	1	3	1	3	3	1	1	2	2	2	2
	<i>Heteropogon contortus</i>											
	<i>Imperata cylindrica</i>											
	<i>Saccharum munja</i>											
	<i>Saccharum spontaneum</i>											
1.4.6	Grasses for miscellaneous uses	3	3	2	3	3	1	1	2	2	2	2
	<i>Thysanolaena maxima</i>											
	<i>Vetiveria zizanioides</i>											
2	Food Products											
2.1	Plant food Products											
2.1.1	Stems/shoots	3	2	3	2	3	3	2	2	1	1	1
2.1.2	Tubers/roots	3	3	3	2	2	3	3	2	2	1	1
2.1.3	Leaves	3	3	3	2	2	2	1	2	1	1	1
2.1.4	Flowers	3	3	1	2	2	2	2	3	1	1	1
2.1.5	Fruits	3	3	1	2	2	2	1	2	1	1	1
	<i>Aegle marmelos (bel)</i>											
	<i>Amorphophallus campanulatus</i>											
	<i>Anacardium occidentale (kaju)</i>											
	<i>Annona squamosa (custard apple)</i>											
	<i>Artocarpus lakoocha (barhal)</i>											
	<i>Buchanania lanzan (chironji)</i>											
	<i>Carissa sp. (karaunda)</i>											
	<i>Dioscorea sp.</i>											
	<i>Emblica officinalis (aonla)</i>											
	<i>Feronia elephantum (kaitha)</i>											
	<i>Ipomoea aquatica</i>											
	<i>Juglans regia (akhrot)</i>											
	<i>Madhuca indica (Mahua)</i>											
	<i>Madhuca longifolia (mahua)</i>											
	<i>Moringa oleifera (drum stick)</i>											
	<i>Pinus gerardiana (chilgoza)</i>											

Important NWFP in Selected Countries of the Asia–Pacific Region

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	CPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Syzygium cumini</i> (jamun)											
	<i>Tamarindus indica</i> (tamarind)											
	<i>Zizyphus jujuba</i> (ber)											
2.1.6	Nuts	3	2	2	2	2	2	1	2	1	2	1
2.1.7	Sap	3	3	3	1	2	3	3	2	2	2	2
2.1.8	Condiments and spices	3	3	2	1	2	2	2	2	1	2	2
2.1.9	Oil Seeds	3	1	2	1	2	1	2	2	2	2	2
	<i>Actinodaphne</i> sp.											
	<i>Azadirachta indica</i>											
	<i>Garcinia indica</i>											
	<i>Madhuca indica</i>											
	<i>Mangifera indica</i>											
	<i>Pongamia glabra</i>											
	<i>Salvadora oleoides</i>											
	<i>Schleichera trijuga</i>											
	<i>Shorea</i> sp.											
2.1.10	Mushroom	3	1	3	3	3	2	1	2	3	1	1
2.2	Animal food products	2	1	3	2	2	2	2	3	3	1	1
2.2.1	Honey											
2.2.2	Bush meat											
2.2.3	Fish, shells etc.											
2.2.4	Edible bird nests											
2.2.5	Eggs											
2.2.6	Insects											
3	Medicinal and cosmetic plant products											
3.1	Medicinal Plants	3	2	2	1	2	1	2	1	1	2	2
	<i>Atropa acuminata</i> (Belladonna)											
	<i>Cassia angustifolia</i> (Senna)											
	<i>Costus speciosus</i>											
	<i>Datura innoxia</i>											
	<i>Datura metel</i>											
	<i>Datura stramonium</i>											

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	GPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Dioscorea sp.</i>											
	<i>Rauwolfia serpentina</i>											
	<i>Solanum sp.</i>											
3.2	Cosmetic plants	3	3	3	3	3	2	3	2	2	3	3
4	Extractive products											
4.1	Gums	3	3	1	3	2	2	3	3	1	2	2
	<i>Acacia catechu</i>											
	<i>Acacia modesta</i>											
	<i>Acacia nilotica spp. indica</i>											
	<i>Acacia senegal</i>											
	<i>Anogeissus latifolia</i>											
	<i>Bauhinia retusa</i>											
	<i>Cochlospermum religiosum</i>											
	<i>Lannea coromandelica</i>											
	<i>Pterocarpus marsupium</i>											
	<i>Sterculia urens</i>											
	<i>Sterculia villosa</i>											
4.2	Gum Resins	3	1	2	1	3	2	2	3	1	1	1
	<i>Commiphora mukul</i>											
	<i>Garcinia morella</i>											
4.3	Resins	3	1	1	1	3	1	1	1	1	1	1
	<i>Canarium strictum</i>											
	<i>Hopea odorata</i>											
	<i>Shorea robusta</i>											
	<i>Vateria indica</i>											
4.4	Oleoresins	3	2	2	1	3	1	1	1	1	1	1
	<i>Boswellia serrata</i>											
	<i>Dipterocarpus turbinatus</i>											
	<i>Kingiodendron pinnatum</i>											
	<i>Pinus roxburghii</i>											
4.5	Latex	3	3	2	1	1	3	3	1	1	1	1
4.6	Tans											

Important NWFP in Selected Countries of the Asia–Pacific Region

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	CPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
4.6.1	Fruit tannins	2	3	2	3	3	3	2	2	1	2	2
	<i>Acacia mollisima</i>											
	<i>Acacia nilotica</i>											
	<i>Anogeissus latifolia</i>											
	<i>Carissa sp.</i>											
	<i>Cassia auriculata</i>											
	<i>Emblica officinalis</i>											
	<i>Shorea robusta</i>											
	<i>Terminalia bellerica</i>											
	<i>Terminalia chebula</i>											
	<i>Zizyphus xylocarpus</i>											
4.6.2	Bark tannins	2	3	1	2	3	3	1	3	3	3	2
	<i>Acacia mollisima</i>											
	<i>Acacia nilotica</i>											
	<i>Anogeissus latifolia</i>											
	<i>Carissa spinarum</i>											
	<i>Cassia auriculata</i>											
	<i>Shorea robusta</i>											
4.7	Dyes											
4.7.1	Wood dyes	3	3	1	3	3	2	3	3	3	3	3
	<i>Acacia catechu</i>											
	<i>Artocarpus heterophyllus</i>											
	<i>Artocarpus lakoocha</i>											
	<i>Caesalpinia sappan</i>											
	<i>Pterocarpus santalinus</i>											
4.7.2	Bark dyes	3	3	2	3	3	3	3	3	3	3	3
	<i>Acacia concinna</i>											
	<i>Acacia farnesiana</i>											
	<i>Acacia leucophloea</i>											
	<i>Alnus spp.</i>											
	<i>Casuarina equisetifolia</i>											
	<i>Manilkara littoralis</i>											

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	GPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Myrica esculenta</i>											
	<i>Terminalia tomentosa</i>											
	<i>Ventilago madraspatana</i>											
4.7.3	Flower and fruit dyes	3	3	3	3	3	3	3	3	3	3	2
	<i>Bixa orellana</i>											
	<i>Butea monosperma</i>											
	<i>Mallotus philippensis</i>											
	<i>Mammea longifolia</i>											
	<i>Nyctanthes arbortristis</i>											
	<i>Toona ciliata</i>											
	<i>Woodfordia floribunda</i>											
	<i>Wrightia tinctoria</i>											
4.7.4	Root dyes	3	3	2	3	3	3	3	3	3	3	3
	<i>Berberis aristata</i>											
	<i>Datisca cannabina</i>											
	<i>Morinda tinctoria</i>											
	<i>Punica granatum</i>											
	<i>Rubia cordifolia</i>											
4.7.5	Leaf dyes	3	3	2	3	3	3	3	3	3	3	3
	<i>Indigofera tinctoria</i>											
	<i>Lawsonia inermis</i>											
4.8	Oils and fats											
4.8.1	Grass Oil	3	3	2	3	3	1	2	2	2	2	1
	<i>Andropogon genera</i>											
	Citronella Oil											
	<i>Cymbopogon genera</i>											
	Ginger-Grass Oil											
	Lemon-Grass Oil											
	Palmarosa Oil											
	Vetiver Oil											
4.8.2	Wood Oil	3	3	1	3	3	3	3	2	3	3	1
	<i>Agar Oil</i>											

Important NWFP in Selected Countries of the Asia–Pacific Region

Very Important:1

Moderately Important:2

Less Important:3

S.No.	NWFP	BGD	CPR	IND	INS	MAL	NEP	PAK	PHI	SRL	THA	VIE
	<i>Deodar Oil</i>											
	Pine Oil											
	Sandalwood Oil											
4.8.3	Leaf Oil	2	2	1	3	3	1	2	2	2	2	1
	Camphor and Camphor-Oil											
	Cinnamon Leaf and Bark Oils											
	<i>Eucalyptus Oil from E.globulus and E.citriodora oil</i>											
	Mint Oil											
	Pine Needle Oil											
	Winter Green Oil											
4.8.4	Root Oils	2	2	2	3	3	2	3	3	2	3	2
	<i>Costus Oil from Saussurea lappa (Kuth)</i>											
	<i>Indian Valerian Oil from Valeriana wallichii</i>											
	<i>Shorea robusta</i>											
4.9	Essential Oils	3	2	2	1	3	1	2	2	2	2	1
5	Animal products other than food											
5.1	Live animals, birds and insects	3	1	3	2	3	3	3	3	3	1	1
5.2	Hides/skins	2	3	1	3	3	2	2	3	3	2	2
5.3	Horns/tusks	3	3	3	3	3	2	2	3	3	2	3
5.4	Bones	3	3	2	3	3	2	2	3	3	2	3
5.5	Feathers	3	2	2	2	3	3	3	3	3	1	2
5.6	Fur	3	1	3	3	3	3	3	3	3	2	2
5.7	Lac	3	1	1	3	3	3	3	3	3	1	1
5.8	Sericulture	3	1	1	2	3	3	1	3	3	1	1
6	Miscellaneous products											
6.1	<i>Bidi Leaves (Diospyros melanoxylon)</i>	–	–	1	–	–	–	–	–	2	–	–

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Social and Legal Considerations

INVOLVING LOCAL PEOPLE IN THE MANAGEMENT AND HARVESTING OF NON-WOOD FOREST PRODUCTS

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INTRODUCTION

In his opening remarks for this consultation, the FAO's Assistant Director-General and Regional Representative, Mr. Obaidullah Khan, presented the hypothesis that the key to successful development of non-wood forest products often lies in the local people who are directly dependent on these resources. Local people, he observed, must exert some control over development programs in areas they occupy and these programs must be responsive to local priorities and concerns. Most importantly, he said, assurances must be made that the local people will in fact benefit from the exploitation of non-wood forest products.

I agree with Mr. Khan's position, and am encouraged by it. Over the past decade, more people have recognized the importance of involving local people in sustainable resource management. Despite this new emphasis, however, local people still possess few, if any, recognized legal rights to forest resources or any other incentives for sustainable management. National governments throughout Asia generally consider people who have resided in forest areas — including indigenous people — to be squatters, regardless of the length of their occupancy.

The problem is rooted in national legal systems established or inspired by colonial regimes that ignored community-based

management systems. According to most current national legal systems, unless people possess documentation from the government, they have no rights to the natural resources in their area. Meanwhile, it is extremely difficult, and in most instances impossible, to acquire the documentation.

Despite their assertions of ownership of forest lands, Asian governments lack the financial and administrative capacity to manage these areas. Rather than officially involve local people in resource management, many Asian governments opt to give commercial concessionaires exclusive rights to exploit forest resources. There are few incentives, however, for managing resources — timber or non-timber — sustainably.

In Pacific Island nations, the situation is the opposite. In Papua New Guinea, for example, local communities own more than 90 percent of that nation's terrestrial resources pursuant to undocumented, private, community-based rights. Anomaly or paradigm, the Pacific region offers valuable insights about local people being key decision-makers and beneficiaries in the management and exploitation of resources.

NWFPS IN OVERALL CONTEXT

It is important to look at all components of the local resource base, including NWFPs, when promoting and implementing strategies for local empowerment. It is wonderful that local people are finally being recognized as having valuable knowledge about medicinal plants and other valuable resources found in forest areas, but to focus on non-timber forest products alone is to miss the point; it is akin to the North's recent interest in biodiversity and intellectual property rights.

Intellectual property rights and NWFPs are just two components of a larger issue concerning natural resource management. The big question is who decides who gets what, when, and how. While it is appropriate to talk about non-wood forest products, we should not delude ourselves into thinking that considering NWFPs alone is going to solve the problem of local resource degradation or provide adequate local-level incentives for sustainable resource use. Rather we need to identify a more integrated approach and talk about community-based resource management in a broader context.

Michael Dove, an anthropologist at the East-West Center in Hawaii recently wrote a provocative article entitled, "A Revisionist View of Tropical Deforestation" (Dove, 1993). In his article, Dove attacks what he calls "the Rainforest Crunch thesis," which refers to the Brazilian experience with extracted reserves. In Brazil, the government allows local communities to extract minor timber or non-timber forest products for commercial purposes — but this is the sole right they are granted. Dove argues that there are two possible scenarios which will result from this approach. In the first scenario, the resource, because it is

valuable, will be over-exploited by the local community and therefore depleted. And, as consumers, we will be destroying the very resource which we are trying to conserve. In the second scenario, if this is truly a profitable venture and people's only right is to the non-timber forest products, some economically-powerful person or group will likely be able to usurp the local rights and control the enterprise.

Dove argues, and I agree, that we need a more holistic approach when dealing with property rights and community-based management. It is not practical to simply give one or two isolated resource-rights to the community. Rather, an approach that addresses all aspects of resource management — rights, responsibilities, and revenues — is needed.

What is needed is an equal bargaining process between governments, local people, and business interests that addresses rights to all natural resources in a specific area. In the Pacific region, it is apparent that even though people hold rights, many do not understand how to exercise those rights. Thus, when we promote a process of bargaining, we need to keep in mind that it is not a fair process when some of the people are not aware of their legal options.

An equal bargaining process involves some preparation, and perhaps the most important preparation for bargaining is fully appraising local people of their options. In trying to help a local community gain rights to resources, a Thai organization proposed to establish a monitorable compact wherein the community would acquire a non-timber forest products permit. In return, the community would promise the government that it will manage the resources sustainably. What kind of bargain is that? The organization that proposed this to the

government had effectively negotiated away four fifths of the community's resource rights before the community was even involved in the process. As international lawyers, before beginning to negotiate on behalf of others, we need to step back and think, what would I want in the situation of a community? What would I think was fair if I lived in a community and we were going to enter into an agreement with the government?

COMMUNITY-BASED FOREST MANAGEMENT: EMERGING RESPONSES

Even though government officials are reluctant to acknowledge the causes and magnitude of deforestation, forest resource degradation is prompting change. Floods, landslides, and other well-publicized natural disasters have heightened both international and domestic awareness of deforestation's toll on the environment and human well-being. In Thailand, for example, flash floods (caused partly by deforestation) have killed thousands of rural Asians in recent years. Thailand's increasingly active media, combined with a growing spirit of democracy, allowed for a relatively uninhibited public expression of outrage after the floods. Threatened with widespread social unrest, the government not only met but exceeded protestors' demands and enacted a ban on commercial logging. As a newly industrialized country surrounded by poor neighbors, Thailand could afford this policy. With healthy industrial and tourist sectors (and largely depleted commercial forest reserves), the Thai government has come to rely less upon timber revenues. In similar situations in other areas, the reality of decreasing productivity and loss of environmental services has fueled the

development of alternative forest management options.

Many Asian countries are trying to deal with the problems caused by deforestation, and some are beginning to address the root causes. In all cases, equity and human rights concerns have come to play increasingly important roles. No longer merely the province of foreign-sponsored, do-gooder environmentalists, the sustainable management of forest resources by local stakeholders is emerging as a matter of justice, enlightened self-interest, and irrefutable need. In varying degrees, public and governmental awareness of the costs of environmental degradation and its relation to equity and human rights is increasing. Consequentially, more are recognizing the need for innovative and participatory approaches to forest management and conservation (See e.g., Wells and Brandon, 1992; Borrini, 1993; Eaton, 1985). An integral component of these approaches must provide forest-dependent communities appropriate incentives to sustainably manage their resources.

RECOGNITION STRATEGY

Over the past five years, the World Resources Institute has been working with local lawyers in Papua New Guinea, the Philippines, Indonesia, Thailand, Nepal, India, and Sri Lanka to challenge prevailing interpretations of national laws that deny recognition of local rights. The alternative legal perspectives that lawyers are developing and promoting, are designed to support efforts to involve local people in decision-making.

In Indonesia and the Philippines, for example, national laws have been reinterpreted to mean that long-term,

original occupation vests ownership rights in local communities and these rights are protected by the constitutions of these nations. According to the reinterpretation, the Indonesian and Philippine governments have constitutional obligations to recognize community-based property rights.

We call this the "recognition strategy" and it is premised on the conviction that legal rights do not only arise from nation-states. Instead, some legal rights emanate from communities whose existence predates establishment of the nation-state where they are located. And in some countries, such as Indonesia and the Philippines, even national laws mandate recognition of these locally created and observed rights.

The politically feasible, short-term strategy for promoting security of tenure in Asia, however, is to work with government programs that grant rights to local people. Such grants authorize local communities or individuals to use, harvest, protect, and in some instances commercially exploit forest resources. This is the case with non-wood forest products.

EQUITABLE BARGAINING

In Asia and the Pacific, both forest-dependent communities and national governments have obvious interests in ensuring that forest resources are sustainably managed. This report aims to promote those interests by encouraging equitable bargaining processes. In an effective and fair process, both parties understand their rights and concomitant duties, and negotiate a mutually acceptable, secure, and balanced agreement.

On the spot and knowledgeable forest communities are uniquely positioned to help

protect forests. As the guardians of national interests and resource patrimonies, national governments and their forest bureaucracies also have a vital role to play. But for too long, forest-dependent peoples and government forest bureaucracies have communicated poorly, if at all. At the foundation of the discussion must lie a common commitment to balance community and national interests. The final decision about what arrangement is most appropriate should be shared by the community (or communities) concerned *and* the appropriate government agency or official. A good agreement will provide for the establishment of locally appropriate incentives that are in all parties' best long-term interests.

COMMUNITY FOREST LEASES

Recognition of private, community-based rights is a preferred means to protect and sustainably develop South and Southeast Asia's endangered forest resources. However, national laws and political realities in Asia usually preclude that option. The only alternative available to many forest-dependent communities is to lease their local resource base or lose it.

Community forest leases are contracts between appropriate government agencies and resource-dependent communities that recognize the negotiated and agreed upon rights and duties of both entities. *Community forest leases are based on the assumption that government owns the resources and the other has no legal right to use them.* Ideally, community forest leases should be simple, straightforward, and reflect local variables.

In Nepal, Thailand, the Philippines, and to a limited extent, in Indonesia, governments

lease rights to forest land to communities. Such programs give forest-dependent people legal and economic incentives to protect remaining natural forests and to regenerate degraded ones by discouraging migration into forest areas and helping stabilize the populations that are already there. In return for legal permission to use forests and government assistance in keeping out interlopers, communities are often asked to cease certain activities.

Before any specific agreements are reached or any community-based rights recognized or granted, however, communities should first identify the areas that they believe belong to them. Three essential steps follow: government officials must understand how the community perceives its needs; the community must understand the nature and potential impact of the initiative proposed; and both parties must determine if prospects for community-based tenurial rights are realistic.

Establishing a community-based forest management project without informed local consent would likely prove foolhardy, therefore governments should carefully gauge local acceptance of, or opposition to, any such initiative — especially from those who depend on the resources targeted. In the face of persistent, widespread opposition, the project should stop *unless* a clear scientific case has been made for going ahead *and* affected communities receive just compensation for losses incurred (On March 10, 1993, the United Nations Commission on Human Rights unanimously passed a resolution that condemned the practice of forced evictions as a "gross violation of human rights" and urged governments to

stop removing people from their homes against their will).

MAPPING

Around the world, forest-dwelling communities are beginning to recognize the power maps can have in efforts to protect their lands from intruders. Recently, non-governmental organizations and local communities have collaborated to create precise maps of the areas inhabited by forest-dwellers so forest-dwelling communities can inform outsiders about their occupancy and sustainable resource management systems, thereby enhancing their rights and claims to ownership. By combining locally generated sketch maps with government base maps and using the Global Positioning System (GPS is a relatively inexpensive tool that uses signals from satellites to accurately determine latitude and longitude at any given point) to check positional accuracy, villagers can create "scientific proof" of their occupancy.

Forest-dependent people can take aggressive, pro-active steps toward protecting their lands from outside incursion by mapping their lands and their use of its resources. Maps can be used to support community-level education, political unity, and facilitate local participation in government conservation programs. Through coming together to map their lands and discuss regional development, local people can gain a comprehensive view of the amount of destruction that is occurring in the entire area, and how it will effect them. Working with neighboring communities helps foster solidarity among

the various groups and thereby makes them politically stronger (Poole, 1995; WWF/Indonesia, 1994).

INFORMATION DISSEMINATION

Stake-holders must understand their rights, duties, and options before any bargaining process can begin to be equal. Even though private community-based property rights are in effect on over 90 percent of Papua New Guinea's land mass, many villagers and other forest-dependent peoples are generally less informed than government officials and therefore exercise their rights, especially their rights to sell timber, in an information vacuum. They do not understand the implications of their decisions or what their alternative development options are. The Natural Resources Options Network, proposed by the 1992 Conservation Needs Assessment, is one promising model for opening meaningful, informed dialogues, although communication between the government and communities has not been perfect (Beehler, 1993).

INFORMED CONSENT

Dissemination of information itself is not enough. Those affected must give informed consent *before* any externally initiated community-based forest management starts. Holding culturally and logistically appropriate public hearings, open to all people dependent on the area — relevant government agencies and officials, and representatives of appropriate non-governmental organizations, is a good step.

Women and other disenfranchised subgroups should not only be heard but

also, if necessary, be accorded separate identities and representation in any decision-making (Fortmann and Rocheleau, 1990). The results of the discussions should be written up and publicly disseminated in a timely fashion. Where illiteracy is high, a summary of the discussion should be orally disseminated. Special attention should be given to any commitments made in response to local concerns.

NOTICE

People living where community-based forest management is under consideration should receive notice *before* any formal initiative begins. *At a minimum*, the notice should:

- briefly describe the project;
- be in the area's *lingua franca*;
- contain a map of the affected area;
- describe the proponent's proposed rights and responsibilities;
- define the local people's current rights and responsibilities and show how they would change if the area were designated for community forestry; and,
- inform people where and when meetings will be held locally.

COMMUNITY AND LEGAL PERSONALITIES

It is more efficient to deal with entire communities than with individuals when working to legitimize local management systems over substantial areas. When negotiating tenurial rights agreements,

however, it is essential to define the "community" or "user group." *Who* defines the community is also key since some communities are ill-defined, overlap with neighboring areas, or combine conflicting factions.

Generally speaking, people should bear primary responsibility for defining their own community or communities, but they are not always able to do so. If there are numerous small communities then, in order to reach a settlement, it may be necessary to consolidate several communities or revert to individual agreements.

Some forest-based communities, such as users' groups or informal organizations, do not have the internal cohesion and capacity to manage, sustainably develop, allocate, and enforce informal customary rights over the entire local resource base. Where they are already protecting remaining areas of natural forest, less comprehensive forest leases would legalize and support their efforts.

Communities that want to take part in commercial extraction enterprises will probably need "legal personalities," particularly if they will receive processed or taxed income. The degree and rigor of requirements for creating and legally recognizing community-based institutions vary, but all cases in which communities are required to register their legal personality with a far-off government agency has serious drawbacks. Sometimes the legal personality, such as non-stock, non-profit corporations in the Philippines, can be unilaterally dissolved when communities fail to comply with procedural requirements, such as filing financial statements or minutes of meetings.

A more informal approach works better. In the Indian state of West Bengal, for example, forest-protection committees register with their local district forest officers before entering into joint forest-management agreements (Roy, 1991). This procedure is an attractive alternative to incorporation — provided that the committees' registration cannot be arbitrarily revoked by forestry officials, as it can in this case.

An even better procedure is to take a census of all community members or ask all adults or heads of households to sign the title or the lease. The completed census or list of signatories could legally define the community and become an integral part of any title or lease. Either list would ensure that if the corporation were dissolved or registration were revoked, the title or lease would not revert back to the government since there would still be two parties — the minimum requirement for a legally binding agreement.

THIRD PARTIES

In some areas, outside parties, particularly non-government organizations, have an important role to play in helping communities negotiate agreements with governments. Third-party intermediaries who are knowledgeable of external interests and processes, and are trusted by members of local communities can be profoundly helpful in negotiating equitable community-based tenurial arrangements. Indeed, since forest-dependent communities often lack the experience necessary to navigate diverse cultural, bureaucratic, and organizational demands and expectations, many community forestry and conservation projects probably owe their very existence

to the invaluable assistance of third-party intermediaries (Western and Wright, 1994).

A troublesome question, however, is whether a third-party intermediary must be involved in negotiating the terms of community-based forest management agreements. Clearly, no blanket requirement for a third-party intermediary is appropriate since their existence and availability cannot be presumed, nor can their loyalty to local communities be assured. Requiring the involvement of third party intermediaries should depend on a number of factors including the particular community's degree of organization and internal cohesion, community and government preferences. When a community requests that a third party intermediary be involved, however, that decision should be respected.

NEGOTIATIONS AND BENEFIT SHARING

Soon after the concerned community and the state reach a preliminary agreement, the negotiations should formally begin. The forest-management agreement might cover—but should not be limited to:

- the conservation area management plans;
- project boundaries (including internal boundaries to be managed or co-managed by various constituencies according to different plans);
- the routes of service roads and construction details;
- employment guarantees;
- hunting, gathering, and farming rights; and

- other provisions for benefit sharing including (as needed) a formula for allocating profits to communities, individuals, or the state.

An array of arrangements are possible and no set formula will succeed in every situation. Each agreement needs to be tailored case-by-case. One recommendation is universal though: once final, all agreements should be summarized in writing, orally explained, and signed by those in agreement or their authorized representatives (Western, 1994).

The division of benefits may require shareholding agreements, representation on the board of directors of the corporation, and allocation of a percentage of profits from annual operations (including the criteria to determine that percentage). Despite an agreed upon revenue sharing formula, the West Bengal community-forest management projects have experienced misunderstandings between local communities and the forest department over how to determine that agreed upon revenue. Forest Protection Committees agreed to receive percent of the net sales of timber grown within the joint management area. Difficulties have arisen over how to determine the net. Other benefits could include the creation of an independently run community trust, or the construction of new facilities such as a school or health clinic to serve the community. The importance of local contributions, whether in-kind or financial, should also be kept in mind.

CONCLUSION

In many Asian and Pacific countries, tropical forests are the single most important natural resource for rural communities. Unfortunately, few national governments in

developing countries recognize forest-dependent peoples' locally-based natural resource rights or their contributions to sustainable forest management. Nor do most countries give local resource users a say in decisions concerning national forest laws and policies. Instead, many adhere to colonially inspired and centralized systems of forest land ownership that are alien to their rural citizens.

National legal systems that benefit political and economic elites marginalize the hundreds of millions of people who depend upon tropical forests for survival. Such systems reinforce the inequitable distribution of the benefits of natural resources. They also undermine local incentives for sustainable development and contribute to the still accelerating rate of tropical deforestation.

There is a growing body of evidence demonstrating that many forest dwellers actually protect biologically rich areas and sustainably manage their local ecosystems. In particular, many forest dwellers have created elaborate systems of community-based property rights over many generations, systems that often spring from years of experience and a deep sense of obligation to the natural world. At the same time, bilateral and multilateral development assistance institutions tend to accept Asian governments' claims that they own and are managing "public" forest land — a dubious assumption since many laws and policies actually promote the over-exploitation of forest resources and fail to address the inefficiencies of many national forestry bureaucracies.

Forest bureaucracies know, of course, that when conflicts arise many forest-dependent communities can resist or bollix governmental forest management schemes. Forest-dependent populations cannot and will not allow themselves to be legislated or developed out of existence. By building partnerships with forest communities, governments can avoid potential unrest and develop an alternative strategy for sustainably managing fast-disappearing forest resources.

The current plight of forest-dependent communities has evolved over a long period of time, as has the well-documented failure of state-managed systems. Now, the deforestation crises that many Asian countries face can be effectively addressed only by fair and balanced government partnerships with local communities. Power and its rewards must be shared with forest-dependent communities, and community and national interests must be balanced to promote the common good.

National and state authorities need not and should not be eliminated from resource management schemes — empowering local communities does not mean disempowering governments. Only by sharing authority can overburdened national forest departments truly help communities sustainably develop and equitably share in the forest patrimony. In turn, by accepting their share of responsibility and cooperating with reasonable state regulations, local communities will be better able to promote the common good, as well as their own.

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PARTICIPATORY MANAGEMENT AND GENDER ISSUES IN NON-WOOD FOREST PRODUCTS DEVELOPMENT

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INTRODUCTION

The impressive growth in agriculture in Asia and the Pacific over the past two decades has outstripped population growth, so that the Region is more food-secure now than it was when the threat of widespread famine regularly stalked the subcontinent in the 1960s. The crux of the food security problem for the 5-600 million undernourished people in the Asia-Pacific Region is not so much a problem of production, but of a lack of access to available food on the part of the poor, who lack the means to buy food. This is mainly because they lack remunerative employment opportunities which provide a livelihood.

Addressing food security problems in this Region often therefore leads from issues of growth to discussion on equity, and from growth with equity inevitably to the political issues of participation and access to the factors of production - land, water, technology, know-how and so on. Non-farm income generation however is rapidly becoming a major source of cash for landless and marginal rural families. More recently, the word sustainability has also been thrown into the dialogue. The missing ingredient in addressing rural poverty through growth, equity and participation however is often gender - a word much bandied about in esoteric circles of support for women, but easily and readily forgotten by most when the way is clear to do so.

Gender equity however is increasingly recognised as an indispensable link in the food security chain, because women now number over half the farmers in Asia and the Pacific, and are increasingly responsible for household food security. In Vietnam women farmers number as many as 70 percent. In Papua New Guinea women grow most of the food crops, and in India women outnumber male farmers by a substantial margin (Shiva, 1991). Yet their production and their productivity is constrained - sometimes severely constrained - by a plethora of factors which have much to do with social, political and cultural issues, and little to do with biology.

Non-wood forest products can offer a lifeline to food security for an increasing number of rural households. Not all farmers can abandon uneconomic farms in favour of better opportunities in other sectors, so those forced to eke out a living on degraded lands and from denuded forests have increasingly focussed their creative sights on other rural resources to augment a meagre farm income, while the landless turn to Common Property Resources (CPR) in forests and elsewhere for the materials and produce with which to make a living. Indeed women have been doing this since time began, using a host of forest products for handicrafts, dyes, waxes, tools, clothing, medicines, food and fodder. Traditional

land tenure and use patterns which accorded rights of access to common property resources such as forests allowed everyone to enjoy their bounty, but these are now increasingly under threat of exclusion by privatisation, conversion, clear felling, replacement with plantations and so on. Competition for land of all types has squeezed out the people most in need of additional resources, at a time when they can least afford to forfeit those rights. As traditional, participatory decision-making and management has been systematically eroded by power-élites, farmers most dependent on traditional access to CPRs - the poorest farmers on marginal farming lands and landless rural families - are asked to surrender their right to supplement income and strengthen household food security. The predictable result is that many then plunge from poverty into destitution, fuelling rural-urban migration, dependency, unemployment, hunger, poverty and a plethora of related phenomena. The few who retain access to forest areas may well prosper through the development of non-wood forest products, but most remain at best in the margins of life. Without relevant training and necessary support to take the leap of transition from subsistence farmer to entrepreneur, many are forced to abandon rural life as "environmental" or "economic" migrants in urban slums.

Exacerbating this situation is the low priority accorded vocational education by most Governments in this Region. At a time when "manpower" planning requirements indicate the need for more, not less skilled technicians, vocational education is declining as a percentage of all education - the reverse of the situation in other Regions. Where they do exist, vocational schools and colleges are generally concentrated in urban areas, and the student population is overwhelmingly

male. Girls who enroll are found mainly in the "warm and cuddly" areas of nursing, home economics, secretarial and information service sectors.

GENDER, EQUITY AND PARTICIPATION

Inequitable access to productive resources, including access to knowledge and information, to technology and financial services, to employment, to education and extension services and to membership of rural organizations, builds poverty traps for vulnerable populations. Unequal distribution of the benefits of development ensures benefits by-pass the poor. The negation of indigenous farming knowledge, the erosion of culture, and the somewhat cavalier attitude to rural people's rights strips them of the dignity which is necessary to keep poor people out of dependency and welfare.

Rural women are among the poorest of the poor, and are progressively becoming poorer as the gender gap widens. Women now represent over 60 percent of poor rural people worldwide, and will number as many as 70 percent by the year 2000 (IFAD, 1993). The sources of this inequity need to be uncovered as a matter of urgency, if the family members of poor rural women are to be protected. Those of us familiar with gender issues can suggest some of the causes which could be addressed in non-wood forest resource development.

First, the limited profile of women farmers in Asia and the Pacific as elsewhere, shows problems stemming from women's lower education, relative assetlessness, a plethora of constraints in access to productive resources, their dual and triple

responsibilities as a result of an inequitable division of family labour, the scarcity of time available in a long working day, their ignorance about many of the scientific and technological solutions to pressing problems, and severe limits in their access to information and services. These are compounded by their lack of community organization, cultural attitudes to women's role, and stereotypes of patriarchy as the "natural order of things" which in fact have nothing to do with capacity or competence.

Women who head rural households are especially vulnerable, not only because of the loss of able-bodied manpower but because many rural women lack the status, confidence and knowledge to make wise decisions and take appropriate actions, even when they are allowed to do so. Most have had little or no exposure to the market or to entrepreneurial activity, and are uncomfortable in the public arena. When they are forced to supplement a meagre farm income with sideline activities, most steer away from those who could help for fear of exposing ignorance or subjecting themselves to ridicule, contempt or hostility. Handicrafts therefore traditionally command very low returns on time and skill investments for reasons which derive more from female servitude and humility than from inherent weaknesses in the product or the market. The few who know the market and have recognised the potential have been able to break into markets which command extremely high prices by ensuring quality control and continuity of supplies, and mounting aggressive marketing strategies.

While such strategies may initially help the "middleman" more than the producer, it is a step towards more organization in the production of non-wood forest products, and thereby a step towards "participation." Women traditionally engaged in home-

based cottage industries in which they may do everything from gathering and processing raw materials to selling a finished product in the local market, are unlikely to realise a fair return on their investment of time and skill. A degree of organization and specialization can greatly enhance productivity. In a situation where culture or domestic responsibilities do not allow a woman to work outside the home, she may have no choice, but studies have shown that productivity increases tremendously when women work undisturbed in a village factory-type work place, since the fragmentation of her time at home and the incessant demands in her domestic responsibilities place severe constraints on her productivity.

PARTICIPATION IN PRACTICE

Participation is a word heard so frequently in recent years that it is in danger of being debased by overuse. However, the concept remains very important for narrowing equity gaps - between rich and poor, between urban and rural people, men and women and between professionals and artisans. The FAO experience suggests both organization and empowerment of rural people are fundamental to rural poverty alleviation, and that the concept of participation needs to be built in to all projects and programmes which are to be economically, socially and politically sustainable.

A participatory project implies broad, inclusive participation, so it may surprise some to know that there are many cases of such projects where a lack of gender consideration and analysis by planners excludes women by that omission. Even formal cooperative organizations which are generally firmly on the side of the poor and

disadvantaged, are notoriously undemocratic about the role of women among members. While not overtly excluding women from membership they do little to facilitate their participation, and women are practically absent on boards of cooperative management or decision-making bodies.

Project plans and policies which are not explicit about women automatically exclude them, because most people think of farmers, foresters or fisherfolk as men. Resources are therefore directed to men, training and support are given to men, and men of course enjoy the benefits, even if women are later co-opted as "partners" to share the work!

Furthermore, the database on women is usually derived from data provided by men to male enumerators, neither of whom are familiar with the details of women's work, and whose perceptions are based on commonly held stereotypes of women as dependents of men, people who "don't work." This is especially true in areas such as forestry and forest industries which are overwhelmingly male-dominated at the professional and technical levels. Recent collaboration with forestry departments working on Forestry Master Plans in Asia, confirms that gender analysis in development planning in this sector is "donor driven," and will remain so until concerned officials are convinced by the arguments, internalise principles of gender equity, and acquire the tools to apply these in their daily work.

There is no one formula for achieving gender equity. In each country the socio-cultural context will dictate the limits to breaking boundaries around gender roles, and point the direction of appropriate paths to equity. The important underlying principle however is not one of justice as

much as that of mobilizing human resources for efficient and effective development. Many studies show that boosting female incomes benefits all family members considerably more than similar increases in male incomes. To constrain the productivity of one sex therefore, to the point where their work day has lengthened to intolerable levels, where the gap between male and female incomes continues to widen and where girl children and women die because they were not born male, is clearly bad for everyone. In several parts of south Asia, population data shows female numbers declining to as low a proportion as 92 females for every 100 males. In a society where there is more gender equality, the figures usually show females outnumbering males by around 104 or 105 to 100. Economist Amartya Sen of Harvard University estimates 100 million women are "missing" from demographic data in Asia because of systematic, institutionalised gender discrimination.

FAO APPROACHES

Under a 1990 Plan of Action for the Integration of Women in Agriculture and Rural Development, FAO is taking a number of steps to address issues and problems faced by rural women. One of these is education in the context of sustainable agriculture and land use planning. At a Round Table on Women, Population and Environment held in FAO's Regional Office in Bangkok in May, 1994, linkages were clearly established between women, their education or lack of it, population variables, and the environment.

Education is only one component in strategies for poverty alleviation, but the general education of women and girls has

been found by the World Bank and others to yield some of the highest returns on investment. Rural girls and women however lag far behind boys and men in education, and in their access to information and extension services. The reorientation of home economics and agriculture curricula in relevant colleges and universities is now receiving priority attention, with a number of consultations having been held in the Region, and guidelines already prepared. That is in the formal sector. In order to reach rural women directly however, FAO is also encouraging improved agricultural extension and information services directly to women farmers. In Asia and the Pacific less than 4 percent of agricultural extension workers are female, yet women farmers outnumber men in many countries. In some countries there are virtually no women officials or functionaries in agriculture, in forestry or in fisheries extension. It is often in these same countries however, that it is most unacceptable for a male to approach a woman with extension advice, even as women are assuming increasing responsibility for agriculture.

The plight of women farmers is exacerbated by the legal, social and physical constraints on their access to various factors of farm and home production. These include property ownership, rights of access to financial services, membership and management of rural organizations, participation in development planning, access to scientific and technological information and control over water supplies to name but a few. In these areas FAO has documented many of the problems in order to draw the attention of member governments to gender biases which limit overall economic growth in rural areas. A 1993 Regional Expert Consultation on

Gender Issues in Agricultural and Rural Development Policy cited economic, social, political, environmental and moral imperatives for policy initiatives to increase women's efficiency and effective participation. A number of countries provide dramatic illustration of women's increased productivity on farms and in rural development, when policy changes have lifted barriers and increased their access to productive resources.

Action however is limited by the dearth of accurate data on rural women which hampers the design of remedies to women's work constraints. For the first time in 1990, agricultural census data which is collected every 10 years by FAO, was widely disaggregated by sex as well as including certain specific information on women. This provided many previously obscured insights into the situation of rural women, but serious gaps are found in databases and many statistics are found to be flawed by wrong definitions and concepts when it is time to justify policy and planning initiatives. Over the past several years attempts have been made in four Asian countries to test new tools and methods for measuring women's work in agriculture and rural development, in order to provide more accurate data for policy makers and planners, because there are problems in using data which may have been collected using standard classifications, or when enumerators are not trained to probe for accurate information.

Results of pilot surveys using non-participant observation techniques to assess time use by men and women point to three major gender differences:

- the fragmentation of women's time.

- their longer working day and very limited leisure or personal time.
- their overwhelming responsibility for unpaid domestic and farm work including "cottage industry," in a skewed division of household labour.

These figures point to the need for innovations including technology to address some of the more menial, labour-intensive tasks assigned to women, as well as to effect a fairer division of labour in the home. Women lack economic access even to proven simple, and often cheaply available technologies. Financial and information services to women are insufficient to make these technologies accessible. Women need direct access to relevant information in order to make informed choices, as well as a whole range of financial services which make credit for women a productive investment component, and not a liability or yet another burden of self-sacrifice to meet repayment obligations. They also need training to fill gaps which would help them maintain technological hardware, manage farm, household and other economic activities, and ensure the adoption of sustainable production practices.

A necessary complement to these of course, is financial management training - from book-keeping and accounting to the whole range of professional and managerial training. Perceived or real lack of management skill is a major barrier to women's access to credit, as well as a glass ceiling on their capacity to leap from cottage industry to medium-scale local operations, and on into larger, corporate institutions. If the scale of poverty among rural women is to be reduced and eventually eliminated, their capacity to add value to their time and to their primary products must be constrained neither by legal and

social barriers, nor by their own human capacity for management. Dismantling barriers around access to all the factors of production is therefore essential.

To this end, the role of women in the FAO Plan of Action for People's Participation is relevant. Programmes for Sustainable Agriculture and Rural Development (SARD) have been reviewed with intent to enlist rural women as partners in decision-making and management right from the start i.e. at the identification and formulation stage, in data collection and analysis, and in all mainstream activities.

If rural women are to play an equal role, they must acquire a knowledge base equal to that of rural men. Their "indigenous knowledge" and wisdom must not be lost, but it must be complemented and enriched by relevant scientific and technical information. Their much higher rate of illiteracy and lower economic and social status are major constraints to their acquiring this new knowledge, but women are becoming increasingly assertive in demanding access to new knowledge and skills. The education of women on land tenure systems and their rights to land, water and common property resources for example, are issues which emerge with the dismantling of the various social, economic and political barriers placed around educational and service institutions such as agricultural cooperatives. Women's participation in study tours, training and meetings, decision-making processes, the monitoring and evaluation of progress and in the distribution of benefits also elicit great interest from, and return great benefits to rural women and to their entire families.

Case studies have been published to share successful initiatives for the empowerment and mainstreaming of rural women by such

actions, and these have contributed to relevant policy changes by some member governments. Of particular note in these success stories is the enabling environment which policy and planning initiatives at the national level have given to rural women's empowerment when these are translated into programmes at sub-national levels.

Another action which appears to have had a positive impact was the gender awareness and analysis training carried out among FAO professional staff, to equip them with the skills and commitment to respond more positively to women's concerns, and to integrate these in all FAO-supported programmes. FAO has further provided technical support to many Governments to do the same. Such training when backed up by policies which seek to redress gender injustice can effect profound changes which benefit poor women. The impetus given to these actions was set out in the mandate known as the Forward-looking Strategies, the report of the Third World Conference to Review and Appraise Achievements of the United Nations Decade for Women 1976-85, but this has inevitably been diluted in recent years. The fillip given by

preparations for the Fourth World Conference on Women to be held in Beijing next year has allowed national priorities and issues to be brought up and analyzed anew both in the countries, as well as at the Regional and International levels.

Under FAO restructuring, the Women in Agriculture Service has been relocated in a new Department for Sustainable Agriculture. This may be a recognition that gender considerations and women's participation are essential components of sustainability. Time will tell whether it leads to more relevant actions for rural women, but in the end it is people, men and women at the grassroots who can work to close the growing gender gap by ensuring more participation by women in mainstream activities. A facilitating legislative and policy environment of course is necessary to optimise their potential, but the single biggest obstacle to women's participation at all levels today remains a problem of attitudes, stereotypes and limited vision of women's potential. That has nothing to do with sex, but everything to do with gender, and fortunately gender roles can be changed — by you, as much as by me.

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Women and children play important roles in collecting, processing, and marketing NWFPs.

RATTAN: A SOURCE OF EMPLOYMENT FOR UPLAND COMMUNITIES OF NORTHEASTERN LUZON

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INTRODUCTION

The area

Northeastern Luzon, which embraces Region 2 of the Philippines archipelago, has a total land area of about 2,683,658 hectares. Commonly called the Cagayan Valley, this region is a north-south oriented sedimentary basin bounded on the western flank by the Cordillera mountain ranges and the eastern and southern flanks by the Sierra Madre and Caraballo mountain ranges. The Cagayan River, which is the principal drainage system for the valley, flows into the South China Sea.

The mountains are generally covered with *dipterocarp* forests which include numerous non-timber forest products such as rattan, "nito bamban" and many others. All are a source of livelihood for the upland communities living nearby.

In 1990, according to the Regional Statistics Office, about 1.8 million people inhabited the region. The highest proportion of the population are Ilocanos and Ibanags. Smaller groups, known as Indigenous Cultural Communities (Agtas, Ilongot, Dumagats), also inhabit the forest areas.

Rattan is plentiful and one of the major sources of livelihood for communities living in the forest. It is also a premium material for the furniture industry, which at present is

short of wood. The logging ban in the region has awakened the industry's keen interest in rattan which can be manufactured into elegant, world-class furniture and handicrafts.

Opportunities for the rattan industry

Along with providing a direct source of employment for rural communities, rattan plays an important role in the ecosystem, as well as in the national economy.

Rattan is one of the most essential non-wood forest products in the country. This is due to its remarkable beauty, low cost, versatility, malleability and renewability. These qualities make it almost impossible for wood, metal, plastic or any other material to challenge rattan's premier position in the furniture industry.

According to a study by the Appropriate Technology Association, there are 259 companies now involved in rattan furniture and handicraft manufacturing. Although these companies are established in urban centres such as Metro-Manila, Cebu and Angeles City, most of their raw materials are supplied by rural rattan gatherers.

The rattan industry is composed of small-and-medium scale factories. The medium-scale factories, each of which employ 400 to

1,000 workers, provide the most employment. The small-scale factories each employ between 20 and 250 workers.

The country takes pride in its valuable rattan resource, but due to growing demand, both locally and internationally, rattan has been over exploited and supplies are now at a critically low level.

This depletion has been caused by indiscriminate collection by local gatherers who are pushed by the furniture industry to supply raw materials, and aggravated by continuous logging, slash-and-burn farming and forest fires.

THE RATTAN INDUSTRY

Rattan supply and demand

The sustainability of the rattan industry depends largely on the availability of raw

materials. According to the RP-German Forest Resource Inventory (FRI) cited by Wakker (1991), the total estimated rattan stock, as of 1987, is shown in table 1.

Using DENR's ratio of 1.3 linear meters of rattan required for \$US 1.00 of exported furniture, industry requirements for rattan poles were estimated to be 153.71 million linear meters in 1991. Based on an average 10 percent growth per year, demand is projected to increase to 1.4 billion linear meters by the year 2015 (table 2).

It is estimated that if no rattan plantations are developed, the demand for rattan will exceed supplies by 1.2 billion linear meters by 2015 (table 3).

At the regional level, the demand of local producers in 1994 was 8,703,552 linear meters and is projected to increase at an annual average rate of 10 percent (Department of Trade and Industry, 1994).

**Table 1. Standing rattan stock in old growth and residual forests
(all commercial species)**

	Philippines		Region 2		Production area in Region 2	
	million linear meters	percent	million linear meters	percent	million linear meters	percent
Old growth	1,707	37.3	864	59.3	226	42.8
Residual forests	2866	62.7	592	40.6	302	57.2
Total	4,573	100.0	1,456	100.0	528	100.0

Source : Modified from FRI, 1987; Serna, 1990 as cited by Wakker

Table 2. Estimates of rattan pole requirements based on projected value of exports (1991-2015)

Year	1991	1992	1993	1994	1995	2000	2005	2010	2015
Value of exports (US\$1,000,000)	118.24	121.31	133.44	146.79	161.46	260.04	418.80	674.4	1,086.25
Rattan requirements (million linear meters)	153.71	157.70	173.47	190.82	209.90	338.05	544.44	876.81	1,412.13

Assumptions :

Projections of the further demands for rattan poles are based on industry estimates of a 10 percent annual growth rate in exports of rattan furniture. Rattan pole requirements are estimated on the basis of 1.3 linear meters for every US\$ 1.00 of sales.

Year	Demand		Supply		Gap	
	Small Diameter	Large Diameter	Small Diameter	Large Diameter	Small Diameter	Large Diameter
1993	104.08	69.49	110.9	65.5	+ 6.82	- 3.89
1994	114.45	76.33	110.9	65.5	- 3.59	- 10.83
1995	125.94	83.96	110.9	65.5	- 15.04	- 18.46
1996	138.53	92.36	110.9	65.5	- 27.63	- 26.86
1997	152.39	101.61	110.9	65.5	- 41.49	- 36.11
1998	167.62	111.75	110.9	65.5	- 56.72	- 46.25
1999	184.39	122.53	110.9	65.5	- 73.49	- 57.43
2000	202.83	135.22	110.9	65.5	- 91.93	- 69.72
2005	326.66	217.77	110.9	65.5	- 215.76	- 152.27
2010	526.09	350.73	110.9	65.5	- 415.19	- 285.23
2015	847.27	564.85	110.9	65.5	- 736.37	- 499.35

Source: Product Profile Series Bureau of Export Trade and Promotion 1992

Estimates indicate that, up to the year 2001, supplies of natural rattan in Region 2 will exceed demand. Starting in 2002, however, supplies from natural sources will no longer be sufficient (table 4).

Year	Demand	Supply
1994	8,703,552	17,168,181
1995	9,573,907	17,168,181
1996	10,531,298	17,168,181
1997	11,584,428	17,168,181
1998	12,742,870	17,168,181
1999	14,017,158	17,168,181
2000	15,418,873	17,168,181
2001	16,960,761	17,168,181
2002	18,656,837	17,168,181
2003	20,522,520	17,168,181
2004	22,574,772	17,168,181
2005	24,832,250	17,168,181
2010	39,992,586	17,168,181
2015	64,408,460	17,168,181

Harvesting, trade and utilization

People involved in the rattan industry are classified as gatherers, traders, processors and manufacturers.

Gatherers

About 1,000 to 2,500 people collect rattan in Region 2. Practically all these gatherers live in upland villages. These include tribal people like the Dumagats, the Agtas, the Ilongots and other groups. The rattan is gathered for either subsistence needs or trade (barter and cash). Rattan poles or splits are bartered for goods such as rice, liquors and spices.

For most uplanders, rattan gathering is a part-time activity. Their investments are physical effort and time spent gathering (3 to 7 days to collect 200 to 280 poles). Payment is generally very low, ranging from between P 200 and P 450 (US\$7.70 to

US\$ 17.30) per month for part-time gatherers, and from between P 650 and P 1,470 (US\$ 25.00 to US\$ 56.50) for full-time gatherers.

Traders

Traders in Region 2 number from 50 to 250. These are either village-buyers, head cutters, licensees or middlemen.

The village-buyers or head cutters usually live within or near gatherers' villages. They are intermediaries between the cutters and buyers. Some even join the gatherers and act as team leaders, while others simply arrange for gathering and selling the harvest. They receive between 5 centavos and one peso per pole. Their monthly incomes from the rattan trade range from P 330 to P 1,650 (US\$ 12.70 to US\$ 63.50).

Licensees are given permits for rattan-gathering on a specific block of land. They tend to live in larger towns and have representatives taking care of operations and trade.

Another group of traders are the middlemen. Some middlemen buy rattan from gatherers to ship to major centers like Manila and neighboring towns. Others are based in Metro Manila and buy newly-transported rattan from the region for resale to manufacturers.

Processors/manufacturers

The breakdown of rattan poles into wicker and splits is either done manually or by machine. Traders and manufacturers pay workers P 0.15 to P 0.25 (less than US\$ 0.01) for each pole. The price per bundle of split rattan is P 0.15 (\$US 0.01) per 50 pieces of malaccas (malaccas are produced by splitting off the skin from the rattan

poles with a hand-operated tool). Wakker (1991) estimated the number of processors involved in the manual processing of rattan to be between 100 and 350 people, but indicated estimates of processors and their incomes were very difficult to obtain.

Manufacturers' finished products include rattan furniture, baskets, gift items and housewares. The rattan furniture sector accounted for about 70 percent of annual Philippine furniture exports between 1986 and 1991 (Department of Trade and Industry, 1994). Rattan furniture production in Region 2 earned P 77.4 million (\$US 3.0 million) in 1989, decreasing to P 64.0 million in 1990.

Problems

1. **Limited Raw Material:** The present volume of available raw material from natural stands will only last to the year 2001, as shown in table 4. With increasing demand, the demand/supply gap will continue to widen.
2. **Labor Problems:** Most of the rattan gatherers are poor rural people, especially those from the uplands who live near or adjacent to the forests. These gatherers, who include tribal people, experience considerable hardship in climbing the mountains and carrying down their harvest, and are paid very little compared to the middleman and permittees. On the other hand, furniture companies are facing problems with increasing labour costs. Labour has become so expensive that it accounts for as much as 30 percent of the value of finished rattan products (Department of Trade and Industry, 1994).
3. **Competition:** The Department of Trade and Industry anticipates that Indonesia

poses a serious threat to the Philippine rattan export industry. Indonesian rattan furniture exports registered a remarkable annual growth rate of 61 percent in recent years.

Prospects

The export value of Philippine rattan furniture is projected to grow from US\$ 121.31 million in 1992 to US\$ 212.14 million in 1996; an average annual growth rate of 15 percent.

In order to attain this growth, and to sustain the rattan industry, the following measures should be adopted:

1. Strict implementation of regulations aimed at ensuring the sustainability of, and access to, rattan resources.
2. Establishment and development of rattan plantations.
3. Use of rattan products in combination with other materials like wood or metal.
4. Organization of rattan gatherers to ensure the proper protection and management of rattan resources. In return, they should be given priority rights and privileges to extract and utilize the resource.

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Rattan collection and processing employs thousands of rural people, including many tribal forest dwellers.

TRADITIONAL USE OF NON-WOOD FOREST PRODUCTS IN AYURVEDIC MEDICINE IN SRI LANKA

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Sri Lanka's forests cover about 20 percent of its land area. The Forest Department has planted small areas with jackfruit trees in Kurunegala District, teak trees in Anuradhapura District and pine trees in Nuwara Eliya District. The rest of the forest cover is natural jungle with a thick undergrowth, and a large primary rain forest called "Sinha Raja." These natural forests are veritable storehouses of Ayurvedic medicines.

Sri Lanka has a recorded history of 2,589 years, chronicled in the Mahawamsa and the Culavamsa. During the country's long history, there were many instances where traditional medicines were highlighted. The Mahawamsa mentions that King Dutugemunu built hospitals for the clergy and for pregnant women as early as 173 B.C. King Buddhadasa (388 to 416 A.D.) was a great surgeon and physician himself, who was well-versed in medicine and veterinary science. In 1153, King Parakramabahu I built a hospital with hundreds of rooms. Both male and female nurses served the sick day and night. The King visited the hospital once a week and distributed clothes to discharged patients. Anuradhapura and Pollonnaruwa, the ancient capitals of Sri Lanka, have many ruins of hospitals and teaching institutes, where traditional medicine was taught and practised.

The medical system practised in Sri Lanka is called "Ayurveda." The word Ayurveda is derived from Sanskrit ("Ayu" means life, and "Veda" means science). This science was developed in India and spread to almost all the Asian and south Asian countries like Sri Lanka, Bangladesh, Burma, Bhutan, Tibet, Sikkim etc. In Sri Lanka, it intermingled with the indigenous siddha medicine of South India which was in use in northern Sri Lanka, the Unani or Greko-Arabic system, and some aspects of acupuncture from China. At present, Ayurveda serves a large proportion of Sri Lanka's people, providing them with religious, cultural and social values. Just as modern medicine is based on chemistry, physics, biology and mathematics, Ayurveda is built on Indian philosophy and pragmatism. This philosophical background has a great bearing on the beliefs of the people. There is one Ayurvedic physician practicing today for every 3000 people.

Until the introduction of modern medicine by the British in the 19th century, the health of the nation was looked after by traditional physicians. In the beginning of the 20th century, there was a big demand by the intelligentsia of Sri Lanka for the traditional system of medicine in the Health Care Service. The British could not resist this uproar and as a result, a government-run College of Indigenous Medicine was established in 1929. In addition, two private institutions were also set up. Up to this

time, medical knowledge had been passed on from father to son.

There are many factors which contribute to the popularity of traditional medicine in Sri Lanka. Some of these are:

- The expressions of the common people and their symptoms are easily understood by the native physicians.
- There is a very close consonance between the beliefs of the physician and the patient.
- Both the physician and the system of medicine suit the cultural and spiritual values of the people.
- The traditional system adopts a holistic approach to the patient and the disease.
- Treatment is based on the regulation of diet, exercise, behavioral patterns and medicine.
- The drugs used are more of a herbal nature and can be obtained from the environment.
- There is a general belief that traditional medicine has minimal or no side effects at all.
- Traditional medicine acts wholesomely by strengthening the system, especially the immune system.
- There are specialists who treat fractures and dislocations, mental disorders and eye diseases.
- Many people prefer traditional medicine because of its cost effectiveness for chronic conditions like arthritis, diabetes

mellitus, chronic bowel diseases, lung disorders and skin diseases.

- In the village areas, the patient and his or her family are personally known to the physician and hence there is a close bond of understanding.
- Of the 17.5 million people who live in Sri Lanka, 72 percent live in rural areas.

Taking the above factors into consideration, all post-independence governments took an interest in promoting the traditional system of medicine in Sri Lanka. In 1956, a separate government department under the Health Ministry was established to strengthen and promote Ayurveda. Today, the government has accepted the traditional system of medicine to be parallel with modern medicine. In 1977, the government upgraded the Government College of Ayurveda, by affiliating it with the University of Colombo. The existing traditional physicians were registered by a team of physicians who evaluated the knowledge and practical experience of the traditional healers.

There are now 47 government hospitals in different districts and 307 central dispensaries which provide Ayurvedic treatment free of charge. The Bandaranaike Memorial Ayurvedic Research Institute was established in 1962 and declared open by the Prime Minister of India, Sri Jawahar Lal Nehru. An Ayurvedic Drug Cooperative was formed in 1965 to provide medicines for government hospitals and dispensaries. The annual budget for the drugs used in these hospitals and central dispensaries is approximately US\$ 2 million. Apart from the Government Health Care system, there is a large community of about 10,000 physicians who practice in the villages as private practitioners after obtaining a licence

from the government, or a degree from the university.

It is the normal custom of the traditional physicians to prepare their own medicines. However, due to requirements of space, labour and technical know-how, many physicians of the younger generation prefer to buy prepared medicines from the manufacturers. Hence, a new industry has developed to produce local pharmaceutical herbal products. These manufacturing units or small companies have to be registered under the Department of Ayurveda, and there are provisions for the quality of drugs with G.M.P. (good manufacture practices) etc. There are about 75 of these manufacturing units in the country.

The raw material for the manufacture of Ayurvedic drugs is obtained from natural sources. There is no systematic large-scale cultivation of medicinal plants as yet. Many persons are involved in the collection, processing and storage of raw materials. The cultivation, collection and processing of Ayurvedic herbs have great potential for creating new job opportunities. As there is a great demand for traditional medicine, the Department of Ayurveda and the Research Institute have started to popularise the cultivation of medicinal plants. Four herbal nurseries have been established in three different zones of Sri Lanka. Ten species which are currently imported from India in large quantities, but could be grown in Sri Lanka, were selected and studied in great depth and are now under cultivation. These species are:

1. *Acorus calamus*
2. *Woodfordia fruticosa*
3. *Plumbago indica*

4. *Cassia angustifolia*
5. *Withania somnifera*
6. *Abelmoschus muscatus*
7. *Justicia adhatoda*
8. *Rubia cordifolia*
9. *Piper longum*
10. *Vetiver zizanioidus*

Apart from these 10 species, there are about 150 herbs commonly used by traditional physicians. About 2,700 plants are mentioned in Ayurvedic books. Cultivation of these herbs is also encouraged. Extension officers involved in cultivation are utilised to educate villagers in the growing and harvesting of these plant species. These extension officers are given training by state agencies in all aspects of cultivation and processing of Ayurvedic herbs

The common medicinal preparations used in traditional practice are herbal teas, powders, pills, oils, herbal wines, decoctions and pastes. A large proportion of herbs are imported from India, Nepal, Bangladesh and Pakistan at a cost of over 20 million U.S. dollars. Some of these raw materials have to be imported as they grow only in the Himalayan region. There are many non-wood forest products which are being collected from the jungle. These include neem (*Azadirachta indica*), *Cassia fistula*, *Adhatoda vasica*, *Maduca indica*, *Messua ferra*, *Santalum album*, *Tinospora condifolia*, *Vitex negundo*, etc.

The ancient kings grew large herbal gardens, some of which still survive. There are large gardens of the three myrobalans, (i.e., *Terminalia chebula*, *Terminalia*

belerica, and *Phyllanthus emblica*). Their fruits are extensively used in Ayurvedic medicine and there are jungles of these trees which cover thousands of acres. The villagers go to the jungles and collect the fruits when they are in season. In the case of *Phyllanthus emblica*, the fruits should be processed and dried before use. This involves labour and knowledge of processing.

Traditionally, knowledge was transferred by word of mouth through compositions of easily remembered verses. The ancients documented this medical poetry on processed palmyrah leaves called "Ola" manuscripts. These ancient books were restricted to certain families. They are now being collected, transcribed and protected by the Department of Ayurveda. UNDP/WHO support has been received for this venture and 100 books have been published. There are many more Ola books to be read and published, and still more Ola manuscripts to be unearthed from old temples and ancient houses. This massive task will take years.

The Bandaranaike Memorial Ayurvedic Research Institute (BMARI) conducts research in three major fields, (i.e., clinical, literary and drug research), and the following diseases have been selected for clinical research with traditional medicine: Rheumatoid arthritis, diabetes mellitus, bronchial asthma, leucoderma, psoriasis, hydrocephales, obstinate and chronic headaches, epilepsy, urolithiasia, fistula in ano, malaria, haemorrhoids, eczemas and drug addiction. From this research, very promising results have been obtained in rheumatoid arthritis, haemorrhoids, and fistula in ano. WHO assistance was available for research on rheumatoid arthritis, diabetes, urolithiasia and epilepsy.

In the literary research section of BMARI, the transcription of Ola manuscripts and translation of ancient Sanskrit books is being undertaken. Leaflets and pamphlets on common ailments, their prevention, and suitable diets are being published. A pharmacopoeia of Ayurveda with selected prescriptions and formulae of indigenous medicaments has been published. A materia medica of about 400 medicinal species which are included in the pharmacopoeia has been published in a series of volumes. National seminars are being conducted regularly to educate the public and school children about the value of traditional medicinal plants and their uses. The mass media is also used for this publicity campaign.

Drug research highlights cultivation, processing and storage. Another important aspect is the quality control of traditional medicine. Strict quality control was not needed in the early days because the physicians themselves were manufacturing their own drugs. The necessity for quality control arose as private enterprise started manufacturing drugs on a large scale. Developing specific standards for each and every drug is a tedious task because many traditional drugs are compound preparations which sometimes include hundreds of herbs. Different methods are being followed to ensure quality by controlling processing methods. However, there is long way to go in this field. Quality control of any product involves extreme vigilance. With regard to the systematic cultivation of plants, zonal nurseries are maintained at Nawinna (wet zone), Haldummulla (intermediate zone), Girandurukotte (dry zone) and Pattipola (wet zone over 3000 feet.).

Jeevaka, the Indian physician who treated Lord Buddha, could not find a single plant in the jungle that could not be used in an

Ayurvedic medicine. In Sri Lankan villages, the people know a large number of the common medicinal herbs used in snake bites, fractures, etc. Sheer necessity was the motivation for the acquisition of this knowledge. Therefore, when the need arose, in addition to picking up a few herbs from the garden, they visited the jungle to obtain the required herbs. All of the Sri Lankan jungles are storehouses of Ayurvedic herbal medicines. The exploitation of wood in a jungle must be undertaken with the written approval of the government, but non-wood forest products are obtained by villagers as a matter of traditional right, at any time. The cultivation, collection and processing of NWFPs can provide opportunities of employment, especially because herbal products that can be grown locally are still being imported. With the increasing use of herbal products, even in the West, the demand for Ayurvedic herbal products will increase; therefore, the cultivation, collection and processing of Ayurvedic herbs will have to be organised and undertaken on large scale.

Apart from their medicinal value, many forest products have food value as well. Sri Lanka has an extensive system of "home gardens." Different species are cultivated in home gardens to achieve different objectives. From a home garden or a forest, the villagers gather firewood, leaves, fruits, and medicinal plants. They also enjoy watching birds, and listening to their music. There are important food items which the villagers prepare with plants and leaves as part of the rituals of daily life. These include the taking of herbal gruel in the morning and herbal tea between meals. This traditional habit is said to have ensured the health of Sri Lanka's people in ancient times. At present, a campaign has been started by western-qualified doctors to encourage people to resurrect the ancient practise of having a cup of herbal gruel each day. Many restaurants in Colombo have begun providing herbal gruel for sale on a regular basis. It augurs well for the future health of our people, when even western-qualified doctors see the wisdom in Ayurvedic practices.

Annex 1

Plants used for the preparation of herbal tea	
Sinhala name	Botanical name
Polpala	<i>Aerva lanata</i> (L) ex Schult
Neeramulliya	<i>Asteracantha longifolia</i> (L) Nees
Maduruthala	<i>Ocimum sanctum</i> L.
Gotukola	<i>Centella asiatica</i> (L) Urban <i>Hydrocotyle javanica</i> Thunb
Eramusu	<i>Hemitesmus indicus</i> Br
Beli	<i>Aegle marmelos</i> (L) Correa
Ranawara	<i>Cassia auriculata</i> L.
Adhathoda	<i>Justisia adhatoda</i> L. Syn. <i>Adhatoda vasica</i> L.

Annex 2

Plants used in making herbal gruel (the same leaves are also used in salads and curries)	
Sinhala name	Botanical name
Rasakinda	<i>Tinospora cordifolia</i> (Willd) Miers ex.Hook F & Tho
Mathawariya	<i>Asparagus gonoclados</i> Baker
Wel Penela	<i>Cardiospermum halicacabum</i> L.
Elabatu	<i>Solanum melongena</i> L. Syn
Batu	<i>Solanum xanthocarpum</i> Schrad
Wel Tibbotu	<i>Solanum trilobatum</i> L.
Monarakudumbiya	<i>Vernonia cinerea</i> (L) Less
Pitawakka	<i>Phylanthus debilis</i> Klein ex Willd <i>Phyllanthus urinaria</i> L.
Mussanda	<i>Mussaenda frondosa</i> L.
Polpala	<i>Aerva lanata</i> (L) Juss ex. Schult
Gotukola	<i>Centella asiatica</i> (L) Urban
Mukunuwenna	<i>Alternanthera sessilis</i> (L) DC
Koora Thampala	<i>Amaranthus viridia</i> L.
Thampala	<i>Amaranthus tricolor</i> L. <i>Amaranthus hybridus</i> L.
Nivithi	<i>Basella alba</i> L.
Akkapana	<i>Kalanchoe laciniata</i> DC
Karapincha	<i>Murraya koenigii</i> (L) spreng
Sudu Handun	<i>Santalum album</i> L.
Sarana	<i>Trianthema monogyna</i> L.
Kan Kun	<i>Ipomoea aquatica</i> Forsk
Kuringgan	<i>Gymnema lactiferum</i> (L) R. Br. ex Schult
Katuru Murunga	<i>Sesbania grandiflora</i> (L) Poir
Murunga	<i>Moringa olerifera</i> Lam

ECOTOURISM : THE FIJIAN EXPERIENCE

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Environmental tourism is grounded in the concept of the sustainable use of natural resources, as fostered by the World Conservation Strategy and the sustainable development strategy of the World Commission on Environment and Development. Ecotourism evolved in the last two decades from the interaction of environment and tourism interests. Ecotourism should be based upon a relatively undisturbed natural environment, be non-degrading and non-damaging, be subject to adequate management and contribute directly to the continued protection and management of the protected area used.

Ecotourism models around the world differ in their biases. Fiji tends to follow a model that incorporates local community involvement as a bias, given that members of the local communities are usually landowners. The Government of Fiji recognises that ecotourism has the potential not only to provide quality employment, income, and business opportunities for local people, but also to act as a catalyst for the preservation of the natural environment and indigenous culture.

BACKGROUND

Geography and population

Fiji is an archipelago of 300 islands scattered over 1.3 million square kilometers of the South Pacific Ocean. The

mountainous islands, where 75 percent of the population resides, comprise 87 percent of total land area of 18,330 square kilometers.

Fiji's estimated 1992 population of 750,000, at a density of 39 people per square kilometer conceals densities in excess of 170 people per square kilometer on arable land. About 60 percent of the population lives in rural areas, but migration to urban areas is significant and increasing.

Biodiversity

Fiji's natural heritage has been described in three words: rich, unique and ancient. It is abundantly rich in species. With 1,750 native vascular plants, the islands of Fiji carry a much richer biological cargo than other nearby groups such as Tonga, Samoa, Vanuatu, or the Cook Islands. Fiji also has 57 indigenous bird species, 23 percent of which are endemic. Fiji's forests cover approximately 1,067,310 hectares (both natural and plantation), on 58 percent of the total land mass. Almost all forests are on communally-owned native land.

Fiji's vegetation and wildlife are of exceptional scientific and genetic interest due to the high proportion of endemic species. The floristic diversity of the forest is estimated to be in excess of 300 species per square mile. Fiji's biodiversity is threatened due to a shift from a subsistence to a cash economy and increasing population. Deforestation caused by cash-crop development, urbanisation and small

holder farming is currently occurring at about 1 percent per annum.

The threat to Fiji's biodiversity is serious but not yet irreparable. As development accelerates, however, damage may soon be irreparable unless sustainable development is established at grass roots and decision-making levels.

The land tenure system

Central to land conservation in Fiji today is the country's land tenure system. Some 83 percent of the land is native land held under customary communal tenure by land-owning groups (*mataqali*) of ethnic Fijians. The administration and control of these lands is the responsibility of the Native Land Trust Board (NLTB). Native or Fijian-owned lands are classified as either "native lease" or "reserve" lands. The reserve lands are set aside for the sustenance and well-being of indigenous owners. No non-Fijian may utilise these lands unless such lands have been de-reserved through the consent of both the landowners and the NLTBs. Leased lands (i.e. lands surplus to landowner's immediate requirements) may be leased out to Fijians and non-Fijians alike for development or other purposes. For administrative purposes the "mataqali" is recognised as the main proprietary unit.

The Government Lands Department administers and controls a further 10 percent

of the country's land resources. Freehold lands account for 7 percent of the national land area.

Fijian land ownership is therefore closely knitted with the owners' history. This is significant as it involves rights and interests which often emanate from the various traditional bases. These are often described as a "Bundle of Rights."

Tourism in Fiji's economy

Tourism has been the country's largest gross foreign exchange earner over the last three years, surpassing sugar. Tourism generates some 25 percent of gross foreign exchange earnings and is estimated to generate, directly and indirectly, about 14 percent of GDP (without taking into account activity generated by tourism investments). It provides employment, directly and indirectly, for an estimated 40,000 people (about 15 percent of the labour force). The performance of the industry in recent years is summarised in Table 1. Tourism in Fiji is dominated by private sector activity. Foreign investment plays a major role.

Total gross earnings from tourism in 1993 were \$363.3 million. After major setbacks in the late 1980s and early 1990s, tourist arrivals have recovered. The main source markets for Fiji are Australia and New Zealand. Japan is expanding rapidly as a

Year	1986	1987	1988	1989	1990	1991	1992
Visitors	258,000	190,000	208,700	250,600	279,000	259,000	280,000
Average length of stay (days)	7.9	8.3	8.5	9.2	8.8	8.6	8.6
Visitor days (millions)	2.0	1.6	1.8	2.3	2.5	2.2	2.4
Expenditures (US\$ million)	185.4	148.9	184.0	292.4	317.3	309.0	328.5

source of tourists as air access is improved. Europe, USA, Canada and Southeast Asia are also developing as important source markets.

DEVELOPMENT OF ECOTOURISM IN FIJI

The Government's tourism initiatives have traditionally concentrated on marketing, not on planning. The potential problems with this orientation are accentuated when tourists' preferences move towards a product (cultural and natural) that is publicly owned, remotely located and lacking in infrastructure. Difficulties also arise if the industry is slow to accept shifts in interests away from holidays focused on sun, sand, sea, and swaying palm trees, towards a more experiential or educational visit.

Developments within the industry and its marketing have given insufficient attention to the possible significance of Fiji's cultural and natural heritage. Places of historic importance, ancient archaeological sites, Fiji's rainforests, mangrove swamps and reef system have been under-utilised as tourist attractions. The concept of sustainable tourism, however, can find its greatest support through the increased development of ecotourism. Now is also a perfect time to pursue sustainable tourism, as Fiji, is moving towards a range of new initiatives in the area of sustainable resource use, under its National Environment Strategy adopted in 1992.

The concept of Fiji repositioning itself as an ecotourism and World Heritage destination is realistic. It also coincides with the Government's avowed intentions to conserve our fragile environment, protect

our heritage and find greater employment for rural communities.

Strategies for ecotourism development in Fiji must consider the provision of employment and income generation for landowners, the difficulties in the land tenure system, the need to conserve the fragile environment and the need to protect cultural heritage. Diversification of the economy and the generation of foreign exchange are other considerations.

In 1992, the Government of Fiji issued a statement in support of sustainable tourism. It included the following:

"Ecotourism enhances visitor exposure to and awareness of the ecology of Fiji's unique natural attractions and this will be emphasised. The promotion of cultural heritage and ecotourism in the country will require the development of middle level and "backpacker" type accommodation. This type of tourism stimulates secondary tourism, is of particular benefit to remoter regions, and offers particular opportunities for indigenous Fijians to become involved in the tourist industry. Continuous efforts will be undertaken to spread the benefit of tourism development to other areas in the country."

This statement reinforces and encourages environmentally and culturally related tourist activities established in the country from as early as the 1970s. Even though these small culturally-based, individually-owned, inadequately-managed ecological and heritage travel sites were hardly recognised, they have played a significant role in the development of viable alternative visitor destinations.

Organisation

Tour companies are pioneers in the development of ecotourism in Fiji. Most of their activities, however, were culturally or heritage based. The Department of Tourism has been involved with tour groups in marketing activities. In forest-based tourism, the Department of Forestry played a lead role through the development of the Colo-i-Suva Forest Park for recreational and educational purposes as early as 1974. The national Trust for Fiji has been active in the preservation of historical sites and buildings and the Fiji Museum.

Major interest in ecotourism development emerged in the late 1980s and early 1990s when other organizations, especially the NLTB, became active in conservation through ecotourism.

There is a general lack of coordination of ecotourism development in Fiji. Respective organisations have sometimes been pursuing their own developments with some complications, especially where there is conflict or duplication of interests. There is, however, a National Steering Committee of the NLTB, established in 1992, to coordinate conservation and ecotourism development in the country. Members of this committee include representatives of those departments that have, or intend to undertake, ecotourism activities.

The Government also set up an Ecotourism Unit within the Department of Tourism in 1992. The objectives of the Unit are:

1. to increase the involvement of the indigenous population in the industry, particularly in rural areas; and
2. to promote and develop tourism that enhances visitor exposure to Fiji's unique natural and cultural attractions.

The Ecotourism Unit is currently staffed with three officers. A priority of the Unit is the formulation and implementation of a policy for ecotourism, as presently there is no legislation to provide guidelines, regulations, monitoring or infrastructure.

A preliminary register of sites of national significance identifies 140 sites that have the potential to be developed for ecotourism. Only 19 percent of these sites have been developed thus far, so the potential for expansion is enormous.

Cultural and environmental impacts

It has been suggested that ecotourism can provide foreign exchange and economic reward for the preservation of natural systems and wildlife. But in reality ecotourism is also a threat to the resource on which it depends. These threats begin during the development stage, when facilities are constructed, tracks aligned, roads constructed and other infrastructure established to accommodate potential visitors. Threats of degradation of the resource increase when tourists arrive. At times, giving priority to economic benefits overrides the limits of carrying capacity. This ultimately results in resource degradation.

Cultures and traditions are also eroded when abused for monetary rewards. The social structure of closely knit families, groups of families, clans or even tribes can be affected by the infiltration of different cultures.

Ecotourism in Fiji takes into consideration the above possible conflicts and the consequences that may arise. The impact of ecotourism on the environment is so far insignificant as visitor arrivals to these developed sites are comparatively low, and

operators have been advised to safeguard their resources.

Culturally and traditionally, ecotourism development is thus far having positive impacts. Ecotourism has revived traditional dances, traditional meals and the traditional obligation to entertain visitors. But to some degree ecotourism has also caused discontent among indigenous Fijians, especially where it involves the sharing of gains from ecotourism. It has promoted greed as opposed to the sharing and caring attitudes that the Fijian people are renowned for. This has generally caused the disintegration of closely knit family bonds, a foundation for leadership in the Fijian community.

ECOTOURISM AS A TOOL FOR LONG-TERM FOREST CONSERVATION

Traditionally, the taboo system common in the Pacific had been an efficient manner of protecting forest resources. The system unfortunately has been drastically relaxed, in most societies, through the power of money and decreasing resources. Increases in population have put further pressure on resources, aggravating the deterioration of this traditional obligation. Today, conservation and preservation are only attractive if the sustainable management of the resource involved provides some practical gain. If not, destructive exploitation can easily result.

In Fiji's context, the development of ecotourism has been based on the understanding that landowners will benefit through income generation (via employment and business opportunities). Preservation is secondary. Whilst the development of

ecotourism in Fiji is a link between utilisation and preservation of the forest resources, it will only be effective in forested areas that have specialised and unique features, to which visitors will be attracted. Fortunately there are numerous untapped and attractive sites in the country that can be developed for such purposes. But the biggest stumbling block that is currently being faced is the lack of infrastructure to reach these areas and the lack of funds for establishment.

Reserved forest and preservation initiative

The adoption of the reclassification of the country's forest resources from the recent re-inventory effectively means that potential biodiversity conservation areas have increased to 302,737 hectares, of which 264,297 hectares are protected forest and 38,440 hectares are reserved forests. This is 28 percent of the total forest cover and 16 percent of the country's land area. These areas are not legally binding and some protected forests can be utilised for intensive management.

The Forestry Department is responsible for the establishment and management of reserved forests. To date there are 16 forest reserves and 8 nature reserves, covering an area of 36,000 hectares. These are legally protected areas proclaimed under section six of the *Forestry Decree*. They constitute 3.3 percent of the total forest area.

It is now accepted that in order to secure nature reserve areas, land-owning communities should be compensated for foregone opportunities. The NLTB and the Department of Forestry have developed a monetary compensation scheme for landowners who have had their forests

protected for national conservation purposes. Compensation payments to landowners involve a one-off payment based on the value of the timber and ongoing payments based on the value of the land and foregone development opportunities such as agriculture or forestry.

