NON-WOOD FOREST PRODUCTS IN INDOCHINA

FOCUS: VIETNAM

by

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This document is a working paper. It documents information forming part of a larger study and informs interested persons about work in progress.

It is made available in limited numbers for comment and discussion.
This document was prepared, under author's contract, by Mr. Jenne H. de Beer of AIDEnvironment, Amsterdam, as one of the several Regional and Country Studies on Non-Wood Forest Products (NWFP), commissioned by FAO.

This, along with other similar and related studies will be used for preparing a substantial publication of wider coverage on NWFP.

Comments on the document, (along with supporting materials as relevant), will be greatly appreciated.
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1 INTRODUCTION

Objectives and scope

Mr. J.H. de Beer, AIDEEnvironment, was commissioned by the FAO Rome to carry out a short study on non-wood forest products (henceforth called NWFPs) in Indochina, with a strong focus on Vietnam.

The primary objectives were to

a) select NWFPs with a significant potential for expanded sustainable output, but for which market intelligence is currently inadequate in the producer countries;

b) identify the market potential of the selected NWFPs.

While in Vietnam, it was revealed to the consultant that in the light of current discussions in that country, a report with a somewhat broader scope was urgently needed.

However, basic information on the NWFP-sector is seriously lacking. In order to comply with this demand, this report aims at providing a prospective, along which the conservation and development of the NWFP sector can be approached.

If only because of the limited time available to the consultant, this report cannot pretend to be anywhere near comprehensive. From the plethora of products which can be considered, only a few were selected. Important aspects, such as the use of NWFPs on the household level, will receive too little attention.

The scope is Indochina as far as products occur in the whole region or as far as the aspects discussed are relevant for the whole of Indochina. However, a clear focus will be on Vietnam. Some specifics will also be discussed for Laos, whilst Cambodia is only referred to in passing.

The report is based on information gathered during travel to the region, supplemented by the study of literature and consultation with traders in Europe and with specialists in international