Compensation payments are not appropriate for every conservation area, nor are they sufficient to protect all areas. They can even encourage the wrong type of attitude towards conservation. Successful, long-term local commitment to conservation depends as much on landowners believing that conservation is in their personal interest as it does on carefully targeted outside support.

Development of forest-based tourism

The Department of Forestry encourages the development of communally owned forest-based parks anticipating that they will help preserve specialised plant communities. The initiative is based on the understanding that landowners will reap the benefits of ecotourism projects and that they should initiate and be involved in decision-making from conception through management of such projects. To allow landowners to control the operation of ecotourism sites reinforces their authority over their land and helps them be more responsible in the preservation of facilities and the forest resources.

The relationship between protected areas and local communities is a key factor in the long-term conservation of natural resources. This is especially the case in remote areas of developing countries where effective control is difficult to maintain without the support of the local community. The local communities need to be involved as early as possible. It is preferable that the initiative

to develop an ecotourism area should come from the community and that their involvement should start from project conception, and not just during the much later stage of project implementation

The Department of Forestry has been involved in forest-based or community-based tourism through the provision of technical assistance in the establishment of trails or picnic facilities modeled along the lines of the Colo-i-Suva Forest Park. This park has been established and maintained by the Department for the last 20 years. It has been used by schools for educational tours and by members of the public. Amenities provided include B-B-Q facilities, picnic *buves* (huts), cloakrooms and toilets around natural attractions such as waterfalls, hiking trails and a camping area.

Recently the Department's involvement in the development of ecotourism has been reduced to purely technical assistance. Its objectives are:

1. The conservation and enhancement of important, and in some cases, unique aspects of Fiji's rich natural and cultural heritage.
2. The establishment of first class recreation and tourism assets, that are commercially viable, for the enjoyment and benefit of local and overseas visitors.
3. The creation of local employment and income generating opportunities for landowners.

The Department has played a vital role in the development of forest-based ecotourism projects. Of prominence in this regard is the establishment of the Bouma Forest Park in Taveuni. Currently two phases have been

commissioned and are operational. The development of other phases is presently being pursued.

Technical assistance from the Department also contributed to the development of Tavuni Hill Cultural and Archaeological Park near Sigatoka. The project was developed by the Department of Tourism and has been operational since 1993.

The establishment of Mt. Koroyanitu Forest Park, near Lautoka, in 1993, was coordinated with planning and technical assistance from the Department. Further, development of potential sites within the area is being considered.

The above projects are managed by landowners on a commercial basis. In all cases, voluntary manpower provided by landowners was a key factor in the completion of the projects. The New Zealand Government played a vital role in the provision of capital funds. It is presumed that external funding will continue to be sought for ecotourism.

There is great potential for the development of ecotourism in the country. Even though at present ecotourism does not make a major impact on the economy, it is envisaged that once other areas are successfully developed and fully utilised, the impacts will be significant. Ecotourism already contributes rural employment and income for landowners. The Department is currently working with other agencies, especially NLTB, to expand and realize this potential.

CASE STUDY: BOUMA FOREST PARK

The following case study provides details of the planning, establishment, management

and people's participation in ecotourism projects in Fiji.

Background

The Bouma Forest Park is a forest-based ecotourism project. It is located on the island of Taveuni, Fiji's third largest island. The island still retains around 60 percent of its land under tropical rainforest. Most of this (11,291 hectares) is classified as forest reserve with an additional 4,015 hectares as nature reserve. Fiji's largest lake, Tagimoucia, is found on a high plateau in the central range. Forest types include beach forests, tropical lowland forests, cloud forests and mangroves. Numerous undisturbed streams, rivers and waterfalls are still prominent on the island.

The natural qualities of Taveuni and its potential for environmental tourism were recognised as early as 1973 when the UNDP-funded "Tourism Development Programme for Fiji" proposed that Forests of Taveuni be protected for tourism and nature conservation, with recreation development centered on the much frequented Tavoro Falls (site of the now developed Phase 1, Bouma Forest Park). Subsequent studies have reiterated recommendations to protect Taveuni's forests and stressed their conservation and nature tourism values.

For over 20 years people of Nakorovou village have been showing visitors to a waterfall on their land, about one kilometer from the coastal road. Known as Tavoro Falls, it is situated on Tavoro creek near the village. An average of 96 tourists a month visited the waterfall and were charged \$2.00 per person. In 1988, the people of Nakorovou approached NLTB and asked for help to establish a forest park on their land. In consultation with landowners and with

technical input from the Department of Forestry, a development plan was drawn up for the district of Bouma, including the Tavoro Falls Recreation Area.

In May 1990, NLTB and the Forestry Department, on behalf of the people of Bouma, presented the New Zealand Government with plans of phase 1 of the proposed Bouma Forest Park - the Tavoro Falls Amenity and Recreation Area. The New Zealand Government agreed to fund the development and the Department of Forestry, with landowners help, established the park in early 1991. The Tavoro Falls Amenity and Recreation Area was opened in April 1991.

Project objectives

The project involved the provision and expansion of tourist facilities, based on several identified natural features, while concurrently ensuring the conservation and protection of the attractions and the forest in general. It provides opportunities for nature viewing, photography, hiking and trekking, fresh water swimming, bird watching and other forms of passive recreation. The project has the following objectives:

1. The conservation, protection and enhancement of important, and in some cases, unique aspects of Taveuni's rich natural and cultural heritage.
2. The establishment of first class recreation and tourism assets for the enjoyment and benefit of local and overseas visitors.

The creation of local employment and income opportunities for the tribes, the villages and the general district of Bouma.

The Bouma Forest Park emphasises landowner involvement in development and

heritage protection. Significantly, the landowners have initiated the development of ecotourism and are committed to developing their land for tourism rather than traditional exploitation of their natural resources.

Project description

The Bouma Forest Park is a multi-phase project that comprises multidisciplinary recreation opportunities for each of the four villages/tribes that make up the greater district of Bouma. Four development phases have been proposed, based on recreation opportunities for each area (table 2).

Location and protection status

The project area is on the eastern side of Taveuni Island bordering the northern boundaries of the Taveuni Nature and Forest Reserves. It is approximately a 30-minute drive from the airport and a 1-hour drive from the main administrative/shopping centre of Waiyevo.

The project covers 1,603 hectares. All project land is communally owned by the four tribes living in four local villages, with a proportion leased to the Government as nature/forest reserve. The NLTB, the Department of Forestry and the Naituku Clans have drawn up a memorandum of agreement to ensure lasting protection of the forests and their resources, thus safeguarding the tourism values of the forests. The memorandum is based on the cultural precedent of the "Vakavanua" Agreement. It strongly commits all parties to abide by the agreement as it involves the precious commodities of land and the people's word. It is not a lease, but it is considered as equally binding as any legal

Phase	Attraction type	Area (ha)	Tribe / village	Proposed establishment date
1	Forest-based, waterfalls, natural attractions	535	Nakorovou	1991
2	Coastal-based, coastal walk, marine attractions, trekking	645	Lavena	1992
3	Forest- & culture-based, cultural sites, lodges etc.	423	Vidawa Waitabu	1993
4	Forest-based, inland hiking, bird watching	603	Lavena, Vidawa, Nakorovou & Waitabu	1994

court agreement. This memorandum of agreement was signed at Nakorovou village on 21 August 1990 and is effective for 99 years.

This type of agreement can be a precedent in Fiji for the voluntary establishment of a protected area on customary land with the landowners receiving development assistance to create village-based income earning opportunities.

Establishment costs

The establishment of the first and second phases of the Bouma Forest Park was generously funded by the New Zealand Government. A total of \$60,000 was allocated for Tavoro Falls Amenity and

Recreation Area in 1991 and \$48,000 for the Lavena Coastal Walk and Recreation Area in 1994. In addition, villagers supplied voluntary labor valued at more than \$8,600 at Tavoro and \$22,000 at Lavena. Facilities include walking tracks, visitor facilities, pools and river improvements, notices and signboards. The major components and costs of development are shown in table 3.

An additional \$20,000 was granted to NLTB by the Government of New Zealand for the design and printing of the Tavoro Falls Amenity and Recreation Area pamphlet and posters.

Preliminary preparation is currently being undertaken, for the third phase, the Navuga Cultural Attraction and Recreation Park.

	Phase 1 (\$)	Phase 2 (\$)
Voluntary labour provided by villagers	8,678 (4,450 hrs at \$1.95/hr)	22,072 (8,900 hrs at \$2.48/hr)
Materials/equipment	23,564	16,994
Labour	17,275	9,091
Services	16,921	15,391
Allowance & subsistence	2,230	4,524
TOTAL	68,668	68,072

It is hoped that the New Zealand Government will also fund this project. The estimated cost for the third phase is \$105,000.

Project management

Since its opening in April 1991, the Tavoro Falls Amenity and Recreation Area (Phase 1) has been managed by the landowners on a commercial basis. The Lavena Coastal Walk and Recreation Area (Phase 2) has also been operating on a commercial basis from June 1994. Each phase is administered and managed by a park manager who is also responsible for park wardens, tour guides and a receptionist. These park employees are paid not more than \$50.00/week.

The Park Project Committee directs, evaluates and controls the running of the park. It meets four times a year. It is chaired by the *Roko Tui Cakaudrove*, the chief provincial administrator. The District Officer and the paramount chief of the region are also members, along with representatives of the land owning unit. This committee reports directly to the Vanua Bouma Council and to the NLTB's National Steering Committee.

The Vanua Bouma Council must be periodically advised, as a matter of protocol, on the park operation. Its views on the overall management of the park are sought when important decisions are needed. The Council is represented by the four tribal leaders of Vanua Bouma.

The National Steering Committee, or the NLTB preservation and conservation steering committee, is an advisory and planning body based in Suva. It was activated during the implementation phase to advise and monitor progress of the project. The Committee is made up of all

organisations that are involved in forest-based tourism. It includes the NLTB, the Departments of Forestry, Tourism, Lands, Fijian Affairs, Co-operatives, and Economic Planning, the Environment Unit, the Development Bank, and the National Trust of Fiji. This Committee meets four times a year.

Visitor numbers and income

The number of visitors to the Tavoro Falls Amenity and Recreation Park for the period July 1992 to June 1993 showed a decline of 459, or 16 percent, from the previous year. This could be attributed to the general decline in tourist arrivals to the country, and to Taveuni in particular, during that period. Lack of promotion and bad management could also be factors contributing to the decline. The income derived from park fees of \$5.00 per person (tourists) and \$2.00 per person (locals) showed a proportional decline during the period. The income and expenditures for 1992-1993 are summarised in Table 4.

Table 4 is an unaudited account of the Tavoro Falls Amenity and Recreation Area. Moves to standardise accounting for the project were initiated in 1993 and the project will soon become a co-operative. The Department of Co-operatives has already made by-laws to this effect and is preparing the registration of the project as a co-operative. That Department has been advising park managers on the concept and checking their accounts since July 1993.

Summary

The Tavoro Falls Amenity & Recreation Area is a pilot project. Its success so far can be attributed to the foresight of the landowners in initiating the development

Table 4. Summary of income and expenditures at Tavoro Falls Park, 1/7/92 to 30/6/93

Income source	Visitor numbers	Revenue (\$)	Expenditure (\$)	Profit (\$)
Park	3,735	15,978	6,814	9,165
Refreshments		292	60	232
TOTAL	3,735	16,270	6,874	9,397

and the support of responsible Departments and statutory bodies. In addition, the funding agency, the New Zealand Government, played an important role in making the project a reality. It is perhaps too soon to predict the long term success of the venture, but the landowners and the Government are hopeful that the venture will succeed.

CONCLUSION

Tourism is already big business in Fiji, but most of it is coastally oriented. There is considerable potential for developing inland, forest-based tourism in areas such as Bouma. Bouma is also an area of great cultural significance. The fact that visitors find the cultural and natural sites fascinating (and are prepared to go out of their way to see them) indicates the potential for the development of a large new market of visitors to these areas. The project has not only provided economic viability to the district of Bouma, but also employment for villagers. Of importance is the provision for landowners to run and manage the park as a self-supporting venture.

The Bouma forest park has enjoyed some success as an ecotourism project due to several factors. A critical factor has been that the initiative came from the landowners themselves and this has continued to be a

strength in the project. There have been problems but they were solved with improved awareness, open communication and interaction among all stakeholders.

For landowners, forest protection was a secondary consideration rather than a central motivating force. The main motivation was the need to earn a living from their protected forest, which they are now able to do through nature-based tourism. Bouma is now slowly gaining an international reputation of its own. Continued success will depend on the willingness of outside parties to allow the landowners to express and implement their own visions for the future of their land without compromising the environmental integrity of the area.

Recently, there has been a drive for development in Fiji, led by villagers' desire for change. Landowners must retain control and have a sense of ownership over that development, however. Outside parties must be mindful of the long-term implications of their involvement. Recognition of customary land ownership is important. Forest conservation can only succeed if the initiatives of village landowners are supported. To ensure continued success, there should be continued landowner consultation and support and practical community benefits from protecting nature.

RECOMMENDATIONS

1. The initiative to develop an area for ecotourism should come from the landowners, and their involvement in implementation and management is crucial to a project's success.
2. Environmental awareness and education is important to ensure landowner understanding and support.
3. Training of landowners to manage their own project should be provided.
4. Objectives of the project must be made clear from the beginning and must take into account the needs of landowners and the surrounding community.
5. Regular advisory meetings of stakeholders, and regular monitoring of the project, are necessary. Continued liaison with landowners should be encouraged so that landowners continue to take an active part in all decisions made.
6. The landowners must receive some practical gain from the project.
7. Women should be involved as they play a major role in village life. Their contributions should be recognised and included in the social-economic aspects of the project.
8. Use of existing resources should be maximized and projects should start small. Activities should be planned in a way that minimizes the disruption of normal community life.
9. Each project area is unique, so planning should be based on each community's needs and aspirations.
10. Care must be taken to avoid confusion regarding outside funding and what it is to be used to support. Outside partners must be carefully chosen. Outside parties should be mindful of the long-term implications of their involvement.



Ecotourism emphasizes natural resource protection and socially sound development.

NON-WOOD FOREST PRODUCTS OF BHUTAN

*Forest Resources Development Section
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Editor's note: This paper is a very brief synopsis of a detailed report which is being published by FAO/RAPA as a separate publication. The length of the detailed report precludes including it in its entirety in this publication.

INTRODUCTION

The sudden rise of the Himalayas from the Indo-Gangetic plains endows Bhutan with a wide range of ecological zones. In Bhutan, it is possible to travel from the tropics to alpine zones in a matter of a few hours. The resulting flora and fauna are diverse and unique.

Unfortunately, most of the Himalayas are in an advanced stage of decay. Some authors have described the Himalayas as a dying mountain range. Over-population and over-utilization, have long crossed the line of sustainability. Biodiversity is much poorer, the protective value of the forests have been lost and down-stream areas face severe natural calamities on an annual basis.

Fortunately, Bhutan, which is in the Eastern Himalayas, is in a different situation. Here people have learned to live in harmony with nature in a symbiotic relationship that dates back for centuries. The Buddhist philosophy of love and respect for nature has also influenced the attitudes of people.

Sixty percent of the forest cover in Bhutan is still in a pristine state. Flora and fauna that are extinct or threatened elsewhere, thrive in Bhutan.

The national forest policy places conservation in the forefront of all other considerations. Utilization of forest products can take place only after meeting conservation goals, which through scientific management, ensure sustainability. Bhutan has designated 23 percent of the country as protected areas. This system of protected areas covers different eco-zones which are strictly managed to protect biodiversity.

The remaining areas of the country are considered production forests, but management of these areas is guided by conservation principles. Strong emphasis is laid on people's participation in forest management and on development of public education and extension services.

LEGISLATION, ORDERS AND RULES REGULATING NWFPs

Rules and orders have been issued from time to time to enforce forest policy and also to allow people to enjoy traditional use of non-wood forest products (NWFPs).

Medicinal plants

The 1974 National Forest Policy specifies medicinal plants and herbs among the resources to be surveyed for efficient management and utilization because these remain one of country's resources which have not yet been fully exploited.

May 25, 1988 - the Director of Forests, approved a proposal to ban the export of

medicinal plants and establish cooperation between the Department of Forests (DOF) and the National Institute of Traditional Medicine (NITM) for collecting and cultivating medicinal plants

Resin

April 3, 1985 - the rules for tapping chir pine (*Pinus roxburghii*) for resin were approved.

Natural dyes

January 4, 1980 - The Royal Government of Bhutan (RGOB) waved forest royalty and sales tax on the collection and sale of lac and its waste products in order to promote the art of lac cultivation and its associated activities. No monopoly on this is permitted.

September 8, 1985 - the export of vegetable dyes was curtailed. These are to be used for home use only.

Bamboo and canes (rattan)

November 7, 1978 - RGOB permitted the villagers in Phuentsholing to collect bamboo and canes without royalty to encourage production of handicrafts for sale or domestic use.

May 7, 1979 - RGOB approved permits for villagers in Mongar and Zhemgang to transport bangchu, palang and other products made of bamboo and cane to any location if they are to be used as gifts.

September 2, 1984 - RGOB permitted people of Dhrumjar (Mempa) and Trongsa to collect bamboo and cane without royalty to encourage the production of handicrafts for sale or domestic use.

Other NWFPs

No legislation, orders and rules have been issued for essential oils, mushrooms and other NWFPs.

IMPORTANCE OF NON-WOOD FOREST PRODUCTS

More than 80 percent of the people of Bhutan depend on agriculture and animal husbandry for their livelihood. The farming system in Bhutan is highly dependent on the forests to sustain it. Non-wood forest products are harvested and used daily without much thought. The full impact of NWFPs on the rural economy has not yet been documented and assessed.

Animal husbandry is an important contributor to the rural economy. Almost every household maintains a few cattle for draft power, animal products and for manure. Many people maintain large herds as a status symbol or as insurance in times of difficulty. The animal population has been recorded as 300,000 cattle and buffaloes, 28,000 yak, 40,000 sheep, 42,000 goats and 22,000 horses.

The impact of these animals, which depend on the forests for fodder, has not yet been fully appreciated. As a general practice, herders drive the animals into the forests to forage for whatever is available and thus much of the forest is used as grazing land. During winter, when fodder in the forests in colder areas becomes scarce, cattle are moved down to warmer forests. In winter, tree fodder is collected for milch cows to sustain milk production.

Bamboos are rightfully known as "poor man's timber." In Bhutan, bamboo has many important uses. Due to the varied

climate, many different kinds of bamboo are available. Large bamboos such as *Dendrocalamus hamiltonii* are found in tropical areas, and the very small *Arundinaria maling* are found at high altitudes.

One of the best-known uses of bamboo in Bhutan is for making bows and arrows. Archery is the national sport and also a cultural event. Bows are made from *Dendrocalamus hamiltonii*, but only those which grow on particular microsites produce good bows. Arrows are made from high altitude bamboo and require considerable skill to craft. Feathers for the arrows are obtained from a wild pheasant and the glue is made from fish skin.

The making of fine bamboo baskets and containers is a specialty of people in eastern districts. Such products are marketed all over Bhutan and are now becoming popular with tourists. People also use bamboo baskets for storage and as water containers.

Many poor houses are made entirely of bamboo. The small bamboos that are found in central and west Bhutan are also woven into mats, used for fencing and for roofing temporary shelters.

More than 300 species of medicinal plants are used in traditional medicine. The National Institute of Traditional Medicines (NITM) is well-established, with trained doctors. Staff regularly collect medicinal plants and produce medicine according to formulae given in age-old medical scriptures. The traditional system, which includes acupuncture, treats all types of diseases. Traditional medicine is gaining popularity, even though a nearby modern hospital provides free services.

While the treatments in the institute are quite elaborate, more simple systems exist in rural areas. Individuals or groups often provide such services. In the south, traditions are different. The knowledge of medicinal plants is handed down from father to son. Some healers combine spiritualism and go through elaborate rituals while dispensing medicines.

Modernization had almost wiped out traditional medicine but because traditional medicines do not produce the side effects associated with modern medicines, they are becoming increasingly popular again. Historically, at least two plants, ruta and manu were cultivated in the Bumthang valley and marketed. Today many people do not even remember these plants. However, remnant populations of one of the plants, manu (*Innula helenium*) has been found and is being cultivated by at least one family.

Natural dyes are another group of non-wood forest products that are associated with the traditional art and culture of Bhutan. Cloth weaving is an important economic activity in the central and eastern dzongkhags (districts). At one time, colouring of textiles was entirely based on natural dyes. Many plants were cultivated and even exported to Tibet. However, natural dyes are gradually being replaced by chemicals or ready-made thread. Improvements in the quality of natural dyes may revive their use. A project at Khaling in eastern Bhutan is compiling research results and other information on natural dyes.

Collection of pine resin, and lemongrass distillation, are recently-introduced activities in the chir pine areas of the country. More than 270 tons of resin is

collected by villagers in the eastern districts and sold to distilleries. As the distilleries are next to farms, local farmers work in the distilleries when they have spare time. These activities directly contribute more than Nu. 30 million (US\$ 1 million) to the rural economy. Lemongrass distillation also provides income for around 400 families in the eastern dzongkhags. For these families, distillation has become an even more important source of income than farming.

Forests play an important role in assuring food security in the country. During times of crisis, food from the forests becomes critical, particularly in rural areas where the importation of food is difficult and people do not have much purchasing power. Due to varied climatic conditions, drought and poor soil, food problems are faced throughout Bhutan from time to time.

During periods of food shortages, people search for food in the forests to supplement their meager diets. An important plant is *Dioscoria*. This plant has long tubers which must be dug up from deep under the ground. A single vine may yield anywhere from nothing up to 10 kilogrammes of tubers. Tuber hunting is a gamble, but the delicious taste and hungry mouths waiting at home make the digging worthwhile. When food shortages are very bad, the bulbs that grow on the vine are also eaten. However, this occurs only in the most desperate situations because the bulbs are bitter and cannot be eaten too often. There are other tubers that are eaten, but *Dioscoria* is the most important substitute for grains.

Another commodity which can be obtained from the forests during difficult times is cooking oil. There are many wild seeds which produce oil. Seeds of the *Symplocos* tree are commonly used for oil, even in good times. The seed of *Gynocardia* sp., a

subtropical tree, is less frequently used because of its highly poisonous seed covering. Sal (*Shorea robusta*) seeds are collected and marketed in India. In Bhutan, sal is not exploited for oil due to a lack of extraction technology at the rural level. *Neolitsia* is frequently cultivated, especially in the eastern districts. *Aesandra butareace*, a multipurpose tree, is also an important source of oil.

A variety of forest fruits are also eaten regularly. Some fruits are just plucked and eaten while passing through the forest, while others may be taken home. Some fruits such as walnuts, cornus, zizyphus and morus are marketed. Some wild fruits are very rich in vitamins. *Phyllanthus emblica* is recognized to be one of the richest sources of vitamin C.

Villagers also eat many plants as vegetables. Fern shoots, bamboo shoots, mushrooms, cane shoots and even orchid flowers are marketed in season. These delicacies are sought all over Bhutan. Mushrooms, particularly the *Cantharellus cibarius*, is canned and sold for as much as Nu. 50 (US\$ 1.65) a kilogramme. These mushrooms are found in temperate oak-pine forests. The oak mushroom is widely cultivated on oak billets and some are exported.

The sale of betel leaf with betel nut is a year-round activity, particularly in western Bhutan. The leaves are collected from tropical and sub-tropical forests and taken to northern districts where wild leaves are preferred over cultivated varieties.

The forests of Bhutan also produce a number of spices which are used locally and exported. Pepper is one of the most important spices to be collected. Though it is not used locally, the collection of the

spice enables people in tropical areas to earn a good income. *Cinnamomum* bark and leaves are also collected and exported. The seeds of *Zanthoxylum* are marketed locally and used extensively in the country.

CONSTRAINTS IN NWFP PRODUCT DEVELOPMENT

Medicinal plants

- Lack of an inventory of the currently available plant resources - even the more important plants (what species, where, how much?). NITM claims that certain medicinal species have decreased substantially (by as much as 50 percent). Ayurvedic doctors (dungtshos) and other traditional healers also claim medicinal plants are more difficult to obtain, but no quantifiable inventory data are available.
- Poaching of medicinal plants, particularly those used in neighbouring countries such as China, India, Nepal, Sikkim, and Tibet, occurs in northern and southern border areas, purportedly with the help of local people.
- Foresters lack knowledge needed to identify medicinal plants and allied species.
- There is an absence of post-harvest handling facilities suitable for drying and sifting. This is aggravated by a lack of roads to transport materials for immediate primary processing in order to avoid spoilage.
- An agency is needed to take charge of the collection, primary processing, quality control, and marketing of crude and formulated drugs.

Resin tapping

- Inadequate wages given to tappers working under a harsh environment.
- Lack of sufficient and trained manpower to undertake tapping; inadequate opportunities for apprenticeships.
- Non-compliance with revised tapping rules.

GENERAL RECOMMENDATIONS FOR LONG-TERM ACTIVITIES

1. Establish national priorities based on the potential for NWFP development in the country.
2. Develop a more complete inventory of prioritized commodities. Involve taxonomists, botanists, forest rangers, foresters etc. in identifying species, locations, quantities, etc.
3. Train key personal for various purposes: plant identification; proper collection techniques; appropriate processing methods; good manufacturing procedures; quality control; generation of new designs, etc.
4. Establish and maintain gene banks for conservation purposes and future tissue culture.
5. Develop seed storage facilities, herbarium collections and computer databases to store traditional knowledge related to NWFPs.
6. Establish post-harvest handling facilities for drying, sifting, sorting, deep freezing, atmospheric control, etc., as near as possible to the source of supply.

7. Establish annual scholarship grants for key persons to obtain degrees in related disciplines or provide short term non-degree training programs to acquire new technologies.
 - Vegetable oils
 - Mushroom production
8. Create an agency that will serve as a clearing house for all matters pertaining to non-wood forest products, including marketing. This should include a mechanism for an annual review of the agency's accomplishments by non-biased outside persons.
 - Ministry of Trade and Industries
 - Surveys of specific non-wood products with industrial potential
 - Marketing and production
 - National Institute of Traditional Medicine (NITM)
 - Collection of medicinal plants and production of medicines
 - Research on cultivation and propagation of important medicinal plants

ORGANIZATIONS INVOLVED IN THE DEVELOPMENT OF NWFPs IN BHUTAN

- Forest Research Section, REID, Ministry of Agriculture
 - Herbarium collection, plant identification
 - Vegetative propagation of important non-wood products
- Forestry Services Division
 - Collection of information on NWFP use
 - Surveys of non-wood forest products
- Research, Extension and Irrigation Department (REID), Ministry of Agriculture
 - Essential oils
- Handloom Weaving Centre, Khalilng
 - Documentation of traditional natural dyes
 - Production of textiles based on natural dyes
- Cottage industries (Yatha weaving centres)
 - Production of textiles based on natural dyes
 - National Women's Association of Bhutan
 - Interested in local paper production and other non-wood products.

Economic Aspects

INCOME AND EMPLOYMENT FROM NON-WOOD FOREST PRODUCTS: WHAT DO WE KNOW?

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INTRODUCTION

Almost all discussions concerning non-wood forest products development emphasise their employment and income generation potentials. Often their development is regarded as an important option for the socio-economic development of rural areas (FAO, 1993). Supporting these assertions (or hopes) are the statistics, in terms of millions of person days of employment generated and equally impressive figures of income that accrues to the rural poor (Shiva, 1994). It is hence not surprising that the topic has found a slot in this Consultation.

Describing what is already known has its advantages as well as disadvantages. Easy access to information, especially in the printed and electronic forms, makes the task of literature review easier. Such an advantage is however negated by several disadvantages, especially since, as taught in elementary statistics, reliability of predictions is most often dependent on the unknown variables. When the residual is substantial, the conclusions drawn become meaningless. This seems to be so with most studies on non-wood forest products. What we know is fragmentary, incomplete and conceals the reality. Nowhere is it more serious than the social and economic dimensions of non-wood forest products and more particularly on employment and income aspects.

SOME CONCEPTUAL ISSUES

A detailed presentation of studies on employment and income is beyond the scope of this paper; nor is this possible on account of the limited time and short term relevance of such information. Statistics are meaningless unless they are used to answer the right questions. Unfortunately, available studies fail to deal with some of the key issues, largely due to certain conceptual problems. The most important of these are as follows:

Aggregation of products

Notwithstanding the wide range of products, catering to a variety of human needs and greeds - from essential foods that supplement the nutrition of forest dwelling communities to those ingredients used in candies and ice creams, from those used by native medical practitioners for healing ailments to those sold for their proclaimed aphrodisiac properties, from those that are essential wares for household uses to costly handicraft items that adorn the living rooms of the rich-, the historically acquired definition treats them as one broad category. Other than the source of supply, they have very little in common. Hence generalization, especially with regard to social and economic aspects, becomes meaningless.

Definitional problems

The traditional definitions of employment and income used in economics and the lack of effective measures to determine their levels in the less organised informal sector complicates the matter. Aggregation of employment and income, disregarding as to who is actually employed and during which season and the actual contribution of income to the household livelihood, conceals some of the key aspects relating to the potential (or lack of potential) of non-wood forest products. In the case of a number of non-wood forest products, those who are employed fall outside the definition of the working population and in a number of cases the number of hours worked in a week (or day) in non-wood forest product collection and processing is so low that it is seldom accounted for in national employment and income surveys.

Ill-defined objectives

National, sub-national or product-level estimates are primarily aimed at policy makers, planners and donor agencies, to substantiate arguments for increased investment for their conservation and management. Given this objective, there is a strong tendency to ignore (or even conceal) the real issues. Employment and income estimates become statistics to be annexed to project reports (and more particularly to proposals), ignoring their social dimensions. If employment and income are priority objectives of non-wood forest products development, we need more relevant information, from the point of view of the people involved in the various activities.

Snap-shot statistics

In almost all cases the historical perspective or the dynamics of the system are seldom

taken into account and the figures that are provided reflect what exists at a given point of time. Livelihood strategies of households and communities respond to a variety of factors, both external and internal, and dependence on non-wood forest products waxes and wanes both spatially and temporally. A product focussed approach has resulted in collecting information that becomes meaningless over time and across space. Little is known about the process of change and how different factors interact.

WHERE DO NON-WOOD FOREST PRODUCTS BELONG?

Traditionally the classification of non-wood forest products has adopted an end-use oriented approach. Thus, it is customary to group the products as forest-based foods, fibres, medicines, cultural products, industrial products (which includes gums, resins, tannins), etc. For example, medicinal plants could be those utilised locally by the medicine-man in the forest dwelling communities or they could be those that are subjected to complex processing for use in distant markets. The broad group of forest foods include those collected and consumed locally with minimal processing as well as those which undergo industrial processing involving the addition of characteristics like palatability and appearance (or conversely removal of characteristics that impair appearance and palatability) and packaged under sterile conditions to be sold through super market chains in developed countries. Such a grouping seldom gives an indication as to the social and economic aspects of the products, especially who produces or collects the products, what kind of technology is adopted in collecting

(producing), processing and marketing, who consumes the products, who controls the production systems and how the benefits are distributed.

To avoid the inadequacies of existing classification and to focus on the social and economic aspects, a slightly different grouping is warranted. Based on the system of production, processing, trading and the type of markets they cater to, non-wood forest products can be categorised into three, namely (i) traditional subsistence sub-sector, (ii) organised market sub-sector and (iii) an overlapping sub-sector, with a combination of characteristics of the subsistence and organised sectors.

Table 1 summarises the key characteristics of products belonging to the different sub-sectors.

Subsistence sector products

A substantially large number of products belong to the subsistence category, fulfilling the needs of the local economies. These include a variety of forest-based foods, medicines, and cultural and social artifacts, gathered or produced locally. Knowledge is passed on from generation to generation, and the close involvement with the products on a day to day basis facilitates the development of a well adapted indigenous knowledge system. The technology of production/ processing is simple, labour intensive, and supply of the products is largely nature dependent. People seldom make any sectoral distinction of products as belonging to agriculture, animal husbandry, forestry, fisheries. Since the products are locally consumed (or at best bartered with other individuals or communities) no complicated marketing is involved. Several products contribute to livelihood and there are always

fall back mechanisms when one product is not available.

Determining the extent of consumption (or employment and income) derived from different products is difficult and sometimes meaningless. Not that those in the subsistence sector are unaware of the concepts. In allocating the time to various activities, they do take into account the relative advantages. Some of the products are not collected during certain seasons or periods, especially when other products requiring much less time are available. On the other hand, women and children will trek long distances to collect these products in the absence of alternatives. The kind of consumption pattern, the technology available and value systems dictate the extent of effort to gather certain products.

Products in the organised sector

At the other end of the spectrum are the products belonging to the highly organised and commercialised sector. This includes most of the plantation crops like rubber, cashew, coconut, spices (like cardamom, cloves, pepper) cultivated medicinal plants, lac, rearing of silk worms, bamboo and rattan plantations, etc. Some of these are often the subject of turf battles between narrowly organised government departments, with conflicting claims on who should manage them. Notwithstanding differences in the system of cultivation and management (for example they may be cultivated by small holders under mixed cropping systems or by large plantation companies as monoculture), the dominant feature is their close integration with the modern processing sector.

Technological inputs into these products, at all stages of production, processing and trade, have been substantial. Research,

Characteristics	Subsistence sub-sector	Organised sub-sector	Semi-organised sub-sector
1. Production - Technology - Organization - Skill requirements - Input requirements - Capital requirements - Dependence on purchased inputs	Traditional/Entirely relies on natural processes Labour intensive Household/Community unorganised Very low Negligible Negligible Nil	Modern/Environment modified significantly Labour intensive Household/Corporate Highly organised High High High Very high	Traditional/relies on natural processes Labour intensive Household/Community organised Low Negligible Negligible Negligible
2. Processing - Degree of processing - Organization - Location of processing -Technology - Skill requirements - Input requirements	Very low Household/Community Local Traditional Very low Very low	High Households/Industries Varies Modern High High	High Households/Industries Varies Traditional + Modern Low to high Low to high
3. Markets and Marketing - Location of markets/ consuming centres - System of marketing - Link between producers and end users - Effect of market prices on production/processing	Local Sharing of products - Exchange or barter Producers and consumers are the same Nil	Distant markets Cash transaction Intricate network of trading channels Very high	Local/distant markets Cash transaction Network of trading channels Very high
4. Allocation of Income from Final Product	Accrues entirely to the producing unit	Shared as - Wages - Payment for other inputs - Taxes - Profit A major proportion goes to the processing and trading sectors	Shared as - Wages - Payment for other inputs - Taxes - Profit Proportion of wages accruing to producers tends to be low
5. Examples	Forest based foods, nuts, fruits, bush meat, sago, local medicines, fish poisons, bark, etc..	Rubber, cashew, pepper, cardamom, resins, cultivated, medicinal plants, tannins, producing trees, etc..	Collected gums, resins, bark for tannin, leaves (eg: tendu), bamboo, rattan, medicinal plants, fruits (eg: uppage) spices, etc..

extension and other support services, including credit and marketing, are well developed. Demand from distant markets exerts a tremendous influence on the technology and systems of production adopted. Employment and income fluctuates in response to demand which is again determined by a variety of factors. These are primarily prices and availability of substitutes and complementary products.

Products in the overlapping sector

Products belonging to the intermediate category are most often collected in the traditional sector; but invariably they have strong linkages with the modern sector, where they are processed and traded. A large number of non-wood forest products belong to this category which includes forest foods, gums, resins, leaves, tannins, medicinal plants, cultural artifacts, etc. The technology of production (or collection) remains very simple and traditional, but the processing technology is often complex and the final product reaches the consumers through a long trading chain.

Quite often one or more products belonging to different sectors may co-exist, each contributing to the household livelihood in varying degrees. For example forest dwelling communities may derive part of their sustenance from fruits, roots and bush meat gathered from the forests. They may also collect products like medicinal plants, rattan and leaves for sale to local dealers, in addition to cultivating cash crops and fruits to meet the demand from distant markets. A variety of factors, primarily social, cultural, and economic determine the extent of dependence on each of the components. The subsistence sector dominates areas not penetrated by markets. In the other extreme case, the subsistence sector shrinks

drastically, with the organised sector forming the main source of livelihood.

Instances of the same product forming an integral component of more than one sub-sector are not infrequent. For example, part of the bamboo and medicinal plants collected locally from adjoining forests, would be sold in the local market while the other portion is used directly by the household or the community.

WHAT DO WE KNOW?

Studies hitherto on non-wood forest products have largely focused on technical aspects- on botanical identity, properties, end uses, characterization of active ingredients, processing technology, etc. The social science dimension has been generally neglected - as is the case with forestry as a whole - and the limited studies have at best focused on the profitability of cultivation, processing and trading of the more important products.

Official statistics

Although a number of countries incorporate statistics on production and value of non-wood forest products in the annual reports of the forest departments, their usefulness is undermined by several factors:

1. Information is collected only with regard to products that are considered important from the point of revenue to governments. Items that contribute to subsistence consumption, but generate no revenue to government, seldom find a place in the official statistics.
2. A lot of the products are aggregated, especially when areas are leased out for collection. Notwithstanding stipulations

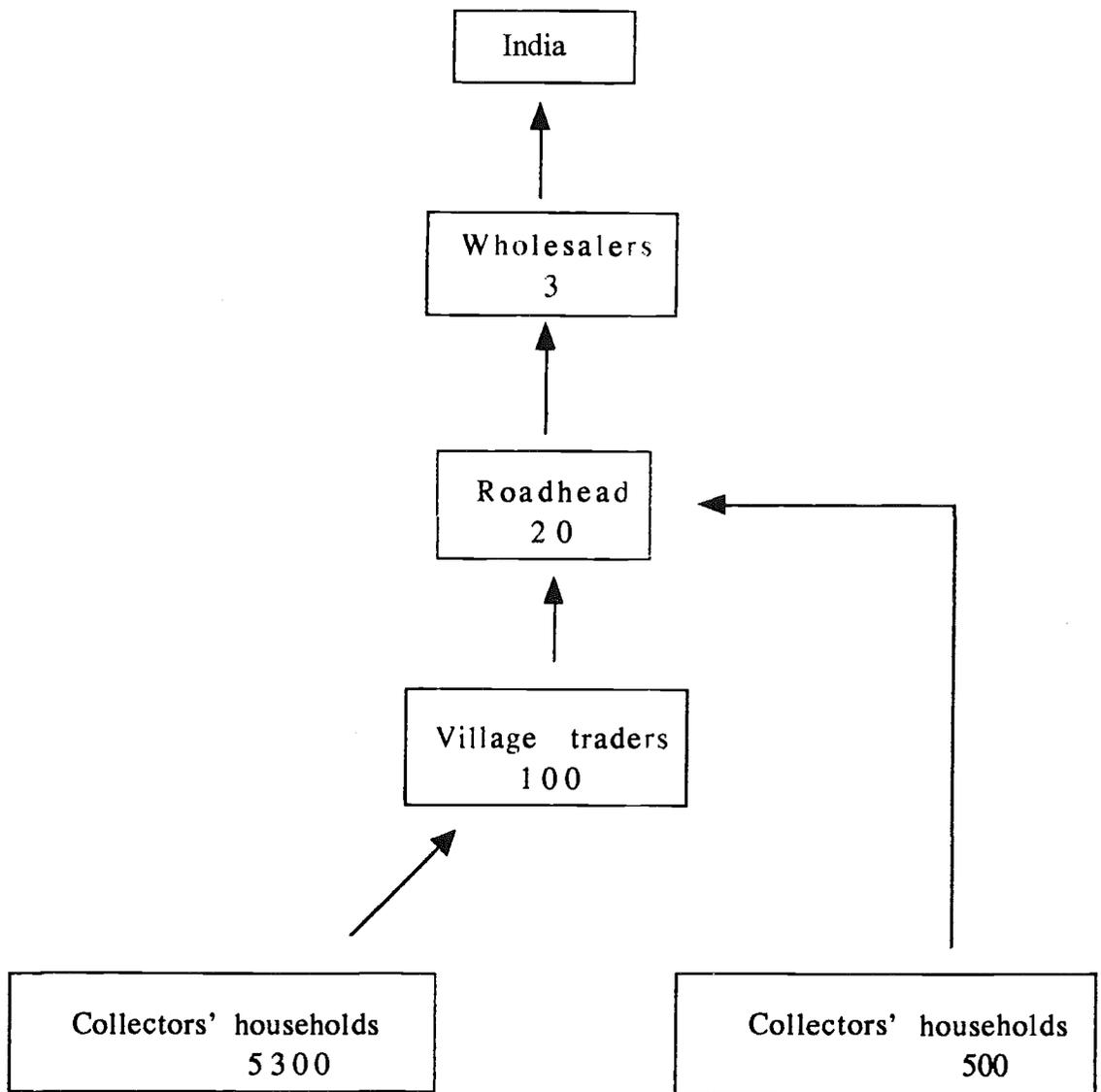


Figure 1. Marketing in the Hile-Basantpur Roadhead, East Nepal (Edwards 1993).

other off-farm employment," but through gum collection could generate "a substantial supplement to the household income" (Poffenberger and McGean, 1993). Traders came to the village to buy the gum and then sell it to another agent. Since the focus of the study was on the community, what happened to the gum *after* this transaction was beyond its scope. Yet this information is critical for a marketing analysis of the product.

It is this part of the marketing channel - *after* the product leaves the community or initial middleman and *before* it arrives at the processor or final consumer - that relatively less is known, especially if the products are illegal, taxed, or regulations ban harvest or export. The information is often fragmented into "bits and pieces" with accurate information very difficult to obtain. In order to fill in the gaps current marketing analysis often estimates product (and income) flows by taking information obtained from a community and projecting it through a sequence of exchanges until it reaches the final consumer, or taking information obtained from the retailer or processor and projecting it back to the collector.

For example, based on information from a sample of households or villages the total flow of products from the region will be estimated: one village sells X amount, so if there are 40 villages and each sell X amount than a total of X is collected and sold in the region. Or the analysis may take the total amount of a product exported and then divide it by the average amount of the product that a household is estimated to collect to arrive at an estimate of the number of collectors. While this form of analysis may provide a rough (often very rough) estimate of the *amount* of the product in the marketing system, it does not explain

the *process* of the marketing system, including such important factors as who does the collection, level of household dependency on the product, sustainability of current harvest levels, and sharing of income and benefits. Such analysis will not, for example, reveal the important role of the middleman in providing cash advances, transport, etc. nor additional or preferred marketing channels of the product.

Barriers to information

There are barriers to filling in the gaps between producers and the consumer or large processor. While the marketing channel can be determined, other information concerning the amount of the product, prices, and destination are more difficult to obtain. One of the primary barriers in obtaining information is the difficulty of gaining access to the major wholesalers or processors. It is a well-known phenomena that the poor are more accessible than the wealthy. While a villager might be willing to sit and chat with a researcher, a busy wholesaler will be less so, especially if there are product taxes to be paid or regulations to be met. Accuracy of information is also a problem and more difficult to ascertain. In the village or the initial assembly points (i.e., the roadhead) observation combined with an interview can provide fairly accurate information. However, when interviewing (or attempting to interview) a wholesaler, the large quantity and variety of products on site may make verification of information difficult.

Regulations that encourage the flow of products into illegal channels also make it very difficult to do an accurate analysis. Most countries in this region, for example, do not permit the export of unprocessed rattan, yet the largest rattan furniture

producers (Hong Kong, Taiwan, and Singapore) do not have domestic sources of rattan. Where the rattan comes from is a matter of speculation.

Information can be obtained on legal exports from official documents, although it should be recognised that products that are carried by porters across a border rather than on a freighter or airplane will go unreported. The amount sold, benefits/income distribution, etc., of what is not “formally” exported, but sold in local markets, or utilised by the forest community is therefore based on estimates from case studies, and the “bits and pieces” of information that are available.

Marketing and sustainability

Information on the flow of products is important not only for marketing analysis, but also for an assessment of the sustainability of both the market for NWFPs and forest conservation. If *icdps* are to be effective in providing income and promoting forest conservation then the sustainability of the continued harvest (off take) of the product must be considered. In order to determine sustainability (“products can be harvested indefinitely from a limited area of forest with negligible impact on the structure and dynamics of the product population being exploited” Peters, 1993), information must be gathered on current and past harvest patterns, communities perception of whether the product is more or less prevalent than in the past, and future market demand.

External markets exert the greatest pressure on forest resources. Without external markets, communities utilise forest resources, but there is little “push” to harvest more of a product than can be utilised by the household or community.

When marketing opportunities do appear, the community may have difficulty in effectively managing the resource. Community based mechanisms to monitor its own members may be weak, while mechanism to protect its resources from other communities may be totally lacking. In the community in northeast Thailand mentioned above, it was reported that “the forest serves as a primary supermarket to the majority of resident families. Excluding rice, about 80 percent of the average Dong Yai household diet is derived from the forest” (Poffenberger and McGean, 1993). In this community the majority of the households are involved in mushroom collection for sale - about 30 percent of the mushrooms collected are sold and provide a significant portion of the household income. However, members of other communities, some as far as 50 kilometers away, now come to Dong Yai to collect mushrooms. The result is that “availability of forest mushrooms has been steadily declining” as more collectors enter the area. (Poffenberger and McGean, 1993)

Control of resources

What is occurring in Dong Yai is similar to what is happening throughout the region. While there might be traditional mechanisms to regulate access and harvest of forest products, these rights of control (including the right of exclusion) are frequently no longer recognised by other communities who want access to the resources or by the state or state agencies. Forest communities are often minorities and/or the poorest in the country with little political power. The communities rights to live in or adjacent to the forests is frequently in question, especially with the current regional concern about deforestation.

The dependency of these communities on the forest resources is often overlooked or ignored. The degree of dependency by a community on NWFPs depends on the condition of the forest (biodiversity, maturity), its proximity to the community, access (rights and restrictions), local and external demand on forest products, and income earning options. In the past, if in close proximity to the forest with little or no hindrance of access, a common pattern was for a community to grow the bulk of its staples (rice, maize, etc.) and gather NWFPs to supplement the cultigens, to provide food during times of scarcity, to add variety to the diet, and to provide income. Forest products such as gums and resins, rattan, and bamboo were utilised by the household as well as sold.

However, when the income from a product increases, then competition within a community and between communities may increase as well. Within the community, the dependency on forest products will be related to the other resources of the households. It is common to find that it is the poorest households, with less agricultural land, livestock, adult males, etc. that are the predominant collectors of forest products (Malhotra et al., 1992; LeCup, 1994; Falconer, 1990; Hegde and Daniel, 1992; Saowakontha et al., 1992) While the actual *amount* of income earned from NWFPs may be small, it may provide the *largest* portion of household income. These are the households that are the most vulnerable to competition both within and between communities.

Valuation and pricing

In a perfect market there are:

- many independent producers, none of whom produces enough to be able to

affect market price by offering or withholding his product

- many independent buyers, none of whom can individually affect price
- the product in any one market is similar (in quality and kind)
- all buyers and sellers always have full knowledge of the current market price

It is not surprising that perfect markets are more a concept than a reality! While there are many independent producers, the number of wholesalers or processors may be very small, and there is often cooperation between the wholesalers (figures 1 and 2).

In NWFPs the buyers usually *set* the price and the collectors *respond* to the price. Theoretically, if the price for a product is regarded by the collector as being high (a good price), more will be gathered. If it is low, less will be gathered. However, forest communities often have few options for generating income. The lack of alternatives for income results in forest products being gathered and sold even when prices are relatively (based on price history for the product) low. It is this lack of alternatives that results in the depressed prices of NWFPs in many forest communities.

The collector may not know what the consumer wants or needs. While products flow out, little information may flow in. The longer the marketing chain, the less likely that this information will be available. The longer the marketing chain, the less likely that this information will be available to the producer. The middlemen may not know what is desired by the final consumer and may not effectively get this information to the producer. Lack of fit between what the final consumer wants and the actual

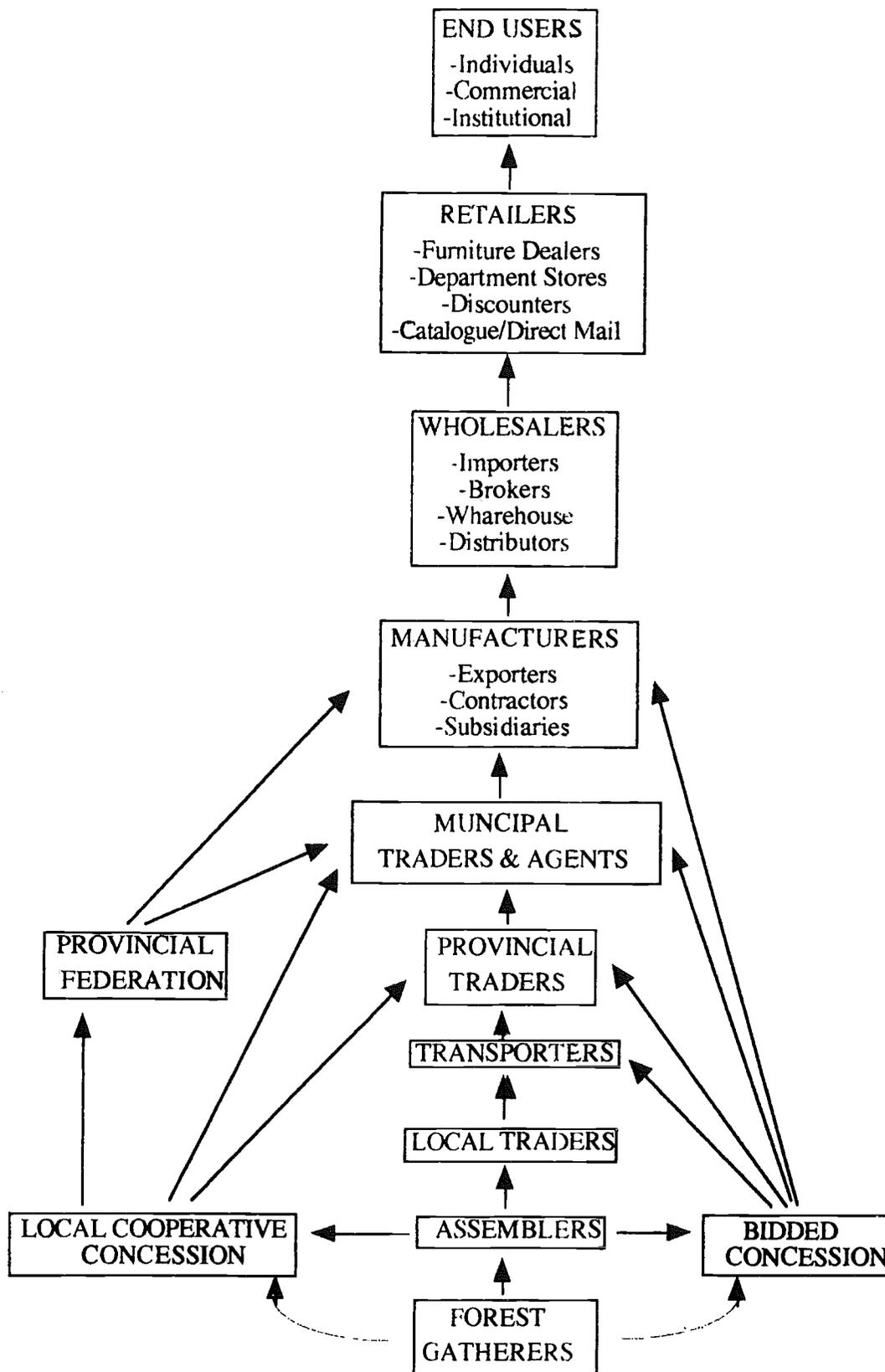


Figure 2. Market systems analysis. Rattan marketing in Palawan (Based on Fricke 1994b)

product results in wastage and low prices. LeCup (1994b) found, for example, that the medicinal plant collectors in the mountains of Nepal were not processing the plants (proper drying, sorting, etc.) in the manner desired by the final consumer. The long chain of middlemen (products were literally carried through a series of middlemen in Nepal and then into India) served as a barrier for the flow of information.

Price information also may not flow back to the collector. Few collectors (or middlemen) may know the final price paid by the consumer or processor. While this may in some instances be intentional (in order to keep the profits at the other end of the marketing chain), it is also the result of the distance the product may travel as well as the lack of awareness that the current system may be changed.

Without this information it is difficult for a collector to determine what is a "good" price and the "real" value. Not only does the collector not have information as to the current market price, but as mentioned above, the collector often does not have access to information as to what the consumer wants, so receives a low price. Also, without information as to the value (determined by what a customer is willing to pay) of the product, the collector cannot negotiate for a larger portion of the final price.

Marketing: issues and constraints

Marketing a product is more than selling a product.

"Marketing is the process of exploring which products potential customers will purchase and then producing, processing, promoting and distributing the products at a profit" (LeCup, 1994a).

In reality, the collectors of NWFPs do not market their products, rather they sell the products to a customer (the middleman). If the goal is for the communities to retain a larger portion of the income generated by NWFPs, the task of both the producer and those involved in assisting market development of NWFPs is to transform the current process from *selling* to *marketing* at the community level. However, there are obstacles inherent in NWFPs, the collectors, and the current marketing system that will hinder this transformation. These include:

1) Small quantities/many collectors.

The small quantities from each collector depresses the price received from the middleman and prevents the collector from receiving a larger portion of the total income generated from NWFPs.

2) Services provided by the middleman.

One of the unfortunate results of the lack of information as to what occurs in the marketing channel from when it leaves the collector and reaches the final consumer is that the role and the services provided by the middleman are misunderstood or distorted. The middleman is often perceived as being the villain, and while exploitation such as debt bondage does occur, the services provided by the middleman should not be overlooked. Nor should it be assumed that the middleman is taking the greater portion of the final price. When vigorous studies have been conducted, the amount the middleman (not the final processor) receives is not disproportionate to his investment (Edwards, 1993).

If the middleman is cut out of the marketing chain, then the services that the middleman provides (cash advances, transport, storage, etc.) must be assumed by other organizations or agencies. As noted above,

cooperatives of collectors are being established in the region. The lack of capital and resultant inability to provide these services have led to the collapse of many cooperatives. These services provided by the middleman/trader are proving to be vital.

Information: There is a lack of information on current marketing channels, amount of each product, price variation, etc. Without this information collectors cannot be effective in negotiating for a higher portion of the product price.

However, beyond the information of the current status of product price, information is also needed on future supply and demand of the product, processed product development, and future price projections. This is the information that is needed to transform the current *selling* into a *marketing* system. This information is not readily available to the community, or to economists, planners, and technicians involved in NWFPs.

POLICIES AND REGULATIONS

International treaties and conventions (and NGOs and environmental advocates) are largely concerned with tropical timber not NWFPs. Policies designed for timber conservation can, however, impact on NWFP collection. Natural resource laws and regulations frequently take the form of difficult to enforce regulations, rather than effective incentives. Regulations based on restrictive policies can create hurdles to effective (and equitable) marketing of products by producers. Bans on logging, for example, can close access to the forest for the gathering of other products. The current ban by countries in the region on the export of unprocessed forest products, can lead to a

thriving black market with little of the benefits being channeled to the producers. While the goal of a ban may be to stop the harvesting of a product, the opposite often results.

Price controls also often have the opposite effect of the original objective. Price controls may be created to either keep prices down or keep prices up. The usual goal is to keep prices down, especially if the buyer is a state agency or board. Price controls rarely benefit the collector.

What is needed?

To develop marketing systems that provide greater benefits to the community (and might lead to conservation of the forest, the following are needed:

Local management of forests. The current state management of resources in the region have not been effective in stopping deforestation. Local or joint management of resources is a promising strategy for the region. For this to occur, policy and legislation must be redesigned to allow communities to take a greater role in forest management (Warner and Wood, 1993).

Cooperatives/community organizations supplied with good market information. In order to get a higher price, collectors can form an organization, whether it is a cooperative, community user group, etc., that will assemble the individual members' small amounts of NWFPs. In the development of marketing systems, the goal should be that such organizations have good market information, not only for the current, but also for future markets.

One of the major roles that government agencies should play in the development of marketing systems is in collecting and

analyzing this information and making it available to collectors.

Removal of regulations: One of the roles that government agencies should not play is regulator of collections, prices, transport, and handling of NWFPs. Such involvement has usually not benefited the collectors, nor has it assisted in conservation of the resource.

Competition: The more buyers the better. If price information is available to the producer/collector, competition between middlemen, government agencies or businesses will result in a better price and better services.

Market analysis: There is an urgent need for market (also called sub-sector) analysis of NWFPs. The flow of each product from

collection to consumer must be studied so that the information needed for sustainable management, fair prices, and efficient markets can be made available to those involved in developing the marketing system.

Final caution

While the development of the marketing system can help the collector, it should be recognised that there are few examples of sustainable collection of a product or resource when it receives a high price. The more successful the marketing system, the greater the pressure to exploit the product. For *icdps*, more efficient equitable marketing systems will provide opportunities for both great success and failure in forest resource conservation.

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INTERNATIONAL TRADE IN NON-WOOD FOREST PRODUCTS IN THE ASIA-PACIFIC REGION

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INTRODUCTION

Socio-economic importance

The Asia-Pacific region is rich in non-wood forest products (NWFPs) in terms of diversity, number and value. The region produces the largest number of NWFPs and dominates world trade. Several NWFPs are unique to the region. The contribution of NWFPs to the revenue of countries and their value in terms of earnings and employment is considerable, especially in the developing countries of the region.

Millions of households in the region depend on the forests not only to supplement their domestic requirements of food, fodder, fibre and medicines, but also to supplement their incomes by selling part, or all, of their collection in local markets. Gathering and processing forest products may be the main source of income, or provide a supplementary income for people involved in activities outside the forest such as farming. Both men and women are involved in such activities. In India alone, more than 41 million tribals and other forest dwellers derive their earnings from these products, after consuming about 60 percent of collected NWFPs for personal use (Prasad, 1985). In the Indian state of Manipur, nearly 90 percent of the population depends on forest products as a major source of their income and some

250,000 women are employed in collecting forest products (FAO, 1992).

Small-scale forest industries based on NWFPs provide part-time employment for hundreds of millions of people in the region. These small-scale enterprises are normally labour intensive, often family-based and generally require very small capital outlay. Members of even the poorest sectors of society are able to run such enterprises. Enterprises based on NWFPs are generally more accessible to disadvantaged groups and women, and they provide diverse opportunities for gainful employment and income for rural people.

Forest-based processing is one of the largest employment sectors, and one of the most widely available sources of income in rural areas. For example, in Southeast Asia, rattan collection alone is estimated to have an annual value of US\$ 50 million, and processing rattan involves as many as half a million people (FAO, 1992). The collection of tendu leaves (*Diospyros melanoxylon*) for bidi cigarettes in India employs an estimated 7.5 million people part time in the off-peak agricultural season. Thus, NWFPs constitute an essential element of the income security base for many rural people in the region.

concerning removal permits and reporting of what is actually collected, the information remains quite unreliable. Products collected from outside the government forests seldom finds a place in the official statistics.

3. Even the limited information available, whatever this is worth, is not analysed to provide indicative conclusions. Existing information collection and retrieval systems continue to be outmoded, notwithstanding the electronic revolution, and too often published information is available only after a long delay.

Employment and income statistics are not collected as part of a regular system of reporting and the limited information available is based on specific case studies, or at best extrapolations derived from information on quantity or value of the products. When non-wood forest products are collected primarily for subsistence purposes, information on their contribution to employment and income are difficult to be estimated except through specific surveys. This is particularly true with bush meat, fruits, roots and a variety of other forest foods.

Product focused studies

Most of our knowledge on the employment and income aspects of non-wood forest products is based on product and location specific studies. There are, for example, studies on the quantum of income/employment attributable to non-wood forest products (Rao, 1994, Caldecott, 1988), the extent of household dependence on these products (Fernandes et. al 1988) and seasonal variation in the degree of dependence. There are also a limited number of case studies dealing with the

dynamics of the use of non-wood forest products (Peluso, 1992, Hadi, 1991) indicating how changes in markets and technology affect employment and income.

Employment and income from non-wood forest products are determined by a variety of factors, and more particularly the interplay of (i) market characteristics, (ii) technology, and (iii) organization. Most often the market characteristics, especially the income of the consumers, will determine the technology and organization of production, which in turn have a direct bearing on employment and income. The technology of production has a direct bearing on the long run sustainability of production.

Market characteristics

A substantial number of non-wood forest products cater to low income markets and this imposes certain limitations on the income that could accrue to the producers of such products. A typical example is that of bamboo mats and baskets, used by farm households. Considering the low income of most of the agricultural households, the value of the products tends to be low. Income that accrues to those involved in production of mats and baskets tends to be lower than the agricultural wage rates.

Low wages and hence marketability is often maintained by employing those who are outside the labour market. Basket and mat weaving are sometimes dominated by women and children; in a situation of high unemployment and underemployment, the opportunity cost of their labour tends to be low and they are hence available for wages far below the normal wages (Joseph, 1992). Production systems - especially the putting-out system, in which most of the work is done in the household - facilitate this and

Many of these products are of considerable commercial importance, and, after passing through domestic market chains, they are ultimately channeled into international markets and thus contribute to the precarious foreign exchange resources of many nations in the region.

Historical perspective

International trade in such products as resins, camphor, edible birds' nests, incense woods, spices and condiments had been going on for centuries before European mercantile adventurers or natural historians ventured into the region. The forests of Borneo have been supplying NWFPs for two millennia (Hall, 1985).

Records show that trade in sandalwood oil dates back to the 12th century and by the 15th century, the oil attracted the attention of traders from the West. By 1910, the annual export of sandalwood had reached 600 tonnes (Menon, 1989). Export of an essential oil, Ylang Ylang, started from the Philippines in 1864.

METHODOLOGY

The list of NWFPs entering international trade from the Asia-Pacific region is quite long. Reliable trade information is not available for many of them. This paper, however, attempts to list the major NWFPs from the region which are traded internationally.

Even for the products discussed here, complete information is not available. This report can at best be considered an attempt to put together bits and pieces of information, in the hope that it will provide a basis for bridging the gaps in information in due time.

This report relies on the recent work of the author on international trade in NWFPs (Iqbal, 1993). It has been supplemented with information relevant to countries of the Asia-Pacific region. Information has also been obtained from the UNCTAD database.

Trade statistics, as far as they do exist, are to be considered with much thought, as a very large volume of NWFPs are traded unregistered. Under-reporting or no reporting at all, double counting, inconsistent grouping of NWFPs, and the use of unrealistic prices are among the systematic shortcomings of these statistics. Such statistics, however, are the starting point for information, and can be considered indicative of actual trade. A study of this nature would never be complete without first hand information from traders in the producing countries. This, however, was not possible for this study, and reliance had to be made on secondary sources of information.

MAIN PRODUCTS

Edible products

A variety of non-wood forest products are collected from the forests of the region for use as human food, but morels, sago, pine nuts, birds' nests and bamboo shoots are the major food products which enter international markets from the region.

Mushrooms

A wide variety of mushrooms are collected from natural forests and consumed locally. Some of them are also traded in local markets as an additional source of income. For example, a considerable quantity of a very valuable mushroom (possibly *Lentinus*

edodes) is collected from the forests in northern Vietnam and sold after drying for 25,000 to 45,000 Dong (US\$ 3.10 to 5.60) per kilogramme of dry weight (de Beer, 1993). Growing and collecting wild or semi-wild mushrooms is now a significant use of forest lands in Thailand. The mushrooms support a thriving export trade in many countries in the region, bringing solid benefits to all concerned in their collection, processing and marketing.

Morels: Morels, or black mushrooms of the genus *Morchella*, are widely gathered by an army of men, women and children in the temperate forests of Pakistan, India, Afghanistan, and China and traded internationally in large quantities. Urban entrepreneurs buy them from local collectors and transport them in dried form to overseas markets, especially to Europe, where demand for them as gourmet or specialty foods consistently exceeds local or regional supplies, and prices are uniformly high.

Outside the Asia-Pacific region, morels grow in many European countries, the USA and Canada, but none of these supply the international trade of morels.

Total world production is estimated to be approximately 150 tonnes. Pakistan and India are the main producing countries. Each produces about 50 tonnes of dry morels annually (equivalent to 500 tonnes of fresh morels); all of which are exported.

France, Switzerland and Germany are the main importers of dried morels from Pakistan and India. According to unpublished records of the International Trade Center (ITC), the imports of dried morels to European Economic Community (EEC) countries and Switzerland, range between 100 to 120 tonnes per annum.

Morels command very high prices. In Pakistan, the price of morels has risen constantly from Rs. 80 per kilogramme of dried mushrooms in 1962 to the current level (f.o.b.) of more than Rs. 4,000 (\$US 133.00 per kilogramme). The gatherers, however, get one-half to two-thirds of the export price (Iqbal, 1991).

Pine mushrooms: Pine mushrooms (*Boletus luteus*) grow spontaneously under plantations of *Pinus radiata* in the USA, Europe, South America and New Zealand. The first specimens appear in the fourth year after planting and reach their peak of production in the seventh year. The yield then continues at a more or less constant level till the 15th year, when the dense foliage prevents penetration of sufficient sunlight. These highly nutritious mushrooms are gathered by the local inhabitants, dried in the sun to reduce the moisture content to about 35 percent, and then sold to exporters in sliced, dehydrated or preserved form.

New Zealand is the only country in the region where pine mushrooms are produced. Production estimates for the years 1990, 1991 and 1992 are 944, 324 and 773 tonnes, respectively, according to the National Progress Reports on Forestry of Asia-Pacific Forestry Commission, 15th Session, Colombo, Sri Lanka.

The latest trade information for pine mushrooms is not available because information on mushrooms of various categories is grouped together by UNCTAD. According to the Chilean Forestry News, June 1982, Chile exported 943 tonnes of pine mushrooms in 1981, valued at US\$ 2,031,863 (f.o.b.). The main overseas markets were the USA, France, Peru and to a lesser extent, Holland,

Switzerland, Ethiopia, Italy and a few others.

Other mushrooms: Other kinds of mushrooms can be cultivated, or "semi-cultivated" after transfer from their natural habitat to compost. In Bhutan, for example four kinds of oyster mushrooms (*Ostreus* spp.) are grown in year-round rotation on forest logs injected with fungal spores or in compost mixtures made from forest litter. As a result of UNDP/FAO input, export of canned oyster mushrooms to neighboring countries (India, Bangladesh and Nepal) has become a major source of export revenue for Bhutan (FAO, 1993).

Sago

Sago (*Metroxylon* spp.) is a fresh water palm, which grows naturally over a wide area, extending from Thailand in the west to the Santa Cruz Islands in the east and from Mindanao (Philippines) in the north to Timor (Indonesia) in the south (Menon, 1989). It is also widely cultivated.

Indonesia and Malaysia are the two major producing countries. Indonesia produced 47,206 tonnes of sago flour in 1984 (Menon, 1989). During 1991, Indonesia exported 10,107.7 tonnes of sago flour and meal to Japan, Hong Kong and Singapore, worth US\$ 2.32 million (f.o.b.), at an average price of US\$ 230 per tonne.

Malaysia produces good quality sago and exports nearly all of its production. It's production, however, is quite limited. During 1991, for example, it exported only 3 tonnes to Brunei Darussalam.

Bamboo shoots

Bamboo shoots represent an expanding and fashionable export market, valued annually

at over US\$ 20 million from Taiwan alone. Shoot production varies by species and locality. In China, *Phyllostachys pubescens* shoots comprise 18 to 30 percent of the total annual production of about 1 million tonnes (Sulthoni, 1989). Nearly 100 species of bamboo in China produce edible shoots. In Thailand, 8 to 15 percent of the total shoot production comes from plantations of *Dendrocalamus asper*.

Thailand exported 31,730 tonnes of canned bamboo shoots in 1989, valued at 460.62 million baht (\$US 18.4 million), according to Thailand's Foreign Agriculture Trade Statistics provided by the Office of Agriculture Economics, Ministry of Agriculture and Cooperatives. The bulk of the exports went to the USA and Japan, followed by the United Kingdom, Germany, Australia, the Netherlands, Canada, Saudi Arabia, Sweden, France and the Republic of Korea. Japan is the main market for bamboo shoots in Asia. Small quantities of bamboo shoots are also exported from Indonesia.

Nuts

Pine nuts: Kernels of Chalghoza pine (*Pinus gerardiana*) constitute a popular dry fruit in Pakistan, Afghanistan, India and many Middle Eastern countries. Chalghoza pine is a medium-sized tree, growing naturally at an elevation of 1,800 to 3,000 metres in the dry temperate forests of Afghanistan, Pakistan and India. Production varies from year to year, with good seed production cycles occurring every fifth year.

According to the National Progress Reports on Forestry, Asia-Pacific Forestry Commission (15th Session, Colombo, Sri Lanka) production estimates for the years 1990, 1991 and 1992 were reported to be

868, 715 and 435 tonnes, respectively. The bulk of the production comes from Pakistan and Afghanistan. Small quantities are also produced in India.

Pakistan exports about 120 tonnes of pine nuts annually to a number of Middle Eastern countries. The average wholesale price within Pakistan ranges from Rs. 40,000 to 50,000 (\$US 1,330 to 1,670) per tonne, whereas the export price ranges from US\$ 3,600 to 4,300 per tonne.

Malva nuts: *Sterculia lychnophora* is a large tree which grows naturally in Vietnam, Laos and Cambodia. One tree yields about 40 kilogrammes of nuts yearly. Annual production in Vietnam is 235 tonnes. Laos exports malva nuts to France, where they sell at a price of US\$ 1.50 per kilogramme (de Beer, 1993)

Walnuts: Walnuts are an important NWFP in China, India, Iran, Afghanistan and Pakistan, where the walnut tree (*Juglans regia*) is an important broad-leaved associate of temperate coniferous forests. The tree is also widely cultivated.

China produces 100,000 tonnes of walnuts annually from an area of one million hectares. Annual exports of walnuts from China are estimated to be 47,000 tonnes (Kunshan, 1991). Current export prices (c.i.f.) of Indian and Chinese walnuts (shelled) range from US\$ 2,500 to 3,000 per tonne, according to information from *The Public Ledger's Commodity Week*, July 3 1993.

Based on the UNCTAD database, the total value of the world's trade in walnuts in 1992 was about US\$ 331.238 million. Of this, 35 percent was for walnuts in the shell, and 65 percent for walnuts without the shell. EEC, Japan, Canada, Switzerland, Austria and

Hong Kong are the major markets. Nearly one-fourth of all walnuts traded come from the Asia-Pacific region: China (16.6 percent), India (6.8 percent), Iran (0.03 percent), Afghanistan (0.03 percent) and Pakistan (0.02 percent). Outside the Asia-Pacific region, USA, Turkey, Chile, Hungary and Argentina are the main suppliers of walnuts.

Chestnuts: Total production of chestnuts (*Castanea* spp.) in Asia and the Pacific was reported to be 85,043, 89,747 and 110,747 tonnes, respectively, during 1990, 1991 and 1992. China is the major producer and exporter of chestnuts in the region. China's chestnut plantations grow over an area of 300,000 hectares, and the country has an annual production of 33,000 tonnes, accounting for one-tenth of the world's total. China exports 25,000 tonnes of chestnuts annually, mostly to Japan, earning about US\$ 50 million.

Vietnam also produces between 70 and 134 tonnes of chestnuts per annum (de Beer, 1993). The Republic of Korea is another important producer and exporter of chestnuts in the region.

Outside the Asia-Pacific region, Spain is the major producer of chestnuts, where *Castanea sativa* covers over 160,000 hectares, yielding 12,000 to 40,000 tonnes of chestnuts. About 15 to 20 percent of the production is not picked and falls on the ground, where it is consumed by domestic livestock or game animals (FAO/ECE, 1988).

Based on the UNCTAD database for 1992, the total world market for chestnuts is about US\$ 110 million. Japan, USA, Switzerland, Hong Kong (entrepot) and Austria are the major markets, collectively accounting for 87.28 percent of the world's imports. China

provides 69 percent of the supplies to these markets, with the Republic of Korea accounting for another 6.7 percent. Thus, the Asia-Pacific region provides more than 75 percent of the chestnuts traded internationally.

Ginkgo nuts: *Ginkgo biloba* is a "living fossil" tree, belonging to *Pteridophyta*. It is native to China, where its fruits are collected and consumed as a food and as a medicine. The fruits are rich in starch, fat, protein and a variety of vitamins. Total annual production is estimated at 5,000 tonnes, most of which is exported at a value of about US\$ 7 million (Kunshan, 1991). A product from *Ginkgo biloba* is the most widely used of all medicines in Germany, in 1989 accounting for over 5 million prescriptions, the majority for the treatment of tinnitus (Lewington, 1993).

Jujube fruit: Drupaceous fruits of the *Zizyphus* species which grow in forests and farmlands in many African and Asian countries are collected and consumed by local communities. Extra supplies are sun-dried and stored for future consumption. The fruits are also sold, dry or fresh, for supplementary income.

China is the only country in the region known to be exporting jujube fruits. Kunshan (1991) reported that in China the jujube tree grows over an extensive area of 240,000 hectares. Annual output of fresh jujube is estimated to be 400,000 tonnes. Average Chinese annual exports are 4,700 tonnes of dry jujube, earning US\$ 5 million.

Total production estimates of jujube fruit for the Asia-Pacific region were estimated to be 5,953, 7,577 and 11,216 tonnes, respectively, for 1990, 1991 and 1992. These figures do not include Chinese production of 400,000 tonnes annually.

Salanganes' or birds' nests

Edible birds' nests are built by two species of cave dwelling swiftlet, *Collocalia fuciphaga* and *C. maxima* living in Borneo, Peninsular Malaysia and Thailand. Although not eaten by the local people, they are collected for sale to Chinese at home and abroad. The sticky secretion of the glands of the nest-builders is the key ingredient in a soup prized by the Chinese for its delicacy and healing properties. The black nests of *C. maxima* incorporate feathers which must be removed, and hence the nests are less valuable than the clean "white" nests of *C. fuciphaga* (de Beer and McDermott, 1989).

Malaysia is the major producer and exporter of birds' nests. Malaysian exports in 1991 totalled 18.6 tonnes, which went primarily to Hong Kong, Singapore, Japan and Taiwan, for a value of 2.93 million Malaysian dollars (\$US 1.2 million), (i.e. an average f.o.b. price of M\$ 157.62 [US\$ 63.00] per kilogramme).

Edible oils

Tengkawang or Illipe nut: All tengkawang trees producing oil-bearing seeds of commercial value belong to the meranti group (*Shorea* spp.). In international markets, these seeds are known as illipe nuts, although true illipe nuts come from the Indian madhuca trees.

The oil extracted from the nuts closely resembles cocoa butter in its physico-chemical properties. It can easily blend with other vegetable fats such as palm-mid fraction, sal and shea stearin. This makes it a potential replacement for cocoa butter fat. In Japan and Singapore, it is used in the manufacturing of chocolate, soap, candles and cosmetics, and even as a lubricant.

Indonesia is the main producer and exporter of tengkawang nuts. Almost the entire production is exported. Details on Indonesian exports of black and brown illipe seeds during 1992 are given in table 1.

In India, sal forests occur over an area of 11,437,900 hectares. Data on current production is not available, but the entire production is consumed domestically.

Spices and condiments

Nutmeg and mace: The nutmeg of commerce is a seed of *Myristica fragrans* and mace is the aril that surrounds the seed. Nutmeg is an evergreen tree belonging to the family *Myrticaceae*. It is indigenous to the Moluccas in Indonesia, but is now cultivated in other countries like India, Sri Lanka and Malaysia. Outside the Asia-Pacific region, Grenada is an important producer of nutmeg and mace, ranking second to Indonesia.

Indonesia accounts for three-quarters of world production and export. Indonesia produced 15,800 tonnes of nutmeg in 1990, according to *Agricultural Products*, November 1991.

In 1991, Indonesian exports of nutmeg and mace rose to 7,335 tonnes and 1,547 tonnes, respectively, compared with 6,391 tonnes and 1,050 tonnes in 1990.

The nutmeg market is facing depression and prices are persistently falling, primarily

because of oversupply. In August 1992, nutmeg's price on the London market was £ 1,115 (US\$ 1,850) per tonne, having fallen to the lowest point in two years. Mace prices, on the other hand, improved, attaining a peak of £3,645 (\$US 6,075) per tonne in November 1992, compared with £ 2,915 (US\$ 4,850) per tonne in June 1992.

Cinnamon and Cassia: True cinnamon and cassia spices are the prepared, dried bark of trees belonging to genus *Cinnamomum*, indigenous to south and Southeast Asia and China. True cinnamon, *Cinnamomum verum*, which originates from Sri Lanka and southern India has been introduced to many other areas, notably Madagascar and the Seychelles.

The major *Cassia* species of international importance are *C. cassia* (China), *C. burmannii* (Indonesia) and *C. loureirii* (Vietnam). *C. tamala* is also traded, but is considered to be of inferior quality (Smith, 1986). A classification system has evolved on the basis of species and origin, because each type has a distinctive flavour and other characteristics.

Cinnamon and cassia are often used interchangeably. Their major uses are in bakery goods, as seasonings for meat, fish, preserved fruit and vegetables, and in curry powders, beverages, tea, desserts, and some pharmaceuticals.

World trade in cinnamon is between 7,500 to 10,000 tonnes annually. Sri Lanka

Product	Quantity (tonnes)	Value (US\$)	Price (f.o.b) (US\$/tonne)
Black illipe	210	105,000.00	500.00
Brown illipe	13,361	7,649,035.00	572.00
Total	13,570	7,754,035.00	-

Source: Indonesia Foreign Trade Statistics, Biro Pusat Statistik.

contributes 80 to 90 percent of the total production, with most of the remaining balance coming from the Seychelles and Madagascar (Smith, 1986). The world trade in cassia is between 20,000 to 25,000 tonnes annually, of which Indonesia accounts for two-thirds, and China for most of the remainder. Minor producers include Vietnam and India. About 2,000 to 3,000 tonnes of cassia bark are exported from Vietnam annually (de Beer, 1993). The USA, EEC, and Japan are the major markets.

Cardamom: Although true cardamom (*Eleutaria cardamomum*) is a perennial cultivated herb, false cardamom or bastard cardamom is obtained from *Afromomum* spp. in Africa and *Amomum* spp. in Southeast Asia.

Amomum sp. is a herb which grows under forest cover. Its seeds are used as a spice. In Laos, it grows naturally and is cultivated. Laos exports 400 tonnes or more of cardamom per year via Thailand and China. In Cambodia, it occurs in the Cardamom Mountains. Cambodia used to be an important exporter in the past, but exports no known quantities today (de Beer, 1993). A small quantity of cardamom is also produced from wild sources in northern Vietnam, from where about 10 tonnes are exported to Japan, Hong Kong and Singapore each year.

Galanga: Galanga is a herbaceous plant (*Alpinia officinarum*) occurring naturally in Vietnam and Laos. It is also cultivated in home gardens. The root is used in Vietnamese and Lao cuisine as a ginger-like spice. It is also used in local medicine. There is a market for galanga in Asia, while some small quantities are imported by the Netherlands (de Beer, 1993).

Plant gums

Gum Tragacanth

Gum tragacanth is an important commercial gum produced by several shrubby plants of the genus *Astragalus*, which grow from Pakistan to Greece, particularly in Iran and Turkey (Anderson, 1989). The exudate is produced spontaneously on the bark of the shrub, but the yield is often increased by making an incision and driving wooden wedges into it.

Iran is the main producing country within the Asia-Pacific region. Small quantities are also produced in Afghanistan, but export consignments are very rare. About 70 percent of supplies originate from Iran. According to *Agricultural Products*, November 1991, Iran's average annual production potential has been estimated at 400 tonnes.

Outside the region, Turkey is the main producer. The gum is also known to be produced in Syria, but export consignments are very rare.

Iran's export of tragacanth was 91 tonnes in 1987, increasing to 142 tonnes in 1988. The export volume further increased to 176 and 257 tonnes in 1989 and 1990, respectively. Thus, there was an increase of 182 percent in 1990, over exports in 1987. With this growth rate, it is expected that Iran may very soon be able to export 400 tonnes of the product.

Tragacanth finds markets in many different countries, but the EEC, USA, Japan and the former Soviet Union are the major importing regions.

Gum Karaya

Also known as Indian tragacanth, this gum is obtained almost exclusively from Indian

plantations of *Sterculia urens* and smaller plantations of *S. villosa*.

World production of gum karaya is currently about 5,500 tonnes per annum, but is declining. India is the only regular producer, overwhelmingly dominating international trade in the gum. Indigenous consumption of gum karaya is very little; only lower grades are consumed in the country.

In 1991-92, India exported 573.6 tonnes of gum tragacanth, mainly to Japan, France, the USA, West Germany, UK, Belgium, Italy, UAE and the Netherlands, in that order. According to monthly statistics on foreign trade from the Directorate General of Commercial Trade and Statistics, Government of India (1991-92), the total value of exports was about 49 million Indian rupees (US\$ 1.6 million), or an average price of Rs. 85,337 (US\$ 2,850) per tonne. There is significant re-export trade from European ports. The USA consumes roughly one-half of gum karaya production and Western Europe around 30 percent.

Oleoresins

A variety of oleoresins are tapped from various plants. Among the important ones are pine oleoresin obtained from pine trees, damar resin from *Dipterocarpus* spp., gamboge and yang oil from *Dipterocarpus* spp., benzoin from *Styrax* spp., copal from *Agathis dammara*, and dragon's blood (rattan resin) from rattan palms. Although all the resins mentioned appear in the international market, pine oleoresin is the most important.

Pine oleoresin

Resin tapping from pine trees is perhaps the best known extractive use of forests and it

remains one of the largest industries in the non-wood forest products sector. It was first used in the days of wooden ships, when pitch and tar derived from resin were essential sealants for ship hulls, hence the name "gum naval stores" still persists for such resins. Today their main use is in the production of turpentine and rosin, also known as gum turpentine and gum rosin.

Rosin is utilised in the paper, synthetic rubber, printing ink, paint and adhesive industries. Turpentine, apart from being a universally recognised paint solvent, is a base material in the production of camphor, insecticides, and perfumery.

World production of pine oleoresin has remained almost stable at between 1.1 and 1.2 million tonnes over the past 20 years (En, 1987). Dominant producers in the Asia-Pacific region are China and Indonesia. Chinese production of gum turpentine, although the largest in the world, is consumed domestically and does not enter international trade. Estimates of Chinese production of rosin and turpentine are 400,000 tonnes and 460,000 tonnes, respectively (Kunshan, 1991).

Indonesia has experienced a dramatic increase in gum resin production over the last decade and it is now one of the largest producers and exporters. Pine (*Pinus merkusii*) plantations which are tapped for resin, grow over an area of 73,400 hectares in Indonesia. Gum turpentine exports from Indonesia increased from around 3,400 tonnes in 1988 to 7,200 tonnes in 1992. India, which buys more than 50 percent of production, is Indonesia's biggest market.

India, Thailand, the Philippines, Vietnam, Laos, Sri Lanka and the Republic of Korea are other important producers in the region, although production is small and consumed

locally. Brazil, Portugal, Mexico, South Africa, Zimbabwe, Kenya, Greece, Turkey and Argentina are other producing countries outside Asia and the Pacific, although production is mostly confined to meeting domestic needs, rather than for export (Coppen, 1994). The USA and Japan are the major markets for gum rosin.

Damar

Damar is obtained by tapping various trees of the dipterocarpus family (e.g., *Dipterocarpus alatus*, *Anisoptera oblonga*, *Cotylelobium melanoxydon*, *Hopea odorata*, *Shorea hypochra*, *S. vulgaris*, *S. obtusa*, *S. talura*, *S. thorelii*, *S. guiso*, etc.). It is also produced by excretions of insects which feed in the intercellular spaces in the bark of these species. The oleoresin produced is used in making natural paint, varnish, printing ink and glue, and for caulking boats.

Indonesia is the leading producer and exporter of damar in the region. Information on current production and exports could not be collected for this study. However, the average value of Indonesian exports of damar between 1983 and 1987 was US\$ 1.274 million (de Beer and Mcdermott, 1989). Some damar from Indonesia enters the European market (Germany and France) via Thailand and Singapore (de Beer, 1993).

Thailand is the second major producer of damar in the region. Chuntanaparb and Hoamuangkaew (1985) reported average annual Thai damar exports of 1,072 tonnes, with an average price of 6.92 million baht (US\$ 275,000) between 1979 and 1983.

Laos and Vietnam also produce damar. Laos produces between 500 and 1,000 tonnes a year, most of which is exported to

Thailand. Vietnam produces about 500 tonnes per year.

Gamboge

Gamboge is a bright yellow resin obtained from trees of the genus *Garcinia*. It is used as a pigment for paints and inks and as a medicine. A small quantity is produced in Thailand. Chuntanaparb and Hoamuangkaew (1985) reported average annual Thai exports of 6 tonnes, valued 1.6 million baht (US\$ 64,000).

Yang oil

Yang oil is obtained by tapping trees of *Dipterocarpus* spp. It is used as a preservative of wood and bamboo; for waterproofing umbrellas and bamboo baskets; in paints, varnishes and printing inks; for caulking boats and in making medications. It is also used to produce balsam oil for perfume base. Indonesia and Thailand are the major producers and exporters in the region.

Chuntanaparb and Hoamuangkaew (1985) reported average annual Thai production of 2.3 million litres and exports of 140 tonnes (average value 39.6 million baht, or US\$ 1.58 million).

Benzoin

Benzoin is tapped from the tree, *Styrax tonkinensis*. The resin is mainly used in the fragrance industry as a base material for high class perfumes and balms. Laos produces over 100 tonnes annually, which are exported to France and China, at prices ranging between US\$ 15 to 22 per kilogramme. Vietnam exports about 10 tonnes per year to France (de Beer, 1993). The only other exporter of benzoin in the

region is Indonesia, but the resin is of a lesser quality. Indonesia exported US\$ 10,269 worth of gum benzoin during 1985 (de Beer and Mcdermott, 1989).

Latexes

Natural rubber

The rubber tree (*Hevea brasiliensis*) originated in the Amazonian region of Brazil and has been planted on a large scale in Indonesia, Malaysia and Thailand, where an area of 7.2 million hectares is estimated to be planted with rubber. Natural rubber is a raw material used for the production of a number of products; one of the most important being automobile tires.

Indonesia and Malaysia are the world's leading producers of natural rubber. In 1992, according to the *Rubber Statistical Bulletin* 47(7) of the International Rubber Study Group, Indonesia and Malaysia together account for 47 percent of the world's total output of 5.54 million tonnes of rubber. Sri Lanka, India, Vietnam, Papua New Guinea, Cambodia, China and Myanmar are other producers in Asia and the Pacific. Major importers are the USA, Japan and the EEC.

Gutta Percha

Gutta Percha is a tough plastic-like substance from the latex of several Malaysian trees of the genera *Payena* and *Palaquium* of the sapodilla family. It resembles rubber, but contains more resin. It is used as insulation and in dentistry. Malaysia and Indonesia are major producers of gutta percha. Small quantities are also produced in Thailand.

The total value of the world trade in gutta percha and other similar latexes was about US\$ 26.73 million in 1991. Japan, EEC, the USA, Korea, China and Australia are the major markets, which together accounted for more than 90 percent of the world imports during 1991. In these markets, the contribution of Malaysian, Indonesian and Thai supplies of gutta percha were 32 percent, 15 percent and 1 percent, respectively.

Fibres and flosses

Rattan

In Southeast Asia, climbing palms or rattans are commercially the second most important forest product after timber. Rattan is a source of multiple products such as chairs, beds, cupboards, bookshelves, mats, carpets, kitchen utensils, umbrellas, flower vases, and sports goods. Producing countries are Indonesia, Malaysia, the Philippines, Myanmar, India, Sri Lanka, Thailand and Bangladesh.

On the basis of trade statistics from 1988 to 1992, the average value of the world trade in rattan has been estimated to be in the order of US\$ 66 million. The entire production and trade originates from the Asia and Pacific region. Malaysia, Indonesia, Vietnam and China are the major producers, each contributing 19.5 percent, 15.9 percent, 14.0 percent and 12.4 percent, respectively, to the world's rattan trade. Small quantities also originate from Myanmar, Thailand, the Philippines and Cambodia. The EEC, Japan and the USA are the main markets. Singapore and Hong Kong are the primary entrepots.

Indonesia used to dominate the world trade in raw rattan, accounting for about 80 to 90

help to circumvent the application of the labour laws.

One approach to enhance income is to tap high income markets through product diversification. A typical example of this is the export of rattan - finished or unfinished - to high income markets. Interestingly, the organizational structures required to tap such markets (which are not directly accessible to the producers) will limit the income that eventually accrues to those involved in collection and preliminary processing. Marketing handicraft items in tourist centres is not different and unless there are significant improvements in the organization of production and marketing, the impact of market shifts is unlikely to have much impact on employment and income.

Technological innovations in response to market changes also fail to have the desired effect. A typical example is that of the manufacture of bamboo boards, or bamboo plywood, adopting the same capital intensive technique as used by the plywood industry. It was assumed that this would help to overcome the decline in the demand for bamboo mats and enhance the income to mat weavers through value addition in the processing sector. However, the way the labour market is segmented, benefits from value addition have remained within the capital intensive processing sector. Wages in the traditional sector continue to be determined by the opportunity cost of labour, ensuring that the income remains very low.

Social restrictions on working outside the household have accentuated the problem. Entrepreneurs have conveniently taken advantage of this by developing putting-out systems of production. Raw material is supplied to the households and mats and

baskets can be made during the spare time, combining it with other household chores. Although some of the women work for more than 10 to 12 hours a day, low wages tend to be justified on the argument that they would otherwise be earning nothing.

The interplay of social factors often make the non-wood forest products sector a low wage trap, inhibiting any development. Since wages are low, households have a strong compulsion to employ all family members including children, who drop out of the school at a very early age to join the labour force. Given the low level of education and skill acquisition, they are virtually trapped in the sector, with no opportunity for enhancing their income and standard of living (Nair and Muraleedharan, 1983). The situation is not much different in the case of several other non-wood products like beedi leaves and medicinal plants. Aggregated information on employment and income conceals this reality.

Backlash effects of technology

Quite often efforts have been made to develop appropriate technology which in theory could be easily adopted by those involved in collection and processing of non-wood forest products. But again the inequities in access to the technology often have negative effects. A typical example of this is introduction of the power lathe for the production of wooden beads in the Indian state of Karnataka. Traditionally women were involved in the production of beads using hand operated lathes, limiting the quantity of beads that could be produced. The Small-scale Industries Centre facilitated the introduction of power lathes, which increased productivity, and hence income, many times.

percent of the trade until a ban was imposed on export of raw rattan in 1979, followed by another ban on export of semi-processed rattan in 1988. These bans were imposed to encourage domestic downstream processing.

Hong Kong is one of the most important rattan processing centers in the region. The city's average annual exports of rattan articles during the period 1980 to 1982 were worth HK\$ 201 million (US\$ 25 million), of which 67 percent was furniture and 33 percent other rattan articles (Prasad, 1985).

Bamboos

Bamboo has been in use from time immemorial for a variety of purposes. China, Indonesia, Malaysia, India, the Philippines and Vietnam are the major producing countries in Asia and the Pacific. Total annual harvests are estimated at 20 million tonnes.

Total world trade in bamboo was about US\$ 23.4 million in 1988, and US\$ 44.9 million in 1992, nearly doubling over the 5-year period. According to the COMTRADE database, the average value of exports from 1988 to 1992 was US\$ 36.2 million. China accounted for 65.7 percent of the exports in 1992, followed by Thailand (10.1 percent). Malaysia, Burma, Korea, Indonesia, Vietnam, the Philippines and Bangladesh were minor exporters.

In 1992, the EEC countries were the major markets for bamboo, collectively accounting for 53 percent of the world's total imports. Of the EEC countries, France, Germany and the Netherlands were the major importers, accounting for 17.1 percent, 14.4 percent and 9.6 percent, respectively, of the world's total imports.

Kapok

Kapok is a mass of silky fibre that surround the seeds of the ceiba tree (*Bombax ceiba*) and is used to fill mattresses, life preservers, and sleeping bags, and as insulation. The tree grows in many South and Southeast Asian countries, but Thailand and Indonesia are the world's main suppliers of kapok. Japan, China, the EEC and the USA are the major markets. In 1992, according to the UNCTAD database, the total value of world trade in kapok was about US\$ 11.394 million, of which about 66 percent was contributed by Thailand, and 16 percent by Indonesia.

Vegetable Tannin

Several forest trees are a source of tanning materials used to preserve and soften animal hides such as leather. In Asia and the Pacific, the most common trees yielding tannin are mangrove species, *Acacia* spp., *Terminalia* spp., and *Cassia* spp.

Outside the region, quebracho, mimosa and chestnuts (QMC), oaks and wattles are important tannin-yielding plants. Black wattle (*Acacia mearsii*) plantations are an important source of tannin in Kenya and Tanzania.

Vegetable tannin is used mainly in curing hides and skins to make finished leather. Large quantities are also used in drilling for oil to control the viscosity and water loss of drilling fluids. Vegetable tannin is also used in the food, metallurgical and pharmaceutical industries, and for water softening.

According to the COMTRADE database, the total value of the world's trade in vegetable tannin extracts (HS No. 3201) was about US\$ 123.3 million in 1991. In

Interestingly, the desired benefits didn't materialise. Men who were earlier reluctant to work in the bead industry on account of the low wages, monopolised bead production using power lathes, while women were relegated to the traditional low productivity activity (ISSI, 1987). Access to technology, and not just its availability becomes critical in determining the extent of employment and income that accrues to the workers.

Technology and long run sustainability

One of the major issues concerning non-wood forest products management is their long-term depletion and its impact on employment and income. Decline in production occurs through diversion of forests for alternative uses (especially logging and agriculture) (Conelly, 1985) or through intensive exploitation in response to commercialization (Peluso, 1992). Policies, especially on access to resources and tenure are critical in determining the level of harvest and the long-run sustainability of production.

Local communities, traditionally dependent on non-wood forest products, were able to sustain production largely due to their dependence on a range of products and their strategy from switching from one to another. Commercialization of selected products has in the initial stages resulted in intensive exploitation of what is available naturally. Management, including cultivation, commences at a much later stage, when depletion enhances profitability on account of price increases.

Forest management has hitherto focused on a limited number of products, especially timber and other major products. Efforts at enhancing production are directed at intensive management of commercially

important products. Systems that help to overcome conflicts in the management of a diverse range of products are not in place yet.

Organizational changes and their impacts

Commercialization and the resultant changes in the system of production are not necessarily always beneficial. The system of production employed under intensively managed plantations tend to exclude those traditionally involved in the collection of the products from natural forests. New jobs created in the plantation sector require different skills, while those traditionally involved are unable to adapt themselves as wage labourers under a plantation system. A more organised plantation sector thus displaces those who are traditionally involved in the activity.

Rubber cultivation by the Indonesian forest dwellers and cardamom collection by the hill tribes in India are examples of how compulsions of organised production could have a detrimental effect on those traditionally involved in the activity. In the latter case, plantation scale production has not facilitated the employment of the local people. On the other hand, most cardamom plantations are managed by labour brought from the plains (who of course have become the most dominant group in some of the areas, encroaching on land traditionally used by the hill tribes). The boom-bust cycle of cardamom, in response to supply-demand interactions, has aggravated the situation, undermining long-run ecological stability of production.

CONCLUSION

What will be the scenario of development of non-wood forest products? This is rather

difficult to predict especially in view of the rapid changes in technologies. Most significant changes in nature or human life are not the outcome of a gradual process, but a result of occasional and often unpredictable quantum jumps. Since the broad category of non-wood forest products include a large number of items, whose properties are yet incompletely known, their potential for new uses is very high. Such breakthroughs in technologies are more likely to emanate from outside the forestry sector.

To match these technologies we will require completely different institutional structures. Our effort should be to take full advantage of the breakthroughs for ensuring that the communities who have been the guardians of the resources get a fair deal through better employment, income and improved access to goods and services. There is

substantial scope for improvement, but realization of this depends on a variety of factors and more particularly social engineering skills.

It was not too long ago that the role of forest-based industrialization was given considerable prominence in the forestry strategies of developing countries. At that time it was considered as a panacea for all the rural development problems, and more particularly unemployment and low incomes. With hindsight we have realised how the assertions at that time have proven incorrect. In theory there is nothing wrong with the strategy, but the failure was due to our inadequate understanding of the social and economic dimensions of the problem. Let us guard against this to ensure that the non-wood forest products development strategy does not end as a missed opportunity.

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Statistical data is particularly weak for NWFPs which do not generate revenue for governments.

MARKETING, VALUATION AND PRICING OF NWFPs

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INTRODUCTION

While NWFPs have a very long history of being utilised and traded in the Asia-Pacific region, there has been a recent dramatic surge of interest. Newsletters, workshops, seminars and courses are springing up throughout the region. In part the increased interest in NWFPs appears to be the result of the emerging new strategy in forest conservation: *integrated conservation and development projects (icdps)*. The underlying assumption of *icdps* is that if a community can benefit from forest based incomes it will conserve the forest. While this assumption is still unproven, it has created interest in identifying the importance of NWFPs to local as well as national economies.

Interest has also been created by the recognition of the potential of "green markets" (Fricke, 1994). There is an increasing number of affluent "green consumers" who are interested in buying products that they perceive as being environmentally friendly. While green consumers were initially believed to be a Western phenomena, the prosperity and growing environmental awareness in this region has been reflected in the rapid growth of consumer interest for "ecological" or "natural" products. The continuing economic boom of this region, rising environmental awareness, and trendiness of

the products are projected to provide an increasing market for at least some NWFPs as raw materials.

Can the growing demand for NWFPs and forest conservation be met? Certainly the forest communities involved in collecting NWFPs will respond to the greater demand for the products. Traditionally, forest communities have been perceived as being subsistence rather than market oriented. This perception was tenacious even as studies continued to cite the importance of forest products not only for direct household consumption, but also for cash income (Dove, 1985; Poffenberger and McGean, 1993). While the belief that forest communities are only interested in subsistence may linger, these communities are becoming increasingly integrated with national/international economies. As a result of improved infrastructure and communication, communities that were once isolated are more aware of external opportunities and products and more vulnerable to external control and destruction of local resources.

It is this vulnerability to external demands and control that creates the challenge of combining the development of NWFP markets and community income with the conservation of the forests.

MARKETING OF NWFPs: FOLLOWING THE MARKETING CHANNEL

Collectors, concessionaires, and traders

Forest communities in the region have historically collected a wide variety of NWFPs for domestic use and external sale. Many of the forest products that were collected and sold by community members were those that could be collected during periods of low labor input during the agricultural cycle (e.g., resins, rattans) or during a brief "bloom" (e.g., mushrooms).

In the past, the collection and marketing of NWFPs that were exported or processed into high value products (rattan, medicinal plants, essential oils, etc.) was often under a concession or license holder system. The common pattern under the concession system was for a government department or agency to grant a concession to an individual or company for products in a designated forest area in return for fees or taxes. For one area there could be a number of concessions for different products, e.g., the timber concession could be awarded to one individual or company, the resin and rattan concession to another. The concessionaire had the right to purchase and sell all of the specified product that was collected and marketed from the designated area. Domestic use of the products by forest communities was either allowed or overlooked.

The concessions were often long term, in response to the then (and current) prevailing theory that if long-term benefits could be obtained there would be better management of the resource. Some concessionaires were good managers. In west central Palawan, Philippines, for example, the concessionaire for almaciga (manila copal, a resin collected

from *Agathis philippinensis*), provided the men who would collect the resin with tapping gear, instructions for how to tap the tree without harming it (initial instruction was from an agent of the Bureau of Forest Development, now known as the Forest Management Bureau) and which areas of the concession to tap.

Since many forest products are scattered throughout the forest, geographically distant from settlements, and seasonal, the concessionaire needed to have a number of collectors to gather the product. One of the primary ways to attract collectors was for the concessionaire to also act as trader. In relatively isolated communities forest products were (and in such situations, still are) traded for goods. The shops often traded in two goods, manufactured goods (kerosene, matches, tobacco, liquor, cloth, etc.) and food. It was easy for a collector to fall into debt; this suited the needs of the concessionaire since it provided leverage to force collection of the product.

In west central Palawan, a majority of the forest community members were in debt to the concessionaire. Although the rainy season was the most productive time for almaciga collection, the men preferred to collect almaciga during the dry season when the paths were dry and there were few competing agricultural and fishing activities. However, the concessionaire needed more almaciga than could be collected during the dry season in order to make the concession profitable. The concessionaire used debt to force the extension of almaciga collection from the dry season to throughout the year. This form of "debt bondage" to the concessionaire was not uncommon in the region. There is still a very negative perception of NWFPs as a source of income generation in many areas because of the

debt burden and exploitation that often occurred.

Currently, the concessionaire system is being restructured or totally done away with in countries in the region, although a system of a licensed agent representing a national agency or private company with rights to purchase the product (rather than products from a specified area) continues, and in some instances is being strengthened. There are increasing attempts among collectors to form cooperatives/associations, but the pattern of gatherers/collectors dealing individually with an agent is still common. The very nature of most forest products ensures that only a small amount will be collected by any one individual.

Services provided by the middleman

Because of the small amounts of forest products of the individual collector, very few forest products are sold directly from the collector to the wholesaler or processor. Middlemen, the first in a series of middlemen, initially buy the product and then move it to the next stage in the marketing channel. This is true in either a concessionaire/agent system or in a more open competitive marketing system. In a recent study of the marketing of medicinal plants in eastern Nepal, for example, roadhead traders give funds to village traders who in turn distribute advances to collectors (Edwards, 1993) (figure 1). The relationship with the village trader is "a serious life-time relationship" of which the cash advance is but one component. Several village-level traders may have dealings in the same village, so there is competition between the traders which inhibits the development of a more exploitive "debt bondage" relationship.

The village traders in eastern Nepal, as do middlemen throughout the region, provide important services to the collector. The trader not only advances money during the period of food shortages before the monsoon, but also arranges for the transport - "bundling, weighing, portering and temporary storage" (Edwards, 1993). It is through providing these services that the village trader is able to attract collectors, and it is through his ability to store (and thereby speculate on product prices) that enables the trader to obtain (if he speculates accurately) a fairly high return on his expenditures.

Gaps in the chain

But what happens after the product leaves the concessionaire, licensed agent, or initial middleman? Although initial agents may deal in a number of NWFPs, each product may later enter separate marketing channels. If it is a product used by local communities, a portion or all may be used by the household or marketed locally. If the product is primarily for external markets, most of the market channel (and income) will be elsewhere.

While case studies provide in-depth community-level information, the marketing analysis usually ends at the community or perhaps the initial middleman. For example, in a thorough study of a community forestry management in northeast Thailand (Poffenberg and McGean, 1993), it was found that gum from *Shorea obtusa*, one of the dominant trees in the local forest, provided income for nearly every household during the dry season when other forest products were less available. The gum collectors were predominately "older, retired men and women who can no longer work in the fields or participate in

1991, 50 percent of the world's supplies of traded vegetable tannin extracts originated from Argentina (34 percent) and Brazil (16 percent). Thailand, China, Japan, Singapore, Australia, India, Pakistan, Malaysia and the Republic of Korea accounted for 12.5 percent of world exports.

The USA, Italy, Russia and Japan are the major markets for vegetable tannin.

Katha/Cutch

Katha and cutch are extracted from the heartwood of *Acacia catechu* which grows naturally, as well as in plantations, particularly in India and Thailand (RAPA, 1992). Katha is an important ingredient in pan and pan masala which are chewed. Cutch is used as a tanning agent for leather; as a cheap dye for canvas, fishing nets, mail bags, etc.; and as a viscosity modifier for drilling mud. Purified cutch is also used for tanning, preparation of toilet products, staining wood, dyeing fabrics in black or brown, and medicinally for treating diarrhea.

India is the largest producer of these products in the region, although estimates of actual production are not available. Small quantities are also exported.

Insect products

Lac

Trade in lac and lacquerwork depends on an insect product - the gummy secretion exuded by the female lac insect (*Techandria lacca*), which feeds on a number of forest trees in many parts of the region. Lac production varies considerably from year to year in relation to weather conditions. Markets for lacquerwork products are

changing dramatically as mass-produced plastic substitutes for these items flood local and urban markets. However, export trade in lacquerware handicrafts has shown healthy growth and larger, mechanized factories have sprung up to cater to this trade. In Chanapata in Karnatka State, India, lacquerwork employs more than 35 percent of the total work force. Annual production in 1991 was worth some US\$ 300,000 and 70 percent of total production was exported.

Lac is produced in a number of countries in the region, including India, Thailand, Myanmar, China, Indonesia, Vietnam and Laos. Total annual production is estimated to be 20,000 tonnes. India and Thailand are the major producers, each producing an average of about 6,000 tonnes per year. While Thailand exports the bulk of its production, India consumes almost half domestically. According to the China Agricultural Yearbook in 1990, China produced 1,482 tonnes in 1988 and 833 tonnes 1989. Laos also produces about 100 tonnes annually, part of which is exported (de Beer, 1993). Vietnam exports, on an average, about 300 tonnes of lac and stick lac annually (Tien, 1991). Lac is exported to about 45 countries, but Germany, Italy, Egypt, Indonesia and the USA are the major markets.

Honey

Honey is highly valued for its high energy content (more than 280 calories per 100 grammes). It is a key item in subsistence diets, particularly in the "hungry season" prior to harvesting plant crops. The blossoms of forest trees and plants growing below the forest canopy provide a year-round supply of food for bees. Trade in honey, beeswax and royal jelly contribute

significantly to the national treasuries of many countries in the region. Village-level bee keeping in India alone yields an estimated 37,000 tonnes of honey a year.

Honey is in vogue as a health food in Europe, Japan, North America and other affluent regions. This has boosted demand for natural honey in recent years. Growth in honey production and improvements in beekeeping techniques have assumed high priority in countries like Thailand.

Forest honey: Forest honey is produced mainly by *Apis dorsata*, and constitutes an important non-wood forest product in many developing countries. It is a source of food, a tonic and a medicine for local communities. It is also a source of revenue for governments. In some countries like Bangladesh and Thailand, honey collection is controlled and organised by forestry departments through the issuing of collection permits. In other countries, the forest dwellers collect it free of charge for domestic consumption or sale.

In Bangladesh, the Sundarbans forests are a main source of honey, yielding on average about 220 tonnes of honey and 55 tonnes of wax annually (ADB, 1992). Small quantities of beeswax are occasionally exported from Bangladesh.

About 350 tonnes of honey and 28 tonnes of wax are collected from forests in India. A single natural hive may yield about 35 kilogramme of honey and 1 kilogramme of wax (Gupta and Guleria, 1982). Annual collection of honey from forest areas in Pakistan has been estimated to be 55 to 60 tonnes (Iqbal, 1991).

In Vietnam, about 200 to 400 tonnes of forest honey are marketed annually. Forest honey earns a better price than cultured

honey because of its good taste and medicinal qualities. One litre of honey from the Mekong delta costs 10,000 to 40,000 Dong (1991 price), whereas one litre of ordinary honey fetches a price of only 6,000 Dong (de Beer, 1993).

Several provinces in Laos produce fine qualities of forest honey. Most is traded locally, but small quantities are sold to neighboring countries. A small factory has recently been established to process and pack forest honey for export to Thailand and Europe (de Beer, 1993).

Because it is free of agro-chemical residues, forest honey has the potential to be marketed as "organic honey". Good potential exists for international trade if production and quality can be enhanced by integrating beekeeping with forest management.

Cultured Honey: Honey obtained from *Apis mellifera* and *A. cerana* in modern apiaries is an important commodity in international trade, although its status as an NWFP may be debatable because it may not originate directly from forests. Forests and cultivated trees do play a role as a source of nectar and pollen for apiary bees. One tree may provide as much nectar and pollen for honey bees as is provided by a hundred or even a thousand smaller plants (Holmes and Heinker, 1978). Some forest plants like *Acacia modesta* and *Plectranthus rugosus* are well-known for producing the best quality honey in the Himalayan region, and beekeepers in Pakistan shift their bees to the mountains each summer to forage.

According to FAO statistics, world production of natural honey was estimated to be 1.19 million tonnes in 1991. Production has followed an upward trend in recent years. China, which contributed 17

percent to the world's total production during 1991 is the major producer of natural honey in Asia and the Pacific. Outside the region, the Commonwealth of Independent States (CIS), the USA, Mexico, and Turkey are the major producing countries which respectively contributed 20 percent, 8 percent, 6 percent and 4 percent to total world production in 1991.

According to the FAO Trade Yearbook in 1991, world trade in honey rose from 287,191 tonnes in 1989, worth US\$ 295.3 million, to 317,580 tonnes in 1991, worth US\$ 317.6 million. In 1991, the developing countries collectively accounted for 68.6 percent of total honey exports, compared with 55.5 percent in 1983.

World exports have been steadily rising since 1975. In 1991, world exports were 26.7 percent of the volume of world production compared with 26.5 percent in 1983 and 19.0 percent in 1976. Considerable expansion of world demand for honey has been caused *inter alia* by increased interest in natural and health food products and higher living standards. Germany, the USA, the United Kingdom and Japan are the major world markets.

Wax

Beeswax is a natural wax secreted by various species of honey bee. It is obtained from old and damaged combs and from the caps bees make to cover honey cells. A substantial portion of beeswax exported from developing countries comes from the combs of wild bees, which are damaged during honey collection.

In the absence of any reliable estimates of beeswax production, a fair estimate can be made by assuming beeswax to be 1.5 to 2.5 percent of total honey produced (ITC,

1978). Thus, on the basis of FAO estimates of 1.19 million tonnes of honey produced in 1991, beeswax production is estimated to be in the range of 17,850 to 29,750 tonnes for the same period. These figures, however, are indicative only.

In world trade statistics, beeswax is grouped with other insect waxes. Nevertheless, beeswax is a major component of insect waxes, and the trade value can be safely assumed to be that of beeswax. Based on information derived from the COMTRADE database, the total value of insect waxes traded internationally in 1991 was US\$ 23.35 million. In 1992, China was the leading exporting country in the world accounting for 14.9 percent of total exports.

Other major exporters included the United Republic of Tanzania, Germany, Canada, the Netherlands, Brazil, Japan, the USA and Ethiopia.

Silk

Another important insect product is silk from the larvae of the silkworm moth. Silkworm rearing, both mulberry and non-mulberry, is a highly labour intensive cottage industry. Mulberry cultivation is indispensable in rearing domesticated silkworms (*Bombyx mori*). Although most of the world's silk is produced under farmed conditions, demand for "wild silk" and the more robust silk fabrics such as tasar silk (widely cultivated on a cottage industry scale in India, Thailand and elsewhere in the region) has remained steady.

Non-mulberry or wild silkworms include eri, tasar, and muga. Eri silkworms (*Philosamia ricini*) and *P. cynthia* are reared on castor oil plant leaves to produce a brick-red silk, popularly known as "eri" silk. Tasar silkworms (*Antheraea pernyi*, *A.*

yamamai, *A. mylitta*) feed on oak, *Terminalia* and other host plants to produce "tasar" silk. Muga silkworms (*Antheraea assama*) are found only in the Indian state of Assam and feed on som (*Machilus bombycina*) and soalu (*Litsaea polyantha*), producing an unusual lustrous golden-yellow, attractive and strong silk.

The world's total production of raw silk was 76,761 tonnes in 1991 (ITC, 1992). Total production by the year 2000 is estimated at 85,000 tonnes (ITC, 1992). Although production has been rising gradually, the share of silk in total for all textile fibres remains very low (about 0.17 percent in 1989). However, the value of silk and silk products in international trade is quite significant because silk is a high value item.

The production pattern has changed over time. Within Asia and the Pacific, China and India have emerged as the world's largest producers of raw silk, whereas production in Japan and the Republic of Korea is declining. China produced 48,500 tonnes, or 64 percent of the world's total of silk in 1991, valued at US\$ 2.1 billion.

India increased production to become the world's second largest producer of raw silk. India has the unique distinction of being the only country in the world producing all the commercially known varieties of silk - mulberry, tasar (both tropical and temperate), eri, and muga. It ranks second to China as a mulberry silk producer and accounts for about 14 percent of the world's production of raw silk. It is also the second largest producer of tasar silk, following China. India is the only producer of golden-yellow muga silk.

Outside the Asia-Pacific region, Brazil has expanded its production and is emerging as an important silk producer. Production in

the Commonwealth of Independent States has levelled off (ITC, 1992).

China is by far the world's largest producer and exporter of raw silk, accounting for a 90 percent share of global exports. The principal destinations of Chinese raw silk during 1990 were Western Europe (Italy, Germany, France, Switzerland, and the UK), Japan, Hong Kong, India and the former USSR (ITC, 1992).

Brazil has recently emerged as an important exporter of raw silk and silk yarn, with modest but steadily rising exports directed to the Japanese market. The Vietnamese are also rehabilitating their sericulture industry.

Insect galls

Some of the galls produced by insects are quite beneficial. The gall nuts of commerce, also called allepo, mecca, Chinese or Turkey galls, are produced on various species of oaks and other trees by Eurasian cynipid wasps. These galls, long used in parts of Asia to make dyes and medicines, are now processed for use in the tanning, ink and pharmaceutical industries. The chief active ingredients are astringent, tannic and gallic acids.

Within the Asia-Pacific region, Iran produces the best grades of insect galls containing more than 50 percent tannic acid. Outside the region, Turkey and Syria are important producers. No information on the trade of insect galls is available.

Live butterflies

Another commercial growth area in insect products is the trade in sustainably "ranchled" live tropical butterflies. Many countries of the South Pacific, which have

spectacular butterfly fauna, are profiting from this trade.

Incense woods

Eaglewood

Eaglewood or aloeswood is a resinous incense wood, produced by diseased tissues of certain individuals of *Aquilaria crassna*, growing in Indochina. This highly valuable product is used in Chinese and South Asian medicine as well as for incense and cosmetics in the Middle East. The tree is found in the Annamite highlands in Laos and Vietnam and in the coastal mountains of Cambodia. First-grade eaglewood is valued at up to US\$ 2,000 per kilogramme in Singapore.

Sandalwood (Cendana)

Indonesia is the main producer of the incense wood obtained from *Santalum album*. The average annual production of sandalwood has been estimated to be 588 tonnes, based on production data from 1968-69 and 1982-83 (Menon, 1989). The wood is mainly used for distillation of sandalwood oil. Indonesia used to be the major exporter of sandalwood, but to encourage domestic production of sandalwood oil, a ban was imposed on the export of sandal wood in December 1987.

Essential oils

China and India are the largest producers of essential oils in the region. The most common among the essential oils produced from forest plants in the region are summarized in table 2. A brief discussion of those having significance in international

trade is also given, based on the recent work of Coppen (1994).

Cinnamon bark and leaf oil

Sri Lanka is virtually the only supplier of cinnamon bark oil and cinnamon leaf oil, extracted from the bark and leaves of the *Cinnamomum vera* tree. India produces very small amounts of leaf oil for domestic use only.

Cassia oil

China is the major producer and a dominant supplier of cassia (*Cinnamomum cassia*) oil. Annual production in China is estimated to be 500 tonnes. Small quantities of cassia oil are also produced in Indonesia, Vietnam, India and Nepal, but these are obtained from a species of *Cinnamomum* other than *C. cassia*.

Camphor

Until the Second World War, *Cinnamomum camphora* was heavily exploited as a source of camphor in Japan and Taiwan. The species was introduced in India in 1950. Due to the availability of cheap synthetic camphor (ex turpentine), there is only modest demand for the natural form. This, combined with the availability of competitively priced Chinese natural camphor (US\$ 3.65 per kilogramme in early 1994), does not make its production elsewhere particularly attractive.

Sassafras Oil

Cinnamomum camphora is also an important source of Chinese sassafras oil which is used principally as a raw material for the isolation of safrole. Next to China,

Table 2. Essential oils obtained from wild or cultivated plants of forest origin in the Asia-Pacific region		
Oil	Botanical source	Main origins
Star anise	<i>Illicium verum</i>	China, Vietnam
Cedarwood	<i>Cedrus</i> spp./ <i>Juniperus</i> spp.	India, Sri Lanka, China,
Cinnamon/ Cassia	<i>Cinnamomum verum</i> / <i>C. cassia</i>	Sri Lanka (Cinnamon), China (Cassia), Myanmar, Papua New Guinea, Thailand, Vietnam
Citronella	<i>Cymbopogon</i> spp.	Indonesia, China, Sri Lanka, Bhutan, Nepal, India, Taiwan,
Davana	<i>Artemisia</i> spp.	India, Pakistan
Eucalyptus	<i>Eucalyptus</i> spp.	China, Australia
Lemon grass	<i>Cymbopogon flexuosus</i>	India, China
Litsea	<i>Litsea cubeba</i>	China
Nutmeg/mace	<i>Myristica fragrans</i>	Indonesia, Sri Lanka
Palmarosa	<i>Cymbopogon martini</i>	India
Patchouli	<i>Pogostemon cablin</i>	Indonesia, China
Sandalwood	<i>Santalum album</i>	India, Indonesia
Pemou oil	<i>Fokienia hodginsii</i>	Vietnam
Vetiver	<i>Vetiveria zizanioides</i>	Indonesia, China
Cajeput or Kayu putih	<i>Melaleuca leucadendron</i>	Malaysia, Indonesia

Vietnam has emerged as an exporter of sassafras oil since 1990. Outside Asia and the Pacific, Brazil is the major producer and supplier of sassafras oil, where it is extracted from the trunkwood of *Ocotea pretiosa*. The supplies from this source, however, are declining as a result of depletion of the natural resource.

World demand for sassafras oil is estimated at 2,000 tonnes annually, of which more than half is supplied by China. Japan, Italy and the USA are the main markets for the oil.

Eucalyptus oils

The Asia-Pacific region dominates the world in the production and export of eucalyptus oils. China, India and Australia

are the main eucalyptus oil producing countries within the region, whereas South Africa, Brazil, Switzerland, Chile, Spain, Bolivia, Uruguay and Paraguay are important producers outside the region.

The People's Republic of China is the largest producer of both cineole-rich medicinal oils (about 70 percent of world output and exports) and perfumery oil (from *Eucalyptus citriodora*). An area of 670,000 hectares is planted with eucalypts for oil production in China. India also produces small quantities (about 50 tonnes). Total world production of the medicinal type of eucalyptus oil is estimated to be 3,000 tonnes, and that of perfumery type at 15,000 tonnes. The EEC is the largest market for eucalyptus oils.

Sandalwood oil

Sandalwood (cendana) oil production and export is dominated by India and Indonesia. On the basis of production estimates from 1968-69 to 1982-83 (Menon, 1989), average annual production of sandalwood is estimated to be 588 tonnes. The bulk of the Indian production, however, is consumed domestically. Indian exports average about 40 tonnes a year, whereas Indonesian exports average around 15 tonnes per year.

The USA, France and the Middle East are the two largest importers of Indian sandalwood oil. The USA is also the chief destination of Indonesian sandalwood oil and is the biggest market for sandalwood oil outside India.

Listea cubeba oil

Listea cubeba oil is distilled from small pepper-like fruits of a small tree, *Listea cubeba*, which is native to China, Vietnam, Indonesia and other parts of Southeast Asia, where it occurs mainly in mountainous regions. World production and exports are dominated by China. Chinese production is estimated to be 1,500 tonnes per annum. Vietnam exports over 30 tonnes per year (de Beer, 1993). The USA, Western Europe and Japan are the major importers.

Olibanum

India and Indonesia are the only countries which export small quantities of olibanum. The bulk of Indian olibanum is used domestically for making incense sticks. The volume of exports, though erratic, averages around 90 tonnes per annum (Coppin, 1994). Indonesian export statistics sometimes show export of frankincense, but the botanical source is not indicated. The bulk of incense resins

(olibanum/frankincense, myrrh and opopanax) is produced outside the Asia-Pacific region. Somalia and Ethiopia are by far the biggest exporters of the three resins, whereas the People's Republic of China is the major importer.

Cedarwood oil

The People's Republic of China is the world's leading producer and exporter of cedarwood oil. Reliable production and export statistics, however, are not available. Chinese exports are about 400 to 500 tonnes per annum. India is the only other country in the region which produces cedarwood oil on a commercial scale. Current Indian production of cedarwood oil is estimated to be 25 tonnes per annum, but the bulk of it is consumed domestically. Average recorded exports of Indian cedarwood oil are less than 1 tonne per annum.

Vetiver oil

Vetiver oil is extracted from the roots of vetiver grass (*Vetiveria zizanioides*) and is used in fine fragrances, soaps, lotions, deodorants and other cosmetics. World production of vetiver is estimated to be 250 tonnes a year (BOSTID, 1993).

Indonesia (Java) and Reunion (a French island colony in the Indian Ocean) are the major producers within the Asia-Pacific region, and Haiti and the USA are the main producers outside the region. The value of world trade in vetiver oil was estimated to be US\$ 3,172,000 during 1992, of which 36.6 percent originated in Haiti, 24.0 percent from Indonesia, 14.6 percent from the USA and 12.9 percent from Reunion.

The EEC, Switzerland, the USA and Japan are the main importers.

Cajeput or Kayu Putih oil

The *Melaleuca leucadendron* tree is well-known for the cajeput or kayu putih oil that is produced from its leaves and twigs by water or steam distillation. Kayu putih oil is widely used as a medicine and in the manufacture of insecticides and perfumes. However, the oil comes into direct competition with some substitutes or essential oils like eucalyptus oil.

Indonesia, where the *Melaleuca* tree has been planted over an area of 9,000 hectares, is the major producer of kayu putih oil in the region. Seven extraction plants, with an annual capacity of 32,000 tonnes of cajeput oil have been established. Actual production has shown a gradual increase from 1987 to 1991, when 303,368 litres were produced. The bulk of the oil is consumed domestically. The average annual export from 1980-1984 was 5.4 tonnes, with an average value of US\$ 49,897 (Menon, 1989).

Vietnam also produces small quantities of cajeput oil. The area under *Melaleuca* forests is shrinking in Vietnam and only about 100,000 hectares remain in the Mekong delta. Besides meeting the requirements of the domestic pharmaceutical industry, about 50 tonnes are exported to Singapore annually (de Beer, 1993).

Pemou oil

Pemou oil is extracted from the roots and stumps of a large tree (*Fokienia hodginsii*), growing naturally in Vietnam. Vietnam used to be a regular supplier of the oil to Western Europe. This trade ended after supplies dried up during the war. At present, 50 tonnes of oil are exported annually to Czechoslovakia. Another 50 tonnes of

powder is exported to Hong Kong and Singapore valued at US\$ 350 per tonne (f.o.b.).

Medicinal plants

Medicinal plants are important in almost all the countries in the region. More than 50 percent of the population in the developing countries of the region is believed to be dependent on medicinal plants for curing various illnesses. There has recently been an upsurge in traditional medicine, mainly Ayurvedic, Unanai, and Chinese herbal medicine. In China alone, 5,000 of 35,000 species are used as drugs in Chinese traditional medicine (Husain, 1991). It is estimated that more than 2,000 species of medicinal value occur in India; about 1,000 in Peninsular Malaysia; 850 in the Philippines; 400 in Nepal; more than 200 in Thailand; and about 100 in Pakistan.

Some medicinal plants find their use in both traditional and Western medicines. Examples of such plants are *Ephedra* spp., *Dioscorea* sp., *Anamirta cocculus*, *Cinnamomum camphora*, *Styrax benzoin* and *Mentha arvensis*.

In addition to those medicinal plants which are sources of alkaloids, there are some which are highly valued as tonics. Ginseng (*Panas ginseng*), native to North Korea and the northeastern regions of the People's Republic of China, is now widely cultivated in China and in the Republic of Korea. China produces 40 percent of the world's total production. In 1991, the total value of international trade in ginseng was about US\$ 215 million, of which 44.4 percent originated from the USA and 44.8 percent from countries in Asia and the Pacific, namely the Republic of Korea (29.1 percent), China (9.1 percent), Japan (3.5

percent), and the Democratic People's Republic of Korea (3.1 percent).

About 4,000 to 6,000 botanicals are of commercial importance. Lewington (1993) reports that between 500 to 600 medicinal plants are traded via Hamburg. However, trade statistics for individual medicinal plants are difficult to estimate, because they are not itemised in national trade data. Only those plants entering a country in very large quantities are listed individually, but the situation is further complicated by the multiple use of such plants. For example, liquorice (*Glycyrrhiza* spp.), in addition to being used as an expectorant and anti-inflammatory, has a multitude of other uses ranging from flavoring for chocolate, beer, tobacco and toothpaste, and as a stabilizing agent for foam in fire extinguishers (Lewington, 1993). In 1992, the total value of international trade in liquorice was US\$ 0.94 million, of which the bulk (55.1 percent) originated from China (24.1 percent), Pakistan (23.7 percent) and Afghanistan (7.3 percent). Outside the region, Syria, Russia and Turkey are the major producers. In addition to ginseng and liquorice roots, cinchona bark, psyllium seeds and husks, belladonna, *Duboisia* spp., serpent wood, senna, periwinkle and berberis are the main medicinal plants entering international trade from countries in Asia and the Pacific.

Some of the essential oils, such as mint oil, eucalyptus oil, cinnamon leaf oil and oil of *Cinnamomum camphora*, are also used in medicine. This complexity was illustrated in the 1982 ITC report on *Medicinal Plants and their Derivatives* in the following words:

"It is not possible to assess the volume or value of the trade in all botanicals that are used medicinally because

trade statistics do not identify all the plants individually and of those listed, the statistics do not identify medicinal and other uses separately. Products reported as medicinal plants often include gums, spices and plants used in the food industry; certain plant products include those used for teas and infusions; a large volume of plants such as pyrethrum are used in the manufacture of insecticides; plants used by the cosmetic industry are also included. While hundreds of medicinal plants are items of commerce, details of the volume traded in most of these will only be obtained from individual traders and users."

Lewington (1993) reports that the medicinal plants trade is further complicated because of various levels of secrecy maintained by the traders and because of the complexity of the trade structure itself.

During 1992, total world trade in medicinal plants was about US\$ 171.234 million, of which 20.9 percent originated from countries in Asia and the Pacific, namely, India (11.2 percent), China (3.8 percent), the Republic of Korea (2.2 percent), Thailand (1.3 percent), New Zealand (0.8 percent), Japan (0.7 percent), Pakistan (0.5 percent), Hong Kong (0.3 percent) and Indonesia (0.1 percent). India was the world's leading exporter of medicinal plants in 1992. Outside the region, the USA, Morocco, Argentina, Egypt and Yugoslavia were significant exporters, which together accounted for 37.5 percent of the world's exports.

The EEC (Germany and UK), Japan and the USA are the main importers. Hamburg (Germany) is the leading trading center for medicinal plants.

Wild plants

Many plants, particularly those produced in the tropical forests of the region, like orchids, palms, and pitcher plants, are prized throughout the world for their aesthetic qualities. Ferns, flowers, leaves, bark, seeds and other colorful, aromatic or symbolic plant materials are used fresh or processed (e.g. in paints or dyes) for personal adornment, ceremonial functions or artistic creations.

Ornamental plants are the basis of a multi-million dollar export trade centered in Singapore. Orchids constitute the most valuable component of the trade. The family *Orchidaceae* has numerous representatives found throughout the region. For instance, over 900 species have been recorded in Thailand and at least 341 have been collected in Sarawak (Chuntanapaib and Hoamuangkaew 1985; National Parks and Wildlife Office, Sarawak, 1986). Although nursery-bred specimens make up the bulk of this trade, the forest is still the original source. In addition to collection for commercial purposes, very rare and valuable species are smuggled from forests by specialist traders (de Beer and Mcdermott, 1989).

Industrial oils

Tung oil

Tung oil is extracted from the seeds of a large tree (*Aleurites montana*) which occurs naturally in some countries in the region, but is cultivated extensively in China and Vietnam. The seeds contain between 50 and 58 percent of a quick-drying oil. The oil is used for varnishes and is mixed with lac.

According to the UNCTAD database, China is the dominant exporter of tung oil. In

1988, out of the total value of US\$ 11.86 million of world trade in tung oil, 81.7 percent was supplied by China. Argentina and Paraguay are also major exporters, supplying 11.7 percent and 4.9 percent, respectively, in 1988.

Neem oil

The neem tree (*Azadirachta indica*) grows naturally in dry forest areas throughout all of south and Southeast Asia, including Assam, Myanmar, India, Pakistan, Sri Lanka, Thailand, Malaysia, Indonesia, Vietnam, Laos and Cambodia. Neem oil is extracted from neem kernels, which contain up to 50 percent oil by weight (BOSTID, 1992). Neem oil is used mainly in soaps, cosmetics and as a lubricant.

India is the leading producer and exporter of neem oil and its products. It has been estimated that India's neem trees bear 3.5 million tonnes of kernels each year, with a potential yield of 700,000 tonnes of oil. The annual production of neem oil in the late 1980s was around 150,000 tonnes, of which only 34 tonnes were exported in 1990 valued at 300,000 rupees (BOSTID, 1992).

Jojoba oil

Jojoba (*Simmondsia chinensis*) is a hardy shrub that grows in arid regions of northern Mexico and the southwestern USA. Australia is the only country in Asia where the shrub grows. It has also been introduced in Israel. Its seeds contain a liquid wax that has impressive industrial potential, as it is a substitute for sperm oil, normally obtained from endangered sperm whales.

The world's trade of jojoba oil valued at US\$ 7.6 million in 1991, of which 91.1 percent was supplied by the USA, followed

by Israel (6.7 percent), Mexico (1.8 percent), and Australia (0.3 percent).

Miscellaneous products

Bidi leaves

The leaves of the tendu tree (*Diospyros melanoxylon*), which grows naturally in many States in India, are used to wrap the small cheroots known as "bidi" that are popular throughout India and several neighboring countries. According to the country report of India presented at the 15th Session of the Asia-Pacific Forestry Commission, India produces about half a million tonnes of bidi leaves a year, worth about US\$ 200 million. Their gathering, processing and selling provides employment for at least half a million people.

India exported 4,675.6 tonnes of the bidi leaves in 1991-92, worth Rs. 183.5 million (US\$ 6.1 million). The bulk of the exports went to Pakistan (74 percent) and Sri Lanka (25 percent).

Gupta and Guleria (1982) reported an average annual export of 3,681.4 tonnes of

bidi leaves from 1967 to 1977, which when compared with current export figures, indicates an increasing trend in annual export volume of bidi leaves.

Gupta (1991) reported an average wholesale price of Rs. 15,000 (US\$ 500) per tonne of bidi leaves. Based on export statistics for 1991-92, the average f.o.b price has been estimated to be Rs. 39,250 (US\$ 1,308) per tonne. Thus, the export price is about 161 percent higher than the domestic price, indicating a high profit margin for the exporters.

Kobuak powder

Kobuak powder is obtained by grinding bark of trees of the *Persea* spp. and all parts (except the leaves) of *Cinnamomum inners*, which grows in Thailand. When mixed with water, the powder forms a sticky liquid which can be used as a glue. Thai exports of the product averaged 6,264 tonnes per year between 1979 and 1983, averaging 56.5 million baht (US\$ 2.3 million) in value (Chuntanaparb and Hoamuangkaew, 1985).

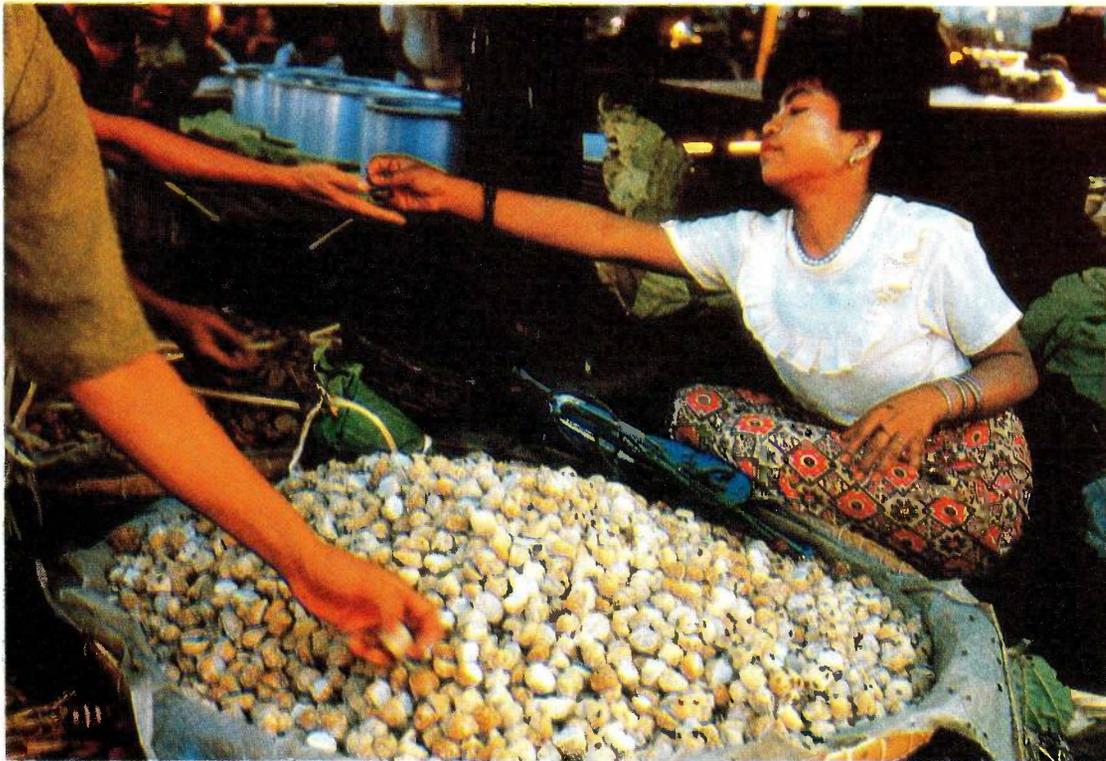
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NWFPs often pass through numerous domestic market channels before reaching international markets.

BENEFITS AND RISKS OF COMMERCIALISING NWFPs: THE CASE OF NGALINUTS IN THE SOLOMON ISLANDS

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INTRODUCTION

As more and more hectares of rainforest become vulnerable to logging in the South Pacific, governments, conservationists and forest resource owners are making extra efforts to find income generating forest products other than timber. There are many non-wood forest products (NWFPs) that have potential commercial value. These include fibres, medicinal plants, oils, oleoresins, edible greens and nuts.

In the Solomon Islands, edible nuts offer the greatest potential as alternative cash crops for forest owners. There are many edible nuts in the islands but the most promising ones are ngalinuts (*Canarium* spp.), cut-nuts (*Barringtonia* spp.), bush alite nuts (*Terminalia* sp.) and dola nuts (*Inocarpus* sp.). These nuts have been part of the traditional diet of the islanders from time immemorial and they have been traditionally traded, particularly the ngalinut.

In 1988, the Solomon Islands Government began a national project to investigate the commercialisation of ngalinuts with the aim of providing another cash earner to the rural villagers of the Solomon Islands. Commercialising a crop which has great traditional value to the villagers is difficult, to say the least. One wonders whether, in the end, the benefits out-weigh the risks especially when non-monetary values are considered. This paper briefly highlights

current progress of our attempt to commercialise ngalinuts. It also discusses the benefits and risks peculiar to the venture and offers suggestions to reduce the risks and optimise benefits of commercialising ngalinuts in the Solomon Islands' context.

COMMERCIALISATION OF NGALINUTS IN THE SOLOMON ISLANDS

Traditional trading of ngalinut products, including nuts-in-shell and processed kernels, previously existed at the subsistence level. It involved exchanging ngalinut products for other goods, services or obligations. As the cash economy penetrated the subsistence sector, ngalinut products in the forms of nuts-in-shell, fresh kernels and dried and roasted kernels were exchanged for cash within villages and in urban markets.

However, the real attempt to commercialise ngalinut products was instigated by the government in 1988. This involved organised purchase of nuts-in-shell throughout the country by the Commodities Export Marketing Authority (CEMA). The nuts were cracked and processed into packaged kernels and oil by the Dodo Creek Research Station. The finished products were then sold by CEMA on the domestic market and, in the case of oil, overseas.

CEMA uses 11 strategically located buying centres to purchase the nuts-in-shell from the nut owners who are dispersed throughout the country. Purchase prices for nuts-in-shell range from US\$ 0.17 to US\$ 0.34 per kilogramme, depending on the species of *Canarium* and the grade, which is based on the kernel-to-nut ratio.

Purchases slowly increased as more villagers became aware of the scheme. In 1989, 3,456 kilogrammes were purchased. This increased to 45,763 kilogrammes in 1991 and 205,228 kilogrammes in 1992. In 1993, purchases dropped to only 7,216 kilogrammes because only one species of nut was bought. The quantities purchased represent only about 10 percent of total ngalinut production. The majority are used by villagers, while a small portion is never collected. Sales have totaled \$134,289 since the buying program began, with \$50,264 from local sales and \$84,025 from export.

Although the project has achieved its main objective of generating additional income for the villagers and earning foreign exchange for the country, the level of success is only moderate. Many factors have affected the success of commercialising the ngalinut in the Solomon Islands. These factors include commercial as well as non-commercial considerations peculiar to ngalinut and the perception of derived benefits by the nut owners.

NGALINUTS IN SOLOMON ISLANDS SOCIETY

One of the most important factors which affects attempts to commercialise ngalinuts, is rural owners' perception of, or values concerning, ngalinuts. Ngalinuts, unlike

other edible nuts, are significant in Solomon Islands' traditional society. First, the fresh or roasted kernels form a significant part of the local diet as snacks and main meals. For some villagers, ngalinuts are their only source of protein and energy. Processed ngalinut kernels are an essential ingredient, together with taro, for customary feasts. A traditional feast is of little value (not fit for the elders or chiefs) if ngalinuts are not included.

However, ngalinuts are held in even higher esteem for their traditional importance in non-food terms. Ownership of the trees, or of the processed kernels, is a measure of wealth or social standing. Furthermore, ngalinut trees are grown in groves marking tambu sites and old villages, which in turn serve as boundary markers for parcels of land between tribes and families. The trees are more scattered within the boundary of a given tribal land. Traditional ownership is communal unless a tree is actually planted by a particular individual.

Processed ngalinut kernels are also used as a medium of exchange for pigs, plots of land, and traditional shell money. Hence, traditional trading with ngalinuts helped accumulate wealth and standing in society.

Ngalinuts are also important to local societies in that other activities revolve around the ngalinut season. So important is the ngalinut season that harvesting and preserving the nuts are regarded as the prime social events of the year. In some societies, the vernacular word for "year" is equivalent to "the ngalinut season." The project has discovered that owners' perceptions of the trees and the nuts are important considerations when commercialisation (and the introduction of the profit motive) is attempted.

BENEFITS OF COMMERCIALISING NGALINUTS

Numerous benefits of commercialising the traditional trading of ngalinut products have been noted:

- Owners receive monetary benefits when they sell excess nuts.
- The country benefits, especially when kernels and oil are exported for foreign earnings.
- Nuts are now available, even out of season, for traditional purposes, and as food for islanders and the more adventurous expatriates.
- Commercialisation of ngalinuts has created more jobs through entrepreneurial processing and marketing of the product.
- As the owners realise the potential monetary value of this traditional and indigenous resource, they are more inclined to protect and preserve the trees - saving the forest from indiscriminate logging.
- Gathering and cracking of the nuts involves women and children; unlike traditional nut preparation, which only benefits fathers' social esteem or status, women and children can now receive monetary benefits more directly.
- Commercialisation of ngalinuts has encouraged the processing of other secondary, tertiary and by-products which makes the ngalinut tree more valuable.

RISKS OF COMMERCIALISING NGALINUT

While the benefits are numerous, the risks involved are just as numerous. The actual and perceived risks can be categorised as socio-economic, trade, commercial and technological in nature.

Socio-economic risks

Socio-economic risks cover a multitude of problems that are peculiar to traditional society. As soon as CEMA started to buy nuts in 1988, many questions and problems arose both for the nut-owners and CEMA. They included the following:

1. There have been some disputes concerning nut tree ownership and individual rights to sell from the common holdings. This is compounded because ownership of trees may imply exclusive rights to the land.
2. Cash incentives encouraged sales and reduced local consumption. For those who depend on the nuts as their main source of protein and energy this is like selling fresh fish to buy tinned tuna.
3. Producers have to decide between temporary monetary gains and more permanent social gains.
4. The mode of marketing is biased against individual entrepreneurs.
5. Theft of nuts from the forest increased.
6. Some communities completely banned selling to CEMA or any other buyer. This arose from suspicions that profits were being made at their expense.

Trade risks

The greatest trade risks relate to initial mistrust. This is particularly true when overseas individuals and companies are involved. Often villagers have been duped by various marketing gimmicks, and have received little profit compared to other partners. Villagers also worry about the sustainability of the venture. Cultivating trust and confidence among nut owners is important.

On the other hand, the marketing expertise and arrangements contributed by the overseas partners cement the trade link once they are understood and accepted by the villagers. Questions of product patent rights have also been raised. The current trade link (trade, not aid) with Bodyshop International has been developed on mutual trust.

Commercial risks

The main commercial risks concern ensuring constant supplies of nuts, given that village priorities are often not cash oriented. The cost of collection from widely scattered production units is also very high. Another disadvantage is that the total quantity of nuts available is low, thus increasing marketing costs. In addition, on the international market, this unknown product will meet resistance or indifference until the nuts become recognized.

Technological risks

The project has had to start from scratch as far as technology is concerned, without a body of knowledge or experience to draw on. Thus, empirical work is being done on processing, quality packaging and marketing of the product. These problems

are not so difficult for the local market, but are more challenging for the overseas market. Appropriate machines, equipment, processing and packaging technology have yet to be identified or developed.

CONSIDERATIONS FOR COMMERCIALISING NGALINUTS

Ngalinuts are an ideal product to market as an NWFP. There are many opportunities, especially in niche markets which often pay high prices. However, to sustain such a market the supplier must meet all the stringent requirements of international trade, including high quality and sustainable supplies. Ngalinut products have more chance of success in the local and regional markets, at least at this early stage of development.

Whether marketing ngalinuts to domestic and regional markets or internationally, success depends greatly on maximising the financial benefits and social well-being of the nut owners, while reducing the risks and challenges that commercialisation brings. Grassroots consultation with villagers must take place and there must be deeper study of the importance of ngalinuts within society. If this is done, the knowledge can be exploited to the villagers' advantage.

Second, villagers are very skeptical of outsiders (local or overseas) who make promises to market their products. "Rip-offs" are too many and too painful to forget. Hence, any trade arrangement must be carefully worked out for the benefit of all concerned. Rural villagers particularly resent losing rights to their product. Another consideration is that the venture must be sustainable. A period of subsidies,

may be needed to build confidence in market commitments.

Once the structures of production, processing and support services are established, the market and its sustainability must be determined. This is the responsibility of the marketing partner. Often the villager judges his or her partner by the level of physical investments that are contributed to start the project. The onus is on the marketer or processor to provide relevant equipment, finance and technology

to get the venture established. There are also advantages in using existing facilities and organisations.

There are many risks associated with the commercialisation of ngalinuts in the Solomon Islands. However, with a thorough appreciation of culture, consultation, proper marketing strategies and appropriate technologies, commercialization is likely to be successful, sustainable, and rewarding.



Traditional uses of NWFPs may point toward commercial opportunities - local cosmetics in Myanmar.

THE BODY SHOP EXPERIENCE

*Robert Allen
Senior Regional Trader
The Body Shop*

There are two reasons why The Body Shop is attending a conference entitled "Non-Wood Forest Products: the Social, Economic and Cultural Dimensions." First, The Body Shop, which manufactures skin and hair care products, is a market for non-wood forest products. Secondly, The Body Shop, as a company, is interested in the cultural, social and environmental aspects of its trading links. The question of ethics in business is an important interest of The Body Shop. In fact, our organisational structure includes a "Values & Vision Centre," with approximately 25 staff.

The Body Shop is a retailer which started with one store in 1976, and has since grown to over 1,200 stores in 46 countries. A new store opens approximately every two and half days. Within the Asian region, we now have stores in Brunei, Hong Kong, Indonesia, Japan, Macao, Malaysia, Singapore, Taiwan and Thailand. In addition, The Body Shop is a manufacturer. We sell only our own private label products, which include 600 skin and hair care products, and approximately 500 accessory items.

The Body shop is also innovative. In the past six months, 10 percent of our products were new products or relaunched products. Our large research and development (R&D) department is continually looking into new products and new ingredients.

The ingredients we seek are not the traditional ingredients of the cosmetic industry. Our ingredients are often derived

from food. The R&D department also has a strong interest in introducing new non-wood forest products. These include items which might have been used as traditional soaps or for their medicinal properties, such as antiseptics.

The Body Shop's innovative approach also extends to the area of social responsibility. Like a growing number of firms, The Body Shop is examining the social impact of its business. One of the most unique and innovative departments of The Body Shop is our Values & Vision Centre, which has the task of looking at questions of social responsibility. Within this department, we have an environmental group, an animal protection group, a Fair Trade section, a human rights group, and a campaign team.

Environmental issues are one of the major concerns of The Body Shop. The Body Shop begins looking at environmental issues by examining its own practices. For example, in our manufacturing area, The Body Shop has become 30 percent more energy efficient over the last two years. We are also putting 33 percent less organic material into the public sewer system than we were two years ago, even though our bulk production is up 57 percent for the same period. Thus, for The Body Shop, our own practices are the starting point of our concern about environmental issues.

As part of our environmental program, we have developed an environmental audit. This is an independently verified statement of our environmental practices. When we

meet groups with which we may trade, we ask many questions concerning their environmental practices. However, we ask these same questions of ourselves first, and we publish the answers in our environmental statement. Like a financial statement, an outside environmental firm examines and verifies our environmental statement.

The Body Shop also has a Fair Trade program. Along with raising environmental questions, we are also concerned about social, cultural and economic issues which have an impact on the local communities which supply our materials. These are not academic questions, but practical questions, and this is a major reason why I am attending a conference which recognises the importance of all these issues.

The Body Shop has a special program which focuses on developing trade links with the communities. This is called our "Trade not Aid" program, and it is a small, but rapidly growing, part of our overall purchasing. The aim of this program is to help create livelihoods for economically-stressed communities or those facing special difficulties. This program works to develop trade links with community groups such as tribal councils, producers' associations, cooperatives, and small family businesses. We believe that the community aspect of development is important in dealing with social and cultural questions.

This program, then, is a way of supporting the community development process and recognising community rights. The quote I often use, which I believe is a basic tenet of our program, is "that without development *of* the community, any development *in* the community will be ineffective." Thus, through our "Trade Not Aid" program, we seek to trade with communities that are

helping themselves by organising their own community economic development programs.

The "Trade Not Aid" program also involves direct sourcing. We increase the benefits to the community by cutting out the middle men and replacing them with a community structure or an NGO structure. This direct sourcing often means that the community gets a much better price than they would through the traditional channels of distribution.

What then are some trends in the marketing of non-wood forest products? First, The Body Shop is an example of the trend for businesses to be concerned about ethics, and of moving beyond just environmental concerns to social issues. This is a trend that will continue in the marketplace. It is not just The Body Shop that asks questions about environment and ethics, but it is our customers who ask questions about environment and many social issues, including gender. This trend is also staff-driven. Our staff is deeply concerned about ethical issues and often choose to work with The Body Shop because of the company's values. Admittedly, The Body Shop is not typical, but it represents a growing trend within the business community.

The second important trend when considering the market for non-wood forest products is the on-going development of the fair trade movement and of alternative trade organisations. In the past two decades, many NGOs such as OXFAM and Self-Help Crafts have set up alternative trade organisations. Their aim is to help development through trading with development projects. These alternative trade organisations have been selling mainly through special channels such as OXFAM stores and the Self-Help Crafts catalogue.

The fair trade movement is now moving beyond the limited non-profit market into the mainstream of the business community. Organizations like The Body Shop and Ben & Jerry's in the United States, are examples of this. In the United Kingdom, Cafe Direct, a coffee product endorsed by the Fair Trade Foundation, is sold in nearly all the supermarkets.

Third, The Body Shop's approach illustrates that opportunities for innovations often begin with niche markets. Small new organisations often lead the way in innovation. The Body Shop built its market share by innovating. Those seeking to promote new non-wood forest products need to find the innovators in the market place. The need for innovation can be the common bond between the producers of new products and the niche market firms.

It is important to note that customers appreciate the fact that The Body Shop buys from community groups. This has fostered a very positive feeling among our customers. However, the key for repeat business is the quality of our products. While the "rain forest" image may create interest, it is not why our customers buy on a continuing basis. Unless a product is good quality, customers will not return. The "rain forest" image has limited marketing value

and community groups seeking to develop non-wood forest products must be concerned above all with quality.

Fourth, the whole area of fair trade is still new, and knowledge and experience with fair trade is still quite limited. There is the potential for many problems and so community groups entering this should do so with caution. Much of what is labelled as "Fair Trade" or "Environmentally Friendly" is good, but also much of this labelling is dishonest and misleading.

When I meet with groups and talk about The Body Shop, I am often met with a degree of skepticism. My response is to encourage this skepticism. What we tell our customers is that "they should know the story behind what they buy." If a customer buys from a group like The Body Shop, it should be because we answer questions. We publish things like our environmental audit, and we explain what we are doing.

I would like to sum up by emphasising that as the business world and communities increasingly ask questions about the social, environmental and cultural aspects of production; how production is organised will become increasingly important. It will be a reflection of how we answer the social and cultural questions.



The Body Shop's Fair Trade Program strives to enhance economic benefits for local suppliers.

PRESENT CONDITIONS AND PROSPECTS FOR THE DEVELOPMENT OF THE BAMBOO PLYWOOD INDUSTRY IN CHINA

Song Yan

Assistant Engineer

China National Forest Product Industry Corporation

With 40 bamboo genera and over 400 bamboo species, China leads the world in the number of bamboo varieties and area covered by them. China has about one-fourth of the world's area of bamboo and produces about one-third of the world's bamboo wood output. There are more than 7 million hectares of bamboo, of which over 4 million hectares are in bamboo plantations and 3 million are in high mountain clumps. The main bamboo species are monopodial, sympodial and mixed types, which are mainly distributed in 12 provinces and regions of southern China.

China's unique bamboo resources have created a rich and varied bamboo culture of long standing, and have formed a cornerstone for the development of the bamboo industry. The rapid development of the bamboo plywood industry in the past decade has aroused increased enthusiasm for the utilization of bamboo resources.

China's bamboo culture can be traced back to the times of the Yellow Emperor, when it was said that musical instruments made of bamboo were used. In the ancient books and records of the Shang and Zhou Dynasties (907 to 206 BC) there are accounts of bamboo use. Today in people's daily lives, bamboo products such as toothpicks, smoking pipes, chopsticks, baskets, boats, furniture and houses, are visible almost everywhere. They play a vital role in the Chinese culture.

CURRENT STATE OF THE CHINESE BAMBOO PLYWOOD INDUSTRY

China is relatively poor in forest resources. Its *per capita* steel production is also low. However, bamboo resources are relatively abundant, fast-growing and high yielding. It is of practical significance to develop the bamboo industry in order to use bamboo as a substitute for steel and timber. The development of the bamboo industry also has far-reaching significance for the maintenance of the environment on which mankind relies for subsistence.

The bamboo plywood industry also offers social benefits. The raw material of bamboo plywood (bamboo mats) is supplied by forest-dwellers. A bamboo plywood mill with an annual production capacity of 5,000 cubic metres needs about 400 bamboo mats per day. Mats can be woven by women in their free time. The value of bamboo can be increased by one-third by such weaving. In addition to those weaving mats, another 200-300 people will be employed in the bamboo plywood manufacturing process.

In the past decade, breakthroughs have been made in the use of bamboo. As a new type of structural material, bamboo plywood is experiencing a boom in both its production and marketing. China's bamboo plywood production is nearly 200,000 cubic metres annually, indicating that the industry has

become an important component of the forest products industry.

Bamboo plywood is widely used as interior boards in automobiles (e.g. by the First Auto-Making Block, the Dong Feng Auto-Making Block, and the Najing Auto-Making Block). About 100,000 vehicles annually are manufactured with interior boards made of bamboo plywood.

As a substitute for timber, steel and wooden plywood formwork, a new generation of bamboo plywood form work has emerged in the building industry. It features durability, high strength and rigidity, water and corrosion resistance, easy release, low cost, and great marketing potential.

Such bamboo products as carriage floorboards, container floorboards and packing boards have wide industrial use. Bamboo plywood is exported to Japan, the USA, Hong Kong and Taiwan. With favourable prospects for further development both at home and abroad, bamboo products will become one of the leading commodities for foreign exchange earnings in the forestry sector.

MAIN USES OF BAMBOO PLYWOOD

Architectural cement form work

Bamboo formwork is a new generation of formwork succeeding steel and wooden plywood. It is incredibly popular in the construction industry because of its superior properties. It has been extensively used in many projects in over 15 provinces, municipalities and autonomous regions. These projects include Beijing Urban Square, Beijing Fuhua Mansion, Shenzhen

Tian'an International Mansion, Guangzhou International Mansion, the Yangtze Bridge in Wuhan, the Capital Expressway, the Jingjiu Railway, and infrastructure construction projects in Zhuhai and Shenzhen. It has gained favourable comments from clients and has been exported to Japan, Thailand, Hong Kong and Taiwan, as well as to other countries and regions.

Floorboards of coaches and railway carriages

Bamboo plywood floorboards are used in the majority of coaches and railway carriages. The number of coaches and carriages manufactured with bamboo plywood flooring has reached nearly 10,000 annually. This reflects the fact that bamboo plywood has significant economic and ecological advantages over some traditional materials such as timber and steel.

Container floorboards

Bamboo plywood floorboards can also be used in shipping containers. Worldwide, about 500,000 cubic metres of wooden plywood (28mm thick) are used annually for containers. The wooden plywood for containers is supplied mainly from southeast Asian countries such as Indonesia and Malaysia. In recent years, however, the call to conserve tropical rainforests has become more powerful and some southeast Asian countries have introduced limits on timber production. In addition, container floorboards require high quality hardwood logs. The current shortage of container floorboards therefore cannot be eliminated quickly. Since 1994, companies and research institutions in China and the International Container Survey Institution have made significant progress in

developing bamboo container floorboards. Product batches are already in trial use.

Bamboo packing board

Bamboo packing board is a major product manufactured by many small-scale bamboo plywood plants in China. It is mainly used for packing mechanical and electronic equipment and materials. In recent years, the bamboo plywood industry has benefited from relaxed regulations concerning the use of bamboo for packing crates.

PROBLEMS IN BAMBOO PLYWOOD PRODUCTION

Over the last 10 years, the bamboo plywood industry in China has begun to take shape. However, the problems that need to be solved urgently are as follows:

- The production capacity of bamboo plywood remains small. At present, the annual production capacity of bamboo plywood in many plants in China is about 5,000 cubic metres. This restricts the range of bamboo products and reduces economic efficiency.
- The technology being used is out of date and the equipment is obsolete. Compared with timber, bamboo wood has special properties which make its processing more difficult. Bamboo's disadvantages include its small diameter, thin wall, hollowness, and ease of cracking. Unfortunately, China has very few specialised and high performance bamboo processing plants, and this has hindered the expansion of production.
- The utilization ratio of bamboo is low, usually between 40 percent to 60 percent,

except for those plants that can produce bamboo particle-board. Thus far, bamboo resources have not been efficiently used and the large quantity of waste has been burnt as fuel.

DEVELOPMENT PROSPECTS OF CHINA'S BAMBOO PLYWOOD INDUSTRY

Given the increasing awareness of the importance of protecting the global environment, bamboo, as a fast-growing, high-yielding and sustainable natural resource will find favour. Bamboo plywood, a new type of structural material, is gaining a unique advantage over timber and steel in utilization. Some prospects for bamboo plywood are indicated in the following paragraphs.

Cement formwork for construction

Used as a substitute for steel, bamboo plywood formwork has a number of advantages which can improve the quality and cost-effectiveness of cast-in-place concrete. Bamboo plywood does not rust, is strong, rigid (even when damp), lightweight, has a smooth surface with little adhesion, low heat conductivity, and low water absorption. Bamboo leaves a smooth concrete surface which does not need plastering.

Steel formwork can be re-used only 50 times, while bamboo plywood formwork can be re-used 50 times on one side and then another 50 times on the other side.

Bamboo plywood formwork also uses fewer joints and reduces the time needed for assembly and disassembly. Since bamboo is lighter than steel, it needs only half the

bracing that steel formwork requires. All parts of bamboo plywood formwork can be transported and assembled by hand, thus improving work efficiency and reducing transport costs. Generally, a building floor can be completed one or two days ahead of the time required for other types of formwork.

By using bamboo plywood, about 48 kilogrammes of steel can be saved for each square, a saving of about 50 percent. Similarly, a cubic metre of bamboo plywood can replace about 27 cubic metres of timber. This can provide even greater savings of trees. Overall, one-third of the costs can be saved by using bamboo formwork and half of the labour and transportation charges, in addition to quicker completion times. Thus, bamboo formwork seems to have a positive future.

Floorboards of coaches and railway carriages and the automobile industry

Bamboo plywood floorboard in coaches, trucks and railway carriages feature wear and corrosion resistance, adaptation to different climates and environments, low cost and easy installation. They are ideal substitutes for timber or steel. As the Chinese automobile industry develops, there will be greater demand for bamboo plywood. There are also prospects in the international market.

Bamboo container floorboards

Compared with wood plywood, bamboo plywood has advantages of strength, good rigidity, wear and corrosion resistance and low cost. In recent years, China's container output has ranked second in the world. More than 100,000 cubic metres of

container floorboards are needed annually. When the second Asian-European continental bridge is built, container railway transport will increase greatly, as will the demand for container floorboards. Since few plywood plants can produce container floorboards, China is presently importing a large quantity and sometimes has difficulties regarding the continuity of supply. This confirms the urgent need to develop the bamboo container floorboard industry.

Bamboo packing board

Bamboo packing board is increasingly making up for shortages in packing material in areas where wood resources are scarce. Bamboo packing board will retain favourable prospects in both domestic and international markets.

Bamboo decorative sheet

Bamboo has a unique and finely textured exterior. As the standard of living increases, this will get more attention and gain favour as a decoration in homes and in public places. This will lay a good foundation for a market in bamboo as a decorative sheet.

CONCLUSION

In summary, the bamboo plywood industry in China is a new and developing industry. It simultaneously confronts challenges and opportunities, difficulties and hopes. China will continue to develop and improve bamboo resources and products with a view toward contributing to the health of the world's ecology and to enhancing the country's development.

COMMERCIALIZATION OF AROMATIC AND MEDICINAL PLANTS IN NEPAL

Rana Bahadur Rawal
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Herbs Production & Processing Co., Ltd., (HPPCL)

INTRODUCTION

Despite its relatively small size, Nepal is well-known for its biodiversity. The different physiographic zones resulting from altitudinal variation have given rise to vegetation ranging from the subtropical to alpine. About 7,000 species of plants have been reported in the country so far, out of which approximately 700 species have medicinal properties (HMG/IUCN, 1986). Some of these medicinal plants are also aromatic.

The use of medicinal plants in ancient cultures is well documented in the "Rigveda," part of the Hindu scriptures. The traditional method of healing, or "Ayurveda," is still practised today in Nepal, India and Sri Lanka. It has been reported that almost 30 percent of modern allopathic drugs are either directly or indirectly derived from plants (Marino-Bettolo, 1980). Thus, the significance of medicinal plants in contributing to health needs is self-evident.

In Nepal, the rural populace has been involved in the collection, or harvesting, of wild aromatic and medicinal plants since ancient times. This activity has supplemented their meagre incomes from subsistence agriculture, although they have not been able to receive their due share because of the manipulation and exploitation by traders and middlemen.

Both the men and women of rural Nepal are engaged in the collection of wild aromatic and medicinal plants. The harvested products are dried and graded and then transported to the nearest trading center to be sold to middlemen, who in turn resell the crude drugs to Nepali or Indian businessmen. Sometimes the middlemen purchase the raw material right at the village. The rural household uses the income it generates from this activity to purchase essentials (clothes, salt, food).

However, environmental degradation now threatens the sustainability of this practice of harvesting from the natural ecosystem.

STATUS OF AROMATIC AND MEDICINAL PLANTS IN NEPAL

The collection of wild herbs from the forests, or the natural environment, has been practised in Nepal for centuries. The aromatic and medicinal plants present in the natural environment are the property of the government. However, every Nepali citizen is free to collect these raw materials if he/she applies to the Department of Forests and pays the appropriate government royalty.

With a view to improving forest management, His Majesty's Government of

Nepal introduced the Community Forestry Development Program. Under this program, certain forest areas have been handed over to local rural communities where user groups manage and utilise the natural resources present in the forest. In such areas, only members of the local user groups are entitled to harvest the non-timber forest products (including aromatic and medicinal plants) and outsiders are not eligible for such activities.

The Department of Forests, under the Ministry of Forests and Soil Conservation, is the legal authority that oversees the harvesting of wild aromatic and medicinal plants. Its activities and responsibilities include the collection of royalties on harvested items and regular monitoring of the natural reserve of indigenous flora. Illegal collection/harvesting or export of timber or non-wood forest products is punishable under existing laws.

Some valuable species of medicinal plants are facing the threat of extinction due to the indiscriminate collection for swift monetary gains. Endangered species whose collection has been officially prohibited include "panchaunle" (*Dactylorhiza hatagirea*) and "yarshagumba" (*Cordyceps sinensis*). Five additional species which can only be exported after processing within the country are: (a) *Nardostachys jatamansi*, (b) lichens (*Parmelia nepalensis*, *Usnea* spp., *Ramalina* spp.), (c) *Valeriana wallichii*, (d) Sugandha kokila (*Cinnamomum glaucescens*), and (e) *Rauwolfia serpentina*.

Another method of protecting the natural ecosystem is the establishment of national parks and wildlife reserves, which now occupy 14 percent of total land area. This measure is not supported by everyone on the grounds that valuable natural wealth in the form of medicinal and aromatic plants and

other important species which are sources of vital drugs, useful dyes, and flavour-fragrance materials are off limits to needy people. Also, the rural population is deprived of potential economic benefits from the collection of NWFPs. The positive impacts of such a measure, however, far outweigh the negative ones. The most significant impact is the protection of the gene pool of the vast flora endemic to the particular region.

SCOPE OF THE MEDICINAL AND AROMATIC PLANT INDUSTRY IN NEPAL

Only a minor proportion of the collected herbs is processed within the country. The bulk is exported to India, where it is processed for use in the pharmaceutical and flavour-fragrance industries. Some of the processed items are eventually exported to Europe. The organized processing of medicinal and aromatic plants in Nepal began in 1981 with the establishment of Herbs Production and Processing Co. Ltd. (HPPCL), a government undertaking.

In the past few years, a number of private sector enterprises have sprung up, manufacturing essential oils, resinoids and Ayurvedic medicines.

HPPCL covers an area of about 300 hectares for the commercial cultivation of aromatic plants on its different herbal farms and under several extension programs. It produces in excess of 20 tons per annum of essential oils, excluding turpentine.

HPPCL has pioneered the commercial cultivation of several exotic species of aromatic plants such as palmarosa (*Cymbopogon martinii*), citronella

(*Cymbopogon winterianus*), lemon grass (*Cymbopogon flexuosus*), japanese mint (*Mentha arvensis*), german chamomile (*Matricaria chamomilla*), French basil (*Ocimum basilicum*), and a few indigenous species such as tagetes (*Tagetes minuta*). Domestication of *Nardostachys jatamansi*, *Valeriana wallichii*, and *Swertia chirata* is being considered. Jatamansi oil and Xanthoxylum oil (from *Xanthoxylum armatum*) are also commercially produced. Commercial distillation of Sugandha kokila oil (from *Cinnamomum glaucescens*) has been patented by HPPCL.

AROMATIC AND MEDICINAL PLANTS FOR POVERTY ALLEVIATION

In accordance with the guidelines prescribed in the Master Plan for the Forestry Sector (HMG/FINNIDA, 1990), several herbal centres have been established in different regions of the country where cultivation and processing activities are carried out with the involvement of user groups.

Processing of wild species by steam distillation (e.g., *Gaultheria fragrantissima*, *Rhododendron anthopogon*, *Artemisia* spp., and *Curcuma zedoaria*) has been facilitated by the establishment of distillation units for operation by the local people. This activity has given the rural low-income populace a new means to generate income on a somewhat permanent basis.

At present, about 5,000 to 6,000 tons of pine resin are tapped from Chir pine (*Pinus roxburghii*) distributed in the warm-temperate belt across Nepal. This activity engages around 2,000 villagers. There is ample scope for expansion of the rosin and turpentine industry. Consequently,

employment could be generated both in the rural and urban areas through resin tapping, processing, and fractionation of turpentine oil for aroma chemicals.

VALUE OF PRODUCTION

Table 1 gives the quantities of wild aromatic plants available for processing and the quantities actually processed within the country. Table 2 shows the quantities of herbal extracts, resinoids and essential oils produced by HPPCL for the six years from mid-July, 1987 to mid-July, 1993. Table 3 shows the annual turnover of HPPCL for the last seven fiscal years. Table 4 shows the quantities and values of the exports of medicinal and aromatic plants to India in F.Y. 1990/91. Table 5 illustrates the export of herbs to overseas markets in F.Y. 1989/90.

MARKET STRUCTURE

The marketing channel for crude herbs (aromatic and medicinal) is quite complex. At present, HPPCL has bilateral contracts, renewable annually, with the village and rural processors. Thus, the company, to some extent, shields the local processors from the uncertainties and fluctuations in the international markets with regard to the prices of the essential oils and extracts. In the case of raw materials (botanicals), however, local and regional price fluctuations seriously affect the income of the true village collector who is at the mercy of the middleman or village trader.

Nepalese essential oils have been well-received in the regional and European markets. The conventional oils such as palmarosa, citronella, lemongrass and

Species	Quantity available (metric tons)	Quantity processed (metric tons)
<i>Gaultheria fragrantissima</i> (leaves)	400	200
<i>Nardostachys jatamansi</i> (rhizomes)	200	80
Lichens (<i>Parmelia nepalensis</i> , <i>Usnea</i> spp., <i>Ramalina</i> spp.)	300	60
<i>Xanthoxylum armatum</i> (fruit)	400	50
<i>Rhododendron anthopogon</i> (leaves and twigs)	80	20
<i>Juniperus indica</i> (berries)	30	x
<i>Cinnamomum glaucescens</i> (berries)	100	80

Product	1987/88	88/89	89/90	90/91	91/92	92/93
Rosin	92.50	155.00	151.00	112.86	110.50	49.89
Menthol crystals	0.16	0.02	0.20	0.36	0.31	0.20
Extracts						
Vasaka liquid*	0.54	0.52	1.58	2.96	-	-
Aconite*	-	0.70	-	-	-	1.01
Belladonna*	0.22	-	0.20	-	0.24	0.21
Resinoids						
Lichen	1.09	1.36	0.79	1.09	0.74	0.41
Valerian	-	0.05	0.19	-	0.51	-
Essential oils						
Citronella	0.51	0.85	1.03	2.20	1.62	5.18
Palmarosa	3.20	3.28	4.41	2.91	2.06	1.08
Lemongrass	0.18	0.21	0.30	0.71	0.61	1.33
Mentha	0.59	0.63	0.72	0.81	0.47	1.14
Sugandha kokila	1.35	0.73	-	-	-	-
Jatamansi	0.04	0.17	0.39	0.01	-	0.23
Juniper berry	0.01	-	-	-	-	-
Calamus	0.18	-	-	-	-	-
Tagetes	-	0.04	0.06	0.01	-	0.04
Wintergreen	-	0.10	-	0.47	0.13	0.69
Matricaria	-	-	0.01	-	-	0.02
Xanthoxylum	-	-	-	-	0.19	0.45
Turpentine*	16.80	29.05	29.50	-	23.78	11.10

Source: Marketing Dept., HPPCL.

Note: * in kilolitres.

**Table 3. Annual turnover of HPPCL for the last seven fiscal years
(thousands of rupees)**

Year	Domestic	India	Overseas	Total
1987/88	2,144.87	7,873.13	289.71	10,307.71
1988/89	2,266.78	2,947.68	344.71	5,559.17
1989/90	8,493.42	1,292.77	1,711.78	11,497.97
1990/91	4,311.91	1,809.15	902.21	7,023.27
1991/92	3,746.16	3,041.44	2,461.26	9,248.86
1992/93	6,592.23	5,044.06	4,919.44	16,555.73
1993/94	4,947.39	3,089.66	3,841.08	11,878.13

Source: Marketing Dept., HPPCL.

Table 4. Exports of medicinal and aromatic plants to India, FY 1990-91

Plant	Quantity (kgs)	Value (Rs.)
<i>Acorus calamus</i>	5,777	109,000
<i>Asparagus racemosus</i>	78,450	909,000
<i>Bergenia ligulata</i>	49,773	669,000
<i>Cinnamomum tamala</i>	129,371	1,132,000
<i>Lycopodium clavatum</i>	17,057	149,000
<i>Orchis</i> spp.(Gamdol)	921	17,000
<i>Picrorhiza scrophularaeflora</i>	43,050	548,000
<i>Rubia cordifolia</i>	22,147	225,000
<i>Rheum emodi</i>	5,906	36,000
<i>Swertia chirata</i>	125,205	1,854,000
<i>Terminalia</i> spp.	1,150	8,000
<i>Nigella sativa</i>	33,307	165,000
Grand Total:	512,114	5,821,000

Source: Foreign Trade Statistics, F.Y. 1990/91, His Majesty's Government, Ministry of Finance, Department of Customs, Kathmandu.

Table 5. Export of crude herbs from Nepal (excluding India), FY 1989-90

Herb	Quantity (kgs)	Value (Rs.)
<i>Lycopodium (Lycopodium clavatum)</i>	6,960	1,046,727
Rhubarb (<i>Rheum emodi</i>)	6,000	129,960
Spikenard (<i>Nardostachys jatamansi</i>)	17,124	442,364
Chiretta (<i>Swertia chirata</i>)	2,000	89,176
Miscellaneous	200	3,976
Grand Total:	32,284	1,712,203

Source: Trade Promotion Centre, Kathmandu.

tagetes have a growing demand from foreign customers. The case is similar with certain newly introduced unconventional items like oil of *Rhododendron anthopogon*. Oils like Jatamansi oil and Xanthoxylum oil require greater effort for successful export. The future of the essential oil industry looks promising, with foreign firms entering Nepal for the manufacture of soaps and detergents.

CONSTRAINTS AND STRATEGIES

The successful marketing of products derived from aromatic plants (e.g., essential oils) must overcome certain constraints. The constraints and recommended strategies are listed below:

1. Aromatic plants yield essential oils, oleoresins, resinoids, concretes or absolutes which mainly depend on the external market for consumption. The internal demand for these items is met through imports from India, France, Germany, the Netherlands, and Switzerland. The imported products are chiefly blends of synthetics or mixtures of synthetic aroma chemicals and natural essential oils. Domestic processors, therefore, should develop blending techniques to cater to Nepal's consuming industries (foodstuffs, beverages, confectionery, soaps, pharmaceuticals).
2. Reaching the customer is not an easy task. Firms in developed countries usually have their own reliable suppliers and are hesitant to switch to new suppliers for fear of poor-quality products, faulty delivery schedules and lack of guaranteed long-term supply. Essential oil producers, therefore, have to

approach the fragrance/flavour compounding firms (the large-scale consumers of aromatic products) through trading houses (importers) in the respective countries. The development of trust over a long period of time will sometimes enable producers to sell directly to consumers. Thus, the entrepreneurs in this field should have a long-term commitment and be willing to develop long-term strategies for success.

3. Acceptance of novel, or unique, essential oils by the world market takes a longer period (at least 2-3 years) than conventional items. This is so because of the numerous tests carried out by the consumer's laboratories on the usefulness of the particular oil, its safety (freedom from toxicity), its stability and competitiveness over similar established products. HPPCL has had to face this situation in the case of essential oils like Jatamansi oil and Xanthoxylum oil.

RECOMMENDATIONS

1. National priority should be given to medicinal and aromatic plants. Policies should be formulated to facilitate the judicious and sustainable utilization of aromatic and medicinal plants. If harnessed effectively, this sector can make a significant contribution to the national GDP.
2. There is an urgent need to develop agrotechnology for the domestication of wild aromatic and medicinal plants, especially those species which are exploited heavily.
3. Access to commercially viable processing technology is important. Product diversification and manufacture

- of finished products (pharmaceuticals, cosmetics) are important commercial avenues. Local and regional markets should not be overlooked.
4. Multi-national companies and joint-ventures with foreign firms should be promoted for the rational utilization of these valuable resources.
 5. Villagers need to be trained in post-harvest techniques (drying, storage) to minimize wastage and unnecessary losses.
 6. The currently practised trade pattern, where the true collector is exploited, needs to be rectified.
 7. All research activities carried out within the country should be coordinated by a national agency which should also function as a liaison between national and international institutes and organizations for sources of information and technology. New findings on NWFPs and medicinal plants should be shared among the concerned agencies and organizations.
 8. The determination of royalties on collected herbs should be based on a more realistic approach in order to promote local processing. The ideal method would be to have the lowest royalty on plant parts that could be collected with the least impact on the plant's natural growth (e.g., fruits), with increasing royalties on plant parts that endanger the survival of plants (e.g., roots and rhizomes would command the highest royalties).

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LAC PRODUCTION AND DEVELOPMENT IN VIETNAM

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Lac is a resinous protective secretion of the lac insect. In Vietnam it occurs naturally in the north-western part of the country, in Lao cai, Yen bai, Lai chau, Son la, Thanh hoa, Hoa binh, Nghe an, and Ha tinh provinces. Within these provinces, lac insects occur only in certain regions between altitudes of 200 and 700 metres. In many of these regions there are no roads, even for bikes. Most lac cultivators are tribal people practicing shifting agriculture.

Traditional lac cultivation by ethnic minorities is very simple. Two types of lac hosts are used, namely perennial trees and annual bushes. The natural preinoculated host trees which grow scattered in the forests are "inoculated" with lac insects. In Vietnam, there are about 40 species of lac hosts. The farmers inoculate the tree, leave it for swarming and come back to harvest it after five to six months. Harvesting involves cutting down branches bearing lac and tying broodlac to new hosts. The harvested host trees are left alone for one to two years so that new branches can come out.

Cajanus cajan is the only annual host species. It is sown mixed with food crops like highland rice, soybean, maize and cassava in April. In September, the food crop is harvested and in October *Cajanus cajan* is inoculated if the plants are big enough. In this case, the lac crop is harvested in April or May of the following year. If the plants are small, they are left to be inoculated in May and harvested in

October. *Cajanus cajan* not only produces lac but also improves soil productivity. This type of mixed crop is suitable for the shifting cultivation tribal people have used for centuries.

Lac cultivation is a traditional occupation of certain families in each village or commune of the lac producing areas. Expertise in lac growing is transferred from father to son. The women are not involved and they have no right to sell the products. Usually each family has only a few big host trees growing scattered in the natural forests or in the garden. Cultivation is casual. The farmers take a few days to tie broodlac onto the hosts and after 4-6 months come back to harvest it. Each lac crop only costs the farmers about one week of work. The yield of lac depends on the weather. If the weather is bad there may not even be enough broodlac to inoculate the next crop.

Highland rice, maize and cassava are the major crops of the subsistence farmers in the lac producing regions. The production of rice and maize is not always sufficient for family consumption, with the worst shortages likely to occur in July-August. Livestock and forest products, such as wood and lac, are the main ways to cover such shortages and other family expenditures. The government ban on wood exploitation makes these highland farmers more dependent on non-wood products and livestock. Thus, lac is often harvested unmaturing in July or August and sold at very low prices.

ADVANTAGES OF LAC CULTIVATION

Lac cultivation has a number of advantages, including the following:

- low labour costs;
- small investment (broodlac is the main cost, but sticklac is obtained from empty broodlac one month after inoculation and can cover two-thirds of the cost);
- quick and regular income;
- easy transportation, which is particularly important for the remote areas where the roads are bad; and
- sustainability, because perennial host trees can be used for many years.

LAC DEVELOPMENT OVER THE PAST 30 YEARS

Since 1960, agricultural cooperatives have been gradually formed in all the villages in the north of Vietnam. They involve more than 90 percent of the farmers. Most land became the property of the cooperatives. Later on state lac plantations were also established in all provinces where lac is produced. High-yield lac hosts like *Protium serratum* and *Dalbergia hupeana* were planted in compact areas. Up to October 1980, the total area planted was 4,425 hectares. It takes five to seven years for these trees to be ready for the first inoculation. From 1962 to 1980, very small areas of the planted hosts were used for lac production and the majority of sticklac was produced by ethnic minority farmers.

Although lac cultivation continued to be a tradition in some families, however, as

members of an agricultural cooperative their own area for lac growing was very limited. Some cooperatives tried to cultivate lac and planted lac hosts in compact areas, but their efforts often failed because of bad management and lack of technical knowledge. Extension services on lac cultivation were weak and available to only some state lac plantations. Although there was financial and technical support from the government, these plantations were not run efficiently.

The sticklac price fixed by the Special Forest Products Company (SFPC) was very low and the cultivators had to walk long distances to the Company's buying branches in order to sell their lac. By the end of the 1970s, many farmers had stopped growing lac and many host trees had been destroyed for fuel wood and to clear land for agriculture.

There are no current statistics on the number of the families involved in lac production or on surviving lac host areas. In 1988, the country's economic system underwent a big change and all state enterprises became self-financing. From 1988 to 1993, there was no lac cultivation in most plantations.

Under the new land allocation policy, long-term leases were issued to farmers in 1988. By the end of 1993, all state lac plantation areas had been allocated to the worker families. Depending on labor capacity, each family was provided with from one to one and a half hectares of lac host trees and a small loan to begin lac cultivation. They retained full rights to their product. The lac market is now free and the price is high. These factors are incentives and farmers are once again keen on lac growing. However, those who are former state lac plantation workers find it easier for the following reasons:

- All of them are literate.
- Their lac hosts are more numerous and in compact areas. Cultivation is therefore easier to manage, as is protecting lac from theft (which is a serious problem for cultivators).
- They have less difficulty in getting support from the agriculture bank and forestry development programs.
- Their farms are situated in the better sites and connected with roads.

Ethnic minority farmers face many difficulties in recommencing lac growing, including the following:

- They are much poorer, and many of them are illiterate.
- The land allocation policy has not been implemented in most areas where they live.
- They have more difficulty in getting loans and support from forestry development programs.
- Their lac hosts are not in compact areas and traditional cultivation (using hosts far from home) is not possible any more because of forest protection.
- There are often no good roads connecting their villages with other regions.

LAC PROCESSING AND MARKETING IN VIETNAM

Prior to 1976, the Special Forest Products Export Company (SFPC) was the only enterprise buying sticklac from cultivators, processing it and distributing it to consumers. SFPC had two big plantations

located in Son la and Lai chau provinces with about 2,000 hectares of compactly planted lac host trees. There was also a lac processing factory, a research division and representative branches in different parts of the country.

Sticklac was purchased at a price fixed by SFPC and processed in the factory located in Ha dong, 10 kilometers from Ha noi. The sticklac was processed into shellac mostly by hand. Most lac production was for export and only small amounts were used inside the country for polishing furniture. It was difficult to buy lac products on the free market at that time. The shellac was exported mainly to China and the former Soviet Union, with some sold to other buyers, including Japan and Hong Kong. As lac production decreased in the years up to 1980, supplies for export ran out.

Illegal private lac processing shops started to appear in 1976. Their numbers increased quickly and the Company found it difficult to compete with them in purchasing sticklac from cultivators. As table 1 shows, the volumes of SFPC purchases of sticklac were varied considerably from year to year and did not increase overall between 1963 and 1980.

In 1989, when the country began to convert to a market economy, all economic sectors were recognised and encouraged. SFPC lost its monopoly in lac and other non-wood forest products. Many small lac processing and trade enterprises have been established with annual capacities ranging from several hundreds to thousands of kilogrammes of shellac. Most of them are family businesses. They are located mainly in big cities like Ha noi, Sai gon and Hai fong. Lac processing and marketing are now entirely under the control of the private sector.

Year	Quantity purchased (tonnes)
1963	52
1964	140
1965	181
1966	310
1967	95
1972	76
1973	200
1974	100
1975	78
1976	62
1977	38
1978	87
1979	165
1980	53

Since 1988, Vietnam has imported lac from China, Laos and sometimes India. There is no statistical data on the volume of lac produced in the country and imported from elsewhere. Imported lac is often transported illegally across the borders to avoid paying tax. Lac now is used not only for polishing furniture, but also in other industries.

Lac prices in Vietnam fluctuate widely according to supply. There are two crops a year, one in May and the other in October. Due to the cold weather in winter, the May crop generally has a low yield and is used mainly for broodlac. Commercial sticklac is usually obtained from the October crop. Cold weather sometimes causes mass mortality of lac insects and this leads to a shortage of broodlac for the next crop. Lac production drops drastically, and it takes two or three more crops for production to recover again.

For the last four to five years, a free lac market has operated. Most lac cultivators are ethnic minority farmers and they usually

do not store sticklac. They sell the fresh sticklac in August and September and sometimes sell unmaturing sticklac in July or dry sticklac from empty broodlac in November. The lac traders and processors store just enough lac for one year's supply. Usually they have no information on lac crop failures and are aware of it only when they can't buy the product. Even the lac cultivators only know about bad crops when the harvesting period arrives, because of the casual cultivation methods. After a bad crop, the sticklac price increases sharply and many traders (not only professional lac traders) rush to China to buy sticklac. This happened in April 1990. The large amount of imported sticklac pulled the price down from US\$ 9.00 to US\$1.00 per kilogramme. The quantity imported was so much higher than domestic demand, that it was only used up at the end of 1992.

In May and June 1993, the sticklac price again rose significantly because of a lac crop failure in May 1992, and because the stocks of lac imported in April 1990 were finished. However, this time the traders were more cautious and they imported lac on the basis of contracts with processors and consumers. China and Laos were the main suppliers, and a small amount of shellac was imported from India (through the state enterprise).

Vietnam's free lac market is relatively new and not entirely stable. Small lac traders and processors do not have much free market experience, but relationships between them and the consumers are being formed and improved.

CAUSES OF THE DECREASE IN LAC PRODUCTION

Lac production has decreased over the past 30 years, despite the government's efforts to

promote it. Although once a lac exporter, Vietnam has become an importer for the last seven years. The following are the main causes of this decline in production:

- The monopoly in the lac market impeded production. The producers could only sell sticklac to the Special Forest Product Export Company at a low price (averaging US\$ 0.50 per kilogramme). There were additional problems because of the Company's bureaucratic purchasing system.
- Cooperative and state ownership did not stimulate the production of lac. Farmers had little interest in production or the end product because they had no rights to it. As a consequence, many host trees were destroyed or used with very low efficiency and the lac growing area was reduced drastically.
- Traditional lac growing practices have been interrupted for several years. Plantations, technical expertise and cultivation experience have been lost. The remaining host trees in state plantations have just been allocated to former worker families and a very small proportion of these are being exploited.
- The government has no supporting extension services. Due to past unsuccessful efforts in promoting lac production, many leaders in the Ministry of Forestry are of the opinion that lac production is not profitable. While the Special Forest Products Research Division (FORSPARCEN) conducts research and some extension services on lac cultivation, it has been self-financed for the last three years and has had great

difficulty in surviving. Many trained technical staff have left the Centre for other jobs.

- Worsening security is also impeding lac production. Lac theft, even of tied broodlac, is common. Traditional cultivation on natural hosts scattered in the forests or the mixing of lac hosts with food crops far from the house cannot be used anymore.
- A land allocation policy for farmers has not been implemented in most lac producing areas. Thus, the farmers still do not have their own farms.
- The high cost of broodlac is an additional obstacle. To inoculate one medium size tree costs the farmers US\$ 6.00 to US\$ 9.00 for broodlac, while their income per year is about US\$ 60. While the national poverty alleviation program has been launched to support the farmers, very few of them have managed to get loans (which average only about US\$50 per family) from the agriculture bank.

Shortage of money, uncertainty about yields and difficulties of protecting the crop make farmers hesitate to grow lac. Nevertheless, there are signs of recovery. Lac cultivation has been started at the household scale in all state lac plantations. Many ethnic minority farmers are also trying to grow lac again, although their lac host areas are restricted and not very favorable. Farmers are realising the profitable nature of lac cultivation. For ethnic minority producers, lac provides additional income, but for those on state plantations it provides their main livelihood, which gives them more incentive.

PROJECTS PROMOTING LAC PRODUCTION IN VIETNAM

To increase lac production, international assistance has been sought. One lac promotion project, with US\$ 661,012 support from UNDP, was implemented between 1985 and 1987. This FAO-supported project was formulated in 1980 when the national lac production had declined dramatically. A target of the project was to increase lac production to 300 tonnes per year, the figure achieved in 1966.

Project activities took place in three parts of the Special Forest Products Export Company, namely:

- The Special Forest Products Research Division (now FORSPARCEN);
- the lac processing factory; and
- the Lai chau lac plantation.

The Lai chau plantation was one of the biggest with 105 hectares of compactly planted host trees (*Dalbergia hupeana*). The plantation is 600 kilometers from Hanoi and transportation is very poor. Under the guidance of a Chief Technical Adviser, the workers were trained in improved techniques of lac cultivation and a broodlac farm was established. The yield and quality of lac from the broodlac farm increased significantly. Other project activities were in the Mai chau district of Hoa binh province, one of the main lac areas. There was also work in the south of Vietnam to seek new areas for lac growing.

The following recommendations arose from the project:

1. To establish broodlac farms at Mai chau and Bao loc, with adequate funding, to ensure a stable supply of broodlac for farmers at a reasonable price.
2. To train the farmers in improved lac cultivation techniques.
3. To plant suitable lac hosts in compact areas, so that cultivation is more convenient for farmers.
4. To extend lac cultivation to other areas by using local host species or by raising compact plantations of species suited to local climates.
5. To strengthen extension services on lac cultivation in the Ministry of Forestry in provinces where lac is produced.
6. To provide adequate support to farmers to form cooperative societies or associations.

With the assistance of government funding, most of these recommendations have been implemented.

In June 1994, a small project, "Lac farming for the Household at Mai chau" was approved with US\$ 30,000 support from the Ministry of Science, Technology and the Environment. It began in September 1994. The duration of the project is two years and 80 percent of the funds will be reimbursed to the Ministry. FORSPARCEN is the implementing agency and project objectives are:

- To transfer lac cultivation technology to the farmers (about 100 families);
- To establish a broodlac farm at Mai chau; and

- To increase lac production of this district to 50 tonnes per year by 1996 (from the present four tonnes annually).

The broodlac farms are being established on 17 hectares of lac host, *Protium serratum*, planted in 1965. This area has been allocated to 11 former worker families of the Mai chau plantation. They are being trained in improved techniques for managing their own broodlac farms.

Training in lac cultivation has been provided to 95 farmers. To buy broodlac, they will be provided with a small loan (US\$100 - US\$ 200) interest-free for two years. By October 1994, 3.7 hectares of lac host had been inoculated, and by May 1995, the inoculated area will cover 40 hectares.

CONCLUSIONS AND RECOMMENDATIONS

For more than 10 years many farmers in Vietnam stopped lac cultivation. Currently the lac market is free and there is a stable, high demand for lac. The farmers are anxious to cultivate lac again, but there are some obstacles for them to overcome. Traditional lac cultivation techniques have been almost forgotten. Over the last two years, lac cultivation efforts have often failed due to insufficient knowledge of cultivation techniques. Shortage of investment and protection of lac from theft are also important problems.

To increase lac production and to generate income for farmers in remote mountainous areas, the following recommendations are being made:

1. The key step is to speed up land allocations to farmers. Assistance should be given for them to establish their own

farms and raise compactly planted lac hosts which can be conveniently managed and protected.

2. Loans should be given to the farmers for purchasing broodlac.
3. There is an urgent need to train the farmers in lac cultivation techniques, such as growing host plants, rearing of lac insects, and harvesting of sticklac and broodlac.
4. Farmers who are former workers of state lac plantations should be helped to establish their own lac farms. Adequate training in farming broodlac and financial assistance are essential for them.
5. Extension of lac cultivation to the south is necessary (the south has been shown to be a suitable region for lac growing). Adequate funds should be provided to establish several broodlac farms in this area.
6. Research should be conducted on developing bush-like host trees and on the introduction of new hosts, particularly dwarf forms, for intensive lac growing.
7. Assistance should be given to establish an association of lac cultivators, traders, processors and consumers. This association would contribute to promoting lac production and stabilizing the market.
8. Technology transfer of improved lac cultivation methods should be encouraged via the Ministry of Forestry and the Ministry of Science, Technology and the Environment, and in provinces where lac is produced.

9. Lac production should be encouraged in national economic and agroforestry programs for the mountainous areas, and for other forestry programs supported by international organisations.



Vietnam's new free market policies are stimulating a resurgence of lac production.

SOCIAL, ECONOMIC AND CULTURAL ASPECTS OF RATTAN IN MALAYSIA

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IMPORTANCE AND USES OF RATTAN

Non-wood forest products (NWFPs), which were regarded as "minor forest products" in the past, are now gaining greater attention as it is realised that these products are important in world trade, and national and local economies. In particular, rattan products emerge as the most important among the NWFPs. Among the marketed NWFPs, rattan ranks the highest in value. It is used not only in the local village economy but also in international markets. In Malaysia, together with round timber, poles, fuelwood, and charcoal, rattan (i.e. *Calamus manan* and *C. caesius*) is categorised as a major forest product under the National Forestry Act of 1984. Indeed, rattan harvesting, its uses and marketing have affected the social, economic and cultural livelihood of the local communities as well as long-term national socio-economic development.

Rural villagers in Malaysia, particularly the forest dwellers, have been using rattan since time immemorial. The use of rattan products is thus related to their social, economic, cultural and religious activities. Among the important species used in these activities are *Calamus* spp., *Daemonorops* spp., *Korthalsia* spp., and *Plectromiopsis* spp. Rattan is used as binding, weaving and supporting material for various household items as well as for food, medicinal and ceremonial purposes (Ave, 1988). Among

the products made from rattan are baskets (for carrying fruits, food and fish), traps (for catching fish, civets, monkeys), house components (poles, walls and floors), utensils (darts, handles) and musical instruments. Fruits and cabbage of some rattans are consumed as food. Palm cabbage, usually eaten raw, has a medicinal function which cures coughs and stomach ailments. Leaves of rattan are believed to have magical powers to drive away evil spirits (Ave, 1988). Young shoots of *Calamus exilis* are eaten raw for treating influenza, coughs and throat irritation, while the juice obtained from stems of *C. manan* and *C. ornatus* are used for stomach-ache and diarrhea (Lim, 1992c).

Other than meeting subsistence needs, the sale of rattan is a major source of income for forest dwellers. Of the 106 species of rattan in 8 genera identified in Peninsular Malaysia (Aminuddin and Abd. Latif, 1992), about 20 have commercial importance. The species that fetches the highest market price and is popularly demanded for furniture making, is *C. manan*. The commercial canes are treated and then used for making baskets, walking sticks, polo sticks, umbrella handles, furniture, carpet beaters, handles and other products. The forest dwellers, and villagers who live on the edge of forests harvest the raw canes for sale to middlemen.

RATTAN COLLECTION

Practically all rattan is harvested from the natural forests in Malaysia as the establishment of rattan plantations and smallholdings is still in its infancy. Under Malaysian law, "all forest produce situating, lying, growing or having its origin within a permanent reserved forest or State land shall be the property of the State Authority except where the rights to such forest produce have been specifically disposed of in accordance with the provisions of this Act or any other written law" (National Forestry Act 1984, Section 14). In the case of rattan harvesting, to obtain the right of harvesting, a person has to register with the Forestry Department as a contractor. The contractor is to apply for a licence from the State Authority as the law states that "No person shall remove any forest produce from any alienated land, land held under a temporary occupation licence, mining land or reserved land unless he is the holder of removal licence" (National Forestry Act 1984, Section 40, part 1). Licensees are to pay premium and royalties (decided by various state forest departments). They also have to contribute forest development assessments (i.e. 10 percent of royalty) for harvesting *C. manan* and *C. caesius*, the two most popular commercial species.

The actual task of rattan collection in Malaysia is undertaken normally by the aborigines in Peninsular Malaysia and the natives in Sabah and Sarawak. These aborigines (known locally as the "Orang Asli") totalled 83,000 people in 1990, while the natives in Sabah and Sarawak numbered 838,000 and 905,800 respectively in 1980. In total, they comprise about 17 percent of Malaysia population. A large proportion of these aborigines and natives are living within or near the forests. The communities

have been given special privileges to harvest forest produce. Under the National Forestry Act 1984, a licence is not required for "any forest produce removed from any alienated land by any aborigine for any purpose" (Section 40, part 3). The State Director of Forestry may exempt from royalty "any forest produce and class of forest produce taken from any stateland or alienated land by any aborigine for the construction and repair of temporary huts on any land lawfully occupied by such aborigine; the maintenance of his fishing stakes and landing places; fuelwood or other domestic purposes; or the construction or maintenance of any work for the common benefit of the aborigines" (Section 62).

Traditionally dependent on the forests to meet their needs, the aborigines and natives remain the most important rattan collectors today. It is thus natural for a licensee to request these aborigines and natives to collect the rattan in a specific forest area. In practice, middlemen without licences also request villagers to harvest rattan. This occurs because, unlike logs, it is relatively easy for middlemen to smuggle rattan in vans or small lorries, past local checking stations where the royalty charges are calculated.

Rattan collection is an arduous task, which requires the collector to climb trees, cut the rattan free, gather the canes and carry them out of the forest. Selected species of rattan are cut near the base and then pulled down by strong tugs. Knives are used to remove the leaves and sheaths. When the rattan stem gets stuck, the collector must climb the tree to cut it loose before pulling it down. Normally, for each rattan harvesting trip, villagers form groups consisting of related and extended family members. Each trip normally lasts one day, but more days will

be spent in the forest if the destination is far away. Harvesters bring along food and other necessities (such as cleavers).

A case study of rattan harvesting among the aborigines in three villages in Peninsular Malaysia illustrates the following interesting features of rattan harvesting (summarized in table 1):

1. Rattan harvesting is carried out either upon the middleman's request or in times when villagers are looking for cash.
2. It is normally done by a team of related villagers, usually headed by the village headman.
3. Rattan harvesting is usually carried out by male members in the local community.
4. A few females who are usually immediate family members (wives, sisters or daughters) of one of the team members may join the collection trip. Their role is primarily to carry food and provide company, rather than actual harvest of rattan.
5. Cash advances are normally obtained from middlemen before harvesting. The middleman is also important in providing financial assistance when the villagers are short of cash.
6. Rotan manau (*C. manan*) is the normal cane harvested as it fetches the highest market value compared to others.
7. Each member's share of rattan collected depends on the number of canes carried home by him even though all members helped to harvest the canes. An adult male normally carries 20-25 raw canes. Women and children, whose canes are added to the household total, receive

their "shares," in the form of pocket money, from the household heads.

8. The price of rattan manau offered to villagers depends on the grade (size and quality) and the distance of the village from the main road. Larger diameter canes fetch a higher price than smaller canes. If a village is located relatively near to the main road, a higher price is offered as the middleman incurs a lower transportation cost.
9. Members also collect other forest produce during their harvesting trip.

Rattan harvesting is regarded as so important in the aboriginal economy that the aborigines describe the situation as "no rattan, no Orang Asli" (Kiew and Hood, 1990: 233). In fact, the importance of rattan to the Orang Asli economy may not be as great as often perceived by some, a point which will be shown later.

Nevertheless, rattan does play a special role in the Orang Asli economy. Rattan's important position in the aboriginal communities, compared with other local economic activities, may be explained by three reasons (Kiew and Hood, 1990). First, this is the only way for Orang Asli to obtain interest-free credit with assured repayment. This is important particularly when they need cash immediately in the event of sickness or preparing for village social, cultural or religious festivals. Availability of cash for immediate needs is important as the Orang Asli is one of the poorest groups in Malaysia. Second, rattan collecting provides alternative/additional employment and supplements household income. The Orang Asli practise shifting cultivation (especially the Temiar and Semelai) and harvest rattan during the "rest period," i.e. after the hill padi harvest and before the next clearance of

Village	Musuh L.Z.	Sungai Bot	Sungai Rensak
Distance of village from main road (km)	10	3	4
Team leader	Headman	Headman	Villager
Team members	10 men, 2 women	18 men, 1 woman	8 men, 1 woman
Reason for harvesting	Requested by middleman	Planned by villagers who needed cash	Planned by villagers
Advance from middlemen	RM100 (US\$ 40) Shared among team members depending on individuals' needs	4 members obtained a total of RM450 (US\$ 180)	None
Departure time	6.00 a.m.	6.30 a.m.	7.00 a.m.
Mode of transport	foot	foot	foot
Arrival at destination	9.05 a.m.	9.10 a.m.	9.00 a.m.
Rattan harvesting	9.30 a.m. - 5.00 p.m.	9.20 a.m.- 12 noon	9.30 a.m.- 12 noon
Sticks of rattan manan (2.7 meters per piece) harvested	130	160	56
Average price/stick	RM2.50 (US\$ 1.00)	RM3 (US\$ 1.20)	RM3 (US\$ 1.20)
Total income	RM325 (US\$ 130)	RM480 (US\$ 192)	RM168 (US\$ 67)
Income sharing	Depending on the number of canes carried by each member.	Depending on the number of canes carried by each member.	Depending on the number of canes carried by each member.
Average income received per member	RM27 (US\$11.00)	RM10 (US\$4.00)	RM19 (US\$7.60)
Other forest produce collected during the trip	Fruits, tortoise, fish for consumption	Forest fruits for consumption	Squirrel and porcupine for self-consumption
Remarks	Rattan kept and sold within a month. Middleman deducted advance before making payment. Headman received RM50 (US\$20) for organising the trips.	Rattan kept and sold within a month. Middlemen deducted advance before making payment.	Ratan kept and sold within a month.

Source: Unpublished field data.

land for cultivation. Those who depend on rubber tapping as the main source of income normally harvest rattan during the rainy days and winter period when no tapping is done. Third, rattan collecting can be carried out when other ways of earning a living are not available. Since rattan collecting involves arduous work, the Orang Asli will engage in other activities such as durian (*Durio zibethinus*) and petai (*Parkia speciosa*) fruit collection during fruiting season. Once the fruiting season is over and there is no other employment available, the Orang Asli will return to rattan collecting.

RATTAN MARKETING BY VILLAGERS

Rattan marketing begins after harvest when the raw canes are transported to the main roads or to the villages. The canes are then sold to middlemen who transport the canes by lorries or vans, process them and sell them to exporters or local factories for further processing.

It is important to note that rattan is normally sold to local middlemen and there is no direct selling by the collector to the final

consumers. The entire marketing process involves the following stages:

Stage 1. After harvesting, the raw canes are transported and stored near roadsides or in the villages.

Stage 2. The canes are sold to middlemen. The prices offered are influenced by transport distance and the grade of rattan. Normally, the price of a mature stick of 2.7-meter manau cane is RM3 (US\$ 1.20). A lower price is offered to the harvester if the storage site is relatively far away or the canes are of lower grades (table 2).

Stage 3. Oil curing, saw dusting and drying. To improve the appearance and finish of rattan products, the raw canes are processed by curing, i.e. boiling with a diesel/coconut oil mixture. This curing process has the following advantages: it removes the waxy or gummy/mucilageous substance for better appearance; it creates a golden yellow or white colour; and it rapidly reduces moisture. After oil curing, the canes go through the process of saw dusting which smoothes the canes and improves the glossiness of the surface. The canes are then sun-dried.

Stage 4. The dried canes are sold to manufacturers for making furniture and other cane products.

Stage 5. Rattan products are sold in local markets or/and exported.

RATTAN PROCESSING AND MANUFACTURING INDUSTRY

Rattan processing is one of the traditional forest-based industries meeting the needs of rural villagers. Traditionally, processing involves only manual work using little or no

machinery. Forest dwellers are the earliest workers in this industry. They traditionally collected rattan from the forests and made into various tools for domestic and agricultural use. This type of rattan industry dwindled in importance over the years as modernisation came to the villages, bringing similar products made of plastic at reasonable and affordable prices. Nevertheless, in the remote areas, the use of rattan in making domestic and agricultural products can still be seen today.

Even though rattan had been traded as early as the third century A.D. (Lim 1992a), the development of rattan processing beyond the local household/village economy took place only after Malaya (Peninsular Malaysia) achieved independence in 1957. From 1957 to 1986, there were limited attempts to develop a rattan processing industry in the country. However, Many wholesalers concentrated on the trade of semi-processed rattan rather than on whole rattan. The rattan furniture manufacturing industry could not develop further because local investors lacked government incentives, capital, a constant supply of rattan, and time to develop the products and find markets (Anon, 1987). Moreover, Taiwan and Singapore, both important rattan furniture exporters, had managed to capture a major portion of the world rattan furniture trade. As a result, there was limited progress in the local rattan furniture making industry.

More recently, the development of the rattan furniture industry has been affected by the actions of other rattan producing countries of rattan products. Thailand's 1978 ban on the export of all rattan materials except furniture, the Philippines' 1980 ban on the export of rattan poles and Indonesia's gradual moves to ban the export of rattan in

Table 2. Prices of 2.7-meter *Calamus manan* poles, 1992

Size (mm)	Grade	Unprocessed ex-farm price (US\$/stick)	Processed (US\$/stick)
35	1/3	n.a.	2.2
35	4/5	1.4	1.6
30-34	1/3	n.a.	1.7
30-34	4/5	1.0	1.3
25-29	1/3	n.a.	1.0
25-29	4/5	0.3	0.6
18-24	1/3	n.a.	0.6
18-24	4/5	n.a.	0.3

Note: Rattan's grade is affected by defects which determine the quality.
n.a.= not available.

1976, 1986 and 1988 have affected Malaysia's rattan industry development (Manokaran 1989). Indonesia, supplier of 90 percent of the world's rattan, banned raw rattan exports in October 1986 to boost the development of its domestic manufacturing industry.

Actions taken in other rattan producing countries have had two results. First, there was an increase in Malaysia's raw rattan exports for three consecutive years (1987-1990). Exports of whole rattan increased from US\$ 2.3 million in 1986 to between US\$ 14.3 million and US\$ 16.6 million during the 1987-89 period. Secondly, Indonesia's action resulted in the Malaysian government giving more attention to the development of the local rattan processing industry. Reacting to Indonesia's move, Malaysia imposed a heavy tax of RM2,700 (US\$ 1,080) per tonne on all types of unmanufactured rattan in 1988 and the subsequent ban on the export of rattan canes from Peninsular Malaysia in December 1989 (Abd. Latif 1989). Export duty of RM1,000 (US\$ 250) per tonne for rattan cane (not exceeding 12 mm in diameter) and rattan skins was also imposed. This appears to have been effective in encouraging the development of the domestic rattan

manufacturing industry as more materials are now available for processing. Consequently, whole rattan exports fell to US\$ 4.7 million in 1990 while rattan furniture exports increased from US\$ 4.4 million in 1987 to over US\$ 20 million after 1987. There was an increase in the number of rattan processing mills in the country from 120 in 1983 to about 700 in 1994 (table 3).

Most of the rattan mills in Malaysia are categorised as cottage enterprises and small-scale mills. Of the 600 rattan mills in Peninsular Malaysia, 276 (46 percent) are cottage enterprises, (less than US\$ 100,000 capital investment and 50 workers or less), 204 (34 percent) are small-scale (up to US\$ 200,000 capital investment and 75 workers or less) and the remaining 120 (20 percent) are medium- and large-scale factories (more than US\$ 200,000 capital investment and more than 75 workers) (Razak, *et al.*, 1989).

While the growth of the rattan processing and manufacturing industry is encouraging, the industry is currently facing two major problems. The first relates to the question of regular and sufficient supply of raw materials for further processing. Many mills have begun to complain of difficulty in obtaining adequate supplies of local raw

rattan. Mills which previously obtained their raw material from one state are now beginning to source their materials from other states. Imports of cane are also increasing, from 847 tonnes in 1986, to more than 5,000 tonnes each year from 1987 onwards. In 1986, Malaysia imported US\$ 404,048 worth of whole rattan. By 1993, import values reached US\$ 6,234,177.

Table 3. Number of mills processing and manufacturing rattan furniture.

Period	Number of mills	Estimated employment
1983	120	3,240
1989/90	600	16,121
1994	700	18,900

Source: Ooi, 1983; Razak et al., 1989; Abd. Latif, 1994; Poh, 1991

The second problem faced by the industry is labour shortage. Development in Malaysia has reached a stage where local workers prefer to work in other modern manufacturing industries such as electronics, textiles, and food processing factories where they are often provided with good working conditions and lucrative salaries. A factory worker is given a free uniform, works in air-conditioned rooms and earns a minimum monthly income of US\$ 240. The rattan processing and manufacturing mills generally have yet to provide such good conditions. As a last resort, many of these rattan mills have to depend on foreign workers such as Indonesians, Bangladeshis and Filipinos whose movement is difficult to control. Some mills complain that these foreign workers also hop from one mill to another in search of better benefits.

CONTRIBUTION TO THE LOCAL AND NATIONAL ECONOMY

Rattan harvesting and processing has contributed much to the socio-economic development of the country. At the local level, rattan-related activities create employment and generate income. At the national level, income is generated for the various state forestry departments through the royalty collected. The government also benefits as the export of rattan products is becoming a more important source of foreign earning.

Employment

Employment created by the rattan industry can be categorised into two types, viz. harvesting and processing/manufacturing. Rattan collecting involves harvesters who are forest dwellers or who live near the forests. Harvesters are either full-time or part-time collectors involved in other economic activities. The Malayan Rattan Industry estimated that in 1987 there were 15,000 people employed in collecting rattan in Peninsular Malaysia alone. Employment estimates for this category of workers was reduced to 13,000 in 1990 (Kiew and Hood, 1990). In comparison, 67,372 workers were employed in the logging industry in 1990.

The rattan processing industry provides a more stable form of employment to workers. It was estimated that employment in each of type of mill ranges from 4-5 persons (cottage enterprises), to 10-20 persons (small-scale factories) and 50-100 persons (medium and large mills). In total,

all mills employed 16,120 people in 1989 (Poh, 1991), or an average of 27 persons per mill.

Income generation

The importance of rattan collection as a source of income can be observed from its position in the rural household economy. Kiew and Hood's study (1990) showed that of 14 aboriginal villages surveyed, 8 derived their main source of income from rattan collection. In the other 6 villages, rattan collection is an important source of supplementary income. The study indicated that the annual income received per worker was between RM750 (US\$ 300) and RM4680 (US\$ 1,872) for full-time collectors and between RM400 (US\$ 160) and RM600 (US\$ 240) for part-time collectors. This means a full-time rattan collector is expected to receive an average monthly income of between RM63 (US\$ 25) and RM390 (US\$ 156). This income is less attractive in comparison with general workers in the agricultural sector who receive an average monthly income of approximately RM300 (US\$ 120).

While recognising rattan as the main source of income for villagers who do not have better economic opportunities, rattan's contribution to the rural household economy may be less significant than expected. This is particularly true in cases where rattan resources are declining or where rural households have alternative sources of income. A 1990 study showed that cash income from rattan and income in kind (i.e. use of rattan for household need) accounted for only 1.5 percent (RM3 or US\$ 1.2) and 0.1 percent (RM0.40 or US\$ 0.16), respectively, of the average household income of RM284 (US\$ 114) in a 20-household aboriginal village (Lim, 1992 b).

Recent studies show that the importance of rattan in the household economy varies from village to village. Table 4 shows that the share of rattan to household income ranges between 0.2 percent and 14 percent.

Workers in the rattan processing and manufacturing industries earn a relatively higher and regular source of income. Table 5 provides information on the monthly income of workers. Income received by foreign workers is higher than those of local workers. This is because foreign workers, who are also provided with free lodging, are relatively more stable than local workers. Staying in the quarters provided enables and encourages the foreign workers to work more regularly. On the other hand, local workers sometimes refuse to work for various reasons and are relatively more mobile.

Royalties for forest departments

While rattan royalties rates differ among states, the average royalty rate for *Calamus manan* and *Calamus caesius* is RM20 (US\$ 8) and RM0.10 (US\$ 0.04) per 100 meters of cane, respectively.

Royalties collected from rattan form a substantial proportion of total NWFP royalty, i.e. between 8 percent and 23 percent for the 1981-1993 period. However, the share of total forestry royalties attributable to rattan is negligible, i.e. less than 1 percent for the same period (table 6).

Foreign exchange earning

With the banning of raw rattan exports in 1989 (except for the East Malaysian states of Sabah and Sarawak) and later restriction of partially processed rattan, there is now

Table 4. Sources of average household income in three aboriginal villages, 1992-93.

Location:	Kg. Batu 24/25, Jalan Pahang, Perak
Distance from main road:	2 km
No. of households surveyed:	15 (48% of total households)
Average monthly household income:	US\$ 200.80
Sources of monthly household income	
(a) rattan (cash):	none
rattan (self-consumption):	US\$ 0.40 (0.2%)
(b) other forest produce (cash):	US\$ 15.60 (7.8%)
other forest produce (self-consumption):	US\$ 24.80 (12.4%)
(c) Salary and wage:	US\$ 160.00 (79.6%)
Location:	Kg. Songkok, Selangor.
Distance from main road:	12 km
No. of households surveyed:	5 (71% of total households)
Average monthly household income:	US\$ 58.40
Sources of monthly household income:	
(a) rattan (cash):	US\$ 6.00 (10.3%)
rattan (self-consumption):	none
(b) other forest produce (cash):	US\$ 23.60 (40.4%)
other forest produce (self-consumption):	US\$ 28.80 (49.3%)
(c) Salary and wage:	none
Location:	Kg. Bukit Telaga, Pahang.
Distance from main road:	5 km
No. of households surveyed:	15 (100% of total households)
Average monthly household income:	US\$ 394.80
Sources of monthly household income	
(a) rattan (cash)	US\$ 52.80 (13.4%)
rattan (self-consumption)	US\$ 1.20 (0.3%)
(b) other forest produce (cash)	US\$ 231.20 (58.6%)
other forest produce (self-consumption)	US\$ 72.40 (18.3%)
(c) Other cash	US\$ 37.20 (9.4%)

Source: Unpublished field data.

Note: Cash income derived from other forest produce includes fruit (durian, petai) and material (bamboo, gaharu). Income in kind for self-consumption of other forest produce comprises durian, petai, bamboo, padi, vegetables, wild meat and fish, firewood, water supply and others. Other cash includes the sale of other fruits, wildlife meat and rubber. Salary and wage refers to cash income received from non-forestry sources.

Table 5. Monthly income of workers in two rattan manufacturing mills, 1994.

Type of workers	Average monthly income/worker (US\$)
Local unskilled worker (male and female)	156.17
Local skilled worker (male)	220.24
Local skilled worker (female)	180.20
Supervisor	432.40
Foreign unskilled worker (male only)	168.18
Foreign skilled worker (male only)	264.28
Foreign production supervisor	250.30

Source: Field data.

Period	Rattan	NWFP	Total forestry royalties	Proportion of NWFP royalties from rattan (percent)	Proportion of total forestry royalties from rattan (percent)
1981	80,078	753,444	35,951,339	10.6	0.2
1982	56,708	362,807	42,298,276	15.6	0.1
1983	51,038	373,600	41,653,846	13.7	0.1
1984	48,597	430,329	36,416,942	11.3	0.1
1985	40,374	386,358	31,665,289	10.5	0.1
1986	36,282	343,580	32,611,538	10.6	0.1
1987	94,974	453,087	41,025,703	21.0	0.2
1988	59,797	494,319	42,810,701	12.1	0.1
1989	105,895	456,976	48,418,889	23.2	0.2
1990	43,338	473,817	47,237,407	9.2	0.1
1991	61,409	474,737	43,653,455	12.9	0.1
1992	63,276	544,455	50,106,982	11.6	0.1
1993	51,691	627,142	40,405,834	8.2	0.1

Source: Department of Forestry, Peninsular Malaysia.

more incentive to produce value-added products domestically. Consequently, the value of rattan furniture exports increased sharply from US\$ 4.5 million in 1987 to US\$35 million in 1993 (table 7). Rattan products' share of total forest products exports also increased from 0.15 percent in 1980 to 0.93 percent in 1992 (table 7).

COMMERCIAL CULTIVATION

The development of the rattan harvesting, processing and manufacturing industry is closely related to the availability of resources. Before 1980 when resources were plentiful, little effort was made to plant rattan commercially. As the country's forest

Period	Rattan whole	Rattan split	Rattan furniture	Total rattan exports	Total forest products exports	Proportion of total forest product exports from rattan (percent)
1980	1.40	0.51	1.27	3.18	1992.87	0.15
1981	1.70	0.60	1.27	3.58	1821.36	0.19
1982	1.81	0.77	0.93	3.50	2149.60	0.16
1983	1.78	0.43	0.75	2.96	1971.00	0.15
1984	1.29	0.38	1.75	3.42	1384.21	0.24
1985	1.43	0.34	2.27	4.04	1775.20	0.22
1986	2.34	0.34	2.71	5.38	1806.18	0.29
1987	15.75	0.32	4.46	20.54	2763.21	0.74
1988	16.58	0.48	12.94	30.00	2648.48	1.13
1989	14.31	0.63	16.75	31.71	3247.59	0.97
1990	4.68	1.13	20.31	26.49	3295.78	0.80
1991	5.41	0.84	22.55	28.80	3544.36	0.81
1992	7.51	0.90	32.10	40.50	4336.63	0.93
1993	5.63	1.15	35.03	41.80	4737.07	0.88

Source: Department of Statistics, GOM (1992).

Note: Major timber products comprise sawlogs, sawntimber, plywood (inclusive blockboard and laminated board), veneer and moulding.

area was reduced, however, and rattan exploitation has intensified, rattan resources have declined significantly. Visits to rattan mills that rattan mills previously obtained their canes supplies from the same state where the mill was located, but by the 1990s supply had to be obtained from other states as well.

Envisaging that the future supply of rattan from the natural forests will not be sufficient to meet the needs of the expanding value-added rattan manufacturing industry, efforts are being made to plant rattan commercially. The initiative encourages government agencies and the private sector to plant rattan, based on feasibility studied showing internal rates of return of 13.4 percent and 14.8 percent at 10 and 12 years after planting, respectively. Gross income is estimated at US\$ 1,343 to US\$ 3,399 per hectare (Aminuddin et al., 1991; Nur Supardi & Abd. Latif, 1991).

Government planting efforts are being made in logged-over forest areas and rubber areas, i.e. smallholdings (less than 42 hectares) and estates (42 hectares and above). During 1980s, a total of 14,030 hectares of logged-over forests were planted with rattan (Table 8). By region, the planted area comprises 4,046 hectares in Peninsular Malaysia, 9,760 hectares in Sabah and 24 hectares in Sarawak. The main species of rattan planted is *C. manan*. In Peninsular Malaysia, this

species accounts for 80 percent (3222 hectares) of the total planted area while the rest consists of *C. caesius* (813 hectares) and *C. trachycoleus* (21 hectares). Under the sixth Malaysia Plan (1991-1995), the Forest Department of Peninsular Malaysia is to plant a total of 15,500 hectares of rattan (table 8) in logged-over forests (Poh, 1991).

The second effort made by the government is rattan planting in rubber smallholdings, particularly those under the Rubber Industry Smallholders Development Authority (RISDA), the Federal Land Development Authority (FELDA) and the Federal Land Consolidation and Rehabilitation Authority (FELCRA). During the 1980s, rattan intercropping was established on 1,584 hectares of rubber smallholdings in Malaysia (table 8). Under the Sixth Malaysia Plan (1991-1995), the area planned for rattan planting includes 4,600 hectares by RISDA, and 2,000 hectares each by FELDA and FELCRA. In Sabah, the Sabah Forestry Development Authority (SAFODA) plans to establish 15,000 hectares during the same period.

In addition to the rattan planting of government agencies, the government also encourages and promotes rattan planting by the private sector. For the period 1991-1995, it was expected that 2,000 hectares of rattan would be planted by the private sector in Peninsular Malaysia alone (Poh 1991).

Table 8. Area planted and planned for rattan cultivation (hectares).

	Planted area in Malaysia (1980-90)	Planned area in Peninsular Malaysia (1991-95)
Logged-over forests	14,031	15,500
Rubber smallholdings	1,584	8,600
Private estates	n.a.	2,000
Total	15,615	26,100

Source: Poh (1991)

This target has actually been achieved much earlier. Three private companies alone have planted a total of about 4,000 hectares. Since government efforts to promote downstream processing industry and rattan planting in the 1980s, a total of 18,794 hectares of rattan has been planted by the private sector in forest areas and rubber estates.

Although a detailed evaluation has yet to be made on rattan planting programmes, indications are that planting in logged-over forests and private estates is more successful than in smallholdings. Under the Sixth Malaysia Plan (1991-95), annual planting in logged-over forest is expected to increase from 1,403 hectares in the 1980-90 period to 3,100 hectares. The number of private companies engaging in rattan planting also is expected to and increase in the future.

Compared with the government agencies and private estates which invest in rattan planting on a relatively large scale, smallholders' participation has been much less successful. Initially, the government viewed RISDA, FELDA and FELCRA as the potential agencies to implement rattan planting on smallholdings. Among these three agencies, RISDA is the only one to actively promote rattan planting among rubber smallholders.

Under the Fifth Malaysia Plan, RISDA identified a total of 39,494 hectares of rubber smallholdings suitable for rattan inter-cropping. RISDA provides free seedlings (400/hectares) and fertiliser (4 bags/hectare) amounting to RM900 (US\$ 360) per hectares. Between 1986 and 1990, 189 smallholders in Peninsular Malaysia participated in RISDA's rattan planting programme covering 518 hectares (Aminuddin *et al.*, 1991).

PROSPECTS FOR FUTURE DEVELOPMENT

To sustain the raw materials needed for the expanding rattan processing and manufacturing industry in the country, efforts in rattan planting need to be intensified. The private sector and smallholders need to play a more active role. Malaysia still has large areas of forest where rattan can be planted. Currently there are 1.8 million hectares of rubber estates and smallholdings. It has been estimated that if only 1 percent of all these areas were to be planted with rotan manau, Malaysia can easily become a major producer of the commodity (Amiduddin *et al.*, 1991: 80).

Market forces have led to an increase in commercial rattan planting. The current outlook is good for the long-term development of the rattan industry which will likely require increasing amounts of raw materials for down-stream processing. In view of the strong demand for rattan products in domestic and international markets, there is no reason for Malaysia to hesitate in enhancing investment in commercial rattan planting.

RECOMMENDATIONS FOR RATTAN DEVELOPMENT

Future development of the rattan industry depends on rattan's value relative to other timber products and close substitutes. There is a general lack of information on the rattan trade and on consumers' attitudes and preferences for rattan products. At the local level, farmers do not have adequate knowledge regarding rattan planting. Better cooperation and collaboration among various agencies and institutions at the

international, regional, national and local levels is also needed.

At the international level, FAO, with collaboration from producing agencies, should publish statistics regarding the rattan trade at both world and regional levels. These statistics should cover imports and exports of various rattan products. FAO has been supportive in terms of providing facilities, manpower and funding to support/sponsor workshops/seminars. This role needs to be intensified. In addition, FAO should develop recommendations on how to improve trade and utilisation of rattan. FAO's efforts should complement those of the International Network of Bamboo and Rattan (INBAR) whose programmes include information, training and technology transfer; production research (plantation and natural forest); genetic conservation; socio-economic research; and post-harvest technology.

The role of the Rattan Information Centre (RIC) and the Forestry Research Support Programme for Asia and the Pacific (FORSPA) in disseminating information should also be expanded. The newly established Center for International Forestry Research (CIFOR) can also play an effective role in rattan research and information dissemination. These organisations should work closely with the International Centre for Research in Agroforestry (ICRAF) which has strong agroforestry networks in Africa and plans to develop similar networks in Asia and Latin America (Sayer, 1994).

At the national level, rattan development requires long-term planning. Databases have to be established to organize scattered information. Research and development needs to be intensified in priority areas. Greater understanding of what motivates

smallholders and the private sector to plant rattan is also needed.

CONCLUSION

The development of the rattan industry must be viewed from the perspectives of future demand for rattan products and possible sources of supply. As world population increases, the demand for rattan can be expected to increase. On the production side, population increase, agricultural land expansion, industrialisation and other development activities will lead to further reduction of world forest areas. This means a likely fall in the production of natural forest resources, including rattan. However, if large-scale rattan commercial planting is carried out by several countries at the same time, the possibility of a glut in the market cannot be ruled out.

As far as Malaysia is concerned, future development of the rattan industry has to be planned within the context of national development while taking into consideration world demand and supply of rattan products. While rattan products may have a bright future, their potential socio-economic contribution to the nation's development is relatively less significant compared to timber products. It is national policy to gradually integrate the forest dwellers and those living on the edge of forests into national development through various programmes, especially educational attainment. Thus, while rattan is regarded as important to local livelihood, its future development must focus on the economic value derived and not its links to social and cultural livelihood. In this regard, encouraging rubber smallholders to plant rattan is a wise move as the supplementary

income received is expected to improve their living standards.

Sustainable production of rattan resources is essential for the development of the rattan industry in Malaysia. Resources are getting scarce in the midst of industrial expansion. Concerted effort is needed to plant rattan commercially. Some encouraging progress

has been made by the public sector and the private companies while more extension work is needed to promote rubber smallholders' participation. With systematic planning and implementation, Malaysia can expect to increase its share of the international rattan trade.

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The beauty of rattan is striking in both nature and finished products.

NON-WOOD FOREST PRODUCTS IN CAMBODIA

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The Kingdom of Cambodia occupies 18,153,100 hectares in the southwestern corner of the Indochina peninsula. In 1991, the population was an estimated 9.3 million with an annual growth rate of 3.3 percent. Cambodia has a total forest area of about 13.829 million hectares and it is losing 310,000 hectares per year through deforestation. Cambodia's *per capita* GDP is between US\$ 150 and US\$ 200 annually (Dennis & Woodsworth, 1992).

Cambodia has very little industry. It also lacks management and harvesting expertise and adequate statistical data on forest products. These deficiencies limit Cambodia's effective utilization of non-wood forest products (NWFPs).

HISTORICAL DEVELOPMENT OF NWFPs

NWFPs have been used widely since at least the 11th century during the reign of His Majesty King Suryavarman II, the most powerful King in the country's history. Among the main NWFPs were kingfisher feathers, elephant tusks, rhinoceros horns, beeswax, cardamom, gamboge and lacquer.

People in the remote mountain areas collected elephant tusks from freshly killed or naturally deceased elephants. Beeswax was found in hollow trees or branches, with some honeycombs weighing as much as 50 pounds. Rhinoceros horns that are light

coloured and veined were most highly prized. Cardamoms were grown in the mountains by the aborigines. Gamboge, a resin taken from a special tree, was harvested by scoring the bark a year in advance and leaving the sap to ooze slowly until it was harvested the next year. Lacquer gum, which grows on the branches of a special tree, has the form of an epiphytic mulberry and was difficult to harvest. Ladles made from coconuts were used for serving soup and rice. Skins of tigers, panthers and deer, as well as rattan and bamboo mats were used as floor or ground coverings.

Bamboo

Bamboos grew wild and were also cultivated. Species such as *Bambusa flexuosa* were used in construction and to produce household handicrafts. *Bambusa burmanica*, a wild bamboo with a diameter of 15-18 centimeters, was used for making rafts, fishnets, storage pots, baskets, etc. Bamboos were also used for manufacturing pulp and paper. In 1961, a pulp and paper factory was established in Chlong Kratie province and it consumed 50,000 cubic metres of bamboo a year. Total production of pulp increased from 1,607 tons in 1961 to 3,695 tons in 1967 and 4,582 tons in 1968. Bamboos were also exported, the largest amount being 36,000 cubic metres in 1944. In 1989, production was estimated to be 173,000 stems.

Rattan

There are two main species of rattan in Cambodia, piidau (*Calamus viminalis* Will) and ropeak (*Calamus salicifolius* Becc). They were used to make chairs, tables and other household items. Rattan exports were estimated to be about 100 tons annually (excluding illegal exports), representing most of the production.

Lianas

These climbing vines have always been used by forest dwellers as fasteners for fish traps, fishnets, chairs and tables.

Chor Tuk resin

Chor tuk resin is used to soak wood which is used to make floors, boats and furniture. National production was about 334 tons in 1955, 642 tons in 1960, 6,278 tons in 1967 and 1,317 tons in 1968. It is estimated that about 50 tons of resin was extracted in 1994. The villagers living in or near forests traditionally gather resin by scoring a hole in the trunks of trees, especially those *Dipterocarpus* species known to produce the best oleo-resin. The hole, which is about 30 cm by 30 cm wide and 5 cm deep, is fired with burning leaves and dry twigs to stimulate the flow of resin. Exudation continues for three or four days, after which the gradually drying resin will stop flowing. At every collection, usually done at the end of the rainy season, fire is applied to melt down the clogging resin. Trees can be tapped from about 20 years of age and they provide at least 30 liters of resin per year for 50 to 60 years.

Hopea resin

This tree resin produces a pale colourless oil which is locally used for caulking boats and

baskets. *Hopea odorata* produces a lower quality oil.

Chor Chong resin

This resin is gathered from the chor chong (*Shorea vulgaris*) tree and phchek (*S. obtusa*). The trees exude it where they are damaged by broken branches, insects or other mechanical injuries. The resin is collected from the branches or from the ground beneath the tree. It is sold in pieces or in powdered form. It is used to make torches by combining it with the leaves or bark of rear mangrove trees. It is also used for caulking boats and baskets. Annual production averaged about 125 tons, although there were wide variations from 25 tons to 923 tons (the highest amount in 1968). It is estimated that about 10 tons of resin were extracted in 1994.

Lacquer

Lacquer is extracted from the kroeul tree (*Melanorrhoea laccifera*). Axes are used to cut the trunk or branches. The gum exuded is mixed with the resin of *Dipterocarpus* sp. until it becomes hard. Annual production was about 40-50 tons, although in 1989 it went as high as 300 tons.

Laka resin

Laka resin, also known as stick lac or chor leak, is created by the insect *Carteria lacca*, which masses on young branches of a number of trees common in Cambodia, including sangke (*Combretum quadrangularis*), pou (*Ficus religiosa*), pongror (*Schleichera oleosa*), reang phnom (*Pentacme siamensis*) and snuol (*Dalbergia nigrescens*). Most laka resin is extracted at two-year intervals in the southern part of Phnom Penh from insects on sangke trees

planted along rice field dikes. Total production was about 27 tons in 1967.

Chor Rung resin

The bark of chor rung trees (*Garcinia hamburyi*) is cut for gum. Forest dwellers use bamboo pots to store the gum, which later becomes hard and crisp. Up to 10 tons were exported annually.

Bark

The bark of *Dipterocarpus* and *Shorea* species can be readily peeled off in large pieces and is sometimes used for the walls and floors of native huts. The chopped bark of *Shorea cochinchinensis* is put in sugar palm juice to prevent the growth of micro-organisms before it is boiled to make sugar. The bark of *Hopea odorata* has a high tannin content and is used in tanning.

Sandalwood

Collecting sandalwood resin from the khlem chan krassna tree (*Aquilaria crassna*) is a traditional activity of the Pore people living in the Kravanh mountains. The resin is used to make incense. Exports of 50 tons a year were made in the latter part of the 1960s.

Medicinal plants

Sleng (*Strychnos nux vomica* L.) is a lowland plant whose seeds contain a toxic strychnine alkaloid. The seeds were exported to Europe and China at an average annual rate of about 425 tons from 1958 to 1967.

Seeds from the krabao tree (*Hydnocarpus anthelmintica*), which grows wild in dense forest and along flowing water in valleys, contain a toxic oil used to treat leprosy.

They were sold to (then) South Vietnam and Singapore.

The bark from preah phnov (*Terminalia nigrovelumosa*) was exported as raw material for pharmaceutical products to treat diarrhea. Three thousand tons were exported in 1967.

Beeswax and honey

In the forests there are two types of bees, one which rests in tree trunks and the other on branches. Beeswax from those living in tree trunks is preferred. Fifty tons of wax were exported to (then) South Vietnam in 1968. A further 50 tons was used domestically to produce candles and in small-scale manufacturing.

Turpentine

Turpentine is tapped from *Pinus merkusii* trees, which are distributed over the 10,000 hectares of the plain of Kirirom at an altitude of 700-800 meters. A refinery operated before the war, although production was variable. A sawmill was also established to produce sawn timber for exports, particularly to Japan and Hong Kong.

CURRENT STATUS OF NWFPs

After 1979, people returned to homes which had been badly damaged by war. They needed shelter, household facilities, furniture, etc. to start their new lives. The fastest and cheapest way to meet such needs was to encroach on the forest. Simultaneously, there were increased demands from forest product dealers for timber, fuel wood, and NWFPs such as rattan, bamboos, resin, sandalwood,

medicinal plants, wild animal products, honey, wax and lac. These products were used for domestic and export markets. There was considerable illegal export of many products and this makes it difficult to calculate accurate statistics. NWFPs which are smuggled across the border include: python skin, tortoiseshell, sandalwood oil, crocodile, elephant tusk, horn, and rattan.

Policy

From 1980 to 1993, the forest policy focused on timber logs being extracted from rainforests. NWFPs were only being exploited by individual families, with activities distributed across most of the provinces with forest resources. From 1980 to 1993, round logs were one of four major national economic targets, and they provided a means for generating hard currency. Exports were to the former socialist countries of Vietnam, USSR, East Germany, Czechoslovakia and to some other countries, such as Thailand, Hong Kong, India, Japan, Taiwan, and Lao PDR. The Department of Forests and Hunting was responsible for meeting production planning targets (averaging about 107,000 cubic metres annually between 1981-89). There was no forest policy concerning the harvesting, utilizing or industrialising minor forest products.

The Royal National Government then decided to support and promote an active conservation policy regarding Cambodia's natural resources. The Royal Decree of 1 November 1993 adopted 23 sites (totaling 3.4 million hectares) for protection, including 7 national parks, 10 wildlife sanctuaries, 3 important landscapes, and 3 multiple-use sites. These 23 sites are under the supervision of the Ministry of Agriculture, Forestry and Fishery, and the Secretariat of Environment.

Constraints

One constraint concerns the adequacy of staffing and infrastructure. The Department of Forests and Hunting was reorganised late in 1979, after the period of the Pol Pot regime. During that regime, all kinds of forestry infrastructure were burned down, and about 97 percent of the resource people were killed. In 1980, only three professional forestry staff remained, with seven technical officers and ten vocationally trained workers. Recruitment of new staff began at once and some of them were trained within 45 days.

The capacity for developing NWFPs is very limited due to insecurity caused by the last 30 years of civil war. This has led to institutional weaknesses, lack of skilled personnel, and unsatisfactory exploitation of forest resources, without technical support and sustainable management practices. There is also an unstable political situation, confusion of roles and responsibilities, and low pay. These factors encourage illegal activities and anarchy.

CONCLUSION

Cambodia has significant natural resources that could supply its people and foreign investors with many kinds of raw materials for social, cultural and economic development. While Cambodia has the potential to manage its NWFPs wisely, the last 30 years of war have seriously depleted the necessary forest infrastructure. Management is further complicated by illegal activities, corruption and the ignorance of some relevant players. There is an urgent need for the Department of Forests and Hunting to survey the flow of NWFPs from the forests and the social and economic impacts and potentials for

NWFPs. Such a survey could produce hard data and form a background for developing

solutions to many inter-related economic and environmental issues.

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Products made from beeswax are used locally and exported from Cambodia.



Damar resin tapping of dipterocarp trees is common in the region.

EUCALYPTUS OIL EXTRACTION IN CENTRAL VICTORIA, AUSTRALIA

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INTRODUCTION

In Australia, the reservation and protection of forests for wood production ensures the future of many of non-timber values such as recreation, catchment protection and non-wood forest products. But collection of non-wood forest products is highly opportunistic and is restricted to relatively small areas of forest where biophysical and socio-economic factors make production viable.

Examples of non-wood forest products commercially exploited in Australia include eucalyptus leaf oil, tannins, sandalwood (*Santalum spicatum*) oil, tea tree (*Melaleuca alternifolia*) oil, and species used in the medicinal plant industry. Research at the School of Forestry, University of Melbourne, and the School of Biological Sciences, University of Ballarat, has focussed on the oil extraction from the leaves of blue mallee (*Eucalyptus polybractea*) and green mallee (*Eucalyptus viridis*).

The genus *Eucalyptus*, which is native to Australia and some islands to the north, consists of over 600 species of trees. The planted eucalypts are used mainly for pulpwood, poles, fuelwood, charcoal and sawn timber. Less well known is the use of eucalypts for the production of non-wood forest products such as floral nectar for honey, bark for tannin and rutin and leaf oils

for pharmaceutical and industrial purposes (Boland *et al.*, 1991).

The leaves of most species of eucalypts yield an essential oil which is known in the trade as eucalyptus oil. Over 300 species of eucalypts in Australia have been shown to contain volatile oil in their leaves, but only approximately 20 eucalyptus species are exploited commercially for oil production. The major species are blue mallee (*Eucalyptus polybractea*), green mallee (*E. viridis*), broad-leaved peppermint (*E. dives*) and narrow-leaved peppermint (*E. radiata*).

Eucalyptus oils are clear liquids with aromas characteristic of the particular species from which they are obtained. Like other essential oils, they are mixtures of organic compounds (mainly terpenes). The individual components of the organic compounds (and their proportions) determine the chemical and olfactory characteristics of the oil and, therefore, its value. The composition of the oil is dependent mainly on genetic rather than environmental factors. The species of eucalyptus from which the oil is obtained is, therefore, the most important factor determining its quality and use (Coppen *et al.*, 1991).

The eucalyptus oil industry in Australia once was an important cash generating rural industry and was able to supply the world

market with substantial quantities of various types of high-grade oil. However, the cost of producing eucalyptus oil in Australia increased so much that it couldn't compete with overseas oil, and thus lost its leading position in the world market. The cheaper imports are largely by-products of large eucalyptus plantations overseas, grown for sawn timber and pulpwood. In these countries labour costs are low, hence the advantage. Currently, the leading producers are China, Portugal, Spain and Southern Africa, which includes Swaziland and South Africa. Australian oil production is about 150 tonnes per annum, which is less than 3 percent of the world market. The cost of Australian eucalyptus oil is about US\$ 3 per kilo; the cost of imported oil is considerably lower (Paul Foreman, pers.comm.).

Currently, there are two main geographical areas where eucalyptus oil production is undertaken in Australia: 1) near West Wyalong, New South Wales; and 2) the St Arnaud-Inglewood-Wedderburn region of Central Victoria. The principal species used for commercial distillation of eucalyptus oil are blue mallee (*Eucalyptus polybractea*) and green mallee (*Eucalyptus viridis*). The natural occurrence of these species is limited to the central parts of Victoria.

Mallees are multi-stemmed from ground level and rarely exceed 10 meters in height when mature. Both blue and green mallees have the same growth habits, form large underground lignotubers, and are commercially worked on by the harvesting of coppice regrowth every two years. Even after nearly all their stems and leaves have been cut off, the underground lignotuber supports rapid regrowth. This tolerance of heavy cropping is ideal for harvesting the leaves for oil production. These species

also have an advantage in that they produce their leaves in a shrub-like habit, making leaf collection easy (Bosisto. J. *et al.*, 1952).

The eucalyptus oil industry in Victoria has not changed much since the 1950s. It is still a primitive business and no commercial plantations have been established. The oil is extracted by steam distillation in old, poorly insulated and inefficient equipment with virtually no control. Currently, there is not much revenue generated and the distillers have little incentive to improve their distillation methods and equipment. Many of the distillers extract eucalyptus oil because it is a family tradition.

The eucalyptus oil industry in Australia must improve its processing methods and research new value-added products to expand the market if it is to compete with imports. Some of the areas that could be addressed to revive eucalyptus oil production in Australia include:

- investigating the possibility of establishing clonal plantations from high yielding species;
- improving the efficiency of the steam distillation process by cohobation (the practice of returning the distilled water back to the vat for re-distillation) and incorporating it into the still design;
- investigating new market demands, diversifying the use of cineole (the active pharmaceutical ingredient) and identifying other useful chemicals from the oils;
- determining the most appropriate time for obtaining the best harvest, so as to achieve the highest percentage of cineole content and oil yield;

- developing alternative harvesting equipment which segregates the stem, bark and leaf; and
- identifying new products and markets for the stem, bark and leaf.

EUCALYPTUS OIL PRODUCTION

Eucalyptus oil production in Victoria is undertaken in three main stages:

- plant harvesting;
- oil extraction;
- spent-leaf extraction.

Plant harvesting

Eucalyptus leaf destined for the commercial production of essential oil can be obtained by one of three methods:

- Recovery of “waste leaf” from felled trees which are grown primarily for their timber.
- Short-rotation harvesting of plantations managed specifically for oil production. Under such a system of coppicing, plants are allowed to grow for no more than about 20 months before cutting.
- Regular harvesting (coppicing) of natural stand (peculiar to Australia). The last method is used extensively in Victoria.

In Australia, a system of harvesting has been developed that has low labour intensity: mechanical harvesting using a “forage harvester.” The blue and green mallee species are ideally suited to mechanised harvesting as they coppice

freely after repeated cutting. The natural stands in Central Victoria have been repeatedly harvested for over 100 years on a two-year rotation basis. It is claimed that there is no apparent loss of vigour or reduction in oil yield over time. However, this practice may eventually cause problems due to the death of stumps during harvesting and lack of seedling replacement.

During mechanical harvesting, the plant is harvested by a “forage harvester” which is towed by a tractor. The harvester has a series of rotating “hammers” with cutting edges that slice through the plants at ground level. The cutting height of the forage harvester is set so that the hammers do not thrash or damage the ligno-tubers or pick up all ground-level litter. The chopped pieces are blown up through a chute, into a separate rectangular box-shaped “bin” trailing behind. When the bin is full, the leaves are tipped over at a collection site and are later collected by the loader. The loader feeds the harvested leaves into a mobile vat and they are then transported to the distillery. The mobile vat serves both as a means of transport and a distillation vessel.

Oil distillation

The eucalyptus oil distilleries of Central Victoria are basically the same and each has the following components: steam supply, distilling vat(s), connecting piping, a condenser, and an oil-collecting vessel. In most of the stills the distilling equipment is antiquated and no updating of this equipment is evident.

At the distillery, the vat containing the harvested leaf is positioned underneath a removable flat lid which can be lifted completely clear of the mobile vat for ease in loading and unloading the leaf material.

Three evenly-spaced pipes, running longitudinally along the floor of the vat, allow steam to be fed through a flexible steam line at the bottom of the vat. The steam line is fed by a spent-leaf fired external boiler. The lid is lowered on to the vat and tightly secured using locking clamps, and steam is injected. One charge consists of approximately 8 tonnes of green, uncompressed leaves. Distillation begins when the vat is full of leaves and the steam then passes through the charge and the oil is vaporised. The vat has a drain at the bottom which allows for the removal of the residual black liquor which consists mainly of tannins.

There are three outlets for the vapour and these are connected to one central duct in the centre of the lid, allowing for the discharge of the oil/water vapours during distillation. The condenser consists of a length of pipe running from the vat to a pond. The condensate is cooled and the condensed liquid flows into the oil collection vessel.

The oil collection vessel is the device for collecting the condensed distillate and allows the separation of the oil from the water. This consists of an open drum partly embedded in the ground. Since the oil is largely insoluble in water, it separates and is scooped off the surface. The distillation process usually takes 3-4 hours and a typical distillery can distill three vat loads per day. The oil is then put into 44-gallon drums and sold in crude form for approximately US\$3 per kilo (Paul Foreman, pers. comm., 1994). No further processing of the oil is undertaken on site.

Further refining of the oil is done in Melbourne. This is done by rectification. Rectification is a more controlled distillation process which is used either to

upgrade the oil or to isolate the major components of the oil. The chemicals are then used as precursors for chemical reactions or may be used as discrete aroma chemicals. For cineole-rich eucalyptus oil, rectification is employed to increase its market acceptance. Cineole can also be isolated by rectification and this is more expensive than basic oil and it is mainly used in high quality products (Boland *et al.*, 1991).

Spent-leaf disposal

The spent leaves remaining after distillation is deposited in a vacant plot adjacent to the distillery. By tipping the vat over, the whole-mass slides out and is left to dry in the sun. Some of the dried leaves are then used to fuel the boiler for steam generation, and the rest is sold to parks and gardens for use as mulch.

Steam distillation of harvested eucalyptus leaf is the only commercial method of extracting the oil in Australia. Other potential methods could include solvent extraction. Conventional techniques based on steam distillation have been shown to have serious shortcomings when compared with solvent extraction procedures. Ammon *et al.*, (1985) found that there is a 30-35 percent loss of terpenes in steam distillation of fresh *E. leucoxylon*, *E. globulus* and *E. plenissima* leaves of the same age when compared with solvent extraction.

RESULTS OF RESEARCH STUDIES

In Victoria, the current practice has been to harvest the blue and green mallee plants together. Current research has illustrated that the oils from the two plants have

different chemical constituents and different oil yields. In both the blue and green mallee, 1,8-cineole was positively identified as the chemical component in the largest proportion. The average percentage cineole yield for the blue and green mallee was 2.4 percent (wet-weight basis) and 1.0 percent respectively, with blue mallee having a cineole content of 91.3 percent and the green mallee having 63.6 percent. Other components identified in both blue and green mallee, but in smaller proportions, were limonene, r-cymene, terpinen-4-ol, cuminal (cuminyaldehyde) and a-pinene. Viridiflorene was present in green mallee but not in blue mallee.

There appears to be a seasonal variation in the concentration of cineole in the two species. There is a general decrease in the percentage of cineole in the oils of blue and green mallee during the winter months. Experiments are still underway to characterise seasonal variation.

During sampling it was observed that some plants growing within the mixed stands of the blue and green mallee had different leaf characteristics. The leaves had the shape and size of the blue mallee but not the distinct blue or green-grey colour of the blue mallee. Instead, they were dark green in colour like the green mallee. This could be attributed to cross-breeding between the blue and green mallee, resulting in a hybrid. It has not been possible to get botanical classifications because there has not been any fruit, seed, bud or flower available for proper identification.

Leaf analyses indicate that the percentage of cineole from ethanol extraction of the "hybrid" is higher than from the green mallee and lower than from the blue mallee. The average oil yield based on the wet weight for the green mallee, blue mallee and

the "hybrid" is 1.60 percent, 1.89 percent and 1.86 percent respectively. There is a significant difference at the 5 percent level between the oil yields of the blue mallee and the green mallee and between the green mallee and the "hybrid." There is no significant difference at the 5 percent level between the blue mallee and the "hybrid." Chemotaxonomy supports the hybrid hypothesis, and qualitative analysis illustrates that there are chemical compounds present in the "hybrid" that are found in both the blue mallee and the green mallee.

Yield analyses indicate that cohobation, the process of returning the condensed water (minus the separated oil) to the still for re-distillation, can improve the quantity and quality of the extracted oil. The condensed water will be saturated with the oil being distilled and if this water is discarded, there will be some loss of oil. For the blue mallee, green mallee and "hybrid" there was a 34.9 percent, 70.9 percent and 54.8 percent increase, respectively, in the oil yield when steam distillation with cohobation was carried out.

CONCLUSIONS

The eucalyptus oil industry in Victoria is constrained by a lack of product diversity. There is no separation of leaves, bark or stem. Whole plants are harvested and subject to distillation, even though the oil is effectively restricted to the leaves. Other products are potentially available from the bark and stem, but there is a lack of research to identify potential products or uses. The exploitation of only one product will inevitably result in the instability of an industry that suffers from fluctuating prices of what is essentially a low-commodity oil.

Potential products have been identified from other eucalyptus species. This includes a liver-curing compound (2 alpha hydroxyursolic acid) isolated from acetone extraction from spent leaves. Leaf extracts from *Eucalyptus globulus* have recently been identified as a suitable nematicide (worm treatment) for livestock (National Forests and Timber, 1994). Bark extracts are used as tribal medicines. Tannins have a variety of uses as scavengers for heavy metals, glue manufacture and leather curing. The tannins of some species are reported to have potential as mud-block stabilisers to improve surface hardness and water repellency, (mud is gaining in popularity as a building material in Australia).

Spent eucalyptus leaves are very effective for mulching and reducing weeds. In forest areas where spent leaves are left for drying, the soil is left devoid of vegetation for some time after the leaves have been removed. This may indicate the presence of a natural weedicide in the leaves after oil extraction. The identification of other products from

“whole tree utilisation” would go a long way towards stabilising a vulnerable, but potentially valuable, rural industry.

Blue mallee has been shown to have a much higher oil and cineole content than green mallee. However, propagation and utilisation practices have failed to enhance the potential oil yield. The variability in oil yield between plants indicates potential for genetic selection for higher oil yielding plants.

Yield studies also indicate that simple practices like cohobation can be used to increase oil production. However, the eucalyptus oil industry in Victoria has reached a senescent phase. Failures in research, innovation and technology transfer will witness the demise of a potentially valuable rural industry.

Effective research, innovation, and technology transfer are needed if the demise of a potentially valuable rural industry for Central Victoria is to be averted.

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NON-WOOD FOREST PRODUCTS FROM THE MANGROVE FORESTS OF BANGLADESH

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The Sundarbans, a cluster of islands with an approximate area of 3,600 square kilometers, is the largest mangrove forest in the world. It is located at the southern extremity of the Ganges delta bordering the Bay of Bengal in the southwest of Bangladesh, in the district of greater Khulna.

Non-wood forest products (NWFPs) provide employment to about 299,000 people in Bangladesh. Much of this employment continues throughout the year, or at least during the agricultural off-season. NWFPs from mangrove forests contribute an estimated Tk. 717 million (US\$ 17.9 million) annually to the Bangladesh economy, directly or indirectly. For most mangrove NWFPs, there are no policies, rules or regulations applicable to their growth or harvesting. Processing of most NWFPs in the mangroves is still primitive. Product quality is low and, therefore, less accepted by international markets.

GOLPATTA

Golpatta (*Nipa fruticans*) is one of the valuable NWFPs of Bangladesh's mangroves. It is common in tidal channels, rivers, low salinity estuaries and in swampy localities in the interior of the mangrove forests. The plant has a variety of uses. The leaves are principally used as thatching material, but they can also be made into

bags, baskets, hats, mats, raincoats and wrappers. The leaf mid-ribs can be made into brooms. The petioles are cut as firewood after sun-drying. Fresh petioles are used as tying materials and coarse brushes. From the cut stalk, sap can be extracted from which alcohol, wine, sugar and vinegar can be obtained. Ripe fruits can be eaten raw.

Harvesting and utilization

Golpatta is sold on a permit basis. Holders of permits from the Forest Department cut golpatta under the following rules, prescribed to sustain production.

1. Exploitation should be by sequential felling. This means that harvesting will not be allowed in any area more than once a year. Moreover, cutting is not allowed during the growing season from June to September.
2. The unopened frond, or the central leaf and the leaf next to it, must be retained in each plant.
3. All dead and dry leaves should be cut when the clump is cleared.
4. Flowers and fruits should in no way be disturbed at the time of cutting the leaves.
5. Collectors are not allowed to cut leaves which they don't intend to utilise. In this

way, the maximum leaf surface possible will be left on each rhizome after it has been cut and the maximum energy will be left for the plant.

6. Young plants with only one usable leaf should not be cut.

The usual season for golpatta collection, transport and trading has been fixed from October to March. After being cut, the golpatta is loaded into boats and transported for marketing in the surrounding districts. The prevailing price of golpatta is Tk. 480 (US\$ 12) per tonne. This includes the costs of collection, transport, royalties and other expenses.

Economic importance and social benefits

Golpatta is not only a source of inexpensive construction material for the poor, but also a valuable material for commerce. It provides a livelihood for the people and revenue for the government. Golpatta is the source of income and employment for a considerable number of people residing in and around the Sundarbans. Annually, about 19,200 people go to the Sundarbans to cut and collect

golpatta fronds and market them in the nearby communities. Each person owning a boat engages about three to five people.

Over the last 11 years, government revenue from golpatta increased an average 18 percent annually (table 1), although this was less due to increasing production than to increasing prices (US\$ 1 = Tk. 40.00).

Cultural aspects

Traditionally, golpatta is a common material for building walls around the Sundarbans. A study on rural housing shows that the percentage of households using leaves in walling materials in Barisal is 25 percent, or 173,910 house holds, in Khulna 9 percent, or 72,861 households, and in Jessore 4 percent, or 33,828 households. There is also a small demand for golpatta for the traditional construction of animal shelters and other uses, especially in rural areas adjoining the Sundarbans. Total annual demand is likely to be about 75,000 tonnes (see table 2). Future demand will depend on changes in requirements for construction materials in Bangladesh, and on the increasing population.

Table 1. Golpatta production and revenue

Year	Production (million kg)	Production (% change)	Revenue (million Tk.)	Revenue (% change)
1990-91	2.63	+6	5.8	+13
1989-90	2.48	0	6.7	+67
1988-89	2.48	-14	4.0	-4
1987-88	2.89	+10	4.2	+10
1986-87	2.63	+13	3.8	0
1985-86	2.33	+5	3.8	+72
1984-85	2.22	-5	2.2	+3
1983-84	2.33	0	2.1	+10
1982-83	2.33	-6	1.9	-9
1981-82	2.48	0	2.1	+5
1980-81	2.48	-	2.0	-

Source: Bangladesh Forest Department.

Uses	Annual demand (tonnes)
Roofing material	68,800
Walling material	4,400
Animal shelter	1,900
Total	75,100

Conclusion

The present estimated productive area of golpatta in the Sundarbans forest is about 595,739 hectares. Golpatta stands are not in large contiguous areas, but are widely scattered all over the Sundarbans. There are only a few continuous blocks or strips along the sides of tidal estuaries, khals, rivers and creeks. To ensure a sustained yield, it is recommended that the rules and regulations for cutting golpatta are strictly adhered to.

HANTAL

Hantal (*Phoenix paludosa*) is a small, clump-forming erect palm. It is distributed throughout the Sundarbans, particularly in dry banks of khals, rivers and creeks. It sometimes appears as the dominant undergrowth and is ecologically important in the mangrove forests. It is a valuable material to villagers near the Sundarbans. Stems are harvested and used as purlins and rafters for village houses, as posts for trellises for growing betel leaf, and for animal shelters and fencing. The leaves are used in making walls for houses and other shelters.

Harvesting and utilization

While hantal harvesting is done by permit holders, there are no set rules for harvesting. Collection is allowed throughout the year.

There is no indication whether harvesting is done on a rotation basis or not, and there is no limit on the number of stems that can be collected from each clump. Hantal collectors cut the whole stem, including the leaves. Often only the stems are transported and marketed. Permittees generally use a small boat which can easily reach the small khals where hantal grows. After cutting, the hantal is loaded onto boats for transport and marketing. Most hantal stems produced from the mangrove forests are sold in local markets surrounding the Sundarbans. There are thousands of households in need of cheap but durable purlins and rafters for their houses.

Table 3 shows the quantity of hantal produced from 1980-81 to 1990-91. There has been a slight increase in production over the past 11 years. This is likely to be due to increased harvesting rather than because of any improvement of existing stands or the establishment of new areas.

Economic and social factors

Like other forest products, the value of hantal has increased considerably. Hantal contributes a handsome revenue to the Forest Department. Table 3 shows that from 1980-81 to 1990-91, hantal revenue increased from Tk 24,700 (US\$ 617) to Tk 334,400 (US\$ 8,370), representing a 1,253 percent increase. Again, this increase seems due to increasing prices (and higher royalties) rather than to improved production. The present rate of royalties is 12.5 percent of the actual market price. Extraction, transport and trading of hantal products provide job opportunities and are a good source of income for the poor people. Forest Department records show that the number of permittees collecting hantal each

Year	Production (tonnes)	Production (% change)	Revenue (Tk.)	Revenue (% change)
1990-91	6.7	-6	334,400	-1
1989-90	7.2	-13	339,100	+57
1988-89	8.3	+5	223,400	+6
1987-88	7.8	+27	210,200	+23
1986-87	6.1	+12	170,200	+19
1985-86	5.4	-39	142,400	+268
1984-85	8.9	+30	38,700	+16
1983-84	6.8	+19	33,100	+36
1982-83	5.7	+21	24,200	+12
1981-82	4.7	-24	21,500	-12
1980-81	6.2	-	24,700	-

Source: Divisional Forest Office, Sundarbans, Forest Department

year ranges from 900 to 1,000, each employing two to three collectors. Approximately 2,400 people are so engaged annually.

In order to ensure a sustained yield, cutting rules should be introduced and enforced immediately for hantal.

HONEY AND BEESWAX

Honey and beeswax are important NWFPs in the mangrove forests. Honey and the pollen in it are used as medicines, high energy food, and as a source of vitamins and minerals.

Harvesting and utilization

Harvesting of honey is open to the public

from April to May. The floristic composition of the Sundarbans is very favourable for honey collection. Table 4 shows the main species and their flowering times.

Collection permits are issued in the first week of April. They can be valid from one week to 15 days, depending on the size of the area, number of collectors employed, and the amount of honey to be collected. There are no prescribed rules for the collection of honey and beeswax. Usually a group of six to eight people work in the designated area. They divide the area into 50-foot-wide strips, with each member assigned to a strip. They move cautiously because of the risk of tiger attacks. Collection of honey is done by the

Common name	Botanical name	Flowering time
Kulshi	<i>Aegicerus majus</i>	Feb to Mar
Amur	<i>Amoora cucullata</i>	Feb to Mar
Goran	<i>Ceriops decandra</i>	Mar to Apr
Keora	<i>Sonneratia apetala</i>	Mar to Apr
Passur	<i>Xylocarpus mekingensis</i>	Mar to Apr
Sundri	<i>Heritiera fomes</i>	Apr to May
Gewa	<i>Excoecaria agallocha</i>	Apr to May
Kakra	<i>Brugiera gymnorrhiza</i>	Apr to May
Baen	<i>Avicennia officinalis</i>	May to June

traditional method, which uses fire or smoke to drive away the bees, and in the process destroys the queen and the brood.

Immediately after collection, the permittees report back to the place where the permit was originally issued to surrender the permit and measure the collection. If more honey is collected than indicated in the permit, an additional royalty is charged.

No processing is done in the field. The honey, still in the comb, is sold to processors in nearby communities easily reached by water transport. In some cases, traders come and buy the unprocessed honey. Some collectors have prior arrangements with traders and get cash advances.

Economic importance and social benefits

The collector's selling price is Tk. 20 (US\$ 0.50) per kilogramme, while the processor's buying price is Tk. 50 (US\$ 1.25) per kilogramme. Processed honey sells for Tk. 80 (US\$ 2.00) per kilogramme. In 1990-91, 211.71 tonnes of honey were collected

from the Sundarbans. Production over recent years and revenues accruing to the government can be seen in table 5. Between 1980-81 and 90-91, the amount realised increased by 33 percent for honey and 23 percent for beeswax. This increase in revenue is mainly attributed to increases in royalties.

Honey and beeswax collection, though a very risky job, continues to provide a seasonal source of income. An average of 350 permittees, employing 2,640 collectors, collect honey and beeswax from the mangrove forests of the Sundarbans. There are good prospects for the export of both honey and beeswax if quality and quantity can be maintained.

Conclusion

Bangladesh has a large population, with a significant percentage suffering from malnutrition. It needs a multipurpose resource like honey, which provides both food and an economic stimulus. Important plants producing honey flowers in the Sundarbans should be scientifically

Table 5. Sundarbans honey products and revenues

Year	Honey (tonnes)	Honey revenue (Tk.)	Beeswax (tonnes)	Beeswax revenue (Tk.)
1990-91	211.27	536,400	52.8	211,200
1989-90	146.55	620,280	36.5	195,400
1988-89	99.45	84,560	24.9	39,840
1987-88	223.31	178,650	55.8	89,280
1986-87	229.11	183,930	57.5	92,040
1985-86	224.52	180,450	56.4	89,220
1984-85	255.80	102,800	64.2	51,390
1983-84	260.35	114,610	65.4	52,360
1982-83	232.65	93,460	58.12	46,730
1981-82	225.26	107,050	53.92	53,520
1980-81	310.93	120,450	75.03	60,030

Source: Divisional Forest Office, Sundarbans, Forest Department.

managed to ensure better yields, both qualitatively and quantitatively.

HOGLA

Hogla (*Typha elephantina* Roxb) is an abundant NWFP species found in the mangroves and tidal forests of coastal belts adjoining the Sundarbans. Hogla leaves are woven into mats used for beds, to dry crop on and for prayer mats. They are also used for making storage containers and hut walls. Young succulent leaves are a forage crop palatable to animals. Hogla pollen grains are collected and sold in the markets or used to make home-made cakes.

There are no specific rules for cutting hogla. After harvesting, hogla leaves are gathered, bundled and transported by head load or by boat. Standing hogla leaves are not purchased by the weavers, but by traders. The traders then harvest, transport, and dry the leaves and sell them in the local market. Consequently, weavers buy the raw materials from the market at higher prices. Weaving is mainly done by women. Men purchase the raw materials, splitting and extracting the mid-rib and selling the finished product in the local market. Hogla collection, transport, trading, weaving and the marketing of finished products provide a source of income and livelihood to the poor people in and around the Sundarbans.

A systematic study of hogla should be undertaken, examining its production, cultivation and management, in order to ensure a sustained yield sufficient to support the rural cottage industries dependent on it.

FISH, PRAWN AND SHELLS

Fish, prawn, shells and other fishery resources abound in the rivers and water systems within the Sundarbans. They serve as a major source of food and employment for the people of Bangladesh, as well as providing revenue for the government. There is an increasing international demand for these resources, particularly if the quality and the quantity can be maintained. The present harvesting and management of these resources seems to threaten the sustained fish production in the Sundarbans. A current intensive study of integrated resource management will produce guidelines on how to manage sustained yields.

Harvesting and utilization

Fishing and shell collection within the mangroves are controlled by the Forest Department. Only B.L.C. holders can apply for fishing and shell collection permits. The permits are valid for seven days and a fine is levied against anyone over-staying in the permit areas. Permits stipulate the specific stretch of water and the duration of stay allowed. Fishermen must report back to the Forest Station for measurement of the catch and to surrender the permit.

Fishing and shell collection permits are issued throughout the year. However, the main season is from mid-October to the end of March. During this time many fishermen from outside the area make temporary camps on the chars along the Sundarbans coast and fish in the open sea and the coastal waters. There are about 36 chars in

the Sundarbans where fisherman set up their camps. The greatest concentration is on Dubla Island.

Fishing techniques are traditional and not up to the latest standards. Fin fish, other than hilsa, are mainly sun-dried on the chars. Dried fish are then cleaned, packed in jute bags and transported to traders and commission agents, located mainly at Chittagong. Sometimes, the traders and commission agents send their own vessels and charge, by weight, for transport and commission for selling the products by auction in Chittagong. Sharks are either bought dried or fresh by traders who visit the chars. Prawn and shrimps are sold through middlemen to traders at base camps on the chars. Jhongra shells are collected off the mud banks of the rivers and khals and burned into lime to be used with pan (betel leaf). The shells of jhinook, an estuarine bivalve, are also collected.

Economic importance and social benefits

Assuming that the royalty rate is only 12.5 percent of the gross value of the products, it can be calculated that the gross value of the fish products in 1990-91 was Tk. 112 million (US\$ 2.8 million). In addition, the value of 60 million shrimp, mainly tiger

prawns, produced annually from the Sundarbans and other mangrove forests of the adjoining coast is Tk. 30 million (US\$ 750,000). The government revenue from fish and shell products, can be seen from table 6.

The revenue generated from fish products increased from Tk. 1.04 million (US\$ 26,000) in 1980-81 to Tk. 14.3 million (US\$ 357,000) in 1990-91. An average of 67,195 boats with 165,270 fishermen annually visit the Sundarbans and fish for their livelihood. Recent data reveals that the collection of "seed" prawns involves about 25,000 men, women and children. Shell collection also contributes to the employment of young boys and girls (with about 550 permittees each engaging three or four people each year). The number of shell collectors increases during the winter tourist season.

MISCELLANEOUS NWFPs

Several miscellaneous NWFPs warrant a brief discussion.

The bark of goran, garjan (*Rhizophora conjugata*), dhundul (*Canapa obovata*), passur and kankra are rich in tannin. Tannin extracted by traditional methods,

Table 6. Sundarbans fish and shell production and revenue

Year	Fish production (tonnes)	Fish revenue (million Tk.)	Shell production (tonnes)	Shell revenue (million Tk.)
1990-91	4.82	14.03	2.44	65.52
1989-90	5.07	11.51	2.85	65.43
1988-89	7.20	7.50	3.64	48.76
1987-88	6.22	8.47	3.60	48.21
1986-87	6.80	7.07	3.18	42.65
1985-86	8.01	5.13	2.66	15.78
1984-85	8.04	3.54	2.27	9.47
1983-84	9.17	4.03	2.43	10.51
1982-83	9.19	3.83	2.17	7.44
1981-82	9.33	1.04	3.33	12.28

Source: Forest Department.

particularly from goran, is used in fisherman's nets.

Ullu grass (*Saccharum cylindricum*) and Nal grass (*Orundo Karka*) are two important grass species of the Sundarbans. The former makes the most durable type of local thatching, but its supply is limited to the sandy open land in the mangroves. Nal grass is a tall reed-like grass belonging to the family *Graminae*. It is used extensively to make matting, called "dharma," which is used for walls of houses, boat coverings and floor mats.

Bhola (*Hibisens timaceous*), a semi-climbing liana belonging to the family *Malvaceae*, may also be treated as a NWFP. Its exploitation for fuel or for other purposes is permitted without restriction or payment of royalties.

TOURISM IN THE SUNDARBANS

For miles and miles, the lofty treetops of the Sundarbans form an unbroken canopy, while nearer the ground, the effects of high and ebb tides are marked on the soil and tree trunks. The variety of the natural mangrove forest has much to offer an inquisitive visitor. Land and water meet in many novel ways. The Sundarbans is the natural habitat of the world-famous Bengal tiger, spotted deer, crocodiles, jungle fowl, wild boar, lizards, Rhesus monkeys and an innumerable variety of beautiful birds.

For the botanist, the lover of nature, the poet and the painter, this land provides a variety of wonders. Thousands of meandering streams, creeks, rivers and estuaries add charm. The many sail boats loaded with

timber, golpatta, fuel-wood, honey, shells and fish add to the serene natural beauty of the Sundarbans.

The main attractions of this area for tourists include wildlife photography, viewing and studying the world's largest mangrove forest, boating, and meeting local fishermen, wood-cutters and honey-collectors. Also of great importance are the peace and tranquility of the wilderness.

Boats are the only means of transportation inside the forest. There are no roads or paths. Wood-cutters make temporary dwellings at the edge of the forest 8 to 10 feet off the ground for fear of wild animals. In the Chandpai region it is fascinating to see the nomadic fishermen (living with their families on boats) catching fish with the help of trained otters. Exciting activities take place in Dublar Char in the forest where fishermen from Chittagong gather for four months (mid-October to mid-February) to catch and dry fish. But the most daring and exciting of all activities involve the honey-collectors who work in groups for just two months (April to May): it is interesting to see how they locate a hive and collect the honey.

Famous spots include Hiron Point (Nilkamal) for observing tiger, deer, monkey, crocodiles, birds and natural beauty. Katka is another spot for deer, tiger, crocodiles, varieties of birds and monkeys, and a morning and evening symphony of wild fowls. The vast grassy meadows running from Katka to Kachikhali (Tiger Point) provide opportunities for wild tracking. Tin Kona Island has tiger and deer. Dublar Char (Island) is interesting for its fishermen and its herds of spotted deer.

MAJOR NON-WOOD FOREST PRODUCTS OF THAILAND

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INTRODUCTION

In Thailand, minor forest products are defined as all products from the forest, excluding wood and other intangible products. This is equivalent to non-wood forest products (NWFPs).

Previously, NWFPs were ignored by policy makers because of the high revenue then derived from forest logging. After 1989, logging was banned in Thailand, and the issues of forest conservation and sustainable forest management came to the fore. Since then, NWFPs have played a more important role. The government has come to realise the direct and indirect benefits of NWFPs, their value to rural people for subsistence and incomes, their potential for bringing in foreign exchange and their importance in forest conservation.

Management of NWFPs has a legal framework in the *Forest Act B.E. 2484* (A.D. 1941), a *Royal Decree* issued in 1987 and a 1989 Forest regulation. NWFPs are divided into 2 categories: protected and non-protected. Protected NWFPs include:

- wild orchids;
- aromatic wood (*Dracaena loureirei* Gaegnep), agarwood (*Aquilaria* sp.), Drumm. (*Mansonia gagei*) and sappan (*Caesalpinia sappan* Linn);
- charcoal;
- yang oil (gurjan);

- some barks, including *Castanopsis* spp., *Walsura* spp., *Hopea* spp., *Cotylelobium melanoxylon* Pierre, *Persea* spp., *Litsea* spp., *Shorea* spp., *Artocarpus* spp., *Cinnamomum* spp. and *Platynerium* spp.;
- gums and resin, including gutta percha, *Pentace* spp., jelutong, lacquer resin, and oleoresin;
- some palm leaves and some ferns, including *Platynerium* spp. and *Osmunda* spp.;
- rattans; and
- talipot (*Corypha umbraculiferra*).

Protected NWFPs are allowed to be collected or harvested, for subsistence needs, in small amounts (e.g., 10 kilogrammes of rattan, 30 kilogrammes of dammar, 10 kilogrammes of oleoresin, 1/2 kilogramme of agarwood and 100 talipots). But for trading, permits are required. Non-protected NWFPs may be collected without permits. Neither category of NWFPs may be collected in conservation forests.

RATTAN

Rattan has been used for centuries in Thailand and is now famous worldwide. Its many uses include:

- Handicraft manufacturing, including hats, baskets, ropes and mats;

- Furniture;
- Some species (*Calamus rotang*, *C. ceasius* and *C. triginus*) are used medicinally for treating rheumatism; asthma, diarrhea, snake bites and intestinal disorders;
- Edible fruits and shoots.

Annual quantities extracted and their value

In the past, all rattans, except *C. caecuis*, were non-protected NWFPs. However, in 1987, all rattans were brought under protection because over-exploitation had depleted the resource. Now, permits from the Royal Forest Department (RFD) are required for harvesting. Table 1 shows the quantity of rattan officially extracted from forests in recent years and its value in baht (US\$ 1.00 = 25 Baht).

Year	Production (tonnes)	Value (million Baht)
1980	2,320	4.5
1981	205	1.5
1982	385	3.4
1983	2,924	35.0
1984	1,405	15.6
1985	2,588	30.3
1986	3,147	37.6
1987	5,960	74.5
1988	3,558	46.2
*1989	1,235	16.7
1990	1,098	15.2
1991	868	13.2
1992	417	6.5

Source: Forestry Statistics of Thailand.

* Logging permits closed

Collection and processing of rattan cane

The Ministry of Agriculture and Cooperatives has established regulations for rattan harvesting, although since data on growth rates, harvestable age and cutting regimes of Thai species are very limited, the regulations are only temporary guidelines. They require:

- cutting only mature canes of at least 8 metres length;
- retaining half of the number of stems in each clump;
- clearing the areas under the clumps after harvesting;
- a felling rotation of 5 years.

Mature canes are recognizable because the leaf sheath has fallen. The best time for cutting rattan is from November to March. Sometimes pre-factory treatment is done before transport. Peeling and splitting of the cane is done with ordinary knives. In factories this is done by machine.

After harvesting, there are several possible treatment methods, including:

- Sun-drying until the moisture content is about 5-10 percent;
- Washing the canes in water, rubbing them with sand and coconut husk, and then leaving them to sun-dry (as above);
- Washing the canes in water, fumigating them with SO₂, sun-drying them, washing them in water again, and rubbing them with sand and coconut husks;
- Immersing the canes in a solution of sodium hypochlorite for one hour, then

washing them in water, followed by fumigation with SO₂, and sun-drying;

- Boiling the canes in a mixture of diesel and coconut or palm oil for 30-40 minutes at 70-120°C, rubbing them with coconut husk, and sun-drying

Edible rattan

In northeast Thailand, people in some provinces eat rattan fruits and shoots. Normally, they collect the rattan from the wild. However, with the increasing depletion of natural forests, wild rattan is becoming very scarce and farmers are now starting to plant rattan for shoots. The most popular species is vaiyai (*Calamus siamensis*).

When the shoots are four or five months old, they can be harvested. The amount of shoots which can be extracted from each clump depends on the age of the plant. Harvesting begins in the second year, when only one or two shoots can be cut. More shoots can be cut each year, with more than 10 shoots able to be cut after 6 years or so. After each cutting, humus should be applied to encourage the growth of new shoots.

Economic aspects

Thailand imports substantial volumes of raw rattan from Burma, Vietnam, Laos, Singapore, Indonesia, Hong Kong, Malaysia and elsewhere. Because rattan furniture exports were very promising, the quantities of imported raw rattan increased rapidly. In 1987, 18,433 tonnes, valued at 142 million baht (US\$ 5.68 million), were imported. In 1988, the quantity went up to 2,939 tonnes, valued at 224 million baht (US\$ 8.96 million). Subsequently, imports have declined. Exports of raw rattan from Thailand have generally been very low, peaking in 1989 at 331 tonnes, valued at 4.8 million baht (US\$ 192,000). Exports and imports for recent years are given in table 2.

Chuntanaparb et al (1985) estimated that local production of about 5,000-6,000 tonnes per year would generate employment, in harvesting and transportation, of about 35,000 person-days and, for furniture production, about 400,000 person-days per year.

BAMBOO

Bamboo is widespread in Thailand. In 1988, it covered about 5.5 percent (8,100

Table 2. Exports and imports of rattans

Year	Exports		Imports	
	Quantity (tonnes)	Value (Baht)	Quantity (tonnes)	Value (Baht)
1987	5.0	654,000	18,443	142,237,000
1988	0.3	21,000	29,339	224,446,000
1989	331.0	4,810,000	27,188	164,063,000
1990	0.3	121,000	15,977	136,263,000
1991	7.0	753,000	17,048	97,542,000
1992	4.0	266,000	10,875	81,641,000
1993 Jan-Nov	3.0	488,000	11,156	86,142,000

Source: Royal Forest Department

square kilometers) of the forest area (148,600 square kilometers). Wild bamboo mostly appears in mixed deciduous forests. Thailand has 60 species of bamboo in 13 genera (i.e. *Arundinaria*, *Bambusa*, *Cephalostachyum*, *Dendrocalamus*, *Dinochloa*, *Gigantochloa*, *Melocalamus*, *Melocanna*, *Neohouzeaua*, *Pseudosasa*, *Schizostachyum*, *Teinostachyum*, and *Thyrsostachys*).

Use

Bamboo culms are used for house construction, scaffolding, ladders, fencing, containers, pipes, toys, musical instruments, furniture, wicker work, partitions, house walls, fuel, and as a raw material for pulp and paper making. Edible bamboo shoots are a favourite in both fresh and preserved food. Bamboo serves as a living fence or wind break, and it can help prevent river bank erosion. The best-known species are *Thyrsostachys siamensis* and *Dendrocalamus asper*.

Thyrsostachys siamensis is mostly collected from natural forests. It is tolerant of drought and salty soils. It is used as a raw material for pulp and paper making. Due to strong demand, this species is now diminishing in occurrence.

Management

Bamboos are among the most useful of all rural plants. Proper management systems for natural bamboo forest are required to ensure sustainability of supplies. Although bamboo is plentiful nationally, areas of shortage and over-exploitation still exist because of uneven distribution, inaccessibility, population pressures and localised industrial demand. Furthermore,

cutting licenses can be issued without any resource assessment.

The most common species found growing in small plots along fences and around homesteads for domestic use are *Thyrsostachys siamensis*, *Bambusa blumeana*, *Dendrocalamus asper* and *D. membranaceus*. *D. asper* is a favorite species for bamboo plantations. It is easy to propagate, has a short cutting cycle, and produces many bamboo shoots. Management of these plantations is very well developed. The first bamboo plantation was established in Dong Pro Ram district in 1987. About 17,000 hectares of bamboo plantations have been established in 25 provinces under the extension program of the Department of Agricultural Extension. In addition to the bamboo widely grown in rural areas throughout Thailand, there are about 1,000 hectares of bamboo plantations which supply the raw material for the pulp mill in Khon Kaen. Comprehensive figures for bamboo plantations throughout the whole country are not available.

Production, exports and imports

Since 1939, the pulp and paper industry has required over 5 million culms each year. The natural forest is capable of supporting that demand, in addition to requirements for construction, and wicker-work.

The quantity removed under RFD permits is shown in table 3. Total harvests, however, are certainly higher because some species are not protected under the Forest Bill (so records are not maintained) and some harvesting of protected species goes undetected.

Table 3. Bamboo culms removed under permits from natural forests in Thailand

Year	Production (million culms)	Value (million baht)
1986	38	234.8
1987	41	365.8
1988	61	633.0
1989	54	583.1
1990	48	482.9
1991	52	518.2
1992	57	565.0

Source: Royal Forest Department

Table 4 shows that the quantity of bamboo imports increased rapidly as the forest areas decreased or were over-exploited. The quantity of exports is small.

Collection and processing

Bamboo harvesting should be carried out by selective cutting. One-year old culms should not be harvested. Cutting is generally done by using a small axe, machete, bill hook or saw. The first harvest is carried out during the third to the fifth year in bamboo plantations. There are up to five shoots in the first and second year for each clump. Mature culms are found at the centre of the clump. Two and three year old culms are cut for poles, construction work and wicker work. The culms should be cut

close to the ground. Over-mature culms are too brittle while immature ones are not durable. Culm cutting is done from November to March.

Due to its ease of extraction, the horse shoe harvesting method is suitable for *Thyrsostachys siamensis* in natural forests. A three year cutting cycle is suitable in natural forests. At first harvesting, a single clump yields about 250 culms (or 11,100 culms per hectare), and the second cutting (three years later), will yield a further 230 culms of similar size (or 10,200 culms per hectare).

De-branching of culms is done immediately after cutting and the culms are cut to the required lengths at the site of the clump. The poles may or may not be bundled before being transported to the roadside or yard. It is important to keep the poles free from insect infestation and deterioration. Generally, at the yard, poles are graded according to size, length and defects. They are then dried by the sun, the air or in an oven. It is preferable to dip the poles into diesel oil to protect them from insect infestation. They are bundled before delivery.

Shoot harvesting runs from May to October (the rainy season). Shoots can be collected from clumps daily, or twice a week. In bamboo plantations, *Deadrcalamus asper*

Table 4. Exports and imports of bamboo, 1989-1993

Year	Export quantity (tons)	Export values (Baht)	Import quantity (tons)	Import values (Baht)
1989	997	3,241,000	175	658,000
1990	567	1,174,000	206	1,514,000
1991	1,076	1,544,000	2,043	2,586,000
1992	666	2,114,000	3,771	5,630,000
1993 (Jan-Nov)	780	2,785,000	11,023	11,007,000

Source: Royal Forest Department.

plants of one to two years can give five or six shoots each year. Bamboo shoots can grow up to 120 centimeters within 24 hours in the rainy season. Export canning requires shoots weighing from 0.4 to 2.0 kilogrammes. About 20 percent of the shoot production is consumed fresh, while 80 percent is processed for canning. Processing involves the following:

- Shoots are trimmed at the top, boiled in hot water for one to two hours, then left in cold water overnight.
- They are debarked, trimmed smooth, then graded (by size).
- The graded shoots are packed in cans, then boiled for one to two hours and covered with water before sealing.
- Trimmed shoots can be sliced into small pieces and canned for home use.

Early in the cutting season, wholesalers buy shoots at the producing site, and take them to the market to sell to consumers. At the height of the season (September to October), farmers bring the shoots to sell at the canning plant or at the farmers' association office.

GUMS AND RESINS

Gums and resins are liquids which come from the inner bark or the wood of trees. They may be white, yellow, golden, brown, red or black. Gums are partly soluble in water, while resins are soluble in alcohol, but not in water.

Thailand has about 27 plants which produce gums and resins. They are mostly used to satisfy the subsistence needs of rural people. Different resins show great differences in

their chemical composition and properties. For example, two important Thai resins are oleoresin, which is extensively used in the paper, synthetic rubber, printing ink and adhesive industries, and yang oil or gurjan, which is used for varnish and which comes from *Dipterocarpus alatus* Roxb. and other Dipterocarps. Besides these, Thailand has gambodge from *Garcinia hanburyi* Hook.f., Chinese lacquer from *Melanorrhoea usitata* Wall (syn. *Gluta usitata*), benzoin from *Styrax benzoin* Dry, gutta percha from *Palaquium obovatum* Engler, jelutong from *Dyera costulata* Hook.f. and Gum dammar from Dipterocarps.

Gum oleoresin

Gum oleoresin is tapped from the jung tree (*Pinus merkusii*). It is found in natural mountain forests about 700 metres above sea level, or on plateaus at altitudes of 100-200 metres. Its two products are:

- gum rosin, which is used in making paper, paint and adhesive, and in a few other industries; and
- gum turpentine, which is mostly used in making paints and pharmaceuticals.

Gum oleoresins are protected NWFPs. People may collect up to 10 kilogrammes without a permit from the Royal Forest Department. The tapping can be done all year, but summer is the most productive time. The traditional method of tapping is by cutting into the stem of the tree. The first cut should be 15 centimeters long, 10 centimeters wide and 3 centimeters deep. Resin can be collected from the same re-cut wound every seven days for a year. After a year, the wound should not be longer than 30 centimeters and its width and depth should be no greater than the first cut. Only

trees with a girth of at least 120 centimeters may be tapped.

The technology of processing resin into rosin and turpentine is similar to that used in other countries. The processing plant at Ban Wat Chan uses a direct heating system to distill resin. The key point is to keep the temperature at 150°C for about four hours. The Chiang Mai plant uses a steaming process. The direct heating system loses about 10 percent of the yield, while the more modern steam system has a slightly higher yield.

Yang oil

Gurjan, or yang oil, is a protected NWFP which is tapped from *Dipterocarp* spp. It is used to make torches, as a preservative for wood and bamboo, in varnish and printing ink, to caulk boats and water-proof bamboo baskets (when mixed with powdered gum dammar), and to produce balsam oil for perfume bases.

Tapping yang oil involves making a hole about 30 centimeters wide, 30 centimeters high and 20 centimeters deep into the trunk of tree. The tapper collects the oil every 10-15 days. For each collection, a fresh fire is lit for two minutes to melt the hardening resin and stimulate production. Only trees with a minimum girth of 200 centimeters may be tapped.

Natural lacquer

In Thailand, natural lacquer is tapped from *Gluta usitata* Wall. (*syn. Melanorhoea usitata* Wall.). It is found in the north and northeast of Thailand, but the trees are tapped only in the north. Lacquer trees occur naturally in open forests, especially

the evergreen and hill evergreen forests. They are rare in dry forests.

Natural lacquer is a protected NWFP. Permits are required from the Royal Forest Department to take more than 10 kilogrammes and people must follow the regulations of the Ministry of Agriculture and Cooperatives when they tap the trees. Tapped trees must be bigger than 80 centimeters in circumference.

Tapping is done by the traditional method, involving a V-shaped cut in the bark of the stem or a branch with a special iron chisel. A bamboo collecting cup and tube are placed at the base of the V-shaped cut. The wound should not be deeper than 2 millimeters. The latex is collected four times, ten days apart. After each collection, the wound is enlarged to continue the flow. Use of fire or any other stimulants for tapping is prohibited. Tapping is done from June to February.

The latex at first is grayish white, but turns black on exposure to the air. The raw lacquer is packed in a container and covered with wet paper touching its surface. Raw lacquer is mixed with turpentine, then stirred and filtered through a thin cloth or mulberry paper. It is then ready for use as varnish for lacquer ware, or for wood-work, water proofing paper, cloth or umbrellas and in decorating Buddhist temples. It is applied directly to the article to be varnished.

Exports and Imports of Gums and Resins

Table 5 shows that, for most years, more gums and resin (gum Arabic, gum dammar, gum benzoin, gambodge, and gum tragacanth) were imported than exported.

Year	Export quantity (tons)	Export value (Baht)	Import quantity (tons)	Import value (Baht)
1988	2,210	21,308,000	549	20,713,000
1989	2,378	20,767,000	5,742	63,048,000
1990	1,534	15,318,000	2,839	40,455,000
1991	1,874	18,271,000	2,101	37,354,000
1992	1,398	10,928,000	991	30,406,000
1993 (Jan-Nov)	11	1,028,000	1,651	36,186,000

Source: Royal Forest Department

MEDICINAL PLANTS AND SPICES

Medicinal Plants

Tropical forests contain trees, herbs, vines, shrubs and other plants with medicinal properties. These raw materials are exported or processed into modern and traditional medicines. Modern medicine involves drugs whose chemistry and pharmacology are known, and for which scientific trials have been conducted. Traditional medicine uses drugs from nature, which are used in their natural state or with little processing. Drugs are derived from various parts of plants, including fruits, flowers, leaves, stems and roots.

Thailand has many kinds of medicinal forest plants. Of 5,800 plant species indigenous to Thailand, 1,900 have already been studied.

Over 800 species are described in Thai traditional recipes. About 400 species are available in traditional drug stores and about 51 species are used in the traditional medicine industry.

The most important active constituents in medicinal plants are alkaloids such as reserpine, saponin, colchicine and peperazine. Some medicinal plants of commercial potential and used in traditional medicine are *Rauwolfia serpentina*, *Gloriosa superba*, *Cassia angustifolia*, *Amomum krervanh*, *Dioscorea* spp., *Cartharanthus roscus*, *Strychnos nux-vomica*, *Diospyros mollis*, *Costus speciosus*, *Derris elliptica*, *Hydrocarpus anthelmintica*, *Calophyllum inopyllum* and *Stemona tuberosa*.

Table 6 shows that the annual quantities of medicinal plant exports between 1988 and 1992 ranged from 1,393 to 3,379 tons, demonstrating an increasing trend.

Year	Export quantity (tons)	Export value (Baht)	Import quantity (tons)	Import values (Baht)
1988	1,393	66,383,000	1,761	76,942,000
1989	3,072	133,369,000	1,640	81,553,000
1990	2,210	74,419,000	1,814	77,752,000
1991	2,009	103,097,000	2,182	110,291,000
1992	3,379	173,394,000	2,088	105,842,000

Spices

Spices are used as flavoursome food additives and to stimulate digestion. Most spices consist of essential oils and other constituents. Some important forest spices are *Amomum krervanh*, *Cinnamomum iners* and *C. bejolghota*. Some cultivated spice trees in the country are exotic species, including *Eugenia caryophyllus*, *Apium graveolens*, *Cinnamomum verum* and *Myristica fragrans*.

Table 7 reports on the recent spice exports and imports (cinnamon and cinnamon-tree flavours, cloves, nutmeg, mace, and cardamoms). It shows that imports have increased in the past two years.

EDIBLE PRODUCTS

There are over 500 species of edible natural plants sold in Thai markets. They include fruits, nuts, leaves, bark and shoots. In the rainy season in northeast Thailand, natural food can account for as much as half of the food consumed by some rural villagers. Because of their poor living conditions and insufficient food supply, some rural people rely greatly on food from the wild. Edible

products can also bring extra income and foreign exchange and can play an important role in improving the economic conditions of rural people.

Mushrooms are important vegetables, which have earned a lot of money for the country. In Thailand, mushrooms are found in forests throughout the country, especially in the rainy season. Mushrooms were previously collected by forest dwellers and used primarily as food, with a few being traded. Some wild mushroom varieties are favourites, selling at high prices. For example, *Termitomyces* sp. and *Russula delica* are sold for 80-120 Baht per kilogramme (US\$ 3.20 to 4.80).

Many edible mushrooms are also ectomycorrhiza, which help trees to take up phosphorus. *Russula delica* helps Dipterocarp species in this way. In two to three year-old Eucalyptus plantations, edible *Amanita* and *Boletaceae* species perform similar functions. *Boletus griseipurpureus* is associated with *Acacia auriculaeformis*, *A. mangium* and *Melaleuca leucadendra*. It is estimated that this mushroom can earn about 2,000-3,000 Baht (US\$ 12.80-19.20) per rai for the plantation owner, while its selling price is about 40-60 Baht (US\$

Table 7. Exports and imports of spices

Year	Export quantity (tons)	Export value (Baht)	Import quantity (tons)	Import value (Baht)
1987	183	18,380,000	224	12,940,000
1988	378	38,347,000	166	9,112,000
1989	772	54,827,000	238	12,655,000
1990	846	51,124,000	227	14,457,000
1991	524	35,378,000	276	12,449,000
1992	312	34,567,000	351	17,714,000
1993 (Jan-Nov)	289	35,774,000	305	14,580,000

Source: Royal Forest Department

1.60-2.40) per kilogramme. Thus, mushrooms can be both a cash crop, and a means of improving tree growth in plantations.

Data is unavailable on the export and import of edible forest products. Small quantities of natural vegetables such as *Azadirachta indica*, *Melientha sauis*, *Tiliacora triandra* and *Emilia sonchifolia* are exported to Japan, USA, France, China and Macau, but bring in low revenue. These are mainly for small southeast Asian immigrant communities (Chuntanaparb, 1992).

INSECT PRODUCTS

Lac

Lac cultivation occurs in India, Thailand, China, Myanmar, Laos, Cambodia and Indonesia. In the past, people used lac for medicinal purposes and for dyeing silk and animal skins. Its properties as a resin became known during the 19th Century, and it is now one of the most important NWFPs.

Thailand is the second largest lac producing country after India. Production fluctuates greatly from year to year depending on weather conditions, although over the last ten years it has averaged 6,000 tonnes annually. The price of lac also fluctuates depending on production and the world market price (table 8). The quantities of lac imports are very small.

There are a large number of trees and shrubs which can host the lac insect. The major lac host tree in Thailand is the raintree (*Samanea saman* Merr). Other highly productive host trees are *Zizyphus maureitiana*, *Albizia lucida*, *Combretum quadrangulare*, and *Acacia glauca*. Host trees are inoculated with six inches of stem,

Year	Export quantity (tons)	Export values (Baht)
1987	7,685	287,184,000
1988	3,483	121,616,000
1989	6,505	151,760,000
1990	4,740	115,907,000
1991	3,692	106,627,000
1992	2,650	124,753,000

containing brood lac insects from another infested plant. This is tied on with string and covered with a straw basket as near as possible to the branch on which the young are to settle. After about a week, the brood lac is moved to another branch. The brood lac is left on the tree no longer than three weeks and then removed, to avoid over-infestation. The lac insect will complete its life cycle within six months. Then the lac can either be harvested or left on the tree for self-inoculation and a further six months' growth. Trees should be inoculated on a three-year rotation. Although lac can be cropped twice a year, in practice it is done only once, from November to January.

Bee products

Before 1987, honey was a protected NWFP, but subsequently it was moved to the group of non-protected NWFPs. There are four species of bees in Thailand, three of which are found in natural forests. These are the giant or rock bee (*Apis dorsata*), the hive bee (*A. cerana*), and the little bee (*A. florea*). In addition, *A. meelifera* has been introduced for beekeeping.

Before 1980, most honey was collected from natural forests with the permission of the RFD, since honey was a protected NWFP. During the 1980s, beekeeping

became more popular in Thailand. In 1990, there were about 77,000 hives in Thailand. It is estimated that national honey production from beekeeping is about 2,000 tonnes per annum. Honey is no longer a protected NWFP. Table 9 suggests that honey exports are promising. Honey imports have been relatively stable from year to year.

Collectors of wild honey from forests smoke the hive using a torch of fresh leaves and dry grass until the bees flee the hive. They then cut the honeycomb out with a knife. This method is used for *A. dorsata* and *A. cerana*, while a cigar is used instead of a torch for *A. florea* hives. After collection, the honey is extracted, filtered and bottled. Harvest time is from April to June.

Beekeepers remove honey combs from the colony and take them to a bee-tight room for uncapping and extracting. The uncapping tool is a sharp knife heated by hot water. The honey is extracted by centrifugal force. Extracted honey is stored for several days to allow air bubbles, bits of wax, and any fine particles to rise to the top. These are skimmed off before bottling.

AGARWOOD

Agarwood, the trade name for the aromatic, resin - permeated wood of *Aquilaria* spp.

(family *Thymelaeaceae*), is a protected NWFP. The tree is a large evergreen, 18-21 metres tall and 1.5-1.8 metres in girth, which grows in India, Pakistan, Nepal, Bangladesh, Sri Lanka, China, Malaysia, Indonesia, Cambodia, Vietnam, Myanmar and Thailand.

Agarwood can be used in various ways. Low grade material is used to distill the volatile agar attar oil used in the perfume and tobacco industries. High grade material is exported to Arab countries where it is used as incense and, when powdered, in the manufacture of joss sticks. The ground wood is also used as a stimulant, a tonic and a calmate. It is an ingredient in several medicinal preparations against rheumatism, body pains and heart palpitations. The price of agarwood can go up to almost US\$ 200 per kilogramme and the oil can bring as much as US\$ 200 per 10 milliliters, depending on the wood grade.

Those collecting the wood from natural forests, fell the trees to examine them thoroughly, but most will yield no agarwood. However, a well-laden tree can

provide several thousand dollars worth of agarwood. Such illegal action causes ecological damage and could lead to the disappearance of the trees. Against this

Table 9. Export and import of natural honey, 1987-1993

Year	Export quantity (tons)	Export value (Baht)	Import quantity (ton)	Import value (Baht)
1987	745	11,111,000	130	3,842,000
1988	1,750	24,548,000	143	5,089,000
1989	704	9,290,000	146	5,586,000
1990	2,432	31,114,000	167	6,190,000
1991	1,206	16,966,000	232	8,794,000
1992	2,407	32,392,000	172	7,301,000
1993 (Jan-Nov)	2,108	28,233,000	182	8,544,000

Source: Royal Forest Department

background, much research was done to investigate the possibility of changing normal wood to agarwood. It has shown that wounds are an important inducer of agarwood, and fungi was also revealed to have some ability to increase the quantity of agarwood.

BARKS

Barks are sources of tannin and natural dyes and have been used medicinally and as spices. Some barks are protected NWFPs, and permits are required for harvesting those species, including *Castanopsis* spp., *Lithocarpus* spp., *Quercus* spp., *Walsura* spp., *Hopea* spp., *Cotylelobium melanoxyton* Pierre, *Persea* spp., *Litsea* spp., *Artocarpus* spp., *Cinnamomum* spp., *Shorea* spp. and *Pentace* spp. One of the most important is yang bong (*Persea kurzii* Kosterm), which produces kobuak. Kobuak is a binder compound composed of yang bong bark and saw dust which is used for making joss sticks. Exports and imports of kobuak are shown in table 10.

Bark is usually removed by using a sharp knife and peeling it along the trunk of the tree. The size of the wound should not be bigger than 20 centimeters wide, 80 centimeters long and 1 centimeter deep. Moreover, the spaces between the wounds should be more than 30 centimeters wide. After peeling off the bark, the collector

should paint the wound with tar oil or an anti-fungus solvent to prevent fungi attack. The bark is then air-dried.

NATURAL DYES

While synthetic dyes produce bright, strong and durable colours, natural dyes produce softer shades associated with traditional arts and much valued by artists. The most important natural dyes used in cottage industries in Thailand are discussed below.

Annatto Tree (*Bixa orella* L. Family *Bixaceae*)

Locally known as *kum sad*, *kum fad*, *kum ngo*, *sead*, or *chad*, this plant produces a seed coat containing orange bixin ($C_{25}H_{30}C_4$) and green bixol ($C_{18}H_{30}O$). Annatto dye is used for both food colouring and cloth dyeing.

The seeds of ripe fruits are soaked in hot water for a few days. Then the colouring matter is dried into a solid. For cotton dyeing, the annatto dye is dissolved in a sodium carbonate solution. The cotton is dipped in the dye for 15 minutes and then in a dilute acidic solution. For silk dyeing, the dye is dissolved in a sodium carbonate solution with an added alkaline. The silk is soaked in water for an hour before being placed in the dye. A stronger yellow colour results if a little tartaric acid is added.

Table 10. Exports and imports of kobuak powder

Year	Export quantity (tons)	Export value (Baht)	Import quantity (tons)	Import value (Baht)
1988	5,003	47,891,000	--	--
1989	4,190	41,134,000	94	330,000
1990	342	3,737,000	452	1,583,000
1991	4,087	45,059,000	16	58,000
1992	3,882	46,609,000	10	35,000

Sappan wood or False sandalwood
(*Caesalpinia sappan* Linn Family
Caesalpinaceae)

The heartwood of this tree, known locally as *fang*, *ngai*, or *fang som*, gives a red colour and its roots produce a yellow. The wood is chipped and boiled in hot water for an hour. Sompoy leaves are then added and the whole mixture is reheated for 10 minutes. The liquid is then strained and a base solution added. The dampened cotton or silk is then put in and simmered for 30 minutes.

**Ebony (*Diospyros mollis* Griff. Family
Ebenaceae)**

The fruits of this tree, known locally as *Kleu* or *ma-kleu*, give a black dye. The fruits are ground up, and the colour is extracted in an alkaline solution, which is then filtered. Wet cotton is dyed in this solution.

**Gambodge tree (*Garcinia hanburyi* Hook.
F., Family *Guttiferae*)**

Resin from this tree, locally called *rong*, produces a yellow dye used for painting and cloth dyeing.

**Catechu or Cutch Tree (*Acacia catechu*
Willd. Family *Leguminosae*)**

This tree is known locally as *bae*, *si-siad khean*, *si siad leung*, or *si siad*, and its wood gives a brown dye used for dyeing cloth.

**Jack Tree (*Artocarpus heterophyllus*
Lamk. *A. integrifolia* Linn. f syn. Family
Moraceae)**

The heartwood and roots of this tree, locally known as *ka nun*, *ma ka nun*, *mak mea*, *nun*, *ka noo*, *payoisa*, or *nako*, give a yellowish-brown dye. The chipped heartwood is

boiled in water with the bark of *Oroxylum indicum* (one third by weight). Soaked cotton is dyed in the filtered solution. A greenish-khaki colour results.

**Mai luang (*Cudrania javanensis* Trecul
Macrula cochinchiensis Lour syn. Family
Moraceae)**

This tree is locally known as *kae lae*, *luang*, *kae kong*, *kae*, *nam kae*, or *chang ga tog*. Its heartwood gives a yellow dye. It is cut into small pieces and the dye extracted after three soaking in hot water. The first extraction contains the strongest yellow color, and the third the palest yellow. Cotton is dyed in the third solution first, then in the second solution and finally in the strongest yellow solution.

**Indigo (*Indigofera tinctoria* Linn. *I.*
arrecta Hochst syn., *I. suffrutiosa* Mill, *I.*
sumatrana Gaertn. Family *Papilionaceae*)**

Indigo is locally known as *kram*, *kam*, or *kram yom* and is used to dye cloth. Bundles of leaves, stems or branches are soaked in water for two to three days and then removed. Lime and banana tree ash are then added to the solution, which is left for two to three nights. The resulting blue dye solution is filtered through fine cotton to get a clean blue dye solution. Cotton and silk are dyed in this solution.

CONCLUSIONS AND RECOMMENDATIONS

In order to integrate utilization strategies and plan for sustainable management of NWFPs, coordinated research of each of the products should be conducted. The products should be developed by:

- establishing plantations and new production zones;
 - harvesting these resources on a maximum sustained yield basis;
 - developing modern technology for processing, transporting, storing and utilization;
 - extension and training activities;
 - making market information available;
 - conserving and protecting rare species; and
 - coordinated planning and implementation.
- To reach these goals, Thailand will need support from FAO and other donors to:
- establish a NWFP network in the Asia Pacific region, in order to exchange ideas, visits, and information;
 - arrange training courses to upgrade the skills of researchers in the area;
 - fund research work, extension and implementation activities; and
 - provide funds to publish research results in English and local languages.

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NON-WOOD FOREST PRODUCTS IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

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INTRODUCTION

Lao PDR has a population of about 4.5 million people, of which 81 percent are living in rural areas. With an average population of 15 people per square kilometre, the country has one of the lowest population densities in Southeast Asia. The country has vast reserves of land in contrast to the small population. However, during the last two decades, Lao PDR has experienced a rapid increase in population.

Employment opportunities are limited and a large number of people (253,000 families or 1.5 million people) depend on farming as their primary source of income. The scattered self-sufficient economic system in the rural and mountainous areas (80 percent of the land area), and the poor physical infrastructure and support services, constitute the principal factors limiting socio-economic development.

Over the years, the forests of Lao PDR (47 percent of the total land area) have provided shelter, food, medicinal products and other materials needed for household consumption. Even though the forests are still in reasonably good condition compared with neighbouring countries, they are under increasing threat from commercial exploitation, shifting cultivation and encroachment by rural people.

The forests of Lao PDR are the source of a wide range of non-wood forest products

(NWFPs). Throughout the country, NWFPs play a particularly crucial role in rural households. A wide variety of NWFPs are collected for sale in local markets or for export to foreign countries. When added together, NWFPs are among the country's most important export commodities.

Numerous problems still constrain the development of NWFPs in Lao PDR. The present collection system is random and indiscriminate, with no consideration for sustainability. The quality of the collected products is still low, and up to 50 percent of the collection is often unsuitable for commercial use. The capacity for processing NWFPs is very limited in Lao PDR, even in catering to the home market. The home market is currently being flooded by foreign processed products, many of which were actually made from raw materials exported from Lao PDR at extremely low prices. Accurate data on these aspects and the actual contribution of NWFPs to social well-being and local economies are lacking.

During recent years, the interest in NWFNP development has increased in Lao PDR. At present, there is general consensus among government and non-governmental organizations concerning the potential of NWFPs with respect to strengthening the forest conservation effort and satisfying the needs of people living in remote areas.

NWFPs IN NATIONAL POLICY AND PRACTICE

Existing NWFP activities

There are some institutions in Laos which already carry out activities related to forest conservation and NWFP development. These institutions have a strong interest in NWFP development and recognise their potential, but they have limited staff with NWFP expertise.

The Department of Forestry (DoF)

DoF has many years of experience in the field of NWFPs, although it has very limited means to further develop their potential. Several organizations active in the field of NWFPs are wholly or partly under the jurisdiction of DoF.

- **The Bamboo and Rattan Research Project:** This project was established two years ago by DoF, with support from the International Development and Research Center (IDRC). The project presently carries out fundamental research on rattan, bamboo and benzoin (*Styrax*), monitors trial plantations, collects germplasm, undertakes socio-economic studies and taxonomic surveys and it has started to build a herbarium.
- **Community Forestry Support Unit:** The prime objective of this unit, which was established within the DoF in 1992, is to formulate strategies for community-based development in forest areas. The Unit, in which DoF and foreign NGOs cooperate, potentially is an effective instrument for ensuring that community aspirations, needs and constraints are

considered in developing a community forestry policy.

- **NWFP study by the Dutch development organization NOVIB:** At the end of 1993 and in early 1994, NOVIB undertook a survey of NWFPs and social-economic conditions in two remote and mountainous areas of Lao PDR. One area is situated in the north and the other in the southern part of the country. Based on this research, an NWFP Seminar was held in Vientiane in February 1994 and the outlines for a plan of action were proposed.

The Department of Science, Technology and Environment

This department is currently preparing a project which focuses on the marketing of NWFPs, in particular on the marketing of natural medicines, fungicides and biocides (non-toxic insecticides). The legislative focus of the project will be to ensure that significant and equitable economic returns from NWFPs flow to rural communities.

Socio-Economics of NWFPs in Lao PDR

In each forest type, the number of NWFPs varies, depending on the season. Ubiquitous NWFPs provide food, raw materials, shelter, and medicine. Most of the rural people in Lao PDR work in the agriculture sector. Major crops are rice, corn, tubers, and maize. Sometimes people plant bamboo as a "living fence," harvest the bamboo shoots for food and use the bamboo culm as material for building and handicrafts. In the southern part of the country, rural people plant cardamom on their swiddon farms, and in the northern part they cultivate styrax on their agricultural land for resin collection and as construction material or fuelwood.

Major NWFPs

Benzoin

Extent and distribution: In Lao PDR, styrax (*Styrax tonkinensis*) grows naturally in mountainous areas in the north, at an elevation of about 400-1000 meters. Styrax is found in the warmer, moister parts of the region. There is one commercial species of styrax in the country (*Styrax tonkinensis*). This species produces an excellent gum called benzoin or *gum benjamin*. The wood is soft and of little use. To obtain the gum, trees are scarred or wounded. In an effort to close the wound, new wood forms. This new wood contains cavities filled with a resinous secretion (raw benzoin).

Management: In 1982, the Department of Forestry carried out a survey of natural stands of styrax. The survey showed that there are significant styrax resources in five provinces in the northern part of the country. Wild styrax grows on fallow land where people practice shifting cultivation. Traditionally, people never planted the styrax forests, they just allowed wild styrax to grow unhindered. For the first time in 1993, the Department of Forestry planted one trial area of styrax, but the results have not been encouraging. This trial will continue for several more years.

Production: During the first half of 1980, the collection of benzoin was about 20 tonnes per year. The price paid locally to collectors was about US\$ 8.00 to 10.00 per kilogramme. Since then the price has dropped year after year. As a result, the production of benzoin has also declined. Declines in production have occurred because raw materials are poor quality and producers lack marketing mechanisms. Thus, villagers cannot enjoy benzoin's potential economic rewards. In 1994, the

price of benzoin was between US\$ 2.00 to 2.50 per kilogramme. No processing of raw benzoin is done in Lao PDR.

Utilization: Benzoin is composed principally of two alcohols, combined with cinnamic acid and associated with free benzoic, or free cinnamic acid. Benzoin tincture is used in Europe to treat acute coryza and the early stages of inflammation of the pharynx when the throat feels harsh and dry. It is also used in steam for acute laryngitis. In Malaysia, benzoin is used for skin complaints: itch, ringworm, the wound made by circumcision, sores on the feet, and rheumatic fever. Sometimes a little benzoin may be put into cigarettes.

Marketing and trade: In the past, benzoin produced in Lao PDR was exported to Europe and other markets via Thailand and Vietnam. Now, however, the bulk of Lao PDR production is exported via China. The largest single final market for processed Laotian benzoin is France.

Income and employment: Most styrax forests grow in areas of shifting cultivation and thus are owned by individual farmers. The yield of rice in these fields is only 1.2 to 1.3 tonnes per hectare per year, and thus it is only for household consumption. Besides work in the rice fields, men are occupied with house repairs and hunting; women collect vegetables, tap styrax and collect the benzoin gum. The income they earn is used for health care, clothes, and school supplies for their children.

Legal aspects: Farmers are free to cultivate, harvest and trade in benzoin. They only pay taxes of 2 percent to the local government.

Recommendations: Benzoin trees are well-suited to cultivation in agroforestry systems. Such systems do not damage the ecosystem,

and offer an excellent method for rehabilitating degraded forests damaged by shifting cultivation. They can also lead to the development of cottage industries which create job opportunities for local people. In addition, benzoin can attain high market value per unit of volume. This feature is particularly important for a land-locked country like Lao PDR. To save rural people from subsistence-level slash and burn cultivation, Lao PDR is seeking help from international donors to improve the technology of cultivation, extraction, processing and purification of benzoin, as well as aid in the development of international trade.

Turpentine and rosin

Extent and distribution: Turpentine and rosin are the products obtained from oleoresin distillation. In Laos there are two species of pines yielding oleoresin, *Pinus merkusii* and *Pinus kesiya*. Pine forests cover about 1,000,000 hectares, distributed in three main regions:

- Nakai plateau, Khammuane Province (central Lao PDR): 500,000 hectares
- Plateau areas of Xiengkhoang Province (northeast): 400,000 hectares
- Xekong Province (southeast): 100,000 hectares

Production: In the 1980s, tapping in the pine forests of Xiangkhoang Province yielded about 15-20 tonnes per year, but because destructive tapping methods were used, trees died and tapping was discontinued.

Recently, tapping began in the Nakai plateau, Khammuane province. The yield

is exported to Vietnam, but no data are available on the volume and prices received.

Pine forests in the southern part of the country are not exploited, perhaps because the mountainous terrain makes access difficult.

Utilization: Turpentine is used in making medicine, paint, varnish and thinner. Rosin is used primarily in making paper, soap, paint, varnish and plastics.

Recommendations: Pine forests in Laos PDR are still in good condition, but management practices and resin production need improvement. Further studies on pine forest management and resin production are needed.

Damar oil (Yang oil)

Extent and distribution: Damar oil is obtained by tapping *Dipterocarpus* spp. *Dipterocarpus* spp. grow in dense, mixed and open forests, predominantly in the central and southern part of the country.

Production: Total production of damar oil averages 100,000 tonnes per year.

Marketing and trade: The bulk is exported to Thailand. The cost paid to the local people is US\$ 0.15 per kilogramme, while the export price is US\$ 0.25 per kilogramme.

Utilization: Damar oil is used to make torches, to preserve wood and bamboo and for waterproofing umbrellas. Freed of residual resin, the volatile oil is used in manufacturing paint, varnish and printing ink. Mixed with powdered gum and kneaded to a proper consistency, damar forms a dark brown paste which is widely used to caulk boats and water-proof bamboo baskets.

Income and employment: *Dipterocarpus* spp. are inherited by farmers. One fifth of farmers in lowland areas practise tapping for damar oil. Damar oil can be harvested all year long by rural people, both for their own use, and for sale to supplement their income from rice farming.

Recommendations: The production of damar oil in Lao PDR could be sustainable, but the price paid for damar oil in Lao PDR appears low compared with the price paid in Thailand. To promote production and conservation, producers need information on marketing and trade.

Honey and wax

Extent and distribution: Nests of honey bees are found in all forest types in Lao PDR, but there is an especially large population of bees in Sekong Province in the south.

Production: Estimated production is about 5 to 10 tonnes per year. A few years ago, a honey processing factory was established in Xekong Province in southern Laos, with support from UNDP. This factory has significant underutilized capacity. In 1993, only 2,000 kilogrammes of honey were processed, although the capacity of the factory was 200 kilogrammes of honey per day.

Bee management and beekeeping are still not developed in Lao PDR, but if developed, they could provide a sustainable, long-term means of exploiting the available flora.

Utilization: In Lao PDR, honey is collected for household use as a food, as a sweetener and for the production of medicine. Wax is used for polishes, cosmetics, and candle making.

Marketing and trade: In local markets, honey and wax can be sold quite easily, but export is difficult because the volume of production (10 tonnes per year) is small and producers lack information on quality-improvement and marketing. The price paid to collectors is about US\$ 0.80 to 1.00 per litre, but in town markets, the price is about US\$ 2.00 per litre. Solidified wax is sold in local markets for US\$ 4.00 to 5.00 per kilogramme.

Recommendations: In 1989-1990, a UNDP supported project introduced beekeeping to rural people in Sekong Province. The project introduced top bar box hives, but this innovation completely failed because the boxes were difficult to make locally and the volume (52 litres), was regarded as too large. In January 1994, an expert team from NOVIB arrived in the same area to undertake NWFP studies and provided advice on technical improvements and establishment of an association of beekeepers. People in this area still need technical advice and marketing support.

Cardamon

Cardamon (*Amomum* spp.) is a zingiber which grows naturally under the cover of mixed dense forests. Commercial names are "bastard, camphor seed or siame cardamon." There are four main species: *Amomum krervanh* Pierre, *A.ovoideum* Pierre, *A.villosum* Lour and *A.xanthoides* Wall. All four are valuable for trade.

Extent and distribution: Cardamon grows in all the natural forests of Lao PDR, but the most productive areas are in the central and southern parts of the country; especially in the Boliven plateau.

Management: Most cardamon grows in natural forests. The seeds are collected in

August-September. Farmers are free to collect the seeds from the forests, and in most cases farmers pay attention only to quantity. In recent years, farmers have learned how to plant cardamon during the course of shifting cultivation, using both seeds and rhizomes. The most productive planting is by rhizomes, which yield a harvest by the third year. The yield of cardamon is very high in the fourth, fifth and sixth years, but declines after that so farmers have to replant with a new cycle of shifting cultivation. The seeds must be fully ripe before harvest and care should be taken not to destroy the plants. The highest yield of cardamon plantations is between 150-200 kilogrammes per hectare.

Production: Each year, the Commerce Department records production of 200-250 tonnes of cardamon seeds, but not all production is recorded. For best quality, the seeds of cardamon must be decorticated and well dried. The preferred species for trade are *A. ovoideum* and *A. villosum*. There is no processing of common seeds in Lao PDR.

Utilization: The seeds of cardamon are used as a spice; in the Middle East cardamon is used to flavour coffee; in Northern Europe and the USA, it is used in bakery products. Elsewhere, cardamon is used in meat seasonings. Seeds and all of the plant can be used for medicinal purposes (no available data).

Marketing and trade: Traders operating at the district or provincial level collect the cardamon seeds from villagers. The price paid for one kilogramme of seeds in rural areas is about US\$ 1.00 to 2.50 per kilogramme, depending on access and distances to secondary markets. Cardamon seeds are exported primarily to Thailand and China. The export price is about US\$ 3.00

per kilogramme. At present trade cardamon is poor due to marketing difficulties.

Recommendations: To reduce problems caused by shifting cultivation, the government is promoting trial plantations of cardamon in natural forests, forest plantations and areas of shifting cultivation in southern Laos. In the future, higher production of cardamon is expected. Establishing solid international marketing links remains a problem. Studies are needed to improve cultivation, varieties, storage and processing.

Rattan

Extent and distribution: Until today, there has been no serious inventory of natural rattan stands. Rattan grows primarily in the central part of the country.

Management: The harvest of rattan is still random and wasteful because after harvesting the canes sometimes lie on the ground for more than one month. Rural people have not been taught proper harvest and post-harvest methods. A research and development project on rattan and bamboo which is supported by IDRC, has been underway since the beginning of 1992. This project has carried out a survey of taxonomy, resources, trial plantations, germplasm collections, and determination of the growth and yield of natural rattan and bamboo. It has also examined the socio-economics of minor forest products, with emphasis on the role women play in production and the transfer of technology to local communities. The project has identified and 30 species of rattan and partially achieved other objectives.

Production: Each year, the government issues cutting permits for up to 400,000 pieces of large-dimension rattan (one piece

measures 4.5 meters in length). Actual production varies from 300,000 to 400,000 pieces of large dimension rattan, and from 25,000 to 30,000 tonnes of small-dimension rattan. All come from wild plants. Large dimension rattan is mainly supplied to four large factories, with smaller volumes going to home production of furniture and handicrafts.

Utilization: There are many products made from rattan cane, but there is no comprehensive list of them all. Among these are furniture, baskets, fish traps, hats, walking sticks, tool handles, ropes and mats. The fruit and shoots of all species are edible and some of them are sold on the local market (US\$ 0.17 for three shoots).

Marketing and trade: Exports of raw rattan and canes which have had only preliminary treatment (boiling, fumigation, washing in water, sun drying, rubbing, classifying by dimension, cutting, banding and storing) have been banned since September 1990. Only processed rattan products are now permitted. The best-known rattan for furniture production and export has traditionally been “wai thoon” (*Calamus* sp.), which has qualities similar to *Calamus manan*.

Income and employment: Rural people earn income from the harvest of rattan either by selling to traders or to representatives from the main factories. Collectors earn about US\$ 0.60 per piece of large-dimension rattan in the rural areas. Cane delivered to factory sites earns about US\$ 1.00 per piece. Small-diameter rattan is sold for about US\$ 0.35 per kilogramme. The number of collectors is unknown. Workers engaged in the four factories number about 700. Cottage industries employ both men and women who share the work between them. However, men usually

make furniture, and women make baskets, hats, ropes and mats.

Recommendations: Proper inventories of rattan resources are needed to facilitate sustainable management and utilization. Training of collectors in improved harvesting techniques is needed to help reduce waste. Finally, rattan plantation trials should be initiated with a view toward supplementing declining stocks of natural rattan.

Bamboo

Extent and distribution: There has never been any attempt to prepare comprehensive inventories of the country’s bamboo resources. During forest inventories, the occurrence of bamboo (and rattan) has been routinely noted, but not quantified. It has not been possible, therefore, to analyze the abundance of bamboo.

Management: Rural people commonly grow bamboo in their gardens as a living fence. Some species are also grown for food (shoots) and construction material (culm). Plantations of bamboo are always small-scale (not more than one hectare). Naturally-growing bamboo is also harvested.

Utilization: In areas where it grows naturally, bamboo is a traditional building material. Houses can be made entirely from bamboo. The same ingenious application of bamboo is also carried out in making furniture, fences, cages, mats, farm implements, ladders, and blinds. Pipes for irrigation and guttering can also be fabricated when the nodes are removed from the bamboo. In each of the country’s 17 provinces, people produce handicrafts for their own use, for sale in local markets and for export. In Vientiane, there are around

50 handicraft and furniture factories. The most famous, the Phay Exclusive Trading Co., Ltd., uses thousands of bamboo culms from *Dendrocalamus asper*, *Bambusa nana*, and *B. blumeana* each year. Bamboo shoots are widely eaten in Lao PDR, and although there is no actual figure for bamboo shoots harvested from natural forests, it can be estimated that thousands of tonnes of bamboo shoots are harvested annually. Methods of preserving bamboo shoots for export are very rudimentary; some shoots are dried, and some are steamed, but most shoots are pickled. In Vientiane, one factory (Korean-owned LAKO) produces bamboo mats. Each year this factory uses about 200,000 culms of *Dendrocalamus lanoifimbriatus*. The products are sold to Korea. This factory also processes chop sticks and toothpicks.

Marketing and trade: In the capital, Vientiane, the total use of bamboo culms is about 1,000,000 culms per year. The price of one culm (5 meters) is about US\$ 0.20 to 0.40. Importation of bamboo mat board from Vietnam averages 80,000 sheets per year according to interviews with traders. The price is US\$ 2.00 per 1.6 x 4.0 metre mat. The number of bamboo products that are exported is considerable (handicrafts, furniture, raw materials), but quantities are still relatively small and no accurate data on quantities or values are available.

Income and employment: Bamboo shoots provide both food and income for some rural people. Shoots sell for between US\$ 0.15 and 0.50 per kilogramme, depending on the season, and the value of 2 kilogrammes of bamboo shoots is roughly equal to 1 kilogramme of rice. Handicrafts made from bamboo are an important source of income for farmers following the rice-growing season. In Vientiane, factories

processing bamboo provide work for about 1,500 people.

Recommendations: Research and development are needed in the areas of bamboo propagation, production of bamboo mat board, and the processing of bamboo shoots for export.

Cashew nuts

Extent and distribution: The cashew tree (*Anacardium occidentale* L.) was introduced in Lao PDR in 1980 from Thailand. Plantations were promoted for degraded land which had red latosols, sandy soils or loose lateritic gravels. Some farmers also planted cashews in deep soil. According to a survey of the Department of Forestry (Minor Forest Products, 1994), there are about 100 hectares of cashew plantations in Vientiane which are between 8 and 12 years old. Because of low market prices, cashew plantations have not expanded, and some plantations have been felled for fuelwood and converted for other purposes.

Uses: In Laos, cashews are used primarily as food in main dishes, as desserts and as snacks.

Processing: In 1994, two new nut-cracking factories opened in Vientiane, but the quality of shelled nuts is low compared with those imported from Thailand.

Marketing and trade: Initial promotional efforts promised farmers a ready market and high prices (US\$ 4.00 to 5.00 per kilogramme) for cashews. Recent surveys, however, indicate frustration on the part of farmers due to low prices, averaging only about US\$ 2.00 per kilogramme in local markets. Export markets have failed to materialise. In fact, an estimated 10 tonnes of shelled cashews are imported yearly from

Thailand and Vietnam. The price of imported cashews is about US\$ 5.00 to 6.00 per kilogramme.

Recommendations: To improve the living standards of the rural people who occupy large areas of fallow land, this is an opportune time for international organisations to assist the country with market development and trials of higher-yielding species. Training and improved technology need to be provided to local communities. Scientists and foresters need training in research, development and extension methods.

Sugar palm

Extent and distribution: Sugar palm (*Arenga pinnata*) occurs mainly on the banks of rivers, in dense or mixed forests.

Utilization: Fruit or nuts of this palm are used as a dessert.

Marketing and trade: The nuts are harvested in February and for next two months are readily available in the local markets. The price currently paid to collectors is US\$ 0.30 per kilogramme for nuts which have been decorticated and boiled. Local people do not know how to preserve the nuts for use and are able to keep them in water for just one month. The demand for this nut is always high because preservation is not practical. A survey conducted by NOVIB in 1994 recorded exports of more than 100 tons of sugar palm to Thailand and Myanmar from northern Lao PDR, and 50 tonnes exported to Thailand from the south. The export price for sugar palm nuts is 10 to 15 baht (US\$ 0.40 - 0.60) per kilogramme.

Legal aspects: In Laos this palm is never planted, but plants usually have an owner

who puts a sign on the tree indicating ownership. The owner watches the tree as the fruits develop and harvests them when they ripen. Trees which grow far from villages do not have owners. These trees are sometime felled when harvesting the fruit. The Forestry Service has instructed rural people not to cut the trees in harvesting because the trees are important in preserving the quality of water resources.

Recommendations: The conservation of sugar palm trees along water courses is important for environmental protection. Local people need training in conservation techniques and marketing.

Yang Bong bark

The Yang bong tree (*Nothalphoebe umbelliflora*) grows 15 to 20 metres in height. Its viscous bark contains laurotetanine, a toxic alkaloid. The bark is used in the production of joss sticks and insect repellent coils. The tree is usually cut before the bark is peeled off the trunk. In 1993, 90 tonnes were exported to Thailand. In 1994, exports of 100 tonnes are expected. The price currently paid to the collectors is US\$ 0.15 per kilogramme of dry weight. At present, forestry services are trying to introduce a more sustainable system of harvesting in order to conserve the forest resources.

Puak ko Bark

Puak ko (*Quercus poilanei*) grows in mixed forests at an elevation of 600-1000 metres above sea level. Puak ko grows throughout the country, but is most plentiful in the north where rural people harvest the bark.

Fifty tons of bark are exported annually to Singapore and India. The bark is used locally for chewing with betel and lime.

Abroad, the bark is used in pharmaceutical products and in the tanning industry. The price paid to the collector for dry bark is US\$ 0.25 per kilogramme. An average of 40 kilogrammes of bark is harvested per tree. The tree will survive, if the tree is left standing, only one third of the bark is removed, and the bottom one metre of bark is not touched.

CONCLUSION

In the past, the most important NWFPs in Lao PDR were benzoin, cardamon and rattan, but nowadays markets for these

products have declined because rural people lack information on production, processing and marketing. In rural areas, people rely on NWFPs to augment their income from farming, but they lack experience in processing NWFPs (drying, milling, canning). Mushrooms, bamboo shoots and other agricultural products such as chilies, garlic, and cashew nuts are often produced in surplus quantities, while at the same time more and more processed products are imported from Thailand, Vietnam, and China. As a result, support needs to be provided for local efforts in cultivation, harvesting, storage and processing.

Some major NWFPs and their applications in Lao PDR			
	Subsistence	Market (local)	Market (export)
Benzoin (<i>Styrax tonkinensis</i>)	-	-	++
Bamboo	++	+	-
Bark of cassia (<i>Cinnamomum cassia</i>)	-	+	+
Bark of <i>Nothaphoebe umbelliflora</i>	-	+	++
Bark of <i>Quercus poilanei</i>	-	-	++
Cardamom (<i>Amomum</i> spp)	-	+	++
Damar (<i>Dipterocarpus</i> spp)	+	-	++
Eagle wood (<i>Aquilaria crassna</i>)	-	-	++
Fruit of sugar plum palm (<i>Arenga pinnata</i>)	+	+	++
Game	++	+	-
Honey	++	+	-
Malva nuts (<i>Sterculia lychnophora</i>)	+	+	++
Medical plants and spices	++	++	++
Pine resin	-	+	++
Sticklac (<i>Laccifera lacca</i>)	-	-	+
Vegetable, mushrooms, tubers	++	+	-

- not important

+ important

++ very important

Commercial rattan species in Laos		
Local name	Latin name	Diameter (mm)
Large diameter:		
Wai Thoon	<i>Calamus</i> sp.	20-40
Wai Tabong	<i>C. rudentum</i>	20-40
Wai Deang	<i>Korthansia laciniosa</i>	20-40
Wai Buun	<i>Daemonorops shmidtii</i>	10-40
Wai Taleuk	<i>Plectocomia pierreana</i>	20-40
Small diameter:		
Wai Thor	<i>Calamus pandanosmus</i>	10-15
Wai Suum	<i>C. sp.</i>	10-15
Wai Hang-noo	<i>C. javensis</i>	5-10

* In Laotiane " Wai" = Rattan

Major bamboo species used in Lao PDR			
Local name	Latin name	Important	Very important
May Hok wane	<i>Dendrocalamus asper</i>		X
May Hok	<i>D. hamintonii</i>	X	
May Phang	<i>D. lonoifimbriatus</i>		X
May Phay bane	<i>Bambusa blumeana</i>	X	
May Damkhuon	<i>B. nana</i>	X	
May Sang phay	<i>B. nana</i>		X
May Hia	<i>B. cephalostachyum virgatum</i>		X



A wide variety of rattan products is sold in the Vientiane, Laos, market.

NON-WOOD FOREST PRODUCTS IN MYANMAR

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The Union of Myanmar remains well endowed with forests and vegetation cover. About half of the total land area (676,777 square kilometers) is covered with forests. These are public forests and are classified either as Reserved Forests or Unclassed Forests. Table 1 summarises the distribution of forests and other land uses in Myanmar. Although the Reserved Forests have legal protection, the government allows rural communities to use the products of Unclassed Forests, except for certain protected plant and animal species.

Land Use	Area	
	(Million hectares)	(percent of total area)
Forests		
Reserved	10.20	15
Unclassed	23.70	35
Agriculture		
Cultivated area	8.00	12
Fallow land	2.10	3
Additional arable land	8.40	12
Other land	15.30	23
Total country area	67.70	100

In Myanmar, forest products are generally divided into commercial and minor forest produce. Minor forest produce is defined as "all kinds of forest produce other than timber and firewood." This includes animals, vegetables, and mineral products.

THE ROLE OF NON-WOOD FOREST PRODUCTS IN MYANMAR

For rural communities, NWFPs are probably more important than timber or other forest products. They depend on NWFPs for subsistence and for trade. The Forest Department counts the following NWFPs for trade purposes: bamboo, cane (rattan), catch, tanning bark, shaw (bast), karamet, indwe/pwenyet, thanatkha, hpala, kanyin oil, roofing materials, te, honey, beeswax, bat guano, thitsi, edible birds' nests, lac, orchids, bomayaza, and pine resin. Recent annual production figures for these products are given in table 2.

Myanmar's NWFPs can be divided into 13 groups according to their nature and uses:

1. Bamboo
2. Cane (rattan)
3. Tanning bark
4. *Shaw* (bast)
5. Scented wood and bark
6. Gum, resin and oleo-resin
7. Spice
8. Roofing material

Product	Units	1992/93	1993/94	1994/95 (provisional)
Bamboo	culms	157,283	153,140	153,620
Cane	pieces	64,997	65,860	62,790
Cutch	kg	271,800	189,750	198,479
Tanning bark	kg	812,250	896,700	903,150
Shaw (Bast)	kg	73,950	73,350	105,000
Karamet	kg	55,500	22,500	24,000
Indwe/Pwenyet	kg	650,030	876,875	929,925
Thanatkha	kg	438,750	439,500	442,050
Hpala	kg	9,225	7,920	7,950
Kanyin oil	kg	7,650	9,150	9,900
Roofing material	pieces	92,596	95,165	104,884
Te	kg	18,000	18,000	10,500
Honey	kg	35,800	36,400	28,710
Beeswax	kg	2,198	2,018	2,018
Bat guano	kg	232,575	234,300	265,650
Edible birds' nests	kg	923	923	1,740
Lac	kg	50,700	227,700	228,900
Orchids	number	32,500	19,500	30,000
Bomayaza	kg	7,650	7,050	9,000
Thitsi	kg	40,200	34,650	48,000
Pine resin	kg	579,750	522,000	385,800

Source: Forest Department, Myanmar.

9. Dyeing material

10. Animal products

11. Medicinal plants

12. Edible products

13. Other miscellaneous products

Bamboo

Bamboos are the most important NWFPs in Myanmar. About 100 species grow in large quantities throughout the country. They major construction materials, particularly in rural areas, and can be used for almost all parts of houses, including posts, roofs, walls, floors, beams, trusses, and fences.

People also use bamboo to make mats, baskets, tool handles, hats, traditional toys, musical instruments, umbrellas, and furniture. In addition, bamboo shoots are edible and pickled-bamboo shoots are becoming very popular. As an industrial raw material, bamboo is commonly used in Myanmar by pulp and paper mills.

The most common bamboo species in Myanmar are kyathaung (*Bambusa polymorpha*), tin (*Cephalostachyum pergracile*), myin (*Dendrocalmus strictus*), kayin (*Melocanna bambusoides*), thana (*Thyrsostachys oliveri*), thaik (*Bambusa tulda*), wabo (*Dendrocolmus brandisii*), wabo-myetsangye (*D. hamiltoni*), waphyu

(*D.membranaceus*), and wagok (*Oxytenanthera albo-ciliata*).

Canes or rattans

About 36 species of canes or rattans grow in swampy areas of semi-evergreen and evergreen forests in Myanmar. The commonly used species are kyet-u-kyein (*Calamus platyspathus*), yamata-kyein (*C. latifolius*), kabaung-kyein (*C. longisetus*), ye-kyein (*C. floribundus*), kyein-bok (*C. myrianthus*), and thaing-kyein (*C. erectus*).

Canes are used in log-rafting as binding materials, and in small-scale enterprises which produce furniture, baskets, handicrafts, mats, etc. Raw canes and finished products have been exported since Myanmar changed to a market economy. This should produce more employment opportunities in collecting, processing and trading canes. However, poor knowledge and technology in processing, and limited experience in trading, mean that most canes are exported unprocessed at lower prices.

Tanning barks

Myanmar forests contain many tree species yielding tanning barks. Ngushwe (*Cassia fistula*), tanaung (*Acacia leucophloea*) and some mangrove species of the family *Rhizophoraceae* are the most important ones used for leather tanning. With the recent expansion of the leather industry, there is great demand for tanning barks.

Shaw (bast)

The people of Myanmar have traditionally used the shaw (bast) of some plants for tying materials. Although urban people now use synthetic rope, rural people still use traditional plant fibres. Ropes made of the

fibre bast collected in the forests are essential for domestic and farming activities in rural areas. Myanmar's famous traditional mats, called "thinbyu," are woven with the bast of thin (*Clinogyne dichotoma*). As a by-product, its inner portions can be used as string. The families *Sterculiaceae* and *Tiliaceae* include good fibre-yielding plants which grow widely in Myanmar. The most important species for rope-making are shaw-ni (*Sterculia villosa*), shaw-gulu (*S. urens*), letpan-shaw (*S. foetida*), don-shaw (*S. ornata*) and tayaw (*Grewia* spp.).

Scented woods and barks

Scented woods, including karamet (*Mansonia gagei*), nanthani (*Pterocarpus santalinus*), santagu (*Santalum album*), taungtan-gyi (*Premna integrifolia*), and thit-hmwe (*Aquilaria agallocha*), are used in fragrances, scented sticks and medicines. These species are rare in natural forests and consequently very expensive.

The bark and wood of thanatkha (*Hesperethusa caenulata*) are yellowish and scented. They are the most popular traditional cosmetics in Myanmar and are a very important part of Myanmar culture. Because of increasing cosmetics manufacturing, thanatkha is in great demand and prices are high.

Gums, resins and oleo-resins

Gums, resins and oleo-resins are exuded products obtained from some of Myanmar's forest trees. The collection and processing of these products provide employment, additional income and traditional household items for the rural people. The most common species which yield these products are discussed below.

Thitsi (Melanorrhoea usitata)

These trees grow in dry dipterocarp forests and yield a black resin called “thitsi,” which is useful for lacquer work, coating surfaces that are to be gilded, coating baskets and bamboo sieves, caulking boats and varnishing.

Pines (Pinus spp.)

Myanmar has two notable native pine species (*Pinus kesiya* and *P. merkusii*). A distillation plant in Chin State uses their resins to produce rosin and turpentine, which are used in making polish, paints and medicines.

Kanyin (Dipterocarpus alatus and D. tubinatus)

Kanyin can be tapped for a kind of wood oil (oleo-resin) which rural people use for making torches, caulking boats and preserving woods. It is also a raw material for manufacturing paint, varnish and medicines.

Subyu (Acacia arabica)

The gum of subyu trees is similar to gum arabic. People collect the gum during hot weather and use it in indigenous medicines, food, dyeing and painting cloth.

Spices

In Myanmar, people usually enjoy their meals with rice and a variety of curries. Therefore, spices are essential in Myanmar’s kitchens and culture. The forests provide many spices, not only for domestic use, but also for export. Some important species include:

- Hpala (cardamons) (*Elettaria cardamomum*).
- Ngayok-kaung (black pepper) (*Piper nigrum*)
- Peikchin (long pepper) (*P. longum*)
- Karawe (*Cinnamomum* spp.)

Roofing materials

One of the most important NWFPs is roofing thatch made of leaves. A variety of roofing materials is available in the forests. Common roofing materials are thetke (*Imperata cylindrica*), dani (*Nypa fruticans*), salu (*Licuala peltata*), in (*Dipterocarpus tuberculatus*) and taunghtan (*Livistona* spp.). The collection, processing and trading of these materials are generally part-time, income-producing activities for rural people.

Dyeing materials

Many natural dye-yielding plants grow in Myanmar’s forests. Although synthetic dyes have been introduced in the textile industry to replace these natural dyes, the rural people still use them for certain purposes. The most important dye-yielding plant species are:

- Meyaing (*Indigofera* spp.): grows throughout Myanmar and is most popular for dyeing fabrics black. It is especially used in cottage textile industries in the Yaw region.
- Pauk (*Butea monosperma*): flowers are used to dye fabrics yellow, orange and red.

- Megyi (*Strobilanthes flaccidifolius*): a shrub which yields blue dye; grows in Upper Myanmar.
- Pein-ne (*Artocarpus heterophyllus*): bark is famous for dyeing Buddhist monks' robes.
- Nibase (*Morinda* spp.): roots produce good red and yellow dyes; common in the dry zones.
- Tein-nyet (*Caesalpinia sappan*): wood yields a well-known red dye; quite valuable.
- Te (*Diospyros burmanica*), common, medium-sized tree which grows in central Myanmar; dye from its fruits is used for dyeing traditional umbrellas and fishing nets.

Animal products

Myanmar's forests have a variety of wildlife including birds, mammals, reptiles, amphibians, fish and insects. The rural people hunt them for food and to earn extra cash. Such animals are their major protein supplement. The animals also provide many valuable trade products, such as lac, edible birds' nests, honey and beeswax, bat guano, hides, bones and horn.

Lac

Lac is a resinous substance secreted by lac insects (*Kerria lacca*). It is used in the manufacture of shellac, polish and varnish, electrical goods, printing inks, sealing wax, dyes, cosmetics and medicine. The quality of lac depends on the species of host tree. The best host trees in Myanmar are pauk (*Butea monosperma*), gyo (*Schleichera oleosa*), zi (*Zizyphus jujuba*), thinbaw-koko

(*Samanea saman*) and ingyin (*Shorea siamensis*).

Edible birds' nests

These nests are composed of a white gelatinous substance secreted by the salivary glands of the grey rumped swiftlet (*Collocalia inexpectata*). They are obtained from natural caves in the Myeik archipelago and on some islands off the Patheingyi coast. They are very precious and used in indigenous Chinese tonics. The nests are collected only by licensed traders under control of the Forest Department. They produce good foreign exchange earnings.

Wild honey and beeswax

Harvesting honey from natural bee-hives in the forests is profitable for rural people. People prefer wild honey to the honey from the hives of bee-keepers. It is used for preparing food stuffs and in Myanmar's indigenous medicines. Two of the commonest honey-bees in Myanmar, *Apis indica* and *A. dorsata*, are found throughout Myanmar.

Bat guano

In rocky, mountainous areas of Myanmar, large quantities of bats live together in natural caves. Their guano is collected and used as a natural fertilizer, which can give high crop yields at low costs.

Hides, bones, horns, etc.

Rural people make good money selling products such as hide, bones and horns from forests animals. The hides of some animals are in great demand for the leather industry. Bones and horns are used for handicraft production and to decorate living rooms.

According to their customs and beliefs, some tribes keep and wear some parts of the bones, horns and hides.

Medicinal plants

Most rural people use traditional indigenous medicines made from a variety of medicinal plants. The indigenous medicines are cheap and efficient in curing some diseases. Today, the Myanmar Medical Research Department and the pharmaceutical industry have upgraded various indigenous medicines, resulting in a high demand for medicinal plants to use as raw materials. Some prominent medicinal plants from Myanmar's forests are bomayaza (*Rauwolfia serpentina*), subyu (*Acacia arabica*), hnaw (*Adina cordifolia*), banbwe (*Careya arborea*), zibyu (*Emblica officinalis*), nalingyaw (*Litsaea lancifolia*), ondon (*L. glutinosa*), tau-shauk (*Citrus medica*) and pwegaing (*Cassia angustifolia*).

Edible plant products

Most rural dwellers who live near forests rely on edible plant products, such as buds, leaves, flowers, fruits, tubers, corms and shoots that are obtained in the forests. Edible mushrooms and fungi are a seasonal food of the forests. Forest foods provide nutrients and cash income for rural people.

Other miscellaneous forest products

Other NWFPs available in the forests of Myanmar include *indwe/pwenyet*, orchids, cutch and others.

Indwe/pwenyet

Indwe is a product of in (*Dipterocarpus tuberculatus*), *ingyin* (*Shorea siamensis*)

and *thitya* (*S. oblongifolia*), which all grow widely in *indaing* (dry dipterocarp) forests. *Pwenyet* is a kind of dammar, produced by small stingless bees of the genus *Melipona*. Both these products are used for caulking boats and water containers. They are essential for people living in delta areas and along rivers. Rural people earn money by collecting these products in their spare time.

Orchids

About 840 species of orchids have been identified and can be collected throughout Myanmar. Some well-known orchids are highly valuable and are exported to earn foreign exchange.

Cutch

Cutch is a water extract from the heartwood of *sha* (*Acacia catechu*), which grows in dry areas of Myanmar. It is used as a dye and a preservative for fishing nets and canvas. The people enjoy chewing betel with *katha*, which is separated from cutch. Cutch also contains tannic acid and can be used as a tannin.

DISCUSSION AND CONCLUSION

NWFPs, were not previously considered to be as important as wood products, although NWFPs have produced good export earnings in Myanmar's recent past (see table 3). Although they contribute revenue to the country and also provide income-generation opportunities for forest dwellers, they have had a low economic profile.

Table 3. Recent export quantities of selected NWFPs.

Product	Units	1992/93	1993/94	Jan-Aug, 1994
Bamboo	culms	189,168	37,166	98,500
Bamboos (split)	bundles	20,200	-	-
Bamboos (peels)	bundles	415,000	-	-
Canes	pieces	2,681,404	856,415	526,033
Thitgyabo	kg	2,570,124	298,450	135,486
Cutch	kg	172,413	217,145	116,582
Nanthaphyu	kg	22,446	5,742	-
Lac	kg	-	23	-
Edible birds' nest	kg	-	1,418	608
Ondon bark	kg	-	13,770	22,410
Thitsi	kg	470	2,343	-
Indwe	kg	-	64,500	191,481
Orchid	number	30	47	-
Taungnangyi	kg	-	474	-
Karamet	kg	7,500	-	-
Pine rosin	kg	-	-	18,375
Kinpwin-thi	kg	-	-	9,000

Source: Forest Department, Yangon Division.

The major impediment to the greater exploitation of NWFPs may be a lack of knowledge of their value. For example, although bamboo is normally treated as "poor man's timber," it is now generating export earnings for the country. With the scarcity of raw materials for pulp and paper factories in neighbouring countries, the future of bamboo as a raw material for making paper and rayon is very promising. Since the rural poor have easy access to bamboo forests, the development of the industry could provide them with additional employment opportunities in cutting, collecting, and processing bamboo.

Likewise, rattan is an important foreign exchange earner today. However, rattan has generally been exported as a raw material or as semi-finished products. This is nationally less beneficial than exporting higher value-added products. With suitable training in processing and treatment, cottage

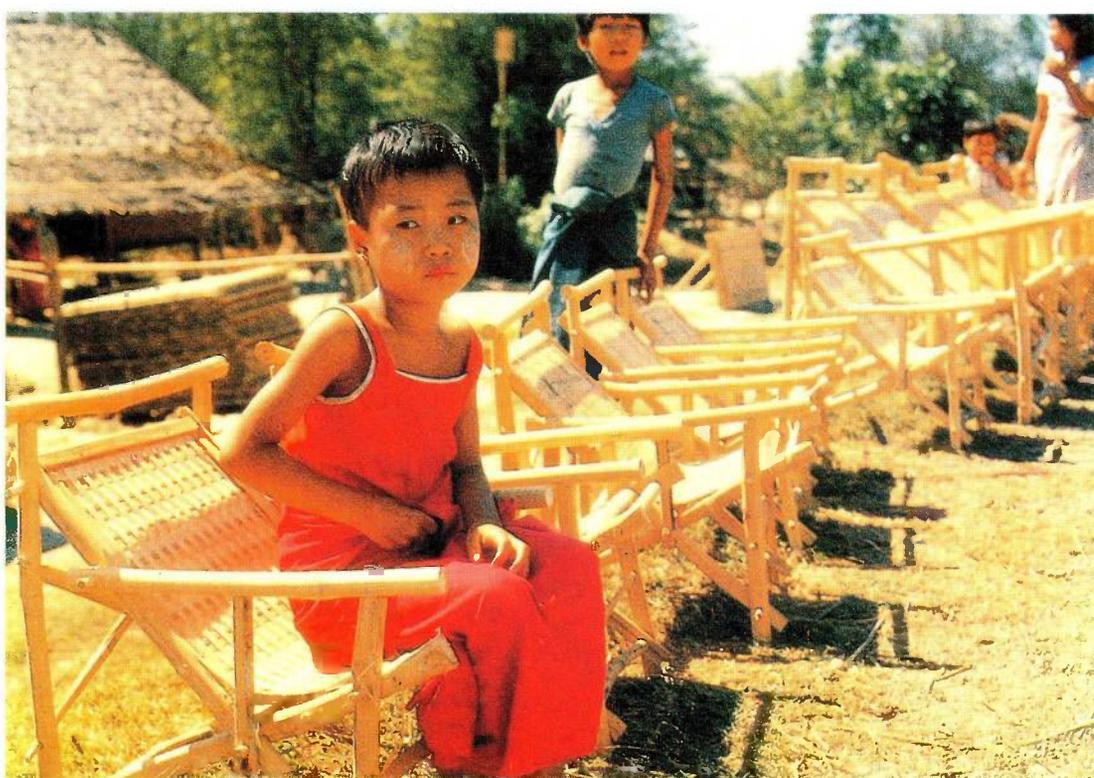
industries could be promoted which would provide job opportunities for the rural poor and improve their social well-being.

These examples show that there is ample incentive to improve the development and use of NWFPs in Myanmar. This can be accomplished by training rural communities to produce forest products of higher value, thereby generating job opportunities and better incomes.

Thus, the Forest Department is currently engaged in rural development through community participation for the socio-economic well-being of rural communities. Satisfactory results achieved from the pilot Kinda Dam project (a rural development and conservation project), will encourage the extension of similar projects into dry and delta areas.

New processing techniques and market promotion are essential for the development of NWFPs in Myanmar. The Forest Research Institute and the Institute of Forestry will participate in research promoting the use of NWFPs, either locally or jointly with interested agencies in the Asia-Pacific Region. Acquiring up-to-date text-books, periodicals, well-equipped

laboratories, and adequate budget allocations are extremely important for the success of these research studies. Strengthening the two institutions through external funding agencies is necessary to promote NWFPs, rural community development and forest conservation, all of which will help improve the well-being of the rural poor.



Bamboo furniture is a popular product of central Myanmar.

Cultural Dimensions

A CULTURAL APPROACH TO NATURAL RESOURCE MANAGEMENT: A CASE STUDY FROM EASTERN NEPAL

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INTRODUCTION

Forest resources are an important source of subsistence in traditional farming systems, with farmers relying on the forests for numerous needs. This is especially evident in south Asia, where the rural poor depend most heavily on non-timber forest products (NTFPs) for their subsistence, perhaps more than in other parts of the world (Blockhus, 1994). Forests and grasslands are now recognised to be the "support lands" on which farming systems depend.

Forested land tends to be undervalued in traditional economics. The prices put on forests resources are often equated with market prices, rather than their value in use. But many products are consumed locally and may never enter the market. In addition, the conservation value of NTFPs covers many indirect as well as direct uses. Soil protection, nutrient cycling, biodiversity maintenance, tourism and recreation are just a few examples.

Subsistence farmers, even in remote areas in the Himalayan region, are increasingly feeling the need for sources of cash income to purchase household items, cloth, improved seeds, etc., and to pay for services such as school fees. These requirements arise from both changing social aspirations and natural resource scarcities. In their search for cash, farmers naturally turn to the exploitation of NTFPs, bringing about a shift from their primary use in subsistence

consumption to their sale in market towns as commercial products. The sustainable management of natural resources and the political economy of market relations, therefore, become issues of increasing concern.

To address simultaneously the needs for sustainable management of the NTFP resources and farmers' cash requirements, innovative approaches are necessary. Such approaches must be based on an understanding of local people's existing knowledge and practices related to forest resource use and management. Indigenous knowledge should include not only the technical knowledge of natural resource use, but also the environmental perceptions that determine such usage. Cultural factors play a key role in affecting people's actions, and need to be understood by development planners interventions.

One action research project undertaken by a non-governmental organization (NGO) in Nepal with the support of the International Centre for Integrated Mountain Development (ICIMOD), has combined research on culture and technical knowledge with agroforestry activities to develop such an approach. The process has focused on the participation of local residents at every step, employing the Participatory Action Research (PAR) framework to encourage the empowerment of residents of a remote eastern Himalayan community in Nepal.

This initiative is presented here as a case study.

CULTURAL APPROACHES AND METHODOLOGIES

Indigenous knowledge

Indigenous knowledge is knowledge linked to a specific place, culture or society, dynamic in nature, belonging to groups of people who live in close contact with natural systems. Knowledge of their physical environment is embedded in epistemologies and belief systems, usually naturalistic and radically different from those of scientific systems. The spiritual beliefs, cosmologies and world views are therefore a vital part of the whole system which must be understood by outsiders attempting to understand the ways in which ethnic groups have managed their environments.

Research on such systems of knowledge reveals that communities possess a great deal of knowledge about their environments and how to manipulate them to best meet their needs (Brokensha et al., 1980; Richards, 1985; Chambers et al., 1989). It is important to understand that this knowledge is not only a function of utility, but it is also an intellectual process that creates order out of disorder (Berlin, 1978; Howes, 1980). The principles of classification of the natural environment reveal this "ordering principle." Its importance goes beyond the intellectual in that such principles are the basis for utility behavior. It suggests that environmental behavior is not a random process that is utility based but rather is ordered and constructed based on culture. Hence, the importance of understanding the

whole knowledge system as a pre-condition for initiating activities related to NTFPs.

Participatory Action Research

The methods of Participatory Action Research (PAR) are most useful in the elicitation of knowledge related to indigenous systems of management and use of natural resources. Local community members and outsiders comprise the team, which aims to empower participants as well as collect data. It is a method of community-based learning and assessment which allows participants to critically analyse their situations and devise solutions to problems.

The very process of collecting information requires local people to reflect on their knowledge and identity vis-a-vis outsiders. Their daily practices, symbols, cultural norms and knowledge may take on new dimensions as they are validated by outsiders. Reflection on their own knowledge can enhance an indigenous community's pride in their own ethnicity. The sense of legitimacy bestowed upon their own knowledge can help empower communities, support their efforts to resist unwelcome outside interventions, and encourage them to play more active roles in determining their own future.

Local organisations and cultural revival

An important element in empowering local people to take control of change in their local environment is the presence of autonomous, participatory people's organisations. Where already existing, local formal organisations or informal groups of people are the best nodal points for project activities, especially to ensure the continuity of project initiatives and benefits beyond the

project duration. Such groups, however, usually require strengthening, through training in leadership, organizational management and technical skills. They also need to be linked to other outside individuals and institutions which can provide advice, funding, and materials.

Even in the remote northern area of Nepal, symbols and forms of the Western, industrialised world are creeping into traditional societies, devaluing and undermining systems of adaptation to the natural world which have sustained rural communities for generations. The loss or disappearance of cultural symbols and indigenous knowledge, particularly from ethnic minority tribes or groups, is rapidly occurring due to the intrusion of state and market forces, and the passing on of elders possessing that knowledge. Once lost, oral-based knowledge cannot be retrieved.

Emphasizing traditional knowledge, cultural traditions, languages and other forms of cultural expression, can help a community to reclaim a common consciousness and identity - and communal dignity - vital to successful community development. Community strengthening boosts the ability to resist the imposition of unwanted outside influences, which may be inappropriate to their cultures and uses of the environment.

In the case of NTFPs, such organisations can act as cooperatives to bring a greater share of the profits back to the original harvesters of the products, perhaps through the management of processing activities to add value to the raw product for its direct sale in markets. Members of community organisations themselves could replace private middlemen by marketing the products in towns and market centres directly linked to NTFP buyers.

A CASE STUDY IN EASTERN NEPAL

Background

In response to an urgent need to protect fragile zones from environmental degradation, and with an eye to the tourism market, vast areas of land have been set aside as protected zones in the eastern Himalayas. One such area is the Makalu Barun National Park and Conservation Area (MBCP) in eastern Nepal, which contains settlements of villagers who affect the condition of protected plants and animals within the park. In collaboration with the Woodlands Mountain Institute (USA) and the Department of Parks and Wildlife (His Majesty's Government of Nepal), the MBCP was set up to protect park resources and assist in the development of villagers residing in the buffer areas.

In October 1991, ICIMOD was awarded a three year grant by the MacArthur Foundation to implement an innovative project for the development of an alternative approach to the conservation of parks and protected areas in the Eastern Himalayan region. In order to implement the project, ICIMOD selected an institution (SAGUN, a Nepali NGO) which had the capability to conduct research on indigenous knowledge, provide training in agroforestry practices and organisational management, and collaborate with agencies given authority over the management of protected areas.

The area selected for the project was the Tamku Village Development Community (elevation 2400 m.) within the Makalu Barun National Park and Conservation Area, Sankhuwasabha District, Nepal. The site falls in the Koshi Hill Zone in eastern Nepal, which forms part of the larger Arun

Basin ecosystem. In general, the Zone lies above 2500 meters, with very fragile, high relief. Over 73 percent of the land has a slope of 40 degrees or above. The area falls in the monsoon belt of the eastern Himalayas, beginning with the pre-monsoon rains in April and May, and lasting well into late September. Annual rainfall in the Arun Basin ranges from 1,783 millimeters to 3,758 millimeters.

The bio-climatic zones in the Arun River Basin range from tropical to alpine, with the tropical to temperate zone (1000 meters-3000 meters) having the heaviest human population. The vegetation in these zones can be described as tropical, subtropical and temperate, and even though the area is densely populated, it exhibits a very high degree of plant diversity (Shrestha, 1989).

Tamku is populated by a group of people called the Rai. They are a distinct ethnic group, and physically, linguistically and to some extent culturally, they are said to be related to the large Mongoloid population of Tibeto-Burman speaking tribal peoples that spread eastward through the sub-Himalayan region and the hills of Assam in northeast India (McDougal, 1979). The Rai themselves are a heterogeneous ethnic unit which consists of numerous smaller groups with distinct languages and varying cultural traditions. The Mewahang represent one such subtribe and they are the majority inhabitants in the Tamku Village Development Community.

INDIGENOUS KNOWLEDGE: PERCEPTIONS OF THE ENVIRONMENT

Perceptions of the environment act as powerful cultural "models" of reality that

determine people's behavior within the environment. Humans base their decisions on the environment as they perceive it, not as it is (Brookfield, 1969), and the information of the natural world is coded in the culture and situated in the social context (Diener, Nonini and Robkin, 1980).

The Origin Myth of the Rai serves as a cultural "model" of the environment, serving as a context for both meaningful and appropriate behavior within the environment. Such a "model" allows the Rai to order the incomprehensible mass of information from nature, and acts as an interpretive "filter" through which behavior in the environment is made rational (Rappaport, 1968).

The myth recounts the origin, differentiation, migration and creative deeds of the ancestors, starting from the very beginning of the world and continuing with the establishment of the traditional order and leading to the roots of the present conditions. The Origin Myth anticipates culture, as the creation of nature unfolds in utilitarian categories of classification. It acts as a prelude to classifications of the empirical environment which forms the basis for ecological behaviour.

The myth also reveals the clan geography (Ca:ri) that is at once mythical and real, thus serving as the basis for behavioral options within such a territory. The "model" of reality that is the myth, empirical nature and culture, evolves through a dialectical fashion; each defining the other through the borrowed authority of the other. And in this fashion, action that results from culturally determined perceptions of the environment are at once functional as well as meaningful.

The "model" is made socially functional through rituals and decision making. Rituals

serve to symbolically display the range of behavioral options within the cultural framework through a series of agrarian rites and ritual dances, while decision making determines the actual behavior within the environment.

THE ORIGIN MYTH

The myth is divided into four parts. The first part deals with the creation of the natural world through an act of creative contemplation by the Creator, Oesechaap. What emerges is a system for classifying nature that is pointedly utilitarian. Animals and plants are created along with the first human in a system that is categorized according to utilitarian principles; animals are grouped in ritual and non-ritual categories, and plants are categorized under those that were immaculately conceived and those born from ordinary circumstances.

The second part of the myth deals with the emergence of the cultural hero who is responsible for the beginning of the domestication of nature. Through a series of symbolic interventions, he begins to practice agriculture, marries and builds himself a house. A feast that he holds in commemoration to the building of the house marks the cultural achievement and is the symbol of the passage from "nature" to culture.

The third part of the myth recounts the journey of the ancestors from the south into the mountains of eastern Nepal. The mythical recounting of the journey symbolises the boundary of ancestral land and such a mythical description sets the context for spatial cognition of land amongst the Rai.

The fourth part recounts "locality myths," and is comprised of ancestral deeds. It recounts how each of the clans settled in their present places in a series of deeds by the clan ancestor. In many instances they include fighting and outwitting local chieftans or demons that inhabited the land before them.

CLASSIFICATION OF NATURAL RESOURCES

The natural environment is organised into discrete mental principles that constitute the basis for behavior within the environment. Such organizing principles form an important source of knowledge and its activation into behavioral patterns constitute an important link into understanding resource use amongst the Rai.

Natural resources are classified according to several cognitive criteria. In the cultural "model" of the myth, nature is created in two phases. In the first act of creation, a total of 73 animals are categorised into ritual and non-ritual species, and then into those that are arboreal and those that are terrestrial. In the second act of creation, nature is further divided into the plant and animal kingdoms.

The cultural model acts as a precursor for the classification principles that the Rai have developed as a result of close association with the natural environment. At the highest level of the taxonomy, plants are identified and named according to uses, thus making it a functional classification. However, the Rais' knowledge of plants exceeds just utility functions as the morphological taxonomy reveals detailed

principles of classification based on physical traits.

The Rai use and identify over 250 species of plants (Botanical names are provided in table 1). Over 86 plants are identified as fodder species. Tree species such as badahar, dudilo, siris, koiralo, tanki, khaneu, sil timbur and lapsi are among the more common fodder species that provide continual supplies of biomass for livestock. Among the grasses are napier and abhijhalo. Fodder species are selected according to the following criteria: they should be easy to propagate on farmland; once propagated they should not harm other crops; they should be palatable for the livestock, milk producing, and provide large quantities of fodder; they should also be available during the dry season and able to be harvested frequently; they should be long lasting, and have multi-purpose uses.

Forty-one types of fruits, vegetables, condiments and tuber crops are collected seasonally from the forest. Such foods serve as vital nutritive supplements during times of shortage, called "anikal," that sometimes last from March to July. Foods such as rukh katar, kali ningro, latey, tarul, naspati and aru serve as vegetables or condiments that are eaten as supplements or pickled for storage. Oil is extracted from amphe, cheuri and siltimbur.

A variety of medicines are extracted from plants like abijalo for treating pneumonia, angeri for scabies, bhunware phool for eye infections, titepate for nose bleeds, chiraito for fevers, harjordne, aank, and haatipaile for sprains, and siltimbur for indigestion. About 20 plants are identified as having medicinal properties.

Religious rituals conducted by the shaman or priest require such plants as bans, jhaankri kaat, kaulo, musure katus, phaledo, ghungring, titepate, chabro, pangra, amliso, dubho, sawami, and puelijhaar.

Other uses for plants include soap made from patle siris, pangra, rato siris and gunhe siris; cloth is made from allo; paper made from lokta and argali; dye is made from tanki and majitho; poison for fishing and pest control is made from khirau and mahuwa; ropes are made from mahuwa and udalo; and agricultural equipment is made from singaane bans.

The knowledge of plants extends beyond utility functions as plants are also classified according to morphological principles, including rukh (trees), jhadi (small type of bush), lahara (vines), ghaans (fodder grass), jhaar (any form of wild grass) and pothra (bush like tree).

Further classification reveals detailed knowledge of species. Trees, for instance, are distinguished by criteria such as height, altitudinal location, canopy area, leaf size and texture, and fruiting patterns.

RITUAL AND DECISION MAKING

The ecology of ritual

Ritual amongst the Rai serves to place the Origin myth in a social context. In doing so, it activates the "model of reality" and assimilates nature into itself" (Douglas, 1972). All rituals are conducted by ritual specialists of which there are three: the clan elder (Purkha), the priest (Nokchung), and the shaman (Bijuwa).

Table 1: Botanical names of local species	
Local name	Botanical name
Bahadur	<i>Artocarpus lakoocha</i>
Dudhilo	<i>Ficus nemoralis</i>
Siris (Patke)	<i>Albizia julibrissin</i>
Siris (Rato)	<i>Albizia mollis</i>
Siris (Guhe)	<i>Albizia lebek</i>
Koiralo	<i>Bacrhinia uariegata</i>
Taki	<i>Bauhinia purpurea</i>
Khaniu (Rani)	<i>Ficus</i> spp.
khaniu (Khasre)	<i>Ficus</i> spp.
Siltimbur	<i>Litsea cubeba</i>
Lapsi	<i>Choerospondias axillaris</i>
Abijalo	<i>Drymeria cordata</i>
Rukha - Katahar	<i>Artocarpus heterophyllus</i>
Kali Nigro	<i>Dryoathyriom boryanum</i>
Latye Sog	<i>Amaranthus uiridis</i>
Tarul	<i>Dioscorea alata</i>
Nospati	<i>Pyrus communis</i>
Aru	<i>Prunus persica</i>
Amphée	<i>Pyrularia edulis</i>
Chiuri	<i>Bassia butyracea</i>
Angeri	<i>Pieris onalifolia</i>
Bhuware Phool (Bhamare Phool)	<i>Desmondiom floribundium</i>
Titepati	<i>Artemisia uulgaris</i>
Chiraito	<i>Swertia angustifolia</i>
Harjorni(unue)	<i>Polypodium amoenum</i>
Ank	<i>Calotropis gigantea</i>
Majitho	<i>Rubia manjith</i>
Mahuwa	<i>Bassia latifolia</i>
Hatipaile	<i>Eulophia campestris</i>
Bans	<i>Dendracalamus</i>
Jhakri Kath	<i>Actinodophne angustifolia</i>
Kaulo	<i>Machilus odoratissima</i>
Musure Katus	<i>Castanopsis tribuloides</i>
Phalaydo	<i>Erythrina arborescens</i>
Pangra	<i>Entada scandens</i>
Amliso	<i>Thysanolaena maxima</i>
Dhubo	<i>Cynodon dactylon</i>
Ghungring	
Chabo	
Swami	
Peuli Jhaar	
Alloue	<i>Girardinia diversifolia</i>
Lopta	<i>Paphre</i> spp.
Arjeli	
Singane Bans.	<i>Bombox</i> spp.
(Ulado) Phaledo	

Ritual specialists

The clan elder is knowledge holder of the origin myth (Muddum) and officiates as the ultimate source of all knowledge. Both the priest and shaman are directed by the elder. The source of knowledge is most often passed on in dreams, but it is not a pre-condition of his status and he is often present in all ritual events.

The priest officiates in functions that have relevance to agrarian occasions and he performs the Ca:ri puja that marks the onset of spring (Ubhaul). It is believed that the clan deities move north to the summer pastures at this time. This is marked by ceremonies that the community participates in under the guidance of the priest. This season is also marked by ecological indicators such as the movement of wild animals northwards, the sprouting of deciduous plants, the upstream movement of fish in the river and the change in the courtship voice of certain birds that respond hormonally to increased daylight. During fall, the opposite process occurs and is known as Udhaul. Both rituals are conducted by the priest for the welfare of the clan by invoking the benevolence of ancestral deities.

The role of the shaman provides an interesting example of invoking myth to heal illness by putting it in the context of the cosmogenic order. However, in doing so, the shaman also provides, through the ritual journey, a boundary for the clan territory. The journey invokes a real geography, set in the context of mythical geography, and this serves powerfully to lay out a spatial cognition for behavior. It provides a context for numerous behavioral options within which the Rai can carry out their subsistence practices.

Decision making

Surface decisions are the result of "deep structures" or sets of cognitive rules that determine the production of behavior. Such rules are usually coded in the language and criteria of the "natives" and flow primarily from the classification principles that have been applied to arrange the natural environment. In the case of the Rai, management decisions usually flow first from the classification scheme into a decision strategy that eventually gets translated into behavior.

LOCAL ORGANISATIONS AND CULTURAL REVIVAL

Although a variety of grassroots groups, forest users groups, and local NGOs comprise the local formal and informal organisations in Tamku, most are distrusted by local people and suffer from poor leadership, interference from political organisations, lack of transparency of financial accounts, and inadequate linkages to outside organisations or agencies which could offer assistance.

SAGUN developed close relationships and trust with these organisations, then encouraged them to become more involved with development activities. One organisation developed an environmental education program, using songs, street theatre and puppets to promote messages of environmental conservation. They were also assisted to conduct meetings, hold discussions with members, arrive at consensual decisions, and identify activities that could be carried out without external resources. Project staff encouraged them to include women in the decision-making processes, as well as during the implementation phase.

SAGUN members have guided the restructuring of a few local NGOs to improve their organisational capabilities. Grassroots groups regularly receive training and technical assistance from team members on topics related to agroforestry. Five forest users groups have been assisted in developing forest management plans. SAGUN then facilitated the process of handing over forest management authority to the groups from the District Forest Office. A training workshop was conducted for leaders of local organisations on project planning and evaluation, simple accounting techniques, and proposal preparation.

One local NGO has become interested in the revival of the Mewahang Rai cultural traditions, which have eroded over the years. The NGO has formed sub-committees to document the language and script, history and kinship, and religious and cultural traditions of the Mewahang Rai, so that it will not be lost to future generations. Rai culture is encapsulated in the Origin Myth, expressed through ritual dance, which today is known by only a few elderly members of a nearby community. Through the process of cultural revival, community members realised that the Origin Myth provides the core, guiding principle of their identity and culture, which is not subject to change over time or space, and may, therefore, provide cultural stability amidst rapid changes.

CONCLUSIONS

Sustainable management of forest resources, including NTFPs, for both subsistence

needs and marketing possibilities, must begin with an understanding of existing socio-cultural systems. From the experience of this action research project carried out in Tamku, eastern Nepal, several key concepts have emerged as being fundamental to an approach to sustainable natural resource management. These are:

- participation of local community members, including women and elders, is essential in all aspects of implementation: research, planning, and training (Participatory Rural Appraisal (PRA) and Participatory Action Research (PAR) are two methods of achieving this);
- indigenous knowledge systems reflect cultural values as well as technical knowledge held by farmers - hence the great importance in understanding these systems before introducing changes;
- existing local organisations and informal associations must be recognised and strengthened to meet the development needs of the communities;
- culture and its symbols are important to the identity and well-being of the community - cultural revival may be necessary to re-establish traditional knowledge that contributes to a balance between man and nature.

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AMERICAN INDIAN CULTURAL PERSPECTIVES ON NON-WOOD FOREST PRODUCTS IN NORTH AMERICA

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BACKGROUND

American Indians are indigenous people of the United States of America. American Indians include Alaska Natives and American Indians. The Alaska natives include not only Indian people but two other separate indigenous groups found only in Alaska, the Aleuts and the Eskimo. Today the United States Government recognises 547 Indian tribes. The largest tribe is the Navajo Nation whose lands total more than 6 million hectares within the states of Arizona, New Mexico and Utah. Indian tribes own approximately 23 million hectares. Additionally, Alaska Natives have 18 million hectares of land. The 1990 census identified just under two million American Indians. Thus, they are a true minority within their own country.

Indian people greeted the arrival of the English and European people with hospitality and respect, but that changed quickly. The Indian people began to lose population due to warfare, diseases and the incoming immigrants' desire for land. This created conflicts, dislocations, and general imbalance in the relationships that Indian people had with place, land and resources. Many tribes today reside in areas that were not aboriginal and this relocation continues to cause imbalance and disharmony in people's lives.

The dominant culture in the United States today is non-Indian. Many Indian tribes, however, have maintained their culture,

language, ceremonies, beliefs and practices, while others have lost their culture, lifestyles or beliefs.

An important feature of the Indian tribes is that they have a unique relationship with the United States Government. As sovereign governments, recognized by the United States Government, Indian tribes have much to say about the welfare of tribal members and the management or use of tribal lands and resources. There is also a special trust relationship between the Federal Government and the Indian tribes which requires the Federal Government to advocate, protect and preserve the assets of the tribes. Some tribes, in ceding their lands to the United States Government, reserved the right to hunt, fish, gather, place temporary shelters or even graze domestic livestock. In these special situations, the reservation of these rights is law and requires the respective agency to consult with the Indian tribes concerning the exercise of and preservation of their rights. Additionally, some tribes are currently asserting claims to land and the right to undertake certain activities. These claims have yet to be fully resolved.

The circumstances of Alaska Natives are unique. Most native lands are held by Alaska Native corporations which are incorporated by the State of Alaska. These lands are assets of the stockholders (native people) and are the collateral for the

ventures of their corporations. Rural Alaska Natives are entitled to subsistence from the land.

Alaska Natives living in remote rural villages are almost totally dependent upon subsistence activities to feed and clothe their families. A majority of the food consumed by rural natives is gathered through subsistence activities including hunting fishing, berry picking, canning, drying and smoking of fish, collecting and processing of plants, and the manufacturing of art and handicrafts. Without the forests or lands providing these multiple products or values, the rural Alaska Natives would not survive.

AMERICAN INDIAN PHILOSOPHY TOWARD NATURE

Indian people have always had a relationship with place, the land and resources. Indian people generally foster a special relationship with earth as one with "Mother Earth." This means that the Earth nourishes, sustains and provides life for all found upon it. All plants, animals, birds, fish, soil, and water are recognised as interdependent and necessary to sustain life. Indian people also recognise that it is important to respect, love and care for all found upon the Earth so that present and future generations of people will be sustained.

The beliefs and subsequent behaviors of Indian people upon the land, and within the forest, are unique. Traditionally, if some product, plant, or animal were removed from the land for food, clothing or shelter, it was done with prayer as thanks and appreciation to the Creator. It was also done with respect for the matter taken or

removed because Indian people understand the relationship of all life and matter and all that supports life. Conservation was, and is, a practice. If a plant or animal is removed, blessing is made and another item is sometimes left in its place. Thanks is given regularly to the Creator and "Mother Earth" for all life and matter.

American Indians have a history of living in balance and harmony with the ecosystem. There may have been some imbalance and disharmony in Indian history, but it was limited compared to what occurred after colonists began arriving from Europe. The beliefs, behaviors and practices of Indian people, and their low population, sustained balance and harmony within the ecosystem. Indian people were disciplined to behave in ways respectful of all life and respectful of the ways of the tribe, band, clan or people.

In recent times, many Americans have challenged the way public and state forests and are managed. They are championing values other than those which promote the harvest of timber for wood products. These proponents of nature have, in many cases, expressed the values long held by American Indians. Indian people regard the ecosystem, or forest, in a holistic manner. All parts of the ecosystem are to be respected and valued. This philosophy is now also being espoused by many non-native Americans. Additionally, some of the latter are suggesting setting aside areas that possess special attributes. This has been endorsed by the United States Congress and the President. Today, many areas are reserved by public law. For example, there is a national wilderness preservation system and many areas have been classified by law as wilderness areas. These areas are valued for their natural qualities and are to have limited visitor use.

INDIANS' RELATIONSHIP WITH FORESTS

Indigenous people of the world share many values of the forest which go beyond basic economics. American Indian people have a spiritual relationship with the ecosystem or forest. Even though many tribes have been socialised and dominated by western culture, tribal culture and Indian people have survived. There is presently increasing interest and support by Indian people for their culture, language, traditions, values and beliefs. This is being heard and responded to by landowners and public land agencies, and even the President and Congress of the United States. As an example, discussions on the harvesting of northwest timber in Washington, Oregon and California have provided the opportunity for Indian people and Indian tribes to express their values and concerns.

To Indian people, forests provide many forms of life. All these forms of life are interdependent and essential to each another. If one value in the forest is featured over another, the forest becomes unbalanced, and unable to sustain the productivity of other life forms found within the forest.

Forests must also be regarded for their psychological, therapeutic or spiritual values. They have healing and calming effects on the mind and spirit of all life. These assets can be eliminated or destroyed in a forest if they are not considered valuable when forestry projects or other activities are being planned.

Many Indian people promote the wisdom that a natural forest or ecosystem provides. If we walk, observe, listen and learn from the forest or ecosystem, we begin to understand the interdependence and value of

all found within the forest. If we do not evaluate and understand the forest, we will likely practice poor or less sustainable forestry.

Indian people generally do not promote the exclusion of people from the forest, but rather a balance within the forest. Indian people have, from time immemorial, found food, shelter, and clothing from the forest, as well as spiritual and mental health. It is important, therefore, to understand the need communities continue to have for gathering materials for food, clothing, shelter, medicines, and baskets or cooking utensils. It is important to remember too, that people visit the forest or ecosystem for spiritual and mental well-being as well. Traditional Indian people will urge that the cultural activities and uses of the forest be given priority in the management or use of products from an ecosystem or forest.

These days, Indian people are being asked more and more to provide their perspective of balance and harmony with "Mother Earth" and "Father Sky." Many non-native Americans are seeking Indian perspectives as they become more environmentally conscious and recognise the need for better management of forests. As a result, Indian values and perspectives are gaining ground within the dominant American society as public land and resource agencies such as the United States Department of Agriculture, Forest Service, and the Bureau of Land Management of the Department of the Interior, seek to sustain healthy forest ecosystems.

Indian people have long been dependent upon the forest for medicines or plants for healing or ceremonial use. These plants are often limited in number and location. Indian people consider that these special plants and plant locations need special

reverence and protection. Unique plants can disappear so quickly. The health or survival of societies or communities may even be at risk without access to these materials.

It must also be said that there are very special places in the forest or ecosystem where spiritual renewal occurs, or where wisdom and knowledge are gained. These places require identification, and special protection. Sometimes Indian people leave items on sites which others find and sell. These actions are considered very disrespectful by Indian people and may even cause them to relocate their spiritual or special learning activity. Most Indian people do not like to disclose these special sites for fear of vandalism or observation of their special activities.

Over time, Indian people have visited special areas for varied reasons. Some visits have been for the beauty of the site, or the good feelings that occur when you camp, eat a meal or visit an area. These places afford special interpretation and managed access or use. They may be considered as tourist sites if agreement is obtained from the respective Indian tribe or people who ceded the area to the United States. In some cases, these special places are now on privately-owned land and it is difficult for Indian people to gain the support of owners to use, protect or access the special sites.

CONCLUSION

Tribes are increasingly being provided with research and technical assistance by different Federal agencies and through partnerships with private groups or states. These relationships support the sharing of information and skills in joint ventures such as forestry and other resource activities.

As support grows for planning which considers the whole ecosystem, Indian tribes will become more active partners in the planning process because they reside within many of the special ecosystems or have tribal rights within them. Indian people consider themselves as an important part of these ecosystem dynamics, and not only want to be consulted, but also want to be a partner in efforts to sustain the health of the ecosystems.

Although each Indian tribe has a unique culture, values, behaviors, and lifestyles, a common consideration is their holistic view toward "Mother Earth" and "Father Sky." American Indians are proud of this traditional view toward nature and are appreciative of others' efforts to work together to achieve long-term stability of ecosystems.

SOCIAL, ECONOMIC AND CULTURAL DIMENSIONS OF MEDICINAL PLANTS IN INDONESIA

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INTRODUCTION

This paper reports on the socio-economic and cultural aspects of the production and use of medicinal plants, which are one of Indonesia's NWFPs.

For centuries, non-wood forest products (NWFPs) have been utilised by the people inhabiting areas in and around the forest. Two groups of NWFPs may be distinguished. The first includes those NWFPs which are most commonly exploited in large quantities for household consumption or for sale. The second includes those NWFPs exploited only in small quantities for domestic use to meet occasional needs.

The first group, which may serve as a source of income, includes rattan, bamboo, tengkawang seeds, honey, fruits, resins, shellac, and volatile oils (e.g., cayuput oil and lawang oil). The second group includes tubers (a staple food), rhizomes (for food and medicine), young fern shoots, and leaves (for vegetables). Momentum is building to exploit medicinal plants for profit due to increasing world trends in using traditional medicines because of their price competitiveness and lower risks of side-effects.

Traditional medicines, locally known as "jamu," may be prepared by utilizing dried whole plants or plant organs, locally known as *symplicia* (in Indonesia, the

pharmacological term *symplicia* refers to unprocessed or dried natural materials that are used for medicinal or health care purposes). Species grow naturally, in home gardens, surrounding orchards, or in nearby forests. An industry is developing in the small-scale and household processing and trade of *symplicia*. In addition, during the last two decades many larger firms have engaged in the jamu industry, including for export. Many people are involved in, and get their earnings from, the collection, production and trade of *symplicia* and jamu.

HISTORY OF UTILIZATION

Most of the traditional medicinal plants utilised by different ethnic groups throughout Indonesia were formerly collected from the forest. As technology and markets developed, medicinal plants made increasing contributions to the economies of indigenous and other communities. Accordingly, plantations are now being established on private and community lands outside forests; some by big jamu firms. Medicinal plants, which were previously little exploited, are now becoming a commodity for domestic and export trade.

Once it was thought that jamu was used only by people on Java. It has since been

learned that jamu has been used for generations by forest communities throughout Indonesia. Such traditional use of medicinal plants is part of the cultural heritage of ethnic groups on other islands such as Sumatra, Kalimantan, Sulawesi, Maluku and Irian Jaya. Today, even in areas where modern health care has been established by the Government, some families prefer to use only traditional medication, while others use it as a supplement to modern medication.

Sutaryadi (1986) mentioned that before the Second World War, the use of jamu was common among the Javanese, Balinese, and Dayak families. Jamu was self-prescribed for curing light illnesses such as colds, fevers, coughs, diarrhea, stomach-aches and headaches. Recent information indicates that such practices were widespread among ethnic groups on different islands. However, early documentation on traditional medicine is only available for Java and Bali (Sutaryadi, 1986). In other places, information was passed on orally from one generation to the next. It was only during the last three decades that such knowledge of traditional medicinal plants was appreciated as an important and valuable heritage. Work was then initiated to gather information and to study traditional medicinal plants.

Originally, jamu was prepared by individual households for their own use. Symplicia were collected from wild plants in fields or forests, or from cultivated plants in home gardens. Later, there was some trade through local and suburban markets in symplicia, for preparation of medicines at home. Still later, a number of households began processing the symplicia and selling jamu. Plantations of medicinal plants were established by a few of the big firms in the jamu industry, although most of the

symplicia processed was purchased from traders of traditionally collected material. The forests thus serve as sites for the collection and production of most medicinal plants used.

GOVERNMENT POLICY

Prior to 1942 (i.e., during the Dutch Administration), considerable attention was paid to the use of medicinal plants. During the Japanese occupation, committees were set up to study the utilization of medicinal plants. During the first years after the proclamation of independence in 1945, the use of medicinal plants was encouraged due to the shortage of modern medicines. In 1963, a law regulating different aspects of pharmacy, including traditional medicine, was promulgated.

The first seminar discussing problems related to the utilization of medicinal plants was organised in 1964 in Yogyakarta. It was sponsored by the Ministries of National Research, Health, Higher Education and Sciences, Agriculture, Forestry, Estate Crops and Fishery (Sutaryadi, 1986). Since then, interest in studying the production and use of medicinal plants has intensified and meetings are being held more frequently.

In 1973, a decree was issued by the Minister of Health concerning requirements to be met in the production of jamu, including the trade and storage of symplicia, the establishment of laboratories, marketing, and trading. In 1978, the Ministry of Health published its five-volume publication, *Materia Medika Indonesia* (Indonesian Medical Materials). In 1985 and 1986, the first two volumes of *Tanaman Obat Indonesia* (Indonesian Medicinal Plants), were published in which different plant

species and their therapeutic properties were described.

As the jamu and cosmetic industries further developed, the need to secure sustainable production of symplicia and to conserve the genetic resources of medicinal plants was realised. To address these issues and also to improve the welfare of farmers living around forests on Java, the Indonesian State Forestry Corporation launched a program to allow the villagers to cultivate certain medicinal plants in forest areas (Bratamiharja & Haryoto, 1985). However, this program was terminated as the villagers had difficulties in marketing their produce. Nevertheless, the government still believes that jamu production and the utilization of medicinal plants can help meet medicinal needs, and also improve the welfare of local people.

SOCIAL AND ECONOMIC ASPECTS

Supply and utilization of symplicia

To illustrate the significant increase in the supply and consumption of symplicia during the last two decades, the estimated national consumption of symplicia by the jamu industry from 1972 to 1992 is presented in table 1.

Many people earn additional income from trading and processing symplicia and jamu, although farmers and collectors get the least benefit. No data is available on the quantity of symplicia extracted from forests compared with that produced from plantations. In small-scale businesses jamu is prepared by traditional methods (i.e., rinsing the symplicia, followed by solar drying and further processing). There is a

possibility that the water or air in which the symplicia are rinsed and dried is polluted. The quality of the symplicia is determined by the age of the plant at the time of

Table 1. Estimated consumption of symplicia by Indonesia's jamu industry, 1972 - 1992

Year	Quantity * (tonnes)
1972	59
1973	55
1974	67
1975	58
1976	97
1977	101
1978	172
1983	1,687
1984	2,217
1986	2,257
1991	6,976
1992	7,784

Source: Hargono (1985) and Directorate General of Food and Drug Administration (1992).

* Excluding the consumption of symplicia by jamu gendong (household manufacturers).

extraction, the stage of the development of plant parts, and the method by which the symplicia is prepared.

For some jamu, imported symplicia have been needed. The quantities imported in recent years are shown in table 2. The need

Table 2. Quantity of imported symplicia used by the jamu industry, 1984-1993

Year	Quantity (tonnes)	Value (US\$ millions)
1984	13.385	no data
1985	20.290	no data
1986	no data	698.05
1987	22.323	844.74
1988	28.135	921.38
1989	31.972	924.35
1990	24.567	1 016.45
1991	19.587	no data
1992	21.863	no data
1993	33.898	no data

Source: Sandra and Kemala (1994) and the Directorate General of Food and Drug Administration (1992).

for imports is due to the unavailability, or inadequate quality or quantity of certain symplicia.

Surprisingly, some of the imported symplicia were also exported. The quantity of exported symplicia during 1988-1993 is shown in table 3. It may be feasible to replace imports with locally grown products through a program which would train villagers in the methods of extracting fresh medicinal plant materials and preparing symplicia to required standards.

Trade of symplicia

Trade in symplicia is carried out at several levels. The first transaction is between the people who gather the symplicia from the forests or nearby fields, and the village traders. This is followed by transactions at the sub-district, district, and provincial levels. Bigger firms or retailers who commonly purchase symplicia at the provincial or district levels, distribute it to agents, retailers and ultimately, after processing, to consumers. For certain symplicia, the needs of these larger traders may also be met by harvesting their plantations or by relying on imported symplicia.

The villagers who gather the symplicia get the smallest returns, whereas the big companies and retailers get the most. Sandra

and Kemala (1994) reported that the retailers' selling prices for symplicia may be as much as 7 times the buying prices from the villagers. Based on results of their studies in villages surrounding Meru Betiri National Park, East Java, Sandra and Kemala (1994) suggested that this system of trade did not improve the welfare of these village communities, although it did benefit collectors at the provincial level and the retailers. It would thus be desirable to encourage direct transactions between the villagers and the jamu producing firms, for example, by organizing transactions through village cooperatives.

In the case of the jamu gendong industry, direct contacts between jamu gendong vendors (who periodically visit families in their villages) and symplicia collectors at the village or sub-district levels, have been common practice. Transactions occur in the sub-district markets.

Production and marketing of traditional medicines

The increasing number of participants in the jamu industry, as well as the increasing value of their products (table 4), indicates the potential of this industry to create employment and contribute to community development.

Jamu has been exported to several countries,

Year	Quantity (tonnes)	Value (US\$ millions)	Average price (US\$/tonne)
1988	33.309	10.33	310
1989	40.574	10.27	256
1990	40.879	14.09	451
1991	50.006	30.67	487
1992	44.264	20.31	455
1993	67.751	38.11	356

Source: National Agency for Export Development.

Table 4. Number of firms engaged in the jamu industry and value of national production

Year	Large firms	Small firms	National production (billion rupiah)
1976	-	-	3.1
1980	44	91	-
1981	50	115	-
1982	53	120	-
1983	68	148	-
1984	65	191	-
1985	69	225	-
1986	74	269	-
1987	78	304	-
1988	88	340	43.8
1989	93	351	40.2
1990	93	353	73.8
1991	14	359	95.5
1992	12	372	124.2
1993	17	383	94.7*
1994	28	423	

Source: Soedibyo (1991) and Directorate General of Food and Drug Administration

* (to September only)

including Singapore, Malaysia, the Netherlands, New Zealand, France and Taiwan. In 1991/1992, the export value was up to Rp. 1.06 billion (US\$ 530,000) (Directorate General of Food and Drug Administration, 1992).

Employment

The potential profit from jamu appears to have stimulated the growth of the industry during the last two decades. The number of associated retailers has also significantly increased. There are currently 503 agents and 4,423 retailers in 27 provinces throughout Indonesia. The largest number of agents (54) is in West Java, while the most retailers (742) are in Central Java, where many Javanese traditionally rely on jamu. The figures indicate that traditional

medicines have good markets all over Indonesia.

No records are available on the number of villagers who collect medicinal plants in the forest or cultivate them in fields outside the forest. Nor are there figures on the number of symplicia collecting traders and jamu gendong vendors.

The number of people directly employed by traditional medicine industries between 1990-1993 is presented in table 5. Soedibyo (1991) believes that the development of the traditional medicine industry may indirectly stimulate business opportunities in other activities, including agriculture and trade. As many people are now engaged in the business of symplicia and traditional medicines, incomes have accordingly improved. These better incomes, in turn, improve the social and economic conditions of the people, including their education and health.

CULTURAL ASPECTS

In contrast to modern medicines, traditional medicines are prepared from plant materials without their active ingredients necessarily being known. Traditionally, the effectiveness of symplicia for curing certain diseases was based on the experience and culture of the local people, without the benefit of chemical analyses or formal experiments. Prescriptions were passed orally from one generation to the next, and the art of utilizing traditional medicines became part of the culture of different ethnic groups in Indonesia. Depending on the group, different plants or prescriptions may be used for a given disease. Traditional medicines are sometimes called native, ethnic or unofficial medicines.

Position	1990	1991	1992	1993
Pharmacist	105	112	104	114
Pharmacy Assistant	179	153	126	123
Other Univ. Graduate	20	86	42	121
Technician	9,039	10,320	7,514	6,490
Total	9,343	10,673	7,786	6,848

Source: Directorate General of Food and Drug Administration

Sutaryadi (1986) indicated that some ethnic groups believe that sometimes there is a correlation between the shape of the plant part and its therapeutic activity. Thus, a fruit shaped like a heart may be used for coronary diseases, or kidney-shaped seeds may be used against renal diseases. There is also a belief that plants with red flowers, leaves, or wood may contain substances for curing blood diseases, whereas those with yellow flowers or corms/rhizomes should be good for curing liver diseases.

Some plant parts are also used by different ethnic groups to prepare food supplements. It has long been the tradition among certain ethnic groups that pregnant women take certain traditional medicines before and after deliveries. Traditional cosmetics are still commonly used in traditional wedding ceremonies, as well as for daily cosmetic use.

Different levels of the jamu industry may be distinguished, based on the number of the people employed. For example, jamu Gendong is the popular name for the household level of the industry, which is commonly run individually by women. Small-scale industries can also be distinguished by having a working capital of less than Rp. 600 million (US\$ 300,000); large-scale industries having a working capital of Rp. 600 million and over and equipped with modern facilities, machinery and laboratories (Menkes, 1990).

Jamu gendong is commonly consumed by blue collar workers, but also preferred by many housewives in urban areas throughout Indonesia. Individual women prepare the medicine daily and sell it door to door or at work places. While this part of the industry may involve low income levels, its scale could be large as it involves many jamu vendors and consumers in almost all provinces in Indonesia.

There are 451 firms in the jamu industry, and they usually produce jamu in the form of packaged powders for specific illnesses. Many people prefer to take this powdered medicine just like having a cup of coffee, whereas others mix it with jamu gendong because they expect a combined effect of both types of traditional medicine.

Most jamu firms only supply domestic markets. Some of the products are sold by traders using vans to visit traditional village market places. They move from one market to another, depending on when the local market is open. It is very common to encounter jamu retailers using loudspeakers to promote jamu in the markets. Local radio broadcasts may also promote certain brands of jamu. Very few large firms have developed in the jamu industry in Indonesia. However, they have nation-wide markets and some export their products (e.g., to Singapore, Malaysia, the Netherlands). They have developed modern methods of processing, packing, and marketing jamu and cosmetics.

Field observations in Nguter, Central Java, show that almost 90 percent of the market place is occupied by shops carrying symplicia. jamu gendong vendors from all over Java periodically come to this market to buy symplicia because of the relatively low prices and because some symplicia that are unavailable elsewhere are abundant in this market. In addition, as jamu gendong vendors are often women who left their husbands (usually farmers), children, and parents in their home villages in this area, they make use of the buying trips to meet with their respective families and to bring their earnings home. These jamu gendong vendors also trade in the packed powdered jamu produced by small industries in the area, selling them as additional ingredients of their jamu gendong.

In the past, the knowledge and skill in preparing jamu was in the hands of women, who had learned from their mothers and grandmothers. Today, young housewives in urban areas usually are not able to prepare such jamu and, therefore, depend on the production of jamu firms and jamu gendong vendors.

During the last two decades, the expansion of jamu industries producing well-packed, powdered traditional medicines, accompanied by intensive advertising, has resulted in wider consumption. Consumers now include not only low-income, but also higher income people. Traditional medicinal plants, which formerly were collected and consumed mainly by the villagers living in and around the forest, are now consumed by a wide range of communities and are becoming part of the modern culture of the Indonesian people.

PROBLEMS AND PROSPECTS

Problems encountered in the production and utilization of medicinal plants growing wild in the forests are as follows:

- The sustainable supply of symplicia needed for the production of jamu and development of the jamu industry depends on the continuous availability of the medicinal plants. Continuous harvesting, without establishing plantations of medicinal plants, may result in the extinction of some of the species.
- People living in villages around the forest who collect medicinal plants benefit less than those engaged in other parts of the traditional medicine business. Their welfare has not significantly improved.
- The villagers who collect or harvest medicinal plants are not well informed about the required standards that symplicia should meet.

There are good prospects for the production and use of medicinal forest plants. Indonesia's population growth and the increasing preference for traditional medicine in Indonesia and in other countries should expand the market for symplicia and jamu. In anticipating future opportunities, the following steps need to be taken:

- Establishment of plantations of medicinal plants in young, as well as old forests located close to villages.
- Development of a system in which the villagers who collect or harvest

medicinal plants, can better benefit from symplicia production and utilization.

- Provision of guidance to villagers regarding the selection of medicinal plant

species to be planted and the scale of the plantations to be established, in accordance with domestic and world market demands and site suitability.

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FOREST NICHES: SUSTAINABLE LIVELIHOOD FOR UPLAND DWELLERS WITH EMPHASIS ON FOOD PROCESSING

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INTRODUCTION

The Ikalahan

The Ikalahan, also known as "kalanguya," are one of several tribes from the Cordillera and Caraballo Mountains in northern Luzon, Philippines, which are commonly, though carelessly, lumped into a so-called generic term "Igorot." The Kalahan Educational Foundation was established by the tribal elders in 1973 to give them a legal entity. Through it, they were able to establish their own high school, the Kalahan Academy, to prevent emotional and cultural damage to their young people who desire to obtain additional education. They also obtained control of nearly 15,000 hectares of their tribal land with an instrument now known as a Communal Forest Stewardship Agreement, although at the time it was simply called Memorandum of Agreement Number 1, it being the first of its kind. Figuratively, the Ikalahan have had to clear the brush from every meter of their upland path to development, because no one has prepared any trails ahead of them. Now, many communities have chosen to follow in their footsteps.

The Ikalahan are hunters and gatherers who have also been engaged in swidden farming for centuries. Sweet potatoes (*Ipomea batatas*) are their traditional basic food.

Over time, they have developed very effective technologies for sustainable production of sweet potatoes on upland slopes. They developed systems of contour composting (*gengen*) and level land composting (*day-og*) and a gene bank with more than 100 local varieties, which are planted in such a way that there is always a crop no matter what the weather brings.

Ikalahan land security

Programs which have succeeded in protecting the resources and the environment are organised as *communal* projects under the Social Forestry Program of the Department of Environment and Natural Resources of the Philippines Government (DENR). Their land tenure gives the people motivation to protect their forests. They know that their grandchildren will have secure access to resources if the present generation protects those resources under the terms of the agreement which were hammered out in a dialogue with the government.

Their motivation for protection stems from two facts. The first is that what is destroyed today will not be available tomorrow. Most adults have a natural concern for their grand-children so they desire to improve

their resources for succeeding generations. Second is the legal fact that under the terms of the Memorandum of Agreement, they and their descendants can continue to use the land as long as they protect the water supply and fertility. The contract itself is a motivation.

Before they obtained their land security, the people knew that the more they improved their land, the sooner someone would come to take it away from them. They had been told that they were squatters and would be driven away eventually, so why should they leave anything for the people who would drive them away? There was no motivation whatsoever for them to protect either the forests or the watersheds. Now, however, with their land tenure secure, the forests are protected as a part of their ancestral lands without government assistance. In brief, land tenure in the hands of a community is the strongest motivation for protection and development.

Kalahan resource sustainability

After their land tenure was secured, the Ikalahan first established regulations and policies for protecting the forests and watersheds. They did not then distinguish between primary and secondary forests, because their concern was watershed protection, not bio-diversity. This was the top priority because it was explicitly required in the Memorandum of Agreement.

Their next concern was their food supply. To depend on cash to buy their food would be dangerous due to the poor transportation system and a shaky national economy. They needed to continue to produce their own food to protect themselves. This should also be a concern for other similar communities.

Building materials and fuel wood are also important, and the people worked out regulations to control how and when to harvest wood so that they would have a sustainable supply of both fuel and lumber without damage to the forests.

After these issues were settled, the people were free to look at their cash income. The experiences gained through many years of trial and error have been both joyful and painful, but they have all been educational.

Niches

An ecological niche is a unique portion of a larger ecosystem. It has its own sustainable symbiotic systems which interact with the larger ecosystem, but it continues to develop its own characteristics. There are many niches in every ecosystem.

At Kalahan, people work to identify and develop those ecological niches which can sustainably provide raw materials for income generation to support the human forest dwellers. In that way, the ecological niche can become an economic niche. People can be a part of it to protect it and keep it sustainable. The number of families entering any given niche should be limited by both the carrying capacity of the niche and the size of the market. If this is done, the forest and related ecosystems will become more valuable and the people will be more highly motivated to protect it.

The Kalahan would prefer not to sell the raw materials obtained from each niche, but to process them to provide maximum opportunities for income generation within the community using a minimum of resources.

The niches which are already being used are:

- Paper making
- Mushrooms and truffles
- Fruit production
- Spice production
- Wild fruit processing
- Orchids, ferns and other flowers
- Butterflies and other insects
- Furniture

In addition, several other niches are being investigated in the hopes of entering them. They include:

- Frog raising
- Honey production from wild bees
- Wild animal raising
- Essential oils

One marketing niche which has been studied, and rejected, is tourism, including eco-tourism. It was rejected because of the serious social pollution which invariably accompanies it.

The community does not want to limit itself to a single niche, however. Biodiversity is critical to the welfare of the environment. Economic diversity is also important to the sustainable development of upland communities.

THE FOOD PROCESSING NICHE

Origin

Even before the staff of the Kalahan Programs identified the niche concept, the

Trustees and staff realised that the utilization of wild fruits was a promising way for the population to obtain a sustainable livelihood without damage to the forests. They established the Food Processing Center in Imugan in 1980 to produce jams, marmalades, preserves and related products using wild fruit from the forests. They market them under the "Mountain Fresh" label.

Biological requirements

Simply stated, any wild fruit may provide the basis for a small industry in a mountain community. Preferably, there should be several fruits, however, to make it possible for the program to work year-round and prevent over-utilization of any one biological niche.

In Kalahan, people began with guavas (*Psidium guajava* Linn.), which were eventually developed into three different products: jam, jelly and butter. With more than 500 hectares of wild guavas within the Kalahan Reserve, there is little danger of over-exploiting the resource.

After guavas, the fruit of a "weed tree" known as dagwey (*Saurauia subglabra*) was discovered. Although children occasionally ate the fruit, it had never been used commercially or even as a major source of food. A way to process it into a raisin-like preserve was soon discovered, however. Later, two other recipes were developed: dagwey marmalade and dagwey jelly.

Dikay jelly is made from the fruit of a vine (*Embellia philippinenses*) similar to grape vines. Like dagwey, it was considered to be a weed but it produces an excellent jelly. These two plants grow on the edge of the forest.

Roselle (*Hibiscus sabdariffa* Linn) and hibiscus (*Hibiscus rosasinensis* Linn) jellies are made from the blossoms of wild flowers. They are both of the genus *Hibiscus*, but roselle is an annual and hibiscus a perennial. Because of the beauty and value of the latter, people are planting it at the sides of trails and along the boundaries of house lots. Roselle is planted in back-yard gardens.

Santol (*Sandoricum koetjape*), prefers open areas. Many of the santol trees were killed by the flooding which followed an earthquake, but people are now planting them again.

Ginger (*Zingiber officinale* Rosc.) is an indigenous cultivated plant in our area. We developed a jelly for use on meats, but most people buy it for use in sandwiches.

Passion fruit (*Passiflora edulis*) is used to make a fruit spread. It is an indigenous perennial vine which grows on trellises or trees.

The bignay fruit (*Antidesma bunius* Linn.) is usually found in the wild, but is sometimes cultivated. It produces a good jelly but is not popular for some reason, and we may phase out the recipe. It grows in open or semi-shaded areas.

One community in the Kalahan Reserve is named Baracbac, because many years ago the area was covered with a weed tree of that name. Now the plant is almost extinct. Two trees were located several years ago, however, and an excellent jelly was made from the fruit. Now the people have replanted baracbac in their village and perhaps will have a salable product by next year. Another source of income may thus develop, and the reason for the village's name may be restored.

There are wild raspberries (*Rubus pectinalus* and *Rubus rosaiifolius*) in the forest, but their flavor is poor. Recently, a similar one with an excellent flavor was found in another forest west of the Kalahan Reserve. There are plans to transplant some plants with a view toward growing berries that will yield a marketable raspberry jelly.

Before the processing of these fruits, ginger was the only plant that had any commercial value to the community. Although guavas, passion fruit and santol could be marketed fresh in the lowlands, the price was so low that it was not economical to ship them. Now they have commercial value and are being utilised. The environment is not being forced to produce what is not natural to it, however, because each fruit is already part of a special forest niche. As each niche becomes important to the population, the people protect it, and with it, the forests.

Many other fruits have been tested, but there is little market in the Philippines for fruits with mild or bland flavors. Testing continues, however, in the search for additional commercially viable fruits.

Technical requirements

Food processing is not a program for the faint-hearted. It involves patience and a considerable amount of time and money to develop recipes suited to the local fruit. Once a recipe has been developed, it must be adapted for production. Standard quantities and qualities are necessary for the process, and the product itself must be standardised.

Cleanliness is very important in the production of food products. The level of cleanliness necessary for commercial food

processing is several steps beyond the level common to most mountain kitchens. It can, however, be achieved if people set their minds to it.

Rigid quality control is very necessary. This includes accurate control of the quality and quantity of fruit, sugar, water and other raw materials. It also includes the standardization of the weight of output of every batch. All of this must be recorded in a log book.

The recipes are not usually complicated, but in the Philippines, each one must be approved yearly by the Bureau of Food and Drugs (BFAD) of the Department of Health. Approval requires the submission of two samples in standard containers, properly labeled. The label must include the name and address of the producer, the contents, the net weight, batch number and expiration date of the product. The approval includes the label. An additional permit is required for every overseas shipment.

Physical requirements

Processing center

Severed attempts were made to make food processing a home activity, but it has never been successful. It is very difficult to maintain the proper quality control and cleanliness in the home. One requirement, therefore, is a processing center. This need not be large or expensive, but it must be easily cleaned and kept safe from rats, cockroaches and other pests which would damage the products.

When the Kalahan center was built, there was no electricity. Everything was designed so that the center could operate without it. An electric cooperative has since delivered

electricity to the center, but service is not very dependable. The center is still maintained to function without electricity.

Plant design

It is easy to waste both time and money in a poorly designed work space. Small wooden boxes with nylon handles were made in which the output from each batch that is cooked. These boxes are put on a sloping shelf with rollers so that they can roll slowly toward the Quality Control desk. After being checked, they are slid to the packaging or storage area. All storage and movement is made as convenient as possible to minimize time and labor costs.

Equipment

At Kalahan, the people manufactured their own stoves and most of their equipment. Thus they are able to make repairs when breakdowns occur. The Lorena stove design was copied, but brick was used in the construction because it lasts longer and is easier to clean.

Aluminum kettles were found to be satisfactory for most products, although stainless steel would be better. Unfortunately stainless steel is much more expensive.

Funnels, knives and other equipment which are in direct contact with the fruit should be made of stainless steel. This is difficult to weld, however. It requires a special TIG welder and the welder needs special training. The Kalahan have had the necessary equipment for several years, but it was difficult to find the proper training. The community's welder finally obtained the necessary training in November of 1994.

Containers

The type of products which are produced by the Kalahan Food Processing Center are best packaged in glass. A few samples have been packaged in plastic containers, but they are difficult to sterilise, even more difficult to seal, and not very attractive.

Theoretically, products could be packaged in small one-ounce "blister packs," but it would require very high-tech equipment which costs nearly a million pesos and requires large amounts of steady electrical power. This would not be feasible at Kalahan. A large enough market for the glass containers exists so there is no need to look for an institutional market.

Glass is attractive, easy to sterilise and easy to seal. There are many sizes and designs available, and at least three major producers in the Philippines. Even second-hand bottles can be used if they are properly chosen and cleaned. Everything must be well sterilised.

Lids must be new. It is not possible to use second-hand lids for storing food products. There are several factories in the Metro-Manila area which produce lids. For food products, it is important that the lid have a PVC liner to ensure the bottle is well sealed. Paper liners are not satisfactory unless large amounts of preservatives are used.

The labels can be printed anywhere, but they should be attractive. It is often expensive to have well-designed labels, but it is worth the cost.

Financial requirements

Food processing is not inexpensive or easy. One problem is that the raw materials are seasonal. When the fruits are ripe, they

must be harvested. Kalahan standards require that fruits be bottled within 18 hours of the time that they are harvested to protect their quality.

Most harvesters in the community are subsistence farmers or students. They have immediate needs and can seldom afford to wait for their payments, which means that the program should have enough cash to purchase all the fruit needed for one year's operation.

The processors must also be able to purchase sugar, containers and other requirements as they are needed. Enough labels are usually printed for one year's operation. All of this requires capital investment. The capital will return eventually with a profit, but this will take several months.

Cash flow problems are even worse for the export market. Local sales are usually small, but frequent; therefore, less money is advanced and returns are realized sooner. Export sales are usually very large orders, and even though some exporters will advance as much as half of the price to the producer, it is still difficult to get the necessary payment "up front" to produce and ship the order.

Marketing requirements

Marketing specialists insist that markets should be identified before products are conceptualised or produced. Because little was known about marketing at Kalahan, the products were developed first and markets were sought later.

Little progress was made, however, until a marketing study was conducted by the Asian Institute of Management (AIM). Their study determined the size of the

market in Metro-Manila, who was buying, where they wanted to buy, and what size of containers they preferred. The study also determined who the competition was. With this information, the high-income bracket of society was identified as the target market. By focusing on this market niche, sales increased significantly.

The intention is to capture about 10 percent of the Metro Manila market. At that level of production, enough income should be earned to subsidise the community high school adequately. Some exporting may continue, but it is recognised that the export market is very fickle and faddish, and therefore undesirable to depend on it very much. The local market, however, sees the term "Export Quality" to mean "High Standards" so it is possible to sell more in Manila if it can be demonstrated that some is being exported.

Another marketing problem which is slowly being overcome, is the uniqueness of the Kalahan products. People have to be educated about the products. Although guavas, santol and ginger are well known in the Philippines, most people have not heard of dagwey or dikay before. The local name for dikay is *Biho-lak*, but people outside the community even have trouble pronouncing it, so it was given a new name (dikay). In labeling, the brand name "Mountain Fresh" is emphasized. After customers have tried the more familiar products such as guava jelly, they can later be convinced to try some of the other products which are not so well known. Once they try them, they usually continue to buy.

Psychological requirements

Food processing requires rigid quality control and sanitary standards. Even the simple act of a cook using a damp cloth to

clean the mouth of a jar caused serious problems several years ago. It turned out that the cloth was not absolutely sterile and it caused some very embarrassing product spoilage. Cloths are still used, but they are always kept in boiling water. It is very important that such attitudes be instilled in the psyche of the workers and, if possible, the community.

Another psychological requirement is the willingness to experiment. This was not common in the past because the people are very sensitive to being perceived to have "failed" at something. Experimentation is a trial and error process. As long as something is learned from the results, it *should not* be considered a failure.

Only recently has there been an increased willingness to experiment and try new things. Hopefully, this attitude can be cultivated and developed in the future. As it develops, there will be a major change in the human psyche, which may have greater impact on the future than the economic benefits which are currently being obtained.

The staff of the Kalahan programs have several more programs in mind that are going to require research and experimentation and a willingness to absorb the "failures." This attitude is a prerequisite to success in these ventures.

IMPACTS OF FOOD PROCESSING

Negative environmental impacts

Fortunately, no significant negative environmental impacts of food processing have been found. The disposal of garbage could be a problem, but a piggery adjacent

to our food processing center consumes most of the garbage which the center produces. Any waste which the pigs reject can be composted for the vegetable production program. The waste from the piggery is used as fertilizer for fruit and vegetable production.

The waste water from washing bottles could be cleaned in a pond containing water hyacinth, but the present volume is not enough to make this necessary. It is disposed of through a blind drainage system.

If all of the available guavas were harvested, the food supply of bats and a few other wild animals that guavas could be disrupted. There is such a large supply in the forests, however, that this is not at all likely. This is also true of most of the other fruits which are used.

If ginger products were promoted heavily, a problem could develop because ginger is a cultivated plant and prefers the rich soils on the slopes. The expansion of ginger production might push people to expand their swidden farms into the forest. That, of course, would have a negative impact on the environment. As it is, however, the amount of ginger which is consumed in the food processing is quite small and easily produced in the existing farms without any need for expansion.

If the food to be processed were field crops such as beans, it would require the clearing of wide tracks of land. That too, would be detrimental to the environment. However, the fruits which are currently used are either wild or forest types, so there is no known problem.

Positive environmental impacts

Both dagwey and dikay were formerly considered to be weeds which were of no

value, so they were frequently destroyed in the second growth forests. Now that they have a market value, they are protected along with other plants which help to shade them, or provided with a trellis for the vines to climb. Not only are people protecting these plants, they are now motivated to replant them and the original biodiversity is being restored.

A small change is taking place in some parts of the forests where people are planting high quality citrus fruits such as lemons and limes. These fruits are needed to expand the processing program. People do not, however, replace forest trees with citrus trees. Portions of the forest that are in need of revegetation are planted with the citrus species. This has two notable benefits. By scattering the orchards, pests have little chance of finding the fruit trees, and the predators of fruit pests can readily multiply within the forests.

The fact that only fruits are harvested, and not the plant itself, is of great benefit to the environment. Guava trees are good nurse trees for many of the climax species that were removed from the forests in past years. With the protection of the guavas, it is easier for the forests to regenerate naturally. If some of the guavas are squeezed out later because of new climax species, they are still free to multiply in the grasslands which they prefer.

A significant increase in many beneficial insects have been noticed since the onset of the food processing program. This has been reinforced by frequent ecology seminars which stress the symbiosis of life within the forests, and because the Center refuses to purchase any chemical fertilizers or pesticides.

Searches continue for new types of fruits which could be processed and the people know this. For that reason they are hesitant to allow any plants to be destroyed, lest it turns out to be a valuable one.

Human impacts

Any new technology is sure to have an impact on the activities and the psychology of the people who are affected by it. At Kalahan, the Food Processing Center has encouraged people to look at the forest in a new way. Having discovered new resources in forest fruit, people are now ready to look at other aspects of the forest which could provide sustainable sources of income for the community. Each new undertaking will require the development of new knowledge and skills. Now that people have been successful with one enterprise, they know they can do it and can enjoy doing it. They are also looking more seriously at the sustainability of those resources.

The most important thing is that people have found that they can make these changes without losing their culture and their unity as a community.

Economic impacts on residents

There are already about 150 families that get most of their cash income from harvesting either wild or cultivated fruit. There is even a group of very young children who watch the cherry trees. When the cherries are ripe they receive permission to climb the trees and harvest the cherries. When they have filled their little baskets, the harvest is divided. They have cherries to eat and Food Processing has some to cook. Anyone who wishes to bring in fruit is welcome to do so and the Center will pay for it.

In addition, there are eight families that are directly employed by the Food Processing Center in Imugan. The cooks in the factory are all women, but the chemist is a man. During rush seasons, jobs such as cleaning containers, peeling fruit and other such activities may be performed by temporary laborers who take turns so that the work opportunities are well distributed. Many of them are students in the high school who need the financial help to pay their tuition.

Recently young children have begun planting hibiscus along the trails and on the elementary school campus because they plan to harvest the blossoms later for sale to the Food Processing Center. With the proceeds they can buy their own notebooks and ball pens. It will be almost impossible for any one family or group of families to obtain any kind of monopoly in this program.

Efforts are now being made to produce sugar (glucose) from a local root crop grown in the forest, so expenses of the Food Processing Center can be reduced further. This will put additional cash into the local economy.

Economic impact on the community

The community, through the Kalahan Educational Foundation (KEF), has established its own Health Center and high school, neither of which are financially self-supporting. The income-generating projects are necessary to develop enough income to support the community service projects. This is one of the purposes of the Food Processing Center.

The present output of the Center is only about 2,200 cases per year for the domestic

market, and 900 cases per year for export. By 1995, through new outlets in Metro Manila, it is expected that 4,500 cases will be sold in the Metropolitan market, 900 cases will be exported, and 150 cases will be sold in provincial outlets. This represents only 3 percent of the Metropolitan market and less than 50 percent of capacity at Kalahan.

By the year 2000, the target is to supply 10 percent of the Metropolitan market and to operate slightly above the present capacity. At that level, the net profit should be more than \$ 35,000, which should be enough to balance the high school budget.

Impact on land use

The greatest benefit of this program is probably its indirect impact on the agricultural practices of the community. Before the opening the Food Processing Center, most families cultivated areas nearly one hectare in size, with half used to produce food for the family and the other half used to grow cash crops. Families still produce their own food crops, but now most of the cash is coming from the sale of forest fruits so the cultivated areas have been reduced to half. Even though their labor is less intensive than formerly, their income is greater.

Second, fruit trees, especially wild ones, do not need to be cultivated. They are productive without disturbing the land and by encouraging the growth of underbrush erosion is generally prevented.

Third, as a result of the reduction in the land needed for cultivation, the forests have begun to expand and cover areas which were formerly agricultural or grasslands. This has caused a very important improvement in the watersheds and the flow

of water in the rivers and streams. It is obvious during heavy rains that the run-off water is now white, not laden with top-soil, as was the case previously.

CONCLUSIONS

Communal land tenure

People must have been very secure land tenure before they will be willing to develop the land, the forest or any other niche. Every development requires investments of time, money and labor. Without the assurance that they, or their grandchildren, are going to obtain the fruits of their investments, no intelligent person is going to be willing to do it. Forest dwellers are intelligent people.

People must also feel that they have very clear authority to manage the land and its resources. If management is conducted by a committee based outside the area (even if representatives of the community are a part of the committee) the program will probably not succeed. People will not feel free, nor will they feel challenged to use their own imagination and creativity to properly identify and develop the various niches which are available within the ecosystem. Very seldom is a tribal representative actually heard in a political meeting.

Availability of consultants

People should not be expected to "re-invent the wheel." They will need to be assured that technical expertise will be available when it is necessary, but that neither the technical experts nor the merchants will be making slaves of them.

At Kalahan, substantial assistance was obtained from the Food Technology

Department of the University of the Philippines in Los Banos. Whenever a serious problem is encountered, the Department is consulted, the problem is shared, and advice is obtained. Without access to such professional advice, the program would be much more difficult.

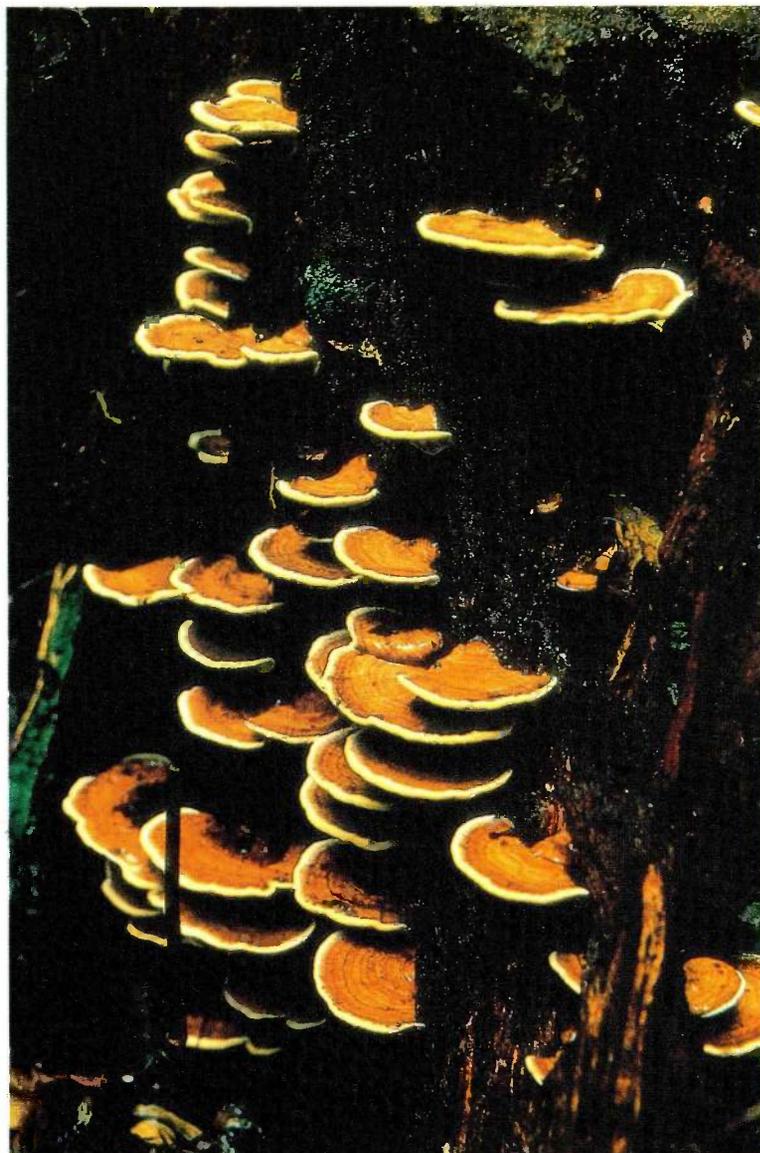
Suitability of the niche

In spite of its many difficulties, food processing is a good niche to develop in many communities to provide sustainable livelihood for a significant part of the population. It often requires some changes in thinking, but given the proper amount of time for the ideas to ripen, it can be done without disrupting the society and cultural patterns.

Government's role

Government should *not* try to "harness" forest dwellers into protecting the biodiversity and resources of protected areas. It should enter into respectful agreements with forest dwellers to *release* their creativity and properly motivate them to be protective. Horses and carabao may be harnessed, but not people.

Protection should be primarily the responsibility of the people, with the respectful support of the government. In the Kalahan case, the people are confident that they can protect the primary forests of the Reserve while developing niches that facilitate the expansion of climax forest and provide sustainable livelihoods. This is the greater challenge which the Kalahan people are trying to meet.



The Kalahan approach identifies economic values of forest resources to motivate protection and sound management.

COLLECTION, UTILIZATION AND MARKETING OF MEDICINAL PLANTS FROM THE FORESTS OF INDIA

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INTRODUCTION

Of late, the importance of Non-Wood Forest Products (NWFPs) has been realised the world over. India is a pioneer in the field of NWFPs, owing to its rich biodiversity and use of different NWFPs from times immemorial. About 45,000 plant species abound in India, which is 12 percent of the global wealth of flowering plants. Of these, about 33 percent are endemic (Jain, 1987). About 3,000 plant species are of economic value in India.

Among the Asia-Pacific countries, the importance of NWFPs was probably first realised by China, then by India, followed by Indonesia, Thailand and others. Various economic plants have been traditionally used by the people, although they were not always named "Non-Wood Forest Products."

A large number of plants have long been used in indigenous systems of medicine by most of the countries of the region. Therefore, when people think of NWFPs, they often first think of medicinal plants.

EXPLOITATION OF NWFPS

Both wood and NWFPs should be managed in an integrated manner. NWFPs can be sustainably harvested and collected without

detriment to the ecosystem. The process can be environmentally friendly with the application of sustainable forest management principles compatible with the conservation of ecosystems and maintenance of biodiversity.

Overall, NWFPs have strong linkages and complementarities for sound environment and sustainability, especially in the rural areas. With the above strategies in mind, collection, utilization and marketing of all the NWFPs, including medicinal plants, needs to be properly addressed from the social, economic and cultural dimensions.

Channels of exploitation

In India, generally all NWFPs, including medicinal plants, are collected from naturally-regenerating forests. In this process, collectors are at the grassroots level because they are the inhabitants living near the forest. Depending upon the economic importance of different NWFPs, marketing channels are created and regulated. Accordingly, all the products are classified into three groups depending upon their degree of use, as indicated below:

- Products restricted to local use (saleable only in the village market);
- Products of moderate commercial importance (saleable in bigger markets at district and state level); and

- Products of high commercial importance traded within the country and abroad.

These are all governed by their different impacts of society, economy and culture of the country. Therefore, collection and marketing of different NWFPs are addressed from these angles.

Rights and concessions for collection of NWFPs

Collection of medicinal plants and other non-wood forest products form an integral part of the economy of the tribals or forest dwellers who are inhabitants of the forest. The local tribal population, however, has not been able to realize the full economic benefits from their collection of medicinal plants. Moreover, the tribal populations are being increasingly exposed to problems arising from increased commercialization of minor forest produce and greater interest by middlemen, contractors and agents in these forest products.

There is growing evidence that the controls, usufructuary rights and tenure status of land, trees, and forest products are critical factors in determining the ways in which users view their resources and manage them. Regardless of market demand levels, inappropriate tenure and trade policies and government imposed field-level regulations often lead to poor management of forest products and low revenues for collectors.

Unlike agricultural commodities, most NWFPs are produced on public forest lands for subsistence use. NWFP collectors often have few or no rights over this domain, and as a consequence their ability to control access, or intensify management through pruning, weeding, enrichment planting, or fertilization is limited. In fact, because of the tenure conditions affecting public forest

lands, local users have incentives to overexploit NWFPs, gathering them as quickly and abundantly as possible, to avoid losing them to others.

As a consequence, on public forest lands, the unsustainable exploitation of NWFPs is often driven more by unclear usufructs and open access utilization, than by high market prices. Where NWFP producers generate such goods on private lands, they are often subject to overlapping regulations which affect the trade in many forest commodities. Consequently, any study of NWFP markets must be cognizant and informed regarding the larger political-economic environment in which forest management and trade decisions take place.

Various NWFPs belong to forest departments and are collected from forest areas which are governed by different state forest departments. In some states like Gujarat, Maharashtra and Rajasthan, free rights have been given to the tribals for the collection and use of forest products. In some other states like Kerala, tribals are allowed to collect medicinal plants and other forest produce at concessional rates. Ideally, a uniform system would be maintained, but such a system has not yet evolved in India.

Since the forest dwellers need some timber, bamboos, canes, and reeds for repair and construction of their houses and agricultural implements, grasses for thatching of roofs, branches and twigs for domestic fuel purposes, and grass for fodder, any curtailment of collection rights results in disputes. Therefore, guidelines must be developed which look after the welfare of village dwellers as well as preserve the forest wealth. The following problems are generally faced:

1. It is not possible to accurately determine the amount of NWFPs required by tribals. Provisions do exist for the granting of concessions to tribals but estimates of actual needs of the tribals are not being quantified properly. In some states, estimates are low compared to actual requirements, while in other states they are high. In those states where the estimates and allocations are below actual requirements, tribals are forced to encroach upon the forest to meet their needs. The solution to these anomalies can be achieved by striking an appropriate balance between the genuine requirements of the tribals and the existing forest wealth.
2. There is no simple remedy to check the misuse of the rights and concessions of forest dwellers. Strict laws are needed as a remedial measure.
3. There is no clearcut identification of forest dwellers personal day-to-day needs relative to the demands posed by contractors, agents and other middlemen. Even if these demands are segregated, the tribals are exposed to increased pressures by middlemen who lure them with monetary rewards to exact valuable NWFPs at costs which are much below market prices. The exploitive middlemen can be overcome by establishment of forest labour cooperative societies, tribal labour cooperative societies and forest development corporations, as has already been done in some states. The NWFPs collected by these societies may be purchased by the Forest Development Corporation which processes markets, and prepares the finished products. This way the tribals receive the commensurate monetary return. The societies can also collect medicinal plants which can be

marketed through the pharmaceutical corporation and marketing federation.

4. There is no proper solution available to sort out the conflicts between the need to preserve the forest wealth and the need for a better deal for tribal or forest dwellers. This may be regulated by the forest department. Since a proper understanding of the actual needs of the tribals is necessary, forest officers will need to collaborate with the tribal cooperative societies to improve the sustainable harvesting of NWFPs by regulated extraction. In addition, forest dwellers may replenish the growing stock by creating plantations. In case of excessive exploitation, a ban may be imposed on felling NWFP bearing trees.

Scope and strategies of medicinal plant collection in the Indian context

A great wealth of medicinal plants are found in the forests of India. Among those commonly used in pharmaceutical preparations are: *Terminalia chebula*, *T. bellerica*, *Emblica officinalis* (these three yield the myrobalans), *Azadirachta indica*, *Aegle marmelos*, *Saraca ashoka*, *Holarrhena antidysenterica*, *Berberis aristata*, *Tinospora cordifolia*, *Adathoda vasica*, *Ichnocarpus frutescens*, *Glycyrrhiza glabra*, *Rauwolfia serpentina*, *Acorus calamus*, *Boerhaavia diffusa*, *Cyperus rotundus*, *Withania somnifera*, *Piper longum*, *Swertia chirayita*, and *Cinchona* sp.

The season in which medicinal plants are to be collected is of prime importance. Also important is the stage of growth of leaves, flowers, fruits, roots or the whole plant when collected, because the percentage and quality of the active properties is directly related to the stage and season of collection. For the efficacy of medicinal plants, these

are very important parameters. Additional salient points are briefly summed up below (Vijayalakshmi, 1994):

- Freshly collected plant parts should be used, however, products like honey, coriander and pepper should be old and stored.
- Generally, drugs should be collected in the autumn season.
- Drugs used as emetics and purgatives should be harvested after the termination of the spring season.
- Roots should be harvested in winter and summer.
- Leaves should be collected in the spring and rainy seasons.
- Barks, bulbs and exudations should be collected in the autumn season.
- Piths (the soft spongy substance in the centre of the plant stems) should be collected before winter.
- Fruits and flowers should be collected in the seasons in which they appear.

Property rights

The rights of property of NWFPs in the raw form lies with the Forest Department or with village panchayat and farmers who grow NWFP species on their own land. Since the NWFPs have not been given the attention they deserve in forest management, property rights have not been well defined. In the case of panchayats, property rights are not well controlled due to villagers' lack of knowledge. In the case of farmers who grow particular NWFPs, they exercise full property rights. In India, in case of NWFPs obtained from trees

grown by the farmer, farmers hold right only to usufructs, while the tree itself becomes the property of Forest Department. Thus, the farmer cannot use the tree crop (i.e., timber) without obtaining permission from the Forest Department.

Legal provisions

No clearcut legal provisions have been made to control the damage caused by unregulated collection of NWFPs. Villagers or contractors are not dealt with legally in the event of disastrous harvesting and improper collection that damages the forests. No warning is being given for the collection of raw materials in the wrong season or at inappropriate stages of growth.

MARKETING RIGHTS

The forest and village dwellers, including tribals who collect NWFPs, are exposed to problems arising from increased commercialization of minor forest produce and greater interest by middlemen and contractors. The middlemen and contractors often take advantage of collectors' ignorance of actual market prices and collectors' inability to hold their collections for any length of time or market them through channels other than those established by the traders/contractors.

Marketing through societies, cooperatives and federations fetch better remuneration for the rural poor who are dependent on the collection of the medicinal or other minor forest products.

Problems in marketing

Most NWFPs are sold without any processing or value addition. The producers'

access to consumers is limited to sales made in local villages and weekly markets. A major portion of their products is sold to intermediaries like contractors and commission agents who operate in the area. Thus, although these products reach a very large market, the market is geographically very limited as far as the producers are concerned.

The limitation in access to market is more pronounced in the case of items like handicrafts made from wood and bamboo, lac products and leaf plates. Except for a small demand in nearby villages for specific items, the rest of the market is geographically dispersed over a wide area and remains inaccessible. This is particularly true for women entrepreneurs. Burdened with other family roles which are traditionally assigned to women, they are unable to look for far-off markets. The small size of their production further aggravates the problem, causing the vicious cycle of a small market, because they have limited bargaining position.

The limited access to markets and the dependence on intermediaries have a direct effect on prices. The prices of produce - whether sold to consumers or to intermediaries - bears no relationship to the cost of labour, input and transportation. In the case of direct sales, these factors combine to depress prices. Localised activity for localised markets creates a supply which exceeds local demand. Traders in the same commodity control the market and dictate the prices.

In the case of sales to intermediaries, the situation is worse because producers have absolutely no control on prices or quantity. Studies show that the poor producers' income always remains low.

Marketing of medicinal plants in Kerala

In Kerala, the major NWFP marketing groups are the Kerala State Federation of SC & ST Development Co-operatives Limited, private traders, and the collectors themselves. The four branches of the Federation, located in Trivandrum, Adimali, Trissur and Kalpetta districts, market the medicinal and other forest produce of 34 Tribal Co-operative societies spread over different districts in the state.

Every year, the Minor Forest Products Committee allots forest areas to different tribal societies for the collection of NWFP's. To facilitate collection, societies establish collection depots inside the forests during the peak collection season. These depots are managed by commission/agents/depot managers who are mainly tribals.

When adequate quantities have been collected from the different depots, auction notices are sent by the Federation to all the parties who have registered interest in the auction.

Another marketing practice adopted by the Federation is direct negotiation. This is resorted to for sales of *Sida rhombifolia*, *Desmodium gangeticum*, *Pseudarthria viscida* and *Nilgirianthus ciliatus*. These plants are needed in the raw form and cannot be stored for long periods. Therefore, the Federation enters into an agreement with the parties interested in purchasing these items and supplies them at a mutually agreed price.

Inadequate storage facilities and lack of funds during the peak collection season are the two major hurdles that impede the smooth functioning of the society and the Federation.

In spite of the efforts of the Federation and the Forest Department, nearly 60 to 70 percent of NWFPs are marketed by private traders. The traders, therefore, exert considerable control over collectors. The private traders provide the tribals with food, clothing, and financial assistance. This in turn forces the tribals to sell their products to repay the loans. Thus a vicious circle is formed and maintained. Private traders offer higher prices than those offered by the societies, but the collectors are cheated by the traders because their products are weighed at less than their actual weight. In remote areas, where tribal societies do not function, the prices paid by the private traders are very low. The products are then transported to wholesale dealers or exported to other states.

The Federation often faces stiff competition from the private traders in procuring and marketing medicinal plants in Kerala. The private traders compete with the Federation by offering higher prices to the collectors. This results in the flow of products to the private sector and weakens the position of the Federation as a marketing agent.

Besides the Federation and private traders, primary collectors directly auction their NWFPs. This practice is found at Kottur, situated in the Agastyavanam Biological Park Range. This is locally known as Kaani chantha (Kaani market). The local tribals come together every Wednesday and Saturday to market their NWFPs. These items are auctioned off under the supervision of Forest Department officials. The auction procedure is a highly informal one when compared to that of the Federation. This is a unique marketing system in Kerala where the tribals meet together in one place to market their commodities.

The main drawback of this system is that the products are not weighed properly. Only a guesstimate is made by the auctioneer. No official sanction or recognition has been accorded to this form of marketing by the Forest Department even though it has been in existence for the last 15 years or so.

Marketing of medicinal plants in Madhya Pradesh

It is estimated that Baiga tribals in Madhya Pradesh collect more NWFPs than any other forest-dwelling group in the world. Out of a total population of 66.1 million in the state, 23.3 percent are tribals. These tribal communities largely dwell in forests and subsist on forest products.

Harra (*Terminalia chebula*), known as chebulic myrobalan, and two other commercially known myrobalans (*Terminalia bellirica* and *Emblica officinalis*), are important medicinal fruits common in Madhya Pradesh forests. Among the medicinal plants, *Terminalia chebula* has been nationalised because of its significance in employment generation and the economy of rural people, as well as in recognition of the product's economic role in industry.

Other medicinal plants collected from the forests of Madhya Pradesh for sale and trade include *Psyllium*, *Senna*, *Cinchona*, *Digitalis*, *Atropa belladonna*, and *Liquorice*. There is a market for some valeriana in the Federal Republic of Germany. While *Dioscorea*, *Ipecacuanha* and *Rauwolfia* have only limited trade potential, the local use these plants is often significant.

Although medicinal plants have tremendous economic and medicinal value, very little information is available regarding their marketing system. The entire trade is in the

informal sector. Market surveys are being conducted to identify marketing channels, price spread, prospective markets, and consumption within the country and abroad.

There are many links in the marketing chain from collectors to consumers of medicinal plants. Changes need to be made to share profits more equitably in the market channel. A detailed study of the medicinal plants collected by the rural population is necessary for stabilizing the trade and ensuring proper margins to the collectors.

Marketing in Tamil Nadu

Terminalia chebula and other medicinal plants are collected by tribals who have access to these trees. Contractors also arrange to collect products. *Chebulic myrobalans* are the main medicinal plants collected in the state. In fact, medicinal trees are frequently tended by the tribals of that area.

The role of corporations and LAMPS (Co-operative institutions) is gaining momentum in the state. The cooperative institution of the state, functioning under state control, is already the monopoly purchaser of *Terminalia chebula* and other medicinal plants. Co-operative institutions, whose members are duly elected from local members function in the collection of NWFPs, and derive the maximum benefit in marketing them.

Support prices are fixed for medicinal plants and other minor forest products through duly elected statutory bodies. The medicinal plant products are usually sold through contractors or co-operative institutions where the quantity to be sold and the sale price are periodically reviewed and fixed.

In case of *Terminalia chebula* and other medicinal plants, though the state has no direct control over the marketing pattern, it is still the owner of the produce with indirect market control over their sale.

Marketing in Maharashtra

In the tribal areas of Maharashtra, NWFPs are collected through the Tribal Development Corporation (TDC). The State Government has given the concession to the TDC to collect and transport the specified NWFPs without payment of royalty. The TDC and other corporations dealing with NWFPs have processing units to add value to the collected produce.

The NWFPs in Maharashtra are mostly sold as a standing crop. No expenditure is incurred by the government for their harvest. The total revenue realised from the NWFPs is of the order of Rs.700 million (US\$ 23 million) annually of which nearly 77 percent is from tendu leaves. Similarly, apta leaves yield a gross revenue of about Rs.700,000 (US\$ 23,000).

The Tribal Development Corporation is losing money as their overhead expenses are more than the permissible limits and hence they are unable to sell their entire produce. Neither the TDC nor the Forest Department have undertaken any market surveys to determine demand for specific NWFPs. There is also no scheme to supply a specific product to manufacturers on a sustained basis mainly because of the uncertainty of availability in the specified quantities. Bombay is the biggest market for most of the NWFPs as it is the center for pharmaceutical companies in the country.

Marketing in Gujarat

Gujarat State Rural Development Corporation (GSRDC), Gujarat State Tribal Development Corporation (GSTDC), Large Agriculture Multipurpose Society (LAMPS) and other corporations in the state related to NWFPs have played major roles in establishing the linkages between collector and buyer. As a result of this interaction, information on the extent of production and utilisation of a particular NWFP is readily available to support its intensive management. Moreover, LAMPS have helped at the grass roots level to motivate local people in their developmental activities. During lean periods, particularly during non-agricultural seasons, the societies provide alternative employment and help in the co-operative management.

The GSRDC has appointed these societies as agents during the collection season to provide local employment. The GSRDC also grants concessions, commissions, loans etc. The market wing of GSRDC is headed by a General Manager supervising different activities of NWFPs. A Senior Divisional Manager undertakes market surveys, research, intelligence, retail sales, exhibitions, publicity, advertising etc. with the help of Divisional Managers, (Marketing) and Sale Assistants. Market surveys are conducted for various NWFPs by gathering information from the local market and adjoining states through Divisional Managers.

TRIFED plays a role in gathering information through market surveys, research and intelligence to identify export markets for important NWFPs like gums, essential oils, neem seeds, mahuda flower, myrobalans etc. to insure their better utilization and management.

Despite good intentions, government-run marketing and co-operative schemes like the Forest Development Co-operatives, TRIFED, LAMPS and others, have frequently failed to get better prices for NWFPs.

The GSRDC purchases various nationalised NWFPs as per the provisions of the Gujarat State Minor Forest Products Nationalization Act, 1979. The GSRDC has been given monopoly purchasing rights in order to stop middlemen from dealing with local people. However, nationalisation reduces the number of legal buyers, chokes the free flow of goods and delays payment to the gatherers. Monopoly purchase by the GSRDC requires sustained political support and excellent bureaucratic machinery.

Transit permits are necessary for trade of various NWFPs in Gujarat. In case of nationalised NWFPs, the permits are issued by the Gujarat State Forest Development Co-operative (GSFDC) to purchasers to transport their goods from one place to another within the framework of the rules and regulations of the Gujarat State Minor Forest Produce Trade Nationalisation Act, 1979. However, the transit passes are also issued to the purchasers by the Forest Department in case of non-nationalised NWFPs. Moreover, no-objection certificate (NOC) is also given to transport NWFPs from one state to other. In this way, NWFP trade is checked and regularised by GSFDC to control illicit activities.

INCOME AND EMPLOYMENT GENERATION FROM NWFPs

NWFPs have held a secondary status relative to wood products, even though nearly 60 percent of all the recorded forest

revenue in India comes from NWFPs. Unofficial estimates place the figure even higher. Most of India's 50 million tribal people receive a substantial proportion of their cash and in-kind income from NWFPs, while about 200-300 million village people depend on products from forests in varying degrees. Most of the NWFPs are locally consumed.

NWFPs are estimated to generate 70 percent of all employment in the Indian forestry sector. Commercial NWFPs alone are estimated to generate Rs.3 billion (\$100 million) annually. NWFPs provide employment for tens of million of rural Indians who would otherwise be forced to migrate in search of jobs as agricultural laborers or marginal urban job seekers. One study estimated that NWFP collection generates over 2 million person-years of work annually and that this could be increased to 4.5 million person-years. In addition, millions of individuals are employed in NWFP processing and marketing. Yet, NWFPs generate some of the lowest wages of the rural employment sector. While the minimum wage in most states ranges from Rs.30 to 40 per day (\$1 to \$1.30), most NWFP collectors earn from Rs.5 to 15 (\$0.25 to \$0.50) per day. Low wages reflect the low productivity of the forest arising from poor management, and depressed prices imposed by state trading monopolies and private buyers (Poffenberger, 1994).

TRADE FLOWS AND INTERNATIONAL TRADE OF NWFPs

Various NWFPs are traded within India and abroad. Trade flows within the country depend upon the product requirements from

one state to another. Those commodities which are exported are generally stocked in Bombay markets. India has the monopoly trade of some NWFPs like sandalwood oil, gum-karaya obtained from *Sterculia urens* and bidi leaves, and enjoys an important place in the trade of other NWFPs. India exports a large number of NWFPs to other countries after meeting internal requirements. Current foreign exchange earnings total about Rs. 10 billion (US\$ 384 million) annually. Major NWFP exports include walnuts, cashew nuts, myrobalans, medicinal plants, sal seeds, essential oils, katha, catch, palmyra palm fibres for brushes and brooms, lac and shellac, silk and a large number of other raw materials and manufactured commodities.

PROSPECTS FOR FUTURE DEVELOPMENT OF NWFPs

It is essential for India to develop a sound forest management system. As the growth of timber species is generally slow, there is a need to propagate fast-growing species, which may be multipurpose tree or shrub species. In this endeavour, NWFP-oriented sustainable forest management is likely to ameliorate the situation because the growing of economic species will be appreciated by the people. Species selection will most often depend on potential end uses and economic prospects. It will also be preferable to raise multi-tiered plantations of profitable tree, shrub and herb species by developing appropriate agroforestry, social forestry, and farm forestry models. These should involve people's participation, as should traditional forest department plantations. NWFPs include all the economic species of vegetational wealth and therefore, have a large potential for meeting the global

challenges of maintaining biodiversity and promoting socio-economic development.

RECOMMENDATIONS FOR DEVELOPING NWFPs

Problems should be tackled with a multi-pronged approach to ensure the integrated development of forest resources, particularly NWFP species. The various tasks which should be addressed in a well planned manner include the following:

- Research
- Training
- Extension
- Follow up-actions.

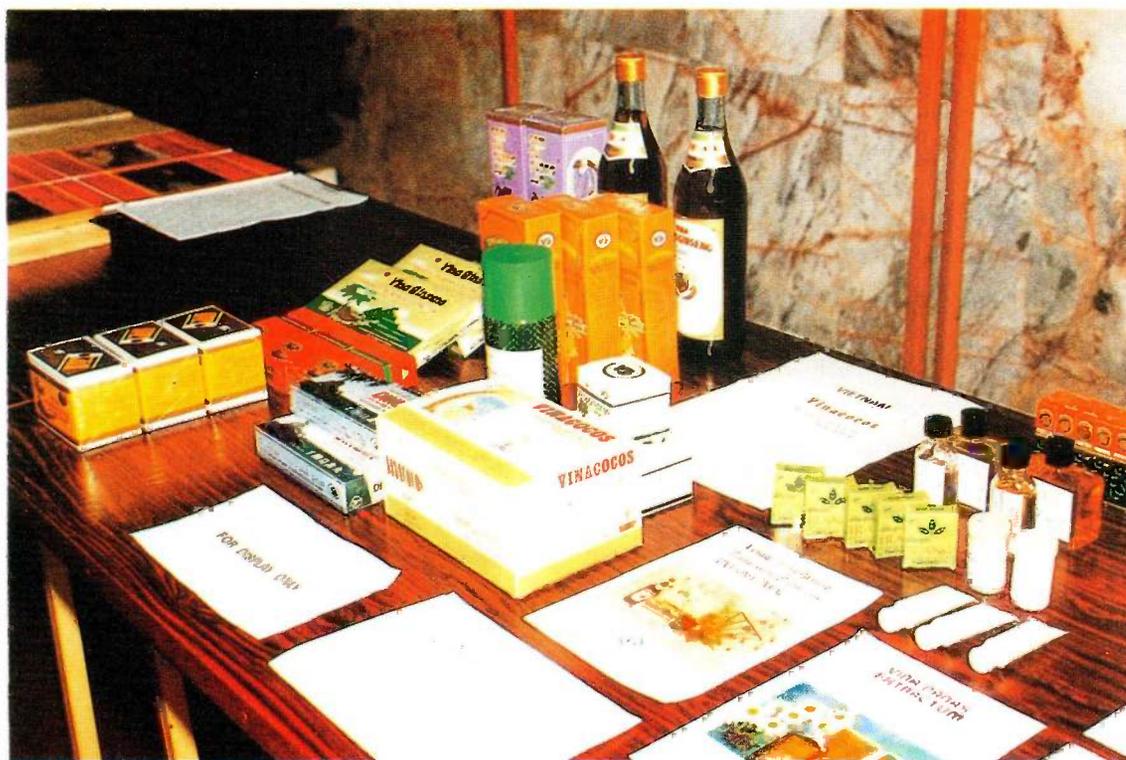
The details of each component must be formulated to tackle the problems of NWFP development. Consultations on NWFPs may further define the strategies below:

- introduce proper methods of collection/harvesting of NWFPs from the naturally regenerating forest;
- create plantations for replenishing the growing stock simultaneous to collection/harvesting;

- undertake adequate research relevant to the problems relating to NWFPs;
- develop economically viable models for planting on public lands;
- develop integrated resource development plans for management of NWFPs;
- develop processing, product refinement and manufacturing of value-added products for fetching better returns;
- identify the property rights of village and forest dwellers relative to NWFPs;
- inform the people about their rights in forest and community lands;
- improve trade and marketing practices while giving due consideration to the institutional aspects;
- popularise Joint Forest Management (JFM) to increase productivity and provide protection to forest resources;
- enhance publicity on all issues related to NWFPs;
- encourage a change in attitudes toward NWFPs on the part of all those involved in forest management.

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Medicinal plant products are increasingly accepted in Western as well as Asian markets.

IMPORTANCE OF NWFPS TO FOREST-DEPENDENT COMMUNITIES IN NAGTIPUNAN, QUIRINO, PHILIPPINES

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INTRODUCTION

Background

This paper is based on the results of activities conducted by the Technologists for Optimal Programming Development, Inc. (TOPDI), under the USAID-funded Natural Resources Management Program-Conservation and Development of Residual Forests (NRMP-CDRF) of the Philippine Department of Environment and Natural Resources (DENR). The objective was to find an alternative management scheme for forests with Timber Lease Agreements (TLAs), which had either been cancelled or expired. This is one of three projects in the Philippines addressing the conservation and development of residual forests, taking due consideration of forest-dependent communities.

This undertaking can be briefly described in terms of the major activities, namely: (1) a comprehensive forest resources inventory, which assessed and characterized of the biological and physical attributes of the 8,000 hectare forest project site; (2) a community resources inventory, which examined the interrelationships between and among communities and forests; and (3) the preparation of a forest resource management plan which made use of the results of the forest and community resources inventories.

Project location and setting

Location: The 8,000 hectare CDRF project area is a typical logged-over forest. It is part of a cancelled TLA with a total area of 68,650 hectares situated in the Sierra Madre mountain ranges within the provinces of Aurora and Quirino, northeastern Luzon, Philippines. It encompasses two communities: Barangays Landingan and Wasid, both under the political jurisdiction of the municipality of Nagtipunan, in the province of Quirino.

Climate: The project site is relatively wet from June through November, and dry from December through May, when the prevailing weather pattern is the northeast monsoon. The driest month is February, with rainfall of about 39 millimeters, while the wettest month is October, with about 267 millimeters. The average annual rainfall is about 1,934 millimeters.

Temperatures range from 21.0°C to 27.3°C. The coldest month is February, while the hottest months are May and June. The relative humidity ranges from 80 percent to 91 percent and is highest during August and September.

Geographically, Landingan lies along a typhoon path that has an average of five

typhoons a year when weather disturbances peak from July to November. The Sierra Madre Mountain range serves as a buffer to the strong winds.

Accessibility: The project site is about 395 kilometers north of Manila, following concrete, asphalt, and dirt roads. The nearest commercial airport is at Cauayan, Isabela, approximately 120 kilometres north of the project site.

FOREST RESOURCES

Physical resources

Geology and soils: The geologic material is mainly shale and limestone. The prevalent soil color and texture is reddish clay loam near built-up areas, black clay loam in the forested zone, and brownish sandy loam in the open grassland areas. Soil depth ranges from 30 to 50 centimeters.

Watershed resources: The project area is drained by a network of creeks and tributaries that flow to the Conwap River, one of the tributaries of the Cagayan River, the largest river system in the Philippines. The northeastern part is drained by the Disabungan River and by the Dimagsanga, Dibuni, Makatka and Diandian creeks. The area in the southwest is drained by two big rivers, i.e. the Ngaden and Nangongoyan, which in turn are fed by numerous creeks.

Land use and vegetation: The project area contains old growth forests, second growth or residual forests, open or idle grasslands, and kaingin farms. The greater part of the area consists of residual forests (70.85 percent).

The dominant weeds include hagonoy (*Chromolaena odorata*), cogon (*Imperata*

cylindrica), *Themeda* spp. and other shrubs and grasses. Major tree species such as narra (*Pterocarpus vidalianus*), dipterocarps and lesser-known species abound within the project area.

Biological resources

Timber: Stand and stock tables were generated for various timber species groups (common hardwoods, construction and furniture wood, light hardwood, other species, narra), and for all species. The overall stand and stock table for the Landingan and Wasid management blocks are given in table 1.

For Landingan, the table reveals that there are about 195 trees per hectare with a corresponding basal area and volume of 19.24 square meters and 128.23 cubic meters, respectively. For Wasid, the number of trees, basal area and volume per hectare are 177.37, 18.64 square meters and 140.29 cubic meters, respectively.

Stand and stock tables were also generated for the more significant non-wood forest products (NWFPs) such as rattan, erect palms, and bamboos. Table 2 shows the average stocking per hectare for these NWFPs for the two sites.

Biological diversity: Surveys revealed that there are 36 families of plants, 34 of birds, 6 of mammals, 3 of reptiles and (1 amphibian family at the site. The dominant floral family is Dipterocarpaceae.

Some endangered species like the cloud rat, the bleeding-heart pigeon and the Philippine deer are present in the project area. There are abundant wildlife species for food consumption including wild chicken, wild pig, fruit bats, common doves and pigeons.

DBH class (cm)	Average # trees/ha.	Average basil area(sq.m./ha)	Average volume(cu.m/ha)
Landingan Site:			
20	80.54	2.4063	11.1983
30	50.49	3.4678	19.9049
40	34.17	4.1015	27.1463
50	14.41	2.7152	20.0336
60	6.72	1.8519	14.1047
70	3.65	1.3597	10.6578
80	2.06	1.0186	7.7596
90	0.96	0.6012	4.8926
100~	1.59	1.7177	12.5368
Total	194.58	19.2399	128.2346
Wasid Site:			
20	73.17	2.1932	12.0381
30	42.23	2.8709	18.3018
40	31.13	3.7749	28.1531
50	14.89	2.7921	23.3115
60	7.45	2.0892	18.4102
70	3.51	1.3016	11.8564
80	2.35	1.1668	10.0762
90	1.09	0.6864	6.0649
100~	1.54	1.7646	12.0812
Total	177.37	18.6397	140.2934

NWFP	Average number per hectare	Average length/height per hectare (meters)
Landingan Site:		
Rattan	6.67	48.04
Palms	3.26	10.63
Bamboo	14.37	121.26
Wasid Site:		
Rattan	8.66	82.86
Palms	2.82	18.63
Bamboo	15.52	139.27

COMMUNITY PROFILE

Other non-wood products are also utilised for subsistence needs by the communities.

The present users of the forest, essentially hunters and gatherers, come from two

communities (Barangays Landingan and Wasid) in the municipality of Nagtipunan, Quirino.

Socio-cultural and demography

Demography, ethnic composition and migration: The project site is occupied by 153 households with a total population of 775, the majority of which are between 15 and 60 years of age. The average household size is 5.19, while the population density is about one person for every 20 hectares. The average annual growth rate is 3.42 percent.

The majority (61.42 percent) of the residents of the project site are Ilongots. All the others are migrants (38.58 percent) such as Ilocanos, Itawes, Yogads, Tagalogs, Pangalatoks, Igorots, etc. These migrants came for various reasons such as: availability of work and land for agricultural purposes, peace and order, intermarriages and kinship.

Labor force: Out of the total population, 287 people (or 37 percent) are part of the actual labor force in the project site. As of 1993, both potential and actual workers (15-60 years age bracket) accounted for about 52.9 percent of the total population.

Literacy and education: Residents of the communities have very low literacy levels because of: a) education limited to the primary level; b) distance of the communities to population centers with higher education facilities; c) poverty; and d) weak motivation among the residents of the communities. Nevertheless, the residents have expressed interest in learning skills in woodworking and basket weaving. In Barangay Wasid, the National Economic and Development Authority (NEDA) is currently sponsoring adult literacy classes.

Socio-political organizations: Relationships, inter-actions, and activities among the local residents are governed by existing organizations. The membership of the Barangay Council consists of all adult male members of the community. Their practice of democracy is combined with their tribal tradition, where a decision is reached only when all agree upon it.

The women and the youth have no voice in making decisions in the community. Women's duties are confined to the kitchen, caring for children, fixing the house, and other household chores. Their occasional presence at assemblies is to represent their husbands, but they cannot vote. The youth must show accomplishments in the Kabataang Barangay before they are allowed to participate in decisions pertaining to the community.

Another key organization is the Ilongot Christian Bible Fellowship, a religious organization composed of Ilongots in the community. In this group, not only is the word of God studied and analyzed, but issues and problems in the community are also taken up. Here men, women, and the youth are heard, although the elders always have a dominant influence.

Generally, the political aspects of barangay administration are handled by the elected officials, while the elders dominate in resolving social conflicts (e.g. marriage, land claims) as these require due consideration of culture and traditions in the decisions.

Resolution of conflicts: When conflicts arise, usually the problem is easily resolved by the elders in the community.

System of cooperation: There are two ways in which undertakings are shared: (1)

individual help on the farm, called *ammuyo*, where service is reciprocated by service; and (2) by *bayanihan*, which is a voluntary service to undertake community projects without any repayment.

Access to basic services: The Local Government Unit (LGU) had plans to put up a mini-hydro power plant, but this met with negative reactions from the residents for environmental reasons.

Infrastructure: A dirt road links the town proper to the project site. The road is generally passable only during the dry season. Tributaries of the Conwap River crisscross this road and there are no bridges. The LGU has plans to upgrade the 47 kilometrer road to an all-weather road leading to the different Barangays.

School houses, which are also used as adult learning centers, are only adequate for school-age children in the primary grades.

However, more buildings are needed for additional grade levels. Recreational facilities, such as a paved basketball court, are available in Barangay Landingan.

Livelihood

Kaingin: Kaingin (shifting cultivation) is the major source of livelihood for the upland farmers (73 percent in Landingan and 80 percent in Wasid). In both Barangays, corn and banana are the principal commercial crops grown. Other subsistence crops include rice, fruits and vegetables. Barangay Wasid is more dependent on subsistence kaingin farming than Barangay Landingan, due to lack of access to markets.

Commercial forest products extraction: Most of the residents in both barangays (50.5 percent for Landingan and 35.8 percent for Wasid) are heavily dependent on

Table 3. Major crops produced and product disposal, Barangays Landingan and Wasid.

Crops	Purposes	Percent distribution	
		Wasid	Landingan
Corn	Sale	85	85
	Seed stock	5	5
	Consumption	10	5
	Animal feed	2	5
Banana	Sale	85	75
	Consumption	8	20
	Give awaay	5	5
Upland rice	As food	95	95
	Seed stock	5	5
Pineapple	As food		50
	Give away		50
Peanut	Sale		90
	As food		5
	Seeds		5
Vegetables	As food		90
	Sale		10

forest products extraction. The greater part of the residents' income comes from timber extraction, particularly narra. It is the biggest source of cash income for all households engaged in this activity in Landingan, and the second highest source of cash income for Wasid residents.

At the community level, Landingan is commercially extracting narra at the rate of 267,340 board feet annually, with a gross value estimated at P2,407,959, while Wasid's rate is 126,012 board feet valued at P1,181,397. A small volume is extracted for home use, but most is sold.

Narra extraction involves the use of a chainsaw in felling and splitting the log into flitches and/or slicing the flitches into lumber right at the stump site. The wood is transported by water buffalo (carabao) or manually hauled along a logging road or river bank and loaded onto a truck or river transport.

Subsistence forest products extraction: Both communities engage in subsistence extraction of wildlife, fish, and other non-wood forest products, shadow priced at P508,479 and P361,046 for Landingan and Wasid, respectively. Fish and wildlife are the NWFPs most commonly utilised for subsistence, accounting for at least 80 percent of the total subsistence value of NWFPs (i.e. excluding wood products) for Landingan, and at least 60 percent for Wasid.

SOCIO-CULTURAL DIMENSIONS OF NWFPs

Boundaries and use of forest land: There are clear boundaries between the different

barangays within the project area. These boundaries are in the form of ecological divides such as waterways, ridges, etc. Even if residents of the two barangays belong to the same tribe, they have a clearly accepted rule that neither community can intrude upon, or gather products from, the jurisdiction of the other.

The communities use their forest for multiple purposes: other than being their source of livelihood, they revere some portions as being sacred, as taught by their ancestors. They look up to their forest as their ultimate home; this attachment to the forest causes them to be suspicious about development projects, as these are perceived as disguised attempts to take their lands away. With a claim over the forest as ancestral domain, the Ilongots exercise almost absolute control in the use of their forest, except in the application of existing government forestry rules and regulations, particularly those concerning the harvesting of timber.

Land ownership: Many residents claim portions of the forest as their property, especially the clearings (kaingin) they have made. Arable lands near the built-up areas of Landingan and Wasid are claimed by the residents through tax declarations. No land ownership has been supported by land title to date. As to the forest land where the project is sited, the communities claim ancestral domain, which the government recognises by way of granting these communities a Certificate of Ancestral Domain Claim (CADC).

Table 4. Subsistence forest products extraction in Lindingan and Wasid				
Product	Unit of measure	% of households involved	Unit shadow price (pesos)	Total shadow price value (pesos)
LANDINGAN:				
Fish	kg.	65	46.30	368,324
Wild pig	kg.	46	58.40	44,258
Construction wood	bd.ft.	30	4.31	37,818
Deer	kg.	21	56.84	24,938
Fuelwood	cu.m.	60	24.26	11,669
Narra	bd.ft.	9	8.33	11,540
Wild chicken	kg.	14	50.32	5,190
Rattan	Poles,9'	22	3.47	1,746
Monkey	kg.	7	47.50	1,642
Cogon	bundle	8	2.95	594
Betel nut	pc.	2	1.00	230
Shells (agurung)	plate	2	5.00	192
Orchids	pc.	2	10.00	115
Shrimps	kg.	2	1.00	96
Ikmo leaves	pc.	2	0.10	58
Monitor lizard	head	2	25.00	48
Wildcat	kg.	2	10.00	19
Shells (empty)	kg.	2	0.10	2
Total				508,479
WASID:				
Construction wood	bd.ft.	63	3.84	121,165
Narra	bd.ft.	25	8.78	100,486
Fish	kg.	76	37.61	66,800
Deer	kg.	28	59.55	22,918
Wild pig	kg.	29	60.50	16,133
Cogon	bundle,10"	51	4.94	14,620
Rattan	pole,9'	26	4.24	8,085
Birds	kg.	6	5.00	3,754
Wild chicken	kg.	11	60.00	1,630
Monkey	kg.	6	60.00	1,453
Buri palm	pcs.	3	10.00	1,306
Orchids	pcs.	15	16.00	951
Wildcat	kg.	3	20.00	870
Betel nut	pcs.	3	4.00	435
Buho (bamboo)	pcs.	3	2.00	209
Anibong palm	pcs.	3	100.00	209
Herbal medicine	various	3	2.00	22
Total				361,046

FOREST MANAGEMENT PLANNING AND NWFPS

A Resource Management Plan (RMP) was prepared after a series of consultations with the residents of the affected barangays, the DENR, and the Local Government Units (LGUs). A multi-resource, multi-objective integrated forest management plan evolved from this project.

The management strategy captures the unique cultural configuration of the local people (e.g. ancestral land rights) and a down-to-earth translation of people empowerment. Consideration was given to adapt the plan to the biophysical and community characteristics determined by the comprehensive resources inventories.

A unique feature of the plan is the provision to maintain the present level of subsistence forest products extraction, bringing non-wood forest products into focus. Moreover, the plan recognises the need to include NWFPs, inasmuch as they contribute

significantly to the welfare of the forest-dependent communities. Consequently, this will lessen the pressure on timber extraction, leading to greater sustainability and equity in the long run.

CONCLUSIONS AND RECOMMENDATIONS

The project resulted in valuable lessons in the socio-politico, biophysical and resource management planning context. Foremost among these lessons are the indispensable involvement of communities and local people, strong resistance and pressure from the socio-politico milieu, and the professional growth of the physical and resource planners.

The resource management plan produced under the project is a major departure from typical timber-oriented forest management plans. It manifests the growing awareness that NWFPs are resources too important to be ignored in forest management planning.

USE OF NON-WOOD FOREST PRODUCTS BY VILLAGE COMMUNITIES IN SRI LANKA

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INTRODUCTION

The island of Sri Lanka has a land area of about 6.5 million hectares. Topographically, the country consists of a highland area in the south central part of the island which rises to about 2,500 metres, and lowland plains which surround it. The climate is tropical and maritime. Three major climatic zones can be recognised based on the rainfall pattern: the wet zone (over 2,500 millimetres per year), the intermediate zone (1,900-2,500 millimetres per year) and the dry zone where dry conditions prevail from May to September (below 1,900 millimetres per year). The natural vegetation follows the pattern of the country's climatic zones. In the wet zone, tropical wet evergreen forests form the climax vegetation type. From the southwestern lowlands, the vegetation gradually changes as it reaches the central mountains. At elevations of 1,000-1,500 metres, the natural vegetation is classified as sub-montane evergreen forest, and at still higher elevations, as montane evergreen forest. The characteristic natural vegetation of the dry zone is tropical dry mixed evergreen forests. The natural vegetation in the intermediate zone is moist semi-evergreen forest.

The rapid population increase in Sri Lanka over the past few decades has had its impact on the country's natural forest cover. The closed-canopy forest has diminished at an alarming rate, and at present it is estimated

to be only 23.8 percent of the country's land area. In the densely populated wet zone, the closed canopy forest is in a critical state, and represents only about 8 percent of the land area. The rate of deforestation in the country during the last few decades has been estimated to be around 45,000 hectares per annum.

Currently, Sri Lanka has a total population of 17.4 million. About 78 percent still live in rural areas. An estimated 30 percent of the rural population utilise some kind of non-wood forest product (NWFP), and about 4 million people in Sri Lanka derive some benefit from NWFPs. However, until recent times, the economic value of a forest was considered primarily in terms of the value of the timber or fuelwood which the forest could supply. Resources were allocated primarily for the development of timber resources, with little attention paid to NWFPs. Thus, the thousands of plants and animal species which provided goods and services for the benefit of millions of people (particularly those living close to the forests), were ignored. According to a recent study carried out in Sri Lanka, the value of NWFPs from lowland rain forests has been estimated to be US\$ 300 per hectare per year. These NWFPs provide a diverse array of materials which enrich and enhance rural life and also provide employment and income for rural people.

NON-WOOD FOREST PRODUCTS

According to the FAO (1991) definition, NWFPs include all the marketable or subsistence goods and services obtained from forests other than timber and fuelwood. However, in this report, emphasis will be given to non-wood forest goods rather than services. The major categories of NWFPs covered by this report are:

- Bamboo
- Rattan
- Medicinal plants
- Edible plants
- Wildlife for meat
- Kitul products (products of *Caryota urens*)
- Bees' honey
- Shifting cultivation (Chena cultivation)
- Grazing

This report is based primarily on the findings of a bamboo and rattan research project implemented by the Forest Department (1984-87); a study on the traditional uses of the forest carried out by the Forest Department in collaboration with the International Union for the Conservation of Nature (IUCN) in 1992-93 and socio-economic surveys carried out in wet zone forests by the University of Peradeniya, in collaboration with the Forest Department and IUCN. This report does not include the collection of water, resins, gems, clay, stones and minerals etc. from the forests.

PRESENT STATUS OF COLLECTION AND UTILIZATION OF NON-WOOD FOREST PRODUCTS

Rattan

The uses of rattan range from construction material for housing (wattle and daub houses) to raw material for furniture, kitchen utensils and rope. Rattan is one of the most important raw materials for cottage industries. At present, the rattan industry operates on a commercial basis in 13 out of 25 administrative districts in Sri Lanka, but production has declined recently due to shortages of raw material. According to surveys conducted in formulating the Master Plan for Handicraft Development in Sri Lanka (1987), about 2,100-2,200 persons earn their primary family income from the rattan craft industry. This figure, however, includes only those persons who earn over one third of their income through the craft. Full-time and part-time workers are nearly equal in number, as are males and females. Table 1 provides information on income and employment distribution in the rattan industry.

Some workers are engaged only in the cottage industry production, while others work in all stages of production, from collecting raw materials to processing and selling rattan products. A third category of workers includes gatherers who only collect raw material, either for their own subsistence consumption or for sale to other crafts workers.

A study carried out by the Forest Department (Epitawatta, 1994) indicates that in almost every village near the wet zone forests, between 20 percent and 60 percent

District	No. of workers	No. of families	Full-time		Part-time		Income
			M	F	M	F	
Gampaha	20	-	20	-	-	-	main source, low
Ratna-pura	30	-	-	55	15	5	fair
Galle	20	-	19	-	-	-	reasonable
Matara	10	7	-	-	10	-	substantial
Kurunegala	150	40	60	20	60	10	fair
Badulla	60	8	-	-	20	40	inadequate
Monaragala	60	-	10	30	10	10	substantial
Hambantota	10	8	-	-	10	-	small
Polonnaruwa	600	-	250	186	80	84	good
Puttalam	160	15	50	30	50	30	significant
Batticaloa	900	600	105	165	255	375	remarkable
Vavuniya	150	25	9	45	6	90	supplementary
Total	2170	700	528	481	501	604	

Source: De Zoysa and Vivekanandan (1991)

of villagers collect rattan, either for commercial purposes, or for their own subsistence consumption. This situation is different in the dry zone where the collection of rattan is confined only to certain areas. In some dry zone areas (e.g., Dimbulagala), more than half of all villagers earn substantial income from rattan collection and cottage industry production.

In Sri Lanka, rattan comes primarily from the natural forests. Of the 10 native rattan species widely used in the rattan industry,

three are large-diameter species and the others are small diameter. Table 2 lists these different species, along with their distribution in the country.

The main marketing channels for rattan products are handicraft and furniture shops in major cities in the country. Due to their small-scale production, craft workers lack capital and very often depend on middlemen for marketing. Sri Lanka earns foreign exchange from exporting rattan products to six or seven countries. In 1986, Sri Lanka

Species	Diameter	Distribution
thambotu wel (<i>Calamus zeylanicus</i>)	2.5 cm	Wet Zone
sudu wewel (<i>Calamus ovoideus</i>)	2.5 cm	Wet Zone
ma wewel, wanduruwel (<i>Calamus thwaitesii</i>)	3.5 cm	Wet and intermediate zones, (Dry zone - Ritigala only)
heen wewel, kola hangala (<i>Calamus pseudotenuis</i>)	1.5 cm	Wet Zone
kaha wewel, ela wewel (<i>Calamus rivalis</i>)	1.5 cm	Intermediate and wet zones
<i>Calamus delicatulus</i>	1.0 cm	Wet zone
heen wewel, Polonnaru wel, pirambu (<i>Calamus rotang</i>)	1.0 cm	Dry Zone
kukulu wel (<i>Calamus didlitanus</i> , <i>C. radiatus</i> , <i>C. pachystemonus</i>)	0.5 cm	Wet Zone

Source : De Zoysa and Vivekanandan (1991)

earned US\$ 50,000 from both bamboo and rattan products. However, at present, export of bamboo and rattan products is negligible because quality has declined.

Bamboo

Bamboo is another group of species utilized in daily life by people throughout the country. In addition to its major use as a construction material, bamboo is used in the production of furniture and domestic utensils such as baskets and ornamental items. In the construction industry, bamboo is used for scaffolding and for construction of temporary structures, water lines, and fences. Bamboo is very effective in reducing stream and river bank erosion, and is commonly planted for this purpose.

According to surveys carried out during the formulation of the Master Plan for Handicraft Development in Sri Lanka (1987), the number of workers engaged in bamboo craft production is fewer than those engaged in rattan production. Table 3 shows employment and income levels in the bamboo industry.

Five species of bamboo are commonly used in Sri Lanka. Three are native, and two are introduced species. Both native and

cultivated species provide raw material for the bamboo industry. Traditional production of basketware, bamboo flutes, ornamental items etc. is based on native species, while the two introduced large-diameter species are used primarily as wood substitutes in the construction industry. The three native species (bata species) grow primarily in natural forests in the wet and intermediate zones. Distribution of these species is shown in table 4. The two introduced bamboo species, common bamboo (*Bambusa vulgaris*) and giant bamboo (*Dendrocalamus giganteus*), are found primarily in non-forest areas such as home gardens, road sides and river banks.

Unlike rattan, the bamboo industry does not totally depend upon natural sources, but the percentage of bamboo harvested from natural forests is unknown. The number of villagers involved in bamboo collection and cottage industry production is generally lower than for rattan. In wet zone areas, 10 to 50 percent of villagers are involved in this activity. Since the natural distribution of bamboo species is confined only to the wet and intermediate zones, people living in the dry zone are generally not dependent on this industry.

District	No. of workers	No. of families	Full-time		Part-time		Income
			M	F	M	F	
Gampaha	220	100	33	143	4	40	main source
Kalutara	40	10	10	30	30	-	substantial
Ratnapura	90	-	10	20	30	30	poor
Galle	15	10	2	3	6	4	insignificant
Matara	120	100	-	-	-	120	reasonable
Kandy	60	-	5	35	5	15	supplementary
Kegalle	20	-	-	15	-	-	inadequate
Kurunegale	120	30	40	10	60	10	fair
Badulla	5	-	-	-	5	1	supplementary
Total	690	250	100	230	260	104	

Source : De Zoysa and Vevekandan (1991)

Name	Diameter (cm)	Distribution
Bata (<i>Ochlandra stridula</i>)	1 - 2.5	Wet zone lowlands
Bata (<i>Davidsea attenuata</i>)	1 - 2.5	Wet and intermediate zone mountains
Bata (<i>Pseudoxytenanthera manadelpa</i>)	1 - 2.5	Wet and intermediate zone mountains

Source : De Zoysa and Vevekanandan (1991)

Products from kitul (*Caryota urens*)

Kitul (*Caryota urens*) is a multipurpose tree species found in natural forests and home gardens in the wet and intermediate zones, at altitudes between 200-1,500 metres. This species provides a variety of popular products, of which the sap is the most important. Kitul sap is the base for local beer (toddy), treacle and jaggery. Treacle and jaggery are sugary substances which are used in preparing a variety of traditional sweets. Hence they have a good market throughout the country. Kitul sap is obtained by tapping the inflorescence. The sap is heated to produce treacle and jaggery. In producing toddy, the sap is fermented with natural yeasts. Other non-wood kitul products include the sago-like pith, which forms a valuable food, and kitul fibre which is obtained from the leaves.

Kitul tapping has a long history in Sri Lanka. There is even a special cast (hakuru), who make their living from kitul tapping and jaggery making, but also generate a large proportion of the rural economy.

There are two main kitul-tapping areas in the state forests. The largest is in the southern and south-western part of the country (Ratnapura, Galle and Matara districts). Smaller clusters are found in the central highlands (Kegalle and Kandy districts). As kitul is a wet zone species, no

kitul-related activities are found in the dry zone. The kitul palm reaches maturity and bears flowers after about five or six years. Tapping is seasonal as the sap is produced mainly in the rainy season. The peak production times are from August to March. The income generated by villagers from this activity is sufficient for their normal livelihood. Although some engage in this work as a part-time occupation, many others regarded this as a full-time job. Around 20-30 percent of the villagers in the wet zone engage in this activity as a source of income. In most of the wet zone forests, kitul products generate over 70 percent of NWFP income for village communities. The average value of kitul products from lowland rain forests (in the wet zone), is around US\$ 200 per hectare per year. Table 5 indicates the income from kitul products in some selected forests in the wet zone. Both men and women participate in kitul tapping and processing. Men tap the inflorescence and collect the sap, while women boil the treacle and produce the jaggery.

Though production is localised, there is a high demand for kitul products all over the country in both rural and urban markets. The marketing structure of kitul has not been studied well. Products are marketed either through middlemen or directly by producers. One of the basic problems in marketing jaggery and treacle is the lack of quality

Forest	Extent (ha)	Ave. income from forest (Rs/ha/year)	Income from kitul (SL Rs/ha/year)	% income from kitul
Dellawa	3,394	13,085	9,260	70.7
Eratne-Gilimale	4,920	17,564	15,749	89.6
Kalugala	2,892	10,479	2,399	22.8
Bambarabotuwa	4,540	15,675	13,741	87.6

US\$ 1 = SL Rs. 50

control measures. Kitul toddy marketing has been seriously affected by current legal restrictions. As a result, toddy is either consumed by the tappers or sold secretly in villages. Kitul products are not exported at present.

Edible plants

Until the early years of this century, rural communities in Sri Lanka relied heavily on the forests to meet their requirements for food. Since then, this reliance has declined for a variety of reasons, including the introduction of commercial crops, depletion of the forest cover and the influence of modernization. Today, the role of edible plants may not be very important at the national level, but quite a large number of people who live in the vicinity of forest areas still depend on the forests for some of their food needs. According to a recent survey, a clear link between major vegetation types (forest types) and food collection habits has been identified. In the intermediate and dry zone forests, collection rates are high (65-70 percent of households), while in montane zone forests, far fewer people collect food from the forests (20 percent of households). Distance from the forest is also a significant factor in the collection of edible plants.

There are two major groups of edible plants - edible higher plants and fungi

(mushrooms). Most of the parts of edible higher plants such as roots, tubers, bark, leaf, flowers, fruits and seeds, are used as food.

Mushrooms

Mushroom collection is a country-wide activity in every forest type, but there is considerable variation in the types of mushrooms found in the natural forest. In the wet zone, kamal hathu and aturuhatu mushrooms are common. In the dry zone, indololu and several other types are common.

Generally, mushrooms are collected by villagers for domestic consumption only. Collection for sale is very rare.

Edible higher plants

- **Yams** - Surveys show four major types of yams are collected. These are: katuala, gonala, jamburala and hiritala (*Dioscorea* spp). The katuala yam is the most common. Harvesting yams from the forest for domestic consumption is an island-wide activity.
- **Fruits** - Fruits of goraka (*Garcinia cambogia*), madu (*Cycas circinalis*), beraliya (*Monochoria hastata*), hal (*Jateria copallifera*), gal siyambala (*Dialium ovoideum*) and wood apple

(*Feronia limonia*) are consumed as both fruits and vegetables.

- **Seeds** - Dried seeds of mee (*Palaquim grande*) are used for extraction of edible oil.

Many other food items collected from the forest are consumed as vegetables or fruits. Some of them (seeds) are used for extraction of edible oil. Some of the more common edible forest plants are listed in table 6. Most foods are used for household consumption, although a limited number of items, in limited quantities, are sold in markets.

Medicinal plants

In Sri Lanka, the use of medicinal plants obtained from the forest dates back many

centuries. Even today, medicinal plants play an important role in the indigenous medical system, especially in rural areas. The flowers, roots, bark, and leaves of numerous forest plants are used to cure a variety of health problems. Medicinal plants are collected from the forest for both domestic use and sale. Medicinal plants are used mainly in the indigenous system of general medicine, osteopathy and for treatment of snake bites. Medicinal plants are also used in native veterinary medicine.

Shops selling indigenous medicines and herbal preparations are common in both rural and urban areas. These shops supply most of the native medical practitioners and their patients who do not have access to forests to meet their own requirements. The shops purchase material from collectors or middle men on a wholesale basis.

Table 6. Common edible plants gathered from Sri Lankan forests

Local name	Latin name
Aralu	<i>Terminalia chebula</i>
Bulu	<i>Terminalia belerica</i>
Ela-batu	<i>Solanum xanthocarpum</i>
Embilla	<i>Antidesma zeylanicum</i>
Ambul-pera	<i>Psidium gaujava</i> (A wild form of)
Bada, Amu	<i>Paspalum scrobiculatum</i>
Bedunru	<i>Polypodium quercifolium</i>
Damba	<i>Syzygium assimile</i>
Dan	<i>Syzygium sp.</i>
Desa-ala	<i>Alocasia indica</i>
Divul	<i>Feronia limonia</i>
Diya-habarala	<i>Monochoria hastata</i>
Diya nilla	<i>Klugiaa notoniana</i>
Gal-annasi	<i>Ananas comosus</i>
Galsiyambala	<i>Dialium ovoideum</i>
Goraka	<i>Garcinia cambogia</i>
Geta-kola	<i>Hedyotis auricularia</i>
Gona-thampala	<i>Amaranthus sp.</i>
Habarala	<i>Alocasia macrorrhiza</i>
Hatawariya	<i>Asparagus racemosus</i>

Hathu (Bimmal)	<i>Fungi</i>
Heen-bovitiya	<i>Osbeckia octandra (Medicinal)</i>
Himbutu	<i>Salacia reticulata</i>
Iramusu	<i>Hemidesmus indicus</i>
Kara	<i>Canthium coromandelicum</i>
Katu-ala	<i>Dioscorea pentaphylla</i>
Kebella	<i>Aporosa lindleyana</i>
Kekatiya	<i>Aponogetova jacobseuii</i>
Kiri-ala, Gahala	<i>Colocasia esculenta</i>
Kiri-anguna	<i>Wattakaka</i>
Kiri-madu	<i>Merremia umbellata</i>
Kitul	<i>Caryota urens</i>
Kohila	<i>Lasia spinosa</i>
Kok-mota	<i>Ariocaulon sexangulare</i>
Kos	<i>Artocarpus heterophyllus</i>
Kurundu	<i>Cinnamomum zeylanicum</i>
Lenatheri	<i>Areca conciina</i>
Ma-dan	<i>Syzygium cumini</i>
Madu	<i>Cycas circinalis</i>
Maha beraliya	<i>Shorea megistophylla</i>
Malithiya	<i>Woodfordia fruticosa</i>
Maran	<i>Syzygium zeylanicum</i>
Miyana (Fern)	<i>Polygonum chinense</i>
Mora	<i>Euphoria longana</i>
Mussanda	<i>Mussanda frondosa</i>
Nelli	<i>Phyllanthus emblica</i>
Palu	<i>Manilkara hexandra</i>
Paththara-werella	<i>Blechnum orientale</i>
Pera	<i>Psidium gaujava</i>
Polpala	<i>Aerva lanata</i>
Ranawara	<i>Cassia auriculata</i>
Siyambala	<i>Tamarindus indica</i>
Thebu	<i>Costus speciosus</i>
Thora	<i>Cassia thora</i>
Thumba karawila	<i>Momoridica diocia</i>
Uguressa	<i>Flacourtia ramontchi</i>
Wal-del	<i>Artocarpus nobilis</i>
Wal-laula	<i>Chrysophyllum sp.</i>
Wali-damba	<i>Syzygium umbrosum</i>
Weera	<i>Drypetes sepiaria</i>
Wel-ala	<i>Dioscoarea alata</i>
Wel-kohila	<i>Syngonium podophyllum</i>
Wel-penela	<i>Cardiospermum halicacabum</i>

The largest volume of medicinal plants collected, and the highest family incomes from the collection of medicinal plants, have been recorded from the savannah forests in Bibile. In this area, the average family income from the collection of medicinal plants represents around 70 percent of the total income derived from the collection of NWFPs, and over 60 percent of the villagers are involved in this activity. In most other areas of the country, family income derived from the collection of medicinal plants is very low and the involvement of village people ranges from 20 to 55 percent. A list of some of the important medicinal plants which are obtained from the forests by village communities are given in table 7. Medicinal plants from Sri Lanka are being exported to a large number of countries and the value of these exports in 1993 amounted to US\$ 2 million.

Wildlife meat

According to the current Fauna and Flora Protection Ordinance, hunting of any animal in wildlife reserves and sanctuaries, and hunting of protected animals in other forests, is prohibited. Despite these legal restrictions, recent studies show that villagers in peripheral areas still use wildlife meat to supplement their diet. Thus, wildlife meat is an important source of protein in the diet of poor people in rural areas. The percentage of villagers who engage in hunting is greater in the dry zone (about 50 to 60 percent) than in the wet zone (about 6 to 10 percent). More than 80 percent of the villagers engaged in hunting, hunt either for family consumption or for sale. Others hunt to protect their crops from wild animals. Villagers use two methods of hunting game — guns and traditional methods. Hunters use shot guns, muzzle

loaders and trap guns. Traditional hunting methods include various types of traps and hunting dogs. The method varies with the type of animal being hunted.

Some common species hunted in Sri Lanka are listed in table 8. The most common animal hunted in all regions is the wild boar. Other animals commonly hunted in the dry zone are spotted deer (*Axis axis*), sambhur (*Cervus uricolor*), porcupine (*Hystrix indica*) and monkey (*Macaca sinica*). Some common species hunted in Sri Lanka are listed in annex II. In general, small animals such as monkeys, giant squirrels, porcupines and jungle fowl are consumed by villagers. A high proportion of large animals like wild boar, sambhur and deer are sold. There is a very high demand for wildlife meat in urban areas. However, it has been reported that many of the large animals, other than wild boar, are threatened with extinction due to hunting. In some areas, the numbers of monkeys and deer are declining rapidly. Careless use of fire to trap animals is a serious problem, particularly in the dry zone. Large areas of forest and forest plantations are destroyed every year as a result of forest fires started by hunters.

Grazing

Rearing of cattle has been a traditional practice in Sri Lanka, and in the past almost every farmer owned cattle. Cattle were used for farming, as a source of milk and as a free source of natural fertilizer. Since the 1960s, as a result of the introduction of tractors for ploughing paddy fields, there has been a decrease in the demand for buffaloes.

Despite this trend, most of the villagers, particularly those in remote areas, still use buffaloes for agriculture and they consider cattle-rearing an important domestic

Local name	Species name
Ankenda	<i>Acronychia laurifolia</i>
Aralu	<i>Terminalia chebula</i>
Babila	<i>Sida</i> spp.
Bimkohomba	<i>Munronia pumila</i>
Bo-mi	<i>Litsea chinesis</i>
Bulu	<i>Terminaliam belerica</i>
Diyamitta	<i>Cissampelos pareora</i>
Derana	<i>Dipterocarpus glandulosus</i>
Dummala	<i>Shorea oblongifolia</i>
Enasal	<i>Elettara repens</i>
Eramusu	<i>Hemidesmus indicus</i>
Gammalu	<i>Pterpcarpus marsupium</i>
Hatawariya	<i>Asparagus falcatus</i>
Hodo ala	
Ingin	<i>Strychnos potatorum</i>
Jatamansa	<i>Nardostachys jatamansi</i>
Jayapala	<i>Croton tiglium</i>
Kadumberiya	<i>Diospyros melanosylon</i>
Kaduru	<i>Cerbera manghas</i>
Karapincha	<i>Murraya koeniggi</i>
Kohomba	<i>Azadirachta indica</i>
Kolon kola	<i>Pogostemon heyneanus</i>
Kon	<i>Schleichers oleosa</i>
Kothalahimbutu	<i>Salacia reticulata</i>
Kumburu wel	<i>Caesalpiinia bonduce</i>
Lumuwila	<i>Bacopa monniera</i>
Munamal	<i>Mimusops elengi</i>
Na	<i>Mesus ferrea</i>
Navahandi	<i>Euphorbia tirucalli</i>
Nelli	<i>Phyllanthus emblica</i>
Nika	<i>Vites negundo</i>
Polpala	<i>Aerva lanata</i>
Ranawara	<i>Cassis auriculata</i>
Sananda	<i>Aristolochia indika</i>
Weniwel	<i>Coscinium</i>

activity which is economically beneficial to them. Villagers living in the vicinity of forests still use the forests for grazing their cattle.

Cattle rearing is carried out in both the wet and dry zones. According to a recent survey carried out by the Forest Department, there are marked differences between these two

Table 8. Some common species hunted in Sri Lanka

English name	Local name	Latin name
Mammals		
Flying fox (giant fruit bat)	Ma wawula	<i>Pteropus giganteus</i>
Toque monkey	Rilawa	<i>Macaca sinica</i>
Purple faced leaf monkey	Wandura	<i>Presbytes sinex</i>
Scaly anteater/pangolin	Kabellewa, Eya	<i>Manis crassicaudata</i>
Porcupine	Ittawa	<i>Hystrix indica</i>
Bandicoot	Urumiya	<i>Bandicota indica</i>
Giant squirrel	Dandu lena	<i>Ratufa macroura</i>
Flying squirrel	Hambawa	<i>Petaurista pataurista</i>
Mongoose	Mugatiya	<i>Herpestes smithi</i>
Spotted deer	Tit muwa	<i>Axis axis</i>
Sambhur	Gona	<i>Cervus unicolor</i>
Munt jak/barking deer	Olumuwa	<i>Muntiacus muntjak</i>
Wild pig	Wal ura	<i>Sus scrofa</i>
Mouse deer	Meeminna	<i>Tragulus meminna</i>
Civet cat	Urulewa	<i>Viverricula indica</i>
Palm civet	Uguduwa	<i>Paradoxurus hermaphroditus</i>
Birds		
Spotted dove	Alukobeiya	<i>Streptopelia chinensis</i>
Green imperial pigeon	Mahaneela goya	<i>Ducula aenea</i>
Green pigeon	Batagoya	<i>Treron pampadour</i>
Ceylon jungle fowl	Wali kukula	<i>Gallus laffayetii</i>
Ceylon spurfowl	Haban kukula	<i>Galloperdix bicalarta</i>
Reptiles		
Land monitor lizard	Thalagoya	<i>Varanus bengalensis</i>

regions in terms of the annual average income each household derives from cattle rearing. In general, cattle owners in the dry zone earn higher incomes than those in the wet zone. Average annual income from cattle in the dry zone is around US\$ 300 to 800 per household; in the wet zone annual income is less than US\$ 100. The main reasons for this difference are as follows:

- In the dry zone, as result of shifting cultivation, large areas of secondary and degraded forest are available for cattle grazing. In contrast, less grazing area is available in the wet zone.

- The average number of cattle owned per household in the dry zone is higher than in the wet zone (due to availability of grazing grounds).
- Due to seasonal patterns of agriculture, most farmers in the dry zone are not fully involved with agricultural activities throughout the year. Hence, cattle rearing provides them with a steady source of income.

For the reasons given above, the number of households engaged in cattle rearing is higher in the dry zone (30 to 40 percent). In

the wet zone, cattle are reared mainly as draught animals and as a source of fertilizer. One of the significant features in the southern part of the dry zone (Rhuna), is the sale of milk products, particularly curd. This curd is in high demand in urban areas.

Cattle grazing has an adverse impact on forests, especially in the dry zone. In the wet zone, grazing also causes damage, but only to peripheral areas of the forest. As a rule, cattle do not go far into the forest due to the steep terrain and the presence of leaches. Despite the adverse impact of grazing in the dry zone, farmers are still able to collect posts, poles and creepers from the forests for construction of their cattle sheds.

Agricultural encroachment and shifting cultivation

Forest clearance for subsistence agriculture has been practised in Sri Lanka throughout the ages by people living in the vicinity of forests. Three broad categories of subsistence agriculture are practised in forest areas:

1. Forest clearing for cash crops.
2. Clearing of wetlands and water logged areas (deniya lands) for paddy cultivation.
3. Shifting cultivation (chena cultivation)

Of these, the most important is shifting cultivation. This is one of the oldest agricultural systems in Sri Lanka. Now considered a destructive agricultural practice, sifting cultivation is largely confined to the dry and intermediate zones of the country; while most forest clearing for cash crops (including deniya lands) occurs in the wet zone.

Many villagers living in the peripheral areas of wet zone forests, encroach on forest land to cultivate cash crops in order to supplement their incomes from existing cultivation. Due to strong law enforcement to protect the forest, villagers take great care to avoid detection by forest guards. The average size of encroachments is around 0.5 to 1 hectare and the main use of these lands is to develop homesteads or to cultivate crops such as tea or cinnamon. Usually it takes about 2 years for a farmer to derive income from newly-encroached land. The average income per hectare of tea in these forest encroachments has been estimated to be about US\$ 140 per month; while a hectare of cinnamon yields about US\$ 600 annually. These forest encroachments for tea and other cash crops are very significant in some parts of the wet zone. People in such areas are not dependent on the forests for NWFPs other than for firewood and kitul tapping. Hence, encroachment rates in these areas are high because people have little alternative interest in the forests. At present, encroachments in wet zone forests are not confined to subsistence needs as was the case several decades ago, but are now motivated by a desire for monetary gain.

In some locations, forests in the wet zone contain water-logged lands in valley bottoms (deniya lands), which are naturally suitable for paddy cultivation. In most areas where "deniya lands" are found in close proximity to villages, they have been taken over for paddy cultivation. The average size of these encroachments is between 0.25 to 0.5 hectare. While some of these deniya lands have been leased out to farmers by the Forest Department, others are cultivated illegally. Due to excessive damage caused by wild animals, the net return from cultivated deniya lands is generally low when compared with

normal paddy cultivation. To reduce the damage from wild animals, these lands are sometimes fenced, using poles and posts obtained from the surrounding forests. Some of the valley bottom lands (deniya lands) which are fairly well drained, are used for growing betel nut. Betel has a good market in villages and adjacent townships. According to a survey carried out recently, villagers in some areas of the wet zone (Akuressa) get an average annual income of US\$ 100 per hectare from betel cultivation. Hence, it is a good source of forest-related income for villagers which enhances the rural economy.

The traditional system of shifting cultivation (chena cultivation) involves the clearing and burning of forests, followed by the sowing of seeds. Although shifting cultivation is legally prohibited, it continues to be practised throughout the dry zone. There is a very strong sociological stimulus for chena cultivation in the culture of rural people. The villagers involved in this activity feel compelled to cultivate a chena plot because their families have done this for generations, and their life would not be complete without it. Clearing and demarcation of shifting cultivation sites, cultivation methods and harvesting practices are tied with traditional, social and cultural norms in areas where chena cultivation has been practised. It is customary to select chena sites for groups of farmers or farmer families. The average chena holding per cultivator varies from between 1 to 2 hectares, depending on the number of farmers. Clearing of the site is a group activity in which all the farmers participate. During the clearing of sites, suitable posts and poles are collected to build watch huts. The crops cultivated in shifting cultivation sites are paddy, chillies, gingelly, finger millet, mustard, maize, pumpkins, tobacco, onions, groundnuts and tomatoes.

Usually every plot contains some cereals and vegetables for home consumption.

Most farmers cultivate chillies, mustard or tobacco as major cash crops in shifting cultivation, but usually every plot has at least a small area of chilli for domestic consumption. There is no problem marketing these crops, as there is a high demand island-wide. According to the results of a recent survey, farmers engaged in shifting cultivation derive their highest income from chillies and tobacco. The average annual family income from shifting cultivation has been reported to be US\$ 100 per hectare in the wet zone, and US\$ 200 to 400 per hectare in the dry zone.

PATTERNS OF NWFP COLLECTION

A wide variety of NWFPs are collected by villagers living in the vicinity of forest areas. Generally, collection is undertaken by the entire family - men, women and children, who sometimes working individually and sometimes as a group. This pattern of collection varies with the activity and the area. Usually, kitul tapping and hunting are done by men. Collection of medicinal plants, edible plants, bamboo, rattan and the practice of shifting cultivation is undertaken by all members of the family, but men usually predominate. Table 9 indicates distribution of work among family members in collecting NWFPs from selected forests in the wet zone.

The number of visits made by family members collecting various NWFPs varies with the activity. The maximum number of visits to the forest recorded in the wet zone was for kitul tapping - over 150 visits per year. Next in importance are visits for collecting medicinal plants, edible plants,

Activity/product	Men	Women	Children
Edible plants	50-70	20-40	5-15
Kitul tapping	95-100	-	0-5
Hunting	100	-	-
Resins	60-90	5-20	0-10
Medicinal plants	60-70	10-20	5-10
Rattan	50-80	10-30	10-15
Bamboo	90-100	-	0-10
Bee honey	80-100	0-5	5-25
Drinking water	20-30	50-70	10-20

Source: Forest Department/IUCN (1994)

Forest type	Climatic region	Number of activities
Tropical wet evergreen forests	Wet zone	3 - 7
Tropical wet evergreen forests	Intermediate and wet zone	4 - 6
Montane evergreen forests	Montane zone	1 - 3
Savannah forests	Dry zone	3 - 8
Tropical dry mixed evergreen forests	Dry zone	4 - 8

Source : Eptitawatta (1994)

bamboo and rattan, which account for an average of 4 to 10 visits per year. The number of visits for shifting cultivation range from 80 to 120 visits per year.

Generally, villagers are involved in collection and use of a range of items from the adjoining forests for household consumption or sale. The number of items collected varies from family to family, and from village to village. Marked differences also exist among different forest types and climatic regions. The highest average number of collection activities per family (4 to 8) was recorded in the tropical mixed evergreen forests in the dry zone and the least number (1 to 3) was recorded in the montane zone (table 10).

MAJOR ISSUES AND RECOMMENDATIONS RELATED TO DEVELOPMENT OF NWFPs

Major issues

Lack of policy on NWFPs

At present, no clear policy objectives have been established for NWFPs, their utilization or development. As most NWFPs are not marketed, their value has not been recognized. Therefore, the economic importance of this sector, especially its importance to the rural economy, has been ignored by policy

makers. Thus, the actual benefits of forests are under-valued and resources allocated for NWFPs are inadequate considering the thousands of plant and animal species which provide goods and services for millions of people.

Shrinking resource base

The natural forest cover in Sri Lanka has been reduced from 44 percent in 1956 to the present 23.8 percent. A direct result of this reduction is the shrinking of the natural resource base for NWFPs. On the other hand, population growth and various other factors such as poverty and unemployment have aggravated social problems, particularly in rural areas of the country. Under these circumstances, it is normal to expect increasing pressure on the NWFP resource base.

Inadequate knowledge

Because little attention was paid to NWFPs in the past, knowledge on the subject is quite inadequate. Information on the resource base, utilization, processing, marketing, income generated and future demand should be obtained. This information is essential in developing strategies for managing, processing and marketing of NWFPs.

Seasonal variations in supply

Compared to wood products, inability to secure a steady supply of NWFPs due to seasonal variations and other factors, is a major constraint in developing markets for NWFPs or their related products.

Multiple use management of forests

Existing forest management plans do not provide adequate emphasis on multiple use management which would include NWFPs. This is particularly important in protected areas (about 40 percent of the natural forest area) where resource utilization has been restricted (i.e., national parks, Strict Natural Reserves, Nature Reserves, Sanctuaries, etc.).

Traditional nature of NWFP utilization

Extraction, processing, production and marketing of most NWFPs are carried out in traditional ways, using traditional equipment and methods. Further, the suppressive caste system is associated with utilization of some NWFPs. (e.g., kitul tapping and rattan)

Lack of supportive services

Compared with traditional forestry, agriculture and industry, the NWFP sector has developed few supportive services. These services are needed if the sector is to achieve its full potential.

Recommendations for the development of the NWFP sector

1. There is an urgent need for forestry to meet the immediate and future needs of growing populations without causing damage to the natural resource base. Sustainable utilization of NWFPs opens up one of the paths for such development through multiple use of forest resources. This in turn leads to better prospects, especially for rural communities.

2. Forestry policies should recognise the importance of NWFPs in the forestry sector. Legislation and forest management plans should be formulated accordingly, with adequate resources provided for the development of this sector, including research, education and extension.
3. Existing legislation governing forest resource utilization should be revised, especially laws related to protected areas, in order to permit multiple-use management in such areas. This includes the Fauna and Flora Protection Ordinance and the National Heritage and Wilderness Area Act.
4. Since the existing knowledge on NWFPs is poor, it is necessary to establish a database on silviculture and agronomic information, employment, income generation, marketing and economics. Current forest inventories are confined to timber and wood species, but future inventories should also cover NWFPs.
5. Conservation of existing species of NWFPs and their habitats and ecosystems is necessary to maintain the resource base for present and future use.
6. Technological improvements in extraction, processing and production of NWFPs are necessary for development of this sector. Rural industries which use NWFPs should be promoted through guaranteed supply of raw materials and marketing facilities.
7. Establish suitable institutional arrangements to enhance the coordination with other sectors such as agriculture, industry and indigenous medicine etc.

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*Institutional Support for
NWFP Development*

FAO ACTIVITIES IN SUPPORT OF NWFP DEVELOPMENT

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PAST FAO ACTIVITIES IN SUPPORT OF NWFP DEVELOPMENT

Even before the term "non-wood forest products" (NWFPs) became common, FAO supported the development of bamboo, resins, honey, medicinal plants, etc. It did not take long for FAO to realise the important role and usefulness of NWFPs in tropical forestry development programmes as NWFPs are easily adopted in social forestry and agroforestry programmes.

Between 1986 and 1990, several NWFP related field projects were formulated in member countries. These included support for lac cultivation in Vietnam, mushroom development in Bhutan, bamboo development in the Philippines, and chemical processing of *Acacia catechu* and deer farming in Thailand.

In Rome, the FAO Forest Industry Division was reorganised in the early 1990s and renamed the "Forest Products Division" to better reflect the importance FAO now attaches to NWFPs. A new senior forestry officer's post was created with direct responsibility for NWFPs.

Several FAO projects and programmes have conducted case studies and other analyses of NWFP development. Most notably, the Forests, Trees and People Programme (FTPP) of FAO has published numerous

reports and case studies on NWFP handicraft and cottage industries.

In 1991, the Forestry Section of FAO/RAPA organised the first regional expert consultation on NWFPs to review the situation of NWFPs in 11 member countries. That consultation focused on the management and biological aspects of NWFPs.

In 1992, FAO/RAPA and UNESCO jointly organised a meeting on "Forestry and Cultures in Asia." The main focus was minority communities dwelling in or around forests of the region with a perspective on how to preserve their ethnic cultures, including valuable knowledge on the utilization of NWFPs. A regional project document was formulated as a result. Unfortunately, however, no donors have been found to launch this project.

CURRENT AND FUTURE ACTIVITIES

FAO's current efforts to promote NWFPs include: i) organizing meetings, ii) conducting county studies, iii) formulating field projects, iv) incorporating NWFP components in on-going community

agroforestry or forestry research projects, and v) disseminating information on NWFPs.

This second expert consultation is one such activity. FAO will also organise an international consultation on NWFPs in Indonesia in January 1995. This will be a milestone to review the past and current activities on NWFP development and confirm the future strategies for FAO and other agencies.

In the area of project formulation, FAO has recently assisted the Government of LAO PDR in preparing a project proposal to improve the utilization and management of benzoin. Similar assistance has been given to Bhutan in formulating a project on mushroom production.

Information dissemination activities have recently been stepped up with the initiation

of *Non-Wood News*, a twice-yearly newsletter produced by FAO/Rome, and several regional publications. FAO/RAPA is anticipating publication of the proceedings of this consultation and a report on NWFPs in Bhutan in early 1995.

The RAPA Forestry Section has established the development of NWFPs as a priority in its regular programme for 1994-95. This will be continued in the next biennium, 1996-97, because NWFPs have a great potential in the promotion of integrated rural development.

This challenging work cannot be done by FAO alone. It is essential to establish and coordinate a good collaborative network on NWFPs among the government agencies, local communities, NGOs, researchers, international aid agencies, and the mass media.

THE INTERNATIONAL NETWORK FOR BAMBOO AND RATTAN

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INTRODUCTION

Bamboo and rattan are arguably the most important non-timber forest products in Asia. The International Network for Bamboo and Rattan (INBAR) is a global network which has been established to support and help coordinate research and development based on these important plants. This paper presents a brief history of the network and provides an overview of the current organization and activities. It also gives details of the socio-economic programme of INBAR.

HISTORY OF INBAR

INBAR is a relatively new network, just over one year old, but it has its roots in more than a decade of bamboo and rattan research in Asia. The network was created by the forestry interests in Asia, with support from Canada's International Development Research Centre (IDRC) and the International Fund for Agricultural Development (IFAD). INBAR is administered by IDRC from its New Delhi Office.

Bamboo and rattan have very high value in a range of applications, both as fiber and as food. Furthermore, for many reasons, they are often particularly important to poor and disadvantaged people. Recognizing this importance, and the great untapped

potential, IDRC began supporting research on bamboo and rattan utilization and development in the early 1980s at several universities and governmental and non-governmental research agencies in the region. Other international and donor agencies began to provide technical assistance in the area as well. Those early projects, and the researchers involved, soon began to collaborate, sharing information and materials. Several international workshops were held, at which researchers had the opportunity to meet one another and to work together to set research priorities. An informal network was born, and over the years, with IDRC support, it became more and more formalised.

After more than a decade, an evaluation of the ongoing work reaffirmed the importance of bamboo and rattan in Asia and globally. Some estimates put the total market value of these two commodities in the order of US\$ 14 billion! Millions of people depend on these commodities to a significant degree for their livelihoods. The evaluation also identified the urgent need for more coordination in research on these commodities. On the basis of ever increasing demands for raw materials, increasing population levels, over-exploitation of the resources, and deforestation, and recognizing potential benefits of increased investment in research, IDRC convened a meeting of interested

donors in May of 1990. This meeting recognised the substantial benefits to large and small industries and to poor people, as well as the role these resources might play in the conservation of tropical forests, and noted the need for more strategic research. Several donors agreed to support a study team to review and synthesise past and current research, to identify strategic research gaps, and to make recommendations for the future.

The study team recommended the formation of an international network to extend existing research activities, broaden their scope, and act as a focus to draw together funding into a coordinated global network. The recommendations were shared with national programme leaders in Asia, and with donors, and support was garnered for the formal establishment of INBAR in 1993.

NETWORK ORGANIZATION

INBAR's general objective is to alleviate poverty through the sustainable utilization of bamboo and rattan resources. To achieve this, INBAR works to: identify, support, and coordinate interactive research on bamboo and rattan according to priorities set by national programmes; build skills and enhance capacity of national research and development institutions; strengthen national, regional, and international coordination, cooperation, and collaboration.

The network has a research advisory group (the RAG), made up of senior directors and managers of forestry research from the Asia region, which advises on strategic and policy directions for the network. The research programmes are guided by five working groups of national programme scientists in the following areas:

- Socio-Economics
- Production Research
- Post Harvest Technology
- Information, Training, and Technology Transfer
- Biodiversity and Genetic Conservation

The first four programme areas are supported out of INBAR's core budget. The fifth programme area is funded by the Government of Japan through the International Plant Genetic Resources Institute (IPGRI). A joint INBAR/IPGRI working group has been established and work is underway.

The working groups have the responsibility to set out research priorities in their programme area, and to review and comment on research proposals according to the appropriate criteria. Research is executed by national programmes, government research agencies and universities. There is also increasing involvement by the NGO community. INBAR provides financial and technical support, but the network depends on strong in-kind support to research by the national programmes.

Emphasis is given to inter-country collaboration in INBAR-supported research. For example, a joint programme of *Agroforestry Trials for Bamboo on Degraded Lands* is currently underway in India, Thailand and China. In other approaches to collaboration, different research groups take on research components according to their respective strengths. A third model of collaboration is being used in the socio-economics research programme, where a series of studies conducted in several countries will support

the development and improvement of a conceptual model.

A large number of activities have been initiated in each of the programme areas, and several have already been completed. INBAR currently has two series of publications — the “Technical Series” and the “Working Paper Series” — and a quarterly newsletter. A list of publications, and the publications themselves, are available from the INBAR Secretariat.

SOCIO-ECONOMIC RESEARCH

INBAR's primary objective is to alleviate poverty through the sustainable utilization of bamboo and rattan resources. There is widespread agreement that to achieve development we need to create employment and income generating opportunities. Essentially, rural poverty is more a problem of who has money to buy food than it is of total food availability. In an increasingly market-oriented, cash-based world, people need access to cash income. The bamboo and rattan sectors provide great opportunities for increasing employment and income, particularly within small and medium-scale enterprises.

Successful development of these kinds of opportunities depends on much more than overcoming technical constraints. Development interventions must be targeted to suit the needs and opportunities of the target groups. Poor people must be able and willing to take advantage of improved technology. Whenever, some aspect of the bamboo or rattan industry is identified as an entry point for development, the whole system must be considered and all important problems must be identified, whether they be technical, social, political or economic. Furthermore, major trends or changes in the

production-to-consumption system must be taken into account.

The review of past bamboo and rattan research noted a very important gap in our understanding of the social and economic aspects of the bamboo and rattan sectors, and recommended more attention be given to this important area. IFAD agreed, and is providing support for socio-economics research. Among other things, it is hoped that the socio-economics research will help to identify opportunities for IFAD investment activities.

The Socio-Economics Working Group (SEWG) met for the first time in August of 1994, hosted by the Faculty of Forestry of Kasetsart University in Bangkok. That meeting identified the main client groups for socio economics research as: 1) poor and disadvantaged people involved in the bamboo and rattan sector; 2) donors and multilateral development banks; 3) governments; 4) NGOs and community-based development groups; 5) researchers; and 6) the private sector, including foreign investors. It is intended that the socio-economics research programme of INBAR will provide strategic information and analysis useful for each of these client groups.

The socio-economics programme of INBAR has three main objectives:

1. to provide a basis for development/ investment addressing the needs of people involved in the bamboo and rattan sector;
2. to provide an analysis of policy and institutional issues with a bearing on the sector; and
3. to contribute to the development of

methodologies and approaches for this kind of work.

The programme is made up of a number of individual research projects falling into two principal areas. The first is a series of small projects which are collating available information on the economic, policy, institutional, and social aspects of the bamboo and/or rattan sectors in several Asian countries. Research has begun in the Philippines, China, Indonesia, India, Nepal, and Thailand. Similar activities are in the exploratory phase in several other Asian countries. The resulting information will be merged into a single database. This collaboration will result in the first estimate of the size of the bamboo and rattan sectors in the region. Where possible, time-series are being assembled to give an indication of trends. It will also provide a state-of-the-art report on qualitative aspects of the sectors.

The second area is a series of case studies designed to satisfy two principal objectives. First, they should identify constraints and opportunities for sustainable development within particular rattan and bamboo production-to-consumption systems, and recommend appropriate interventions. Some of these recommendations are likely to be for research to tackle technical problems, or for the transfer of existing knowledge. These can be referred back to the appropriate working groups within INBAR (Production, Post-Harvest, Genetic Resources, Information). Others will aim to overcome resource constraints, either through institutional mechanisms (e.g., credit, market development) or through improving delivery systems (e.g., nursery development). Still others will aim to improve incentives for particular courses of action through policy reforms, and targeted rural development projects of the kind IFAD undertakes.

The second objective of the studies will be to provide an empirical basis for the development and refinement of frameworks for analyzing NTFP production-to-consumption systems. The bamboo and the rattan sectors are characterised by a wide range of production, processing and marketing systems. These systems use numerous species and produce many types of final products. Within the various "production-to-consumption systems" there is great potential for improvements which could contribute to sustainable increases in the welfare of resource-poor people. However, achieving this objective will require a thorough understanding of very complex social, economic and policy contexts.

Clearly, each system is unique, with a complex set of socio-economic and technical parameters governing the way resources are used and the way benefits are distributed. Still, there are also many common elements. By developing a framework we hope to facilitate comparisons of one system with another. Research can describe different production-to-consumption systems, identify opportunities and constraints in their development, and prescribe development interventions. As an empirical basis is developed, it will become easier to identify "typical" production-to-consumption systems, and the constraints and opportunities common to them. As development projects are undertaken which address some of these constraints, the results can be compared in a systematic way.

In order to understand the range of systems, four case studies each on bamboo and on rattan production-to-consumption systems are being supported by INBAR. Cases have been selected to represent various levels of

management intensity at the raw material production stage. Examples of extractive-based systems through to plantation-based system, with several intermediate situations, are being studied. The studies are tracing the flow of material through the various processes and transactions to the ultimate consumer. Stakeholders at each stage are being identified. The studies will describe as fully as possible the social and economic factors which make up the "decision-making environment" (i.e., the factors that affect the way people use their resources). With improved understanding in this area it will be easier to know what kind of development interventions (technical, policy, institutional, investment, etc.) are needed to benefit target groups in a sustainable way. The studies will also help to show where further research is required. Information generated in this way will increasingly shape the research agenda within INBAR and will help ensure the relevance of technical research.

Research is being undertaken in China, Thailand, India and Nepal on bamboo-based systems, and in Indonesia, India, and the Philippines on rattan-based systems. In each, there is an emphasis on a multidisciplinary team approach. Some involve NGO partners.

CONCLUSION

INBAR is meant to serve the needs of people interested in sustainable development based on bamboo and rattan resources. The organization hopes to achieve that goal through information sharing and collaboration. INBAR can offer technical support, financial support for strategically important work, and a forum for exchange among people working in the field. Membership in INBAR is open to anyone with an interest in bamboo or rattan. The network is eager to expand its range of contacts and collaboration.



Bamboo is a major NWFP in every part of Asia and the Pacific.



INBAR supports research on production, post-harvest technology, genetic resources, and the socio-economic aspects of bamboo and rattan.

ASIAN NETWORK ON MEDICINAL AND AROMATIC PLANTS (ANMAP)

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INTRODUCTION

Why MAPs?

Medicinal and aromatic plants (MAPs) are a large interrelated group of plants possessing active ingredients used in curing ailments, and/or aromatic compounds used as sources of flavours and fragrances. They have been important to mankind, both socially and economically, for thousands of years. People have long used MAPs to cure human ailments and those of domesticated animals, as well as to protect crops from pests.

The importance of medicinal plants as therapeutic agents and their role in the health care and economies of developing countries, is well recognised. This includes not only the use of herbal medicines and drugs derived from medicinal plants, but also industrial scale utilization of medicinal plants.

Aromatic plants which generate volatile essential oils and other useful aroma chemicals are important raw materials for the food, cosmetic and perfume industries.

At present, MAPs are grown by small-scale farmers using primitive production technology. To satisfy industrial demand for raw materials, MAPs are collected from the wild and exported to industrialised countries with little or no processing. Although a lot has been done in the fields of phytochemistry

and pharmacology, very little research and development has been attempted in germplasm conservation, selection, breeding and agronomic practices.

Why Asian MAPs?

Asia has abundant species of MAPs. Traditional medicine has been practiced in Asia since ancient times. The Chinese and the Indians have made use of medicinal plants to cure ailments for thousands of years. Similarly, most other Asian countries have developed their own systems of traditional medicine by modifying the Chinese and/or Indian systems.

Asia is also well known for its aromatic plants, particularly spices. Moluccas and Sri Lanka, for example, are both known as "Spice Island." The famous "Spice Route" has linked Venice, Arabia, Sri Lanka, India, Malaysia (Malacca), Indonesia (Java and Moluccas) and China through spice trading since the 16th century.

Asia has several advantages over other regions, such as well-documented knowledge, long-standing practice of traditional medicine, and the potential for social and economic development of MAPs in large-scale primary health care programmes and industrial-scale production.

Moreover, the potential to expand cooperation among countries of the Region is also great.

Why a network?

A network is an institutional framework committed to cooperation in certain disciplinary activities. The network approach has been particularly useful when the Technical Cooperation among Developing Countries (TCDC) concept is being encouraged as a means of exchanging relevant technologies, expertise, and information among members. A recent FAO study revealed that networks help to reduce or eliminate duplication among national institutions, and provide a cost-effective instrument for information exchange and institution building. Networks also encourage collaboration in technology development, and make the most effective use of limited facilities.

Why an Asian network on MAP?

Recently, a Regional Expert Consultation on "Breeding and Improvement of Medicinal and Aromatic Plants in Asia" was held at the FAO Regional Office for Asia and the Pacific. The participants (MAP experts from 10 countries in Asia) expressed their need to establish a regional network for research and development of medicinal and aromatic plants, in order to strengthen research capabilities through technical cooperation among member countries. Although a few networks related to MAPs already exist, none of them concentrate on the production aspect.

Consequently, the participants unanimously endorsed the establishment of the Asian Network on Medicinal and Aromatic Plants (ANMAP), and requested FAO Regional

Office for Asia and the Pacific to provide logistical support, including nominal staff, facilities and operating funds.

OBJECTIVES

Overall objectives

The overall objective of ANMAP is to assist the participating institutions/departments of the cooperating countries in exchanging information, germplasm, planting materials, experimental data and expertise, as well as to establish effective cooperation in research on mutually selected topics.

Specific objectives

Specific objectives of ANMAP include the following:

1. To collect, collate and disseminate information on MAP research, production, processing, trade and development among the cooperating countries.
2. To document and disseminate success stories on production and post-harvest handling of MAPs under varying agro-climatic conditions of Asia.
3. To exchange expertise and to organise training courses, workshops and expert meetings to improve capabilities in the individual countries through TCDC arrangements.
4. To assist cooperating countries in bridging specific technical gaps in research and development of MAPs.
5. To facilitate the exchange of germplasm among cooperating countries and to

monitor the progress and usefulness of such exchanges.

6. To coordinate regional yield trials of selected clones, improved varieties and hybrids developed by cooperating countries.

ACTIVITIES

In pursuance of the above objectives, ANMAP may undertake the following activities:

1. Periodic compilation and dissemination of country-specific information regarding progress and problems in the production, post-harvest handling, distribution and utilization of MAPs.
2. Prepare directories of the research and development work on MAPs which is currently being carried out, including a list of researchers and the facilities available in participating countries.
3. Promote the exchange and utilization of germplasm through preparation of a germplasm catalogue and monitoring of the performance of clones, varieties, and hybrids being tested in various locations.
4. Document and circulate success stories on production, processing and distribution of MAPs. Publish technical bulletins and information leaflets on selected topics.
5. Organise short-term training courses and inter-country study tours on breeding, propagation/seed production, agronomy, pest management, post-harvest handling, quality control, marketing and other areas as needed, through TCDC arrangements.
6. Organise meetings, workshops, and consultations to review past progress and proposals for future work programmes.
7. Undertake specific cooperative research to bridge technology gaps in areas identified by ANMAP.
8. Maintain liaison with other regional and international organizations concerned with research, development and information on MAPs, and provide specialist advice on specific problems if needed.
9. Prepare, an annual progress report for general distribution to members and other interested organizations on the progress of joint activities.

OPERATION

ANMAP is broadly operated as follows:

1. The Secretariat of the Network is located at the FAO Regional Office for Asia and the Pacific (RAPA), Bangkok. The Asia-Pacific Association of Agricultural Research Institutions (APAARI) provides overall direction for linkages among concerned national and international institutions.
2. The Regional Plant Production Officer (Industrial Crops) of FAO/RAPA is the Secretary of ANMAP and convenes all meetings of the Network.
3. Participation in ANMAP does not entail any fee. However, member countries are expected to:
 - supply information and report to the ANMAP Secretariat periodically;

- set aside local currency to facilitate the activities of ANMAP, particularly those which are in the spirit of TCDC;
- share germplasm research results and technologies with interested countries;
- wherever possible, share in the cost of attending meetings of ANMAP.

MEMBERSHIP

Qualification

The membership of ANMAP is open to national-level research and development agencies dealing with MAPs in the cooperating countries in Asia. International and regional agencies, and NGOs working on or interested in MAPs, are welcome to join ANMAP as resource agencies.

Charter members

The founding members of ANMAP are given in table 1. Country Representatives are focal points for ANMAP activities in their respective countries.

Regular members

These are many research and development agencies in Asian countries that are interested in joining ANMAP. About 20 have already applied for membership.

International and regional agencies

At least five international and regional organizations have expressed interest in joining ANMAP. Among them are various divisions of UNIDO, UNESCO, FAO, and ESCAP.

RECENT ACTIVITIES

The following MAP-related publications were recently prepared and published by the Secretariat:

Periodicals

NANMAP (Newsletter of ANMAP)

- Bimonthly (first issue -1/6/93, 8 pp.)

BANMAP (Bulletin of ANMAP)

- Semi-annually (first issue -Jan-Jun. 95, 36 pp.)

Occasionals

Report of the Regional Export Consultation on Breeding and Improvement of Medicinal and Aromatic Plants in Asia (RECBIMAP)

Proceedings of the RECBIMAP

Study tours

Technical visits were organized for the participants and observers of the RECBIMAP to visit: (1) Thai-China Flavours and Fragrances Industry Co. Ltd. and its factory located at Lat Bua Luang District, Ayutthaya Province, Thailand (3 Jun, 93); (2) Xishuangbanna Tropical Botanic Garden, located in Menglun, Mengla County, Yunnan Province, China (4-5 Jun, 93); and (3) Kunming Institute of Botany, located in Kunming, Yunnan Province, China (6 Jun. 93).

Liason with other regional and international agencies

UNIDO: ANMAP has promoted activities related to the industrial utilization of MAPs through technical collaboration. Will

Country	Agency	Country representatives
1. China	Institute of Medicinal Plant Development	Prof. Xiao Peigen
2. India	National Bureau for Plant Genet. Resources	Dr. Rajendra Gupta
3. Indonesia	Research Institute for Spices & Medicinal Plants	Dr. Pasril Wahid
4. Korea, Rep. of	Natural Products Research Institute	Prof. Chi Hyung-Joon
5. Nepal	Development Associates	Dr. Pradip M. Adhikary
6. Pakistan	Council Sci & Indust. Res. Lab. Peshawar	Dr. S. Fazal Hussain
7. Philippines	Institute of Biological Science, UPLB	Prof. L.S. de Padua
8. Sri Lanka	National Botanical Gardens	Mr. D.B. Sumithraarachchi
9. Thailand	Department of Agriculture	Dr. Prateungsri Sinchaisri
10. Vietnam	Science-Production Union of Vietnamese Ginseng & Med. Plants	Dr. Nguyen Thoi Nham

support a proposed "Workshop on Promotion and Development of Industrial Utilization of MAPs."

ESCAP: ANMAP has established linkage with the Trade and Tourism Division of ESCAP.

It is envisaged that ANMAP and FAO, UNIDO and ESCAP will work in close collaboration, on production (FAO), processing and utilization (UNIDO), and marketing (ESCAP) of MAPs for benefit of member countries. In addition, the following agencies have also been approached:

FAO/RLAC: Joint activities (e.g., exchange of publications, joint meetings, etc.) are being pursued between the FAO Regional Office for Asia and the Pacific, and the Region Office for Latin America and the Caribbean.

ITC: Information is being exchanged.

UNESCO: A number of networks related to MAPs have been operating under the auspices of UNESCO. ANMAP has established links with these networks.

Assistance to Member Countries

ANMAP assisted Vietnam in finding marketing outlets for ginseng products. Three Japanese companies and one Thai company have been approached; one Japanese and one Thai company subsequently sent a fact-finding mission to Vietnam.

PROPOSED ACTIVITIES

Short-term

- Prepare and publish a directory of research and development work on MAPs currently being carried out, including a list of institutes and scientists (to be undertaken in 1994).
- Compile and publish information on MAP gardens in the member countries (to be started in 1994).
- Document and circulate success stories on production, processing, and distribution of MAPs (to be started in 1994).

Long-term

- Compilation and dissemination of country-specific information on progress and problems of production, post-harvest handling, distribution and utilization of MAPs.
- Periodic updating of the *Directory of Institutes and Scientists* dealing with MAPs.
- Preparation of a germplasm catalogue and monitoring of the performance of clones, varieties and hybrids being tested in various locations.
- Organisation of short-term training courses and in-country study tours on breeding, propagation/seed production, agronomy, pest management, post-harvest handling, quality control, and marketing.
- Organisation of the Second Regional Expert Consultation on MAPs (proposed date - June 1996).



Aromatic plants, such as Desmos chinensis, are in strong demand for the food, cosmetic and perfume industries.

COLLABORATIVE DEVELOPMENT-ORIENTED RESEARCH ON CONSERVATION OF RATTAN BIODIVERSITY IN MALAYSIA

Patrick Durand

CIRAD-Foret Regional Representative

The Innoprise Corporation Sdn bhd (ICSB) and CIRAD-Foret are currently carrying out a scientific collaborative programme on the conservation of genetic diversity of rattan in Malaysia. It is interesting to highlight the usefulness and effectiveness of this kind of institutional arrangement.

PROJECT BACKGROUND

Many rattan species are being harvested to meet an increasing world-wide demand. Most rattan is currently collected from natural forests since plantations have not yet been developed successfully either at community or industrial levels. As a result, rattan resources are being depleted from the ever shrinking forest area.

It is necessary, therefore, to undertake actions to assess and conserve the genetic diversity of rattan. The establishment of community-based and industrial plantations seems to be the only way to guarantee the sustainability of rattan resources and should contribute to protecting the diversity of the resources. *In-situ* actions for genetic conservation are actually being conducted in some protected areas, but are too limited to cover all resources. Furthermore, these areas are usually remote and protection measures are sometimes difficult to implement. ICSB has the appropriate resources for this kind of programme: a large-scale plantation, a research and

development centre in Luasong and a Joint Biotechnology Laboratory in Tawau.

The programme focuses on 3 commercial species: manau (*Calamus manan*), saga (*C. caesius*) and batu (*C. subinermis*), plus two other species appropriate for Sabah and Sarawak: irit (*C. trachycoleus*) and sega (*C. optimus*).

It is organized into three operations:

1. **Seed collection** from original sources, with careful identification of individual mother plants. Records of provenances, origins and progenies are maintained to analyze the different components of the genetic variability.
2. **Establishment of conservation plots**, keeping the identified progenies in separate plots for each provenance. All plantations are established in logged-over forests according to an appropriate statistical design for further analysis of within-provenance variability for morphological and growth factors.
3. **Genetic diversity** is assessed by isozyme electrophoresis. This involves the preliminary development of an electrophoretic technique adapted for rattan. This electrophoresis gives reliable results for rattan plants, whatever the origin, age, or sex (important since the reproductive phenology of some rattan species is not yet well known).

COLLABORATIVE ARRANGEMENT

An interesting aspect of this collaborative programme is the synergistic effects of cooperation among the various partners at different stages, offering the following inputs and experience:

ICSB:

- CIRAD's main partner in a broader programme in forest plantations involving forest trees;
- industrial plantations of rattan in natural logged-over forest, which are essential for conservation and plant improvement activities which have been carried out since 1989;
- nursery facilities at the Lausong Forestry Centre;
- Plant Biotech laboratory jointly set-up in Tawau by ICSB and CIRAD-Foret, which developed the electrophoretic analysis for rattan.

FRIM (Forest Research Institute of Malaysia):

- established experience in rattan research;
- strong support at the seed collection stage in Peninsula Malaysia (not an easy task considering the collectors must be at the right place at the time of fruiting, with the right administrative authorization and suitable contact with villagers involved in rattan or rattan seed harvesting). In the framework of this collaboration, FIRIM received one-third of the seeds collected in Peninsular Malaysia.

Forest Research Center Sandakan (Sabah):

- seed collection;
- genetic analytic studies.

Forest Department of Sarawak:

- identification of progenies of rattan to be collected in Sarawak.

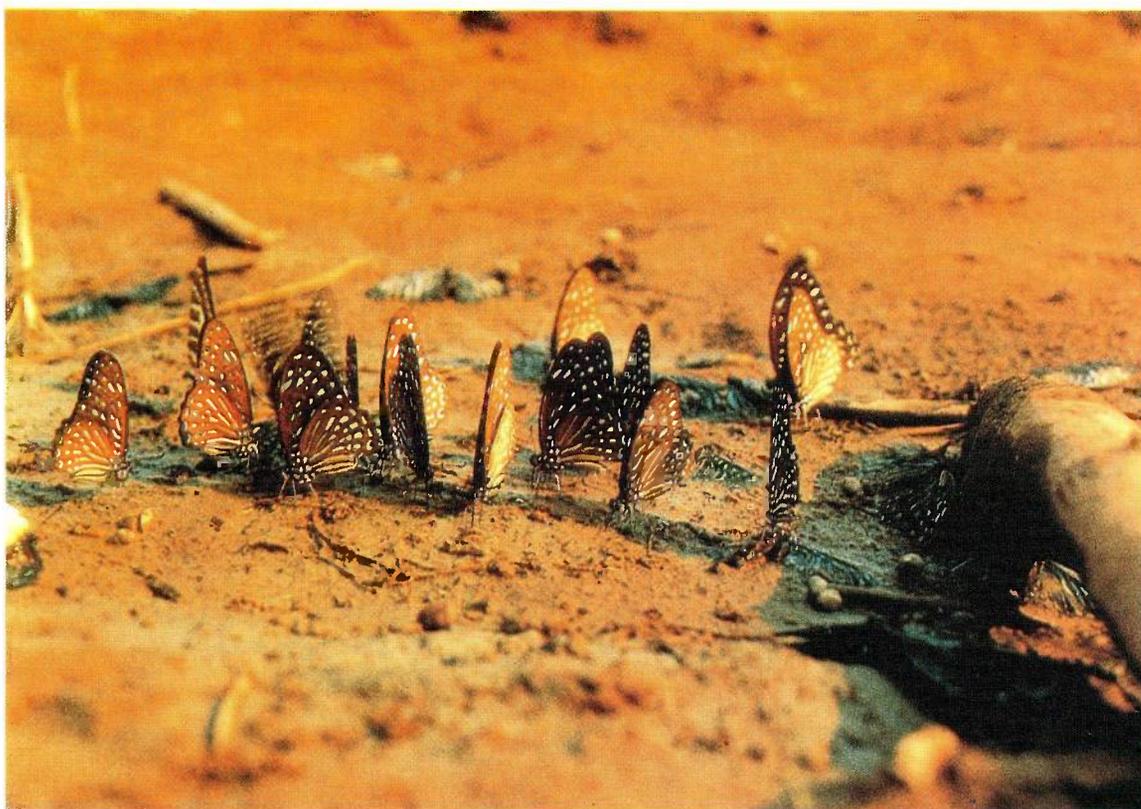
FUTURE INSTITUTIONAL ARRANGEMENTS

In the future, this kind of collaboration will be encouraged not only in the evaluation and conservation of genetic diversity of rattans, but also for reproduction phenology, tissue culture propagation, plant breeding, harvesting technology, and rattan processing.

A research and development programme will begin next year, sponsored by the European Community, which will include CIRAD-Foret and Kew gardens as European partners, and ICSB, FRIM, FRC and the Sarawak Forest Department as Malaysian partners. Other international institutions will be involved in the joint research effort, with national research and development institutions and the private sector, such as International Plant Genetics Research Institute (IPGRI), which has been entrusted by the Consultative Group on International Agricultural Research (CGIAR) to deal with Genetic Resources. Further contacts will be made with IPGRI and the International Network on Bamboo and Rattan (INBAR) in order to merge scientific assets and financial inputs with the concerned partners from the national institutions and private sector, and avoid duplication in research and development programmes.

Another aspect which is to be developed in this collaborative work is the training of researchers and plantation foremen involved in rattan research and in rattan plantations,

in order to promote rattan diversity conservation and rattan plantations at the community and industrial levels.



Insect farming offers new economic opportunities for rural communities.

THE BIODIVERSITY CONSERVATION NETWORK: EVALUATING ENTERPRISE-ORIENTED APPROACHES TO COMMUNITY-BASED CONSERVATION IN THE ASIA/PACIFIC REGION

Bernd Cordes
Programme Officer
Biodiversity Support Program

INTRODUCTION

Several years ago, biologists, scientists and economists began discussing what it means to "make conservation pay," or what it means to "make a forest profitable." From these discussions, the Biodiversity Conservation Network (BCN) evolved, with a mandate to evaluate enterprise-oriented approaches to community-based conservation in Asia and the Pacific. The network, operates in countries spanning from India to the Solomon Islands.

BCN is a component of the United States/Asia Environmental Partnership (USAEP), created by president Bush in 1992 to transfer environmental technologies from the United States to Asia, and to organize scholastic and academic exchanges between Asians and Americans. The BCN is based in Washington DC, but has a regional office in Manila.

All of BCN's funds (US\$ 20 million) come from the U.S. Agency for International Development (USAID), through the Biodiversity Support Program. Therefore, BCN has many bosses who influence its decisions (figure 1). Input from these organizations is very useful, but also results in some constraints on the network.

BCN GOALS

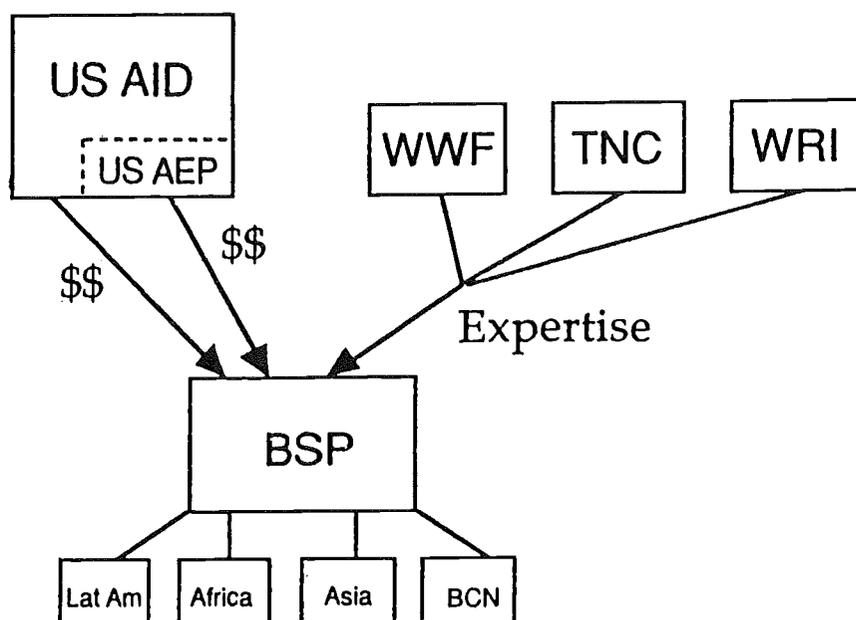
The two fundamental goals of the BCN are:

- to promote biodiversity conservation at a number of sites across Asia and the Pacific; and
- to evaluate the viability of enterprise-oriented approaches to community-based conservation of diverse biological resources.

This evaluation is particularly important because there is a lack of data available on NWFPs and various approaches to conservation and development. The BCN was created to test a specific, narrowly defined hypothesis regarding the viability of enterprise-oriented approaches to community-based conservation of diverse biological resources. BCN's hypothesis is that if conservation is to occur, the enterprise must:

- have a direct link to biodiversity;
- generate benefits; and
- have a community of stake-holders.

Figure 1. The BSP structure - 1992



Direct link to biodiversity

If conservation is to occur, then the enterprise must depend directly on *in-situ* diverse biological resources. The enterprise thus must pass the test: "If the biodiversity of the site were to be degraded, would the enterprise fail?"

- If "yes" then the project is eligible for BCN funding.
- If "no" then the project is not eligible for BCN funding.

In addition, the project must address *threats* to the biodiversity at the site.

Generation of benefits

If conservation is to occur, then the enterprise must generate benefits for the community, both in the short term, and, after BCN funding ends. These benefits can be:

- monetary (such as cash or shares in an enterprise);
- social (such as tenure rights); or
- environmental (such as watershed protection).

For example, BCN has a project in India where the core benefit is to be the maintenance of a watershed system in a particular area.

Community of stakeholders

If conservation is to occur, then the community, as stakeholders in the biologically diverse resources, must:

- be organized and have the capacity to take long-term action;

- be informed regarding the benefits from the enterprise and believe that they are equitably (fairly) distributed;
- have a measure of enforceable control over the natural resource base; and
- participate in the development of an enterprise through its establishment, operation and or maintenance.

This latter aspect is problematical. What exactly is a community? Who is a stakeholder? These are extremely important issues and ones that are very difficult to define. BCN does not necessarily try to make that determination. That is left up to the people who are implementing the project.

GRANTS

BCN provides both planning grants and implementation grants. To date, BCN has awarded about 30 planning grants and three implementation grants. At least three more implementation grants are currently being finalized (December 1994).

Planning grants

Planning grants can be for up to US\$ 50,000 and 3 to 9 months in duration. This type of grant is used primarily to bring people together who can undertake the enterprise; to undertake market studies and to devise biological monitoring frame works. Establishing the socioeconomic and the biological components of each project is extremely difficult. Planning often entails collaboration between the private sector and the non-governmental sector and among government departments. BCN planning

grants often lead to unique collaboration among diverse organizations.

Implementation grants

Implementation grants can be for up to US\$ 300,000 per site per year, lasting up to three years in duration. This type of grant funds project activities.

PROJECT SELECTION

Projects are selected on the basis of criteria at both the individual project level and the overall portfolio level. At the individual project level, the project site must have significant biodiversity, and the local community must be dependent on the sustainable use of *in situ* biological resources. The project design must also biological, socioeconomic, and enterprise issues and their on-going monitoring; demonstrate participatory design and implementation; and address issues of intellectual property rights where needed.

In addition, the project must complement the overall BCN project portfolio and contribute to the broader networking objectives. BCN considers its total portfolio of projects carefully, because of the overall object of gathering data and testing a specific hypothesis. This means BCN wants to fund projects which are unique in one way or other. Perhaps a project has a unique policy framework within which it is operating. Or, perhaps one of the collaborating organizations has a particularly strong enterprise/organization.

PROJECT PORTFOLIO

As can be seen from figure 2, BCN supports a wide variety of projects — timber, ecotourism, bioprospecting etc., but the largest number of projects fall under the category of NWFPs.

Once BCN began reviewing projects, several programme officers strongly proposed expanding the notion of *in situ* biodiversity because the differences between degraded and primary forests are not always very clear — there is a continuum between the two. As a result, BCN has begun to look at the complexities of different types of systems. Often the core enterprise is being supplemented or supported by enterprises in other habitats such as agroforestry. For example, BCN is supporting an agroforestry project of the Kalahan Foundation in the Philippines.

In figure 2, the “herbs” referred to are mainly medicinal and aromatic plants. The “trees” category includes damar resin tapping. The “insect” category includes butterfly projects.

Figure 3 shows the distribution of projects across the region. BCN could provide funding for projects in 23 countries in the region, but managerially that is virtually impossible. BCN's portfolio has therefore been determined by project proposals received from the countries listed in Figure 3, and that is where BCN focuses its attention.

In the Philippines, BCN supports the Kalahan Foundation's agroforestry project. Indonesian projects concern damar, ecotourism, bamboo and rattan. Projects in Nepal concern medicinal herbs and ecotourism in Chitwan National Park. Papua New Guinea's projects deal with

tourism and the sustainable harvest of timber using “walk-about” sawmills. BCN is also supporting a bioprospecting project in the Solomon Islands to see whether or not a legal system can be created whereby revenues over the long term will remain with the community.

BCN is trying to avoid providing subsidies for NWFPs or ecotourism. Rather, BCN is encouraging collaboration among partners with various sources of capital — commercial banks, social funds, environmental venture capital funds and community-oriented donor organizations like the MacArthur Foundation.

For example, BCN works closely with the Environmental Enterprises Assistance Fund (EEAP) to identify projects based on NWFPs. EEAP asks organizations to produce profit/loss statements and cash flow spreadsheets. If enterprises appear viable, EEAP provides equity for the start-up of those enterprises.

BCN is attempting to address the lack of information concerning profit points and distribution chains for various enterprises. It is also trying to determine if it is possible to sustainably harvest products or if it is better to domesticate or cultivate NWFPs in plantations or forest gardens.

BCN is also trying to determine under what specific conditions conservation can occur. Are tenurial rights absolutely necessary? Is the community's active involvement or ownership of an enterprise a necessary condition?

BCN is meant to test a hypothesis but has been reminded (and rightly so) that there is an ethical issue involved. While BCN is attempting to test a hypothesis, its projects do not take place in a laboratory.

Conservation of unique resources and the economic future of communities are often at stake. It is, therefore, extremely important

to recognize the human elements that underlie BCN data.

Figure 2. Distribution of projects across enterprise types

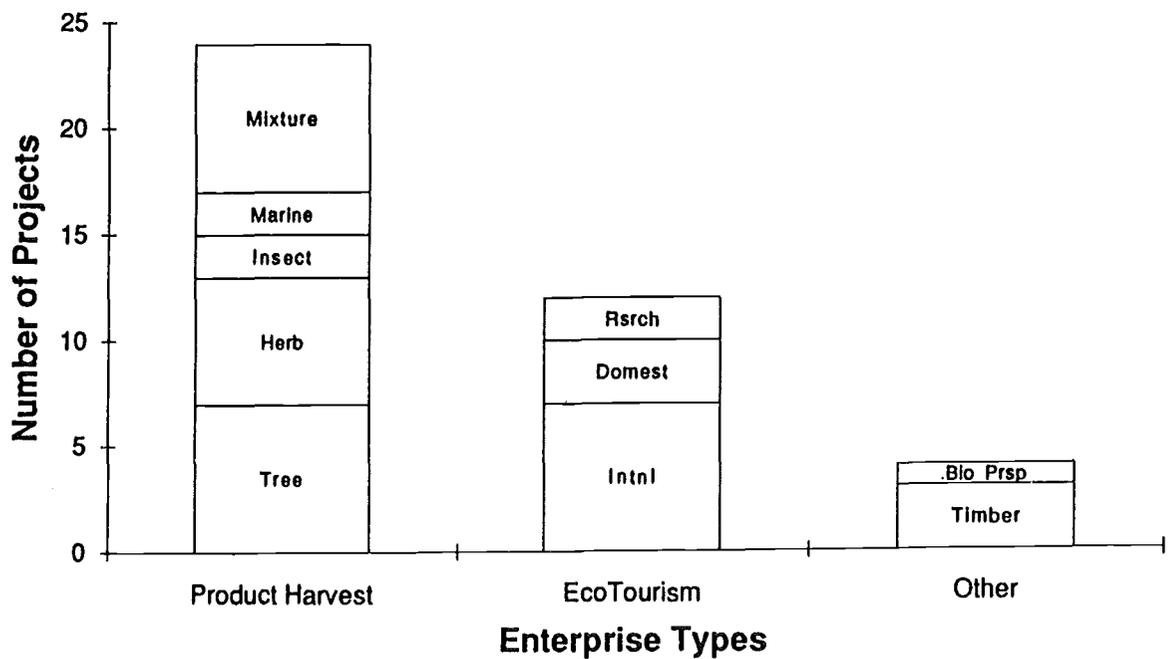
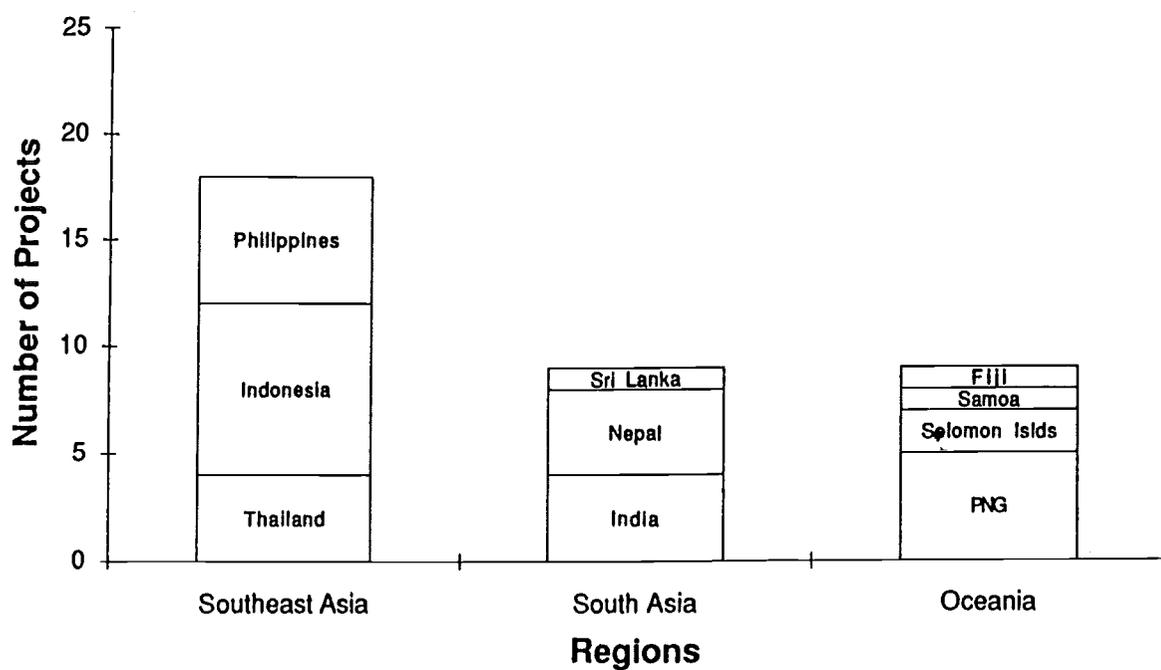


Figure 3. Distribution projects within regions



THE CENTRE OF MINOR FOREST PRODUCTS' ROLE IN SUPPORTING NWFP DEVELOPMENT

M.P. Shiva
Managing Director
Centre of Minor Forest Products
Dehra Dun (India)

Minor forest products (MFPs), or non-timber forest products (NTFPs), are the potential pillars of sustainable forestry, catering to the changing needs of the people in the changing environment. Hence they throw out a strong challenge: planning and growing forests for the future to ensure a sustained and increased flow of NTFP resources. This calls for a sound information base and an integrated multidisciplinary approach for implementation in development schemes.

CENTRE OF MINOR FOREST PRODUCTS

The Center of Minor Forest Products (COMFORPTS) is devoted to the promotion of MFPs/NTFPs through need-based sustainable forest management. To support these efforts, COMFORPTS is building up a pool of information on all categories of NTFPs and their hitherto unknown and under appreciated economic aspects. Seminars, technical assistance, and liaison with research, manufacturing and marketing organizations and individuals are all attempts to fulfill the above objective.

OBJECTIVES

The objectives of COMFORPTS are to:

1. Create awareness of the role and utilization of minor forest products (MFPs) including aspects of ethnobotany through various media including television to create interest in growing MFP crops and sustainable management of MFPs in different forest ecosystems.
2. Encourage people's participation in need-based scientific management of minor forest products.
3. Alleviate poverty through economically-viable packages based on MFP species of multiple uses, including medicinal plants.
4. Increase forest cover and ensure environmental conservation through different land husbandry programmes.
5. Enhance production of MFP species useful for fuel and fodder (energy plantations).
6. Establish demonstration farms and herbal gardens in 21 agro-ecological regions recently recognised by the government of India.
7. Set up and promote MFP-based industries for economic development.
8. Boost trade of MFPs to earn more foreign exchange by increasing

production and introducing MFP species for import substitution.

9. Distribute publicity materials (e.g., handouts on ethnobotany of MFPs, and methods of propagation, harvesting, grading, processing etc.).
10. Build computerised data bank on minor forest products to support better scientific management.
11. Provide job-oriented courses and training on exploitation of minor-forest products at the national level and offer consultancy services.
12. Maintain international liaison with personnel and organisations in the MFP Network.

PUBLICATIONS

The Centre publishes a quarterly newsletter, "MFP News" in both English and Hindi. It has a wide circulation in India and abroad

and is abstracted by CAB International. The Centre also publishes a "Journal of NTFP." Its inaugural issue is devoted to proceedings of the "International Seminar on MFPs in Forestry" held in April, 1993. Various other publications, including a number of case studies and books on NTFPs, are also underway.

OTHER ACTIVITIES

The Centre is an active participant in the Indian Joint Forest Management (JFM) Network and has been proposed to act as a nucleus of information on NTFPs which shall be reflected in MFP News.

The Centre is currently executing a project on "assessment of NTFP Resources or Better Management" funded by the Ford Foundation, while a number of projects are forthcoming for implementation.

In the years to come, the Centre plans to organize short-term training and, refresher courses on various aspects of NTFPs.

INTERNATIONAL CENTER FOR RESEARCH IN AGROFORESTRY (ICRAF) ACTIVITIES RELATED TO NON- WOOD FORESTS PRODUCTS RESEARCH AND DEVELOPMENT

Genevieve Michon
ICRAF, Indonesia

The International Center for Research in Agroforestry (ICRAF) was established in 1977 as a research council. In 1991, it became a research center supported by the Consultative Group on International Agricultural Research. ICRAF's goal is to help mitigate tropical deforestation, land depletion and rural poverty, through improved agroforestry systems.

ICRAF, which undertakes activities in 20 countries in Africa, Latin America and Southeast Asia, has the following objectives:

- to conduct strategic and applied research, aimed at developing appropriate agroforestry technologies for more sustainable and productive land use
- to strengthen national capacities to conduct agroforestry research
- to encourage inter-institutional collaboration
- to promote training, education, documentation and communication in the field of agroforestry.

ICRAF has had a long-standing interest in tree products, some of which are of forest origin. However, from 1977 to 1992, the bulk of ICRAF's activities were concentrated in Africa, especially in the dry

lands of Eastern Africa where ICRAF is based. Previously ICRAF focused primarily on agricultural areas. Its main efforts were to improve existing agricultural systems and to solve some of the problems encountered by local farmers through selected agroforestry technologies. ICRAF considered trees primarily for purposes of boundary or contour-planting, as shade trees in pasture lands, as living hedges and as nitrogen-fixing enhancers to food crops.

In 1992, ICRAF launched a program for Southeast Asia. As ICRAF began work in Southeast Asia, the organization realized that there is an astonishing variety of agroforestry systems in the region and that a great many of them are more closely related to forests than to agriculture. Thus, ICRAF refocused its research in Southeast Asia toward forestry-oriented agroforestry.

In Southeast Asia, ICRAF decided to focus on three target ecosystems: forest margins, *Imperata* grasslands and hilly farmlands. For each ecosystem, ICRAF has formulated an agroforestry system hypothesis to guide research. For the forest margin ecosystem, the hypothesis is: "On the forest margins, complex agroforestry systems or agroforests provide a superior alternative for the small-scale farmer for either continuous food crop systems or monoculture plantation of perennials."

These two models, continuous food cropping or monoculture plantation are usually devised to replace degraded forests or to replace unsustainable "slash-and-burn" farming. These two systems have shown important technical and social weakness. Agroforests, on the other hand offer a complement to other types of production units such as permanent production of staples or unsustainable slash-and-burn practices.

Thus, agroforestry increases production sustainability of the whole farming system. Agroforests increase biodiversity, decrease risks and increase returns to labour. Thus ICRAF still considers agroforests from the angle of agricultural development but agroforests should also be treated under a more forest-oriented perspective which involves non-wood forest products (NWFPs).

As far as NWFP management is concerned, there are clearly two options. One option is to harvest from natural forests, and the second option is to domesticate and establish plantations. Harvesting natural stocks is sustainable as long as the level of extracted matter does not exceed the level of natural regeneration. But pressure on resources is likely to increase. Establishing plantations might save one or two resources, but rarely does it save the ecosystem. Plantation establishment also usually implies a shift in control of the resource. Who owns, who uses, who benefits from NWFP plantations? It is usually not the communities which previously harvested the same NWFPs from natural forests. And usually it is not farmers, but companies.

Extension of plantations of NWFPs often results in the dispossession of local communities from forest resources. Here again, the agroforestry model appears as an

interesting alternative because it secures conservation of the coveted resource but also results in restitution of the resource base and maintains the authority of local communities.

ICRAF is now establishing a program in collaboration with the newly-created Center for International Forestry Research (CIFOR), which is also based in Indonesia. This program aims at a global comparison of the three options for NWFP management — harvesting from natural stocks, plantation development and agroforestry. ICRAF will focus on strategies, not on products or on systems.

NWFP exploitation involves more than simply choosing between extraction from natural forests or development of plantations or agroforestry systems. It also means choosing between sustainable harvest or immediate profits; between multiple use or specialization; between predominant use of natural forests or occasional use; and between subsistence or commercial exploitation of resources.

ICRAF wants to determine what influences the choice of a particular strategy in a given community. How does each recognized determining factor act in the decision-making processes of communities? Among these factors is product availability, regeneration and growth potential, site preferences, production processes, marketing prospects, etc.

Tenure systems are especially important. Ownership of land and resources, access to resources, and ability to transfer and access rights significantly affect NWFP management decisions.

Market organization patterns, at both local and international levels, are being

considered by ICRAF along with the organization of production systems. One question is how NWFP management relates to management of food cropping systems and commercial agricultural practices.

Technological aspects are considered along with cognitive systems. The latter include perception of the environment and responses to changes in resource availability. Local institutions and the social environment are other considerations. Who makes decisions — individuals, or the community as a whole? What are the important social structures for the evolution (or non-evolution) of resource management systems? The impact of external projects (e.g., logging, transmigration, etc.) is another consideration. How do these effect the traditional resource use patterns of a community? Also to be considered are relations with local, central and governmental institutions.

ICRAF will combine two types of approaches in its NWFP research. One is the site-specific approach which compares locations. Locations will be chosen to encompass a wide range of socio-economic situations, as well as different strategies for

NWFP management. The second type of approach is a product-oriented approach. ICRAF will compare different management strategies applied for various NWFPs. Using these combined approaches, ICRAF will try to answer the following three questions:

1. Under what conditions does agroforestry emerge as a desirable and achievable strategy for NWFP development?
2. What are the advantages and disadvantages of agroforestry systems for NWFP development relative to extraction of NWFPs from natural forests or development of NWFP plantations?
3. What can agroforestry strategies provide in terms of positive changes and benefits for local communities (e.g., what are the prospects for empowering local communities for forest resource management)?

ICRAF looks forward to working with scientists throughout the region in searching for answers to these questions.

Consultation Summary



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SUMMARY REPORT OF FAO REGIONAL EXPERT CONSULTATION ON NON-WOOD FOREST PRODUCTS: SOCIAL, ECONOMIC AND CULTURAL DIMENSIONS

28 November - 2 December, 1994
FAO Regional Office for Asia and the Pacific
Bangkok, Thailand

Seventy-two men and women met for a Regional Expert Consultation on Non-Wood Forest Products: Social, Economic and Cultural Dimensions, 28 November - 2 December, 1994, in Bangkok. Participants came from more than 20 countries in the Asia-Pacific region. Resource specialists from North America, Europe, and Africa brought valuable perspectives from other parts of the world to the meeting. Participation by women, NGO representatives, and non-foresters was particularly strong. In addition to foresters, participants included sociologists, economists, marketing experts, buyers of forest products, researchers, product development specialists, rural development officers, pharmacists, and lawyers.

OBJECTIVES

The objectives of the consultation were to:

- review the status of non-wood forest product development throughout the Asia-Pacific region, with particular emphasis on the social, economic, and cultural aspects of non-wood forest products;
- facilitate the exchange of information and sharing of experiences on non-wood forest products development among participating countries;

- develop a base of information and specific recommendations for use by Asia-Pacific representatives at the Global Expert Consultation on Non-Wood Forest Products in Indonesia, in January, 1995; and
- develop specific proposals and action recommendations for support of non-wood forest products development at regional and national levels.

CONSULTATION RESULTS

Twenty-eight technical papers were presented in three separate sessions devoted to the social, economic, and cultural aspects of non-wood forest product development. Briefings on the activities of seven organizations (including FAO) were presented in a fourth session on institutional support for non-wood forest product development.

A one-day field visit was made to the Thailand Royal Forest Department's Non-Wood Forest Products Experiment Station and private bamboo shoot plantations and processing facilities. An exhibit of dozens of non-wood forest products and photographs was on display for the week of the meeting.

The consultation highlighted several successful or promising non-wood forest

products initiatives including efforts to develop markets for forest nuts in the Solomon Islands, preserves and jams made from forest fruits in the Philippines, ecotourism in Fiji, medicinal plants in India, Sri Lanka, and Indonesia, rattan in Malaysia, and others.

Marketing and trade specialists provided advice to consultation participants on how to improve linkages between rural producers of non-wood forest products and consumers through efficient and viable market mechanisms. Similarly, legal specialists provided guidance on ways to protect people's rights of access to increasingly valuable non-wood forest resources.

MAJOR ISSUES IDENTIFIED

Participants in the consultation identified several major issues related to the development of non-wood forest products, including:

- uncertainty over resource sustainability;
- lack of information about the NWFP resource base;
- inadequate local control and participation in resource management and decision making;
- lack of information on current and future demand for NWFPs;
- inequitable distribution of benefits derived from NWFP exploitation;
- inefficiency of marketing systems due to a lack of information, incomplete market analyses, lack of credit availability, inadequate transportation and storage systems, weak management capability,

and inappropriate government policies and regulations;

- lack of clearly defined resource tenure and access rights;
- weak implementation of laws and regulations governing NWFP extraction;
- lack of emphasis on NWFPs on the part of forest management agencies;
- improper or incomplete valuation of NWFPs *vis-a-vis* timber resources; and
- implications of moving from subsistence-based cultures to greater dependence on the cash economy.

RISKS OF NWFP DEVELOPMENT

Consultation participants recognized that accelerated development of non-wood forest products entails several risks. Most important among these are the risks of over-exploiting resources, competitive exclusion of the poor as the demand (and therefore the price) for NWFPs increases, boom-and-bust cycles resulting from erratic production and demand patterns, over-dependence on single-product markets, and threats to traditional cultures from reorientation away from subsistence lifestyles toward cash economies.

RECOMMENDATIONS

Despite the diversity of the meeting's participants, the group developed a surprisingly solid consensus on the need for local community control and management of non-wood forest resources. This was perhaps the singly most important

conclusion and agreement emerging from the consultation.

Based on resource papers, technical presentations, working group sessions, and general discussions, the consultation made several recommendations. They are summarized as follows:

Policy recommendations

1. Wherever possible, communities should be given rights and authorities to protect and manage local resources by, and for, themselves.
2. Countries and institutions should establish policies and enact laws that provide local communities with management capability (e.g., through training, information, and credit) and incentives for long-term sustainable management of non-wood forest products.
3. Agencies with jurisdiction over, or financial interests in, forest resources, should promulgate mission statements and plans to proclaim and strengthen their commitment to stewardship of non-wood forest products and partnership with local resource users.
4. For purposes of monitoring, regulating, and taxing, differentiation should be made between natural (collected) non-wood forest products and those which are planted or cultivated. Exploitation of natural non-wood forest should be carefully monitored and limited to sustainable levels. Propagation of endangered plants should be encouraged.
5. FAO should revisit Resolution No. 8 (1983) concerning the common heritage

of genetic resources with a view toward ensuring that local knowledge and local efforts to conserve and develop non-wood forest products, especially medicinal plants, are appropriately valued and compensated.

Management recommendations

1. Non-wood forest product considerations should not be treated apart from broader forest management activities, but rather should be integrated with a wide range of projects and activities.
2. Forest management agencies should begin a process that will lead to greater emphasis on non-wood forest products in forest management strategies. In some countries this process will be slow, involving task forces, consultations, and research. In other countries the process may depend upon decisions by a relatively small number of individuals and can be accomplished quickly. Process aside, the objective should be the integration of non-wood forest products into mainstream forest management and planning.
3. Management responsibilities of forestry professionals should be expanded to include human ecology and conservation. Financial compensation and incentives should be increased for those professionals that successfully promote biodiversity conservation and the sustainable development of non-wood forest products.
4. Decentralized processing of non-wood forest products should be encouraged to enhance the likelihood of a higher percentage of economic benefits staying within local communities.

5. Communities, local people's organizations, and NGOs should be involved in designing and implementing strategies for non-wood forest product development. Local organizations should be strengthened where necessary to enhance local participation.
6. New products and new market relationships should be developed to meet competitive future demands. Among the approaches worthy of consideration are "fair trade agreements," whereby communities enter into agreements with processors or retailers (i.e. direct sourcing), and rethinking the niche for NWFPs (e.g., bamboo as timber, medicinal plants processed into high-value pharmaceuticals, etc.)

Training recommendations

1. Training of foresters and field forestry workers should be expanded to provide greater emphasis to non-wood forest resources and their productions, utilization, and marketing.
2. The curricula in forestry schools and other educational institutions on all levels needs to be expanded to include more interdisciplinary perspectives, including environmental stewardship, local equity in resource management, marketing, financial management, appropriate technology, and coalition building.
3. Where local knowledge and experience in inadequate, practical training should be provided to local growers, collectors, and processors of non-wood forest products to ensure sustainable and efficient use of the resources and to increase local income levels.

Research recommendations

1. Research should emphasize case studies, especially those that identify and analyze the causes of success and failure in non-wood forest products development. Case studies are particularly needed in the areas of community management, production of non-wood forest products, forest dependency, sustainable utilization, equity, and benefit sharing in marketing

There is also a need to develop case studies that describe and analyze the marketing channels from collectors/producers to consumers.

2. Other specific research should be conducted on:
 - the supply and demand of non-wood forest resources, currently and in the future;
 - indigenous systems of local knowledge and resource management;
 - the connection between tenurial security and the sustainable development of non-wood forest products;
 - the role of gender in resource management, including areas with matrilineal customs and property rights;
 - appropriate technologies for non-wood forest products harvest, use, and processing;
 - the existence and effects of professional biases and inaccurate

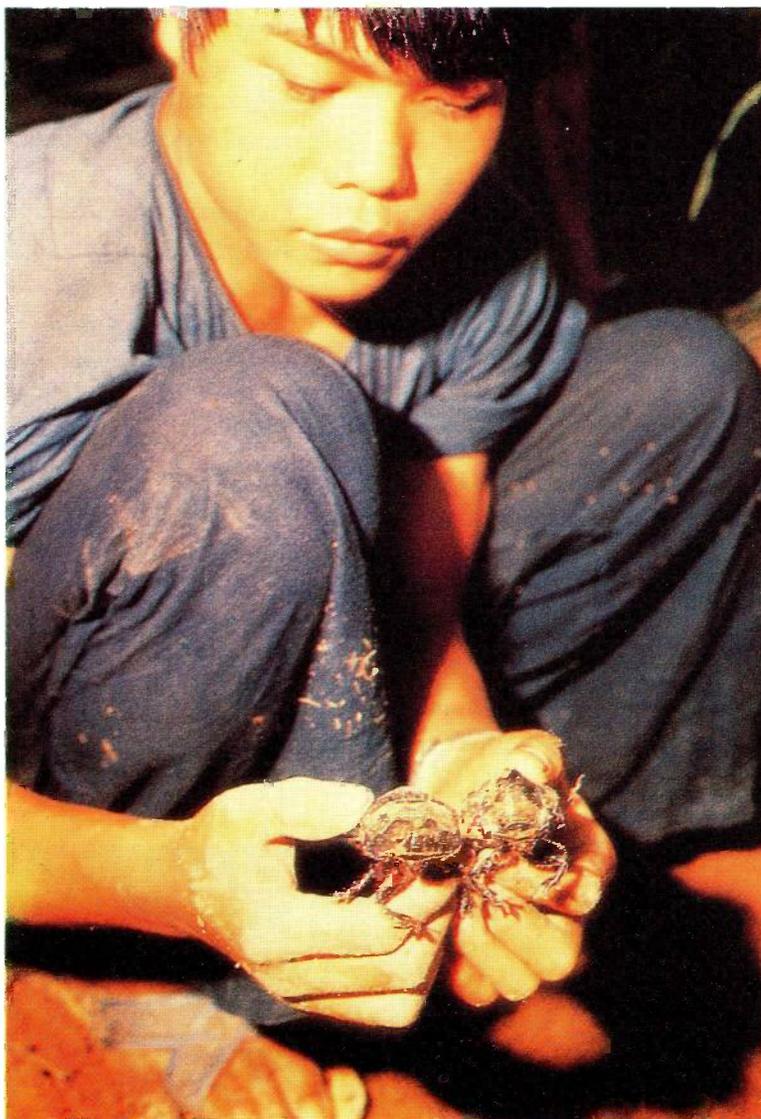
stereotypes, especially those concerning local resource users.

Information needs/recommendations

1. Comprehensive inventories of non-wood forest resources and assessments of their uses are lacking for most non-wood forest products; such inventories are sorely needed.
2. Surveys and analyses of the degree and extent of the subsistence and local uses of non-wood forest products should be conducted prior to encouraging more intensive commercial exploitation.
3. Marketing analyses that follow specific non-wood forest products from collection to final consumer are needed for a variety of products in each country.
4. Better linkages should be developed among the numerous networks and organizations already dealing with non-wood forest products.
5. Producers, buyers, and consumers should be sensitized and made aware of the value of non-wood forest products and the issues related to their development and exploitation.
6. FAO and other international organizations should gather, analyze, and distribute information concerning non-wood forest resources, collection, production, and marketing.



Greater efforts are needed to ensure equitable distribution of benefits from NWFPs.



Inadequate recognition of the social, cultural, and subsistence values of NWFPs is a widespread problem.

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28 November- 2 December, 1994
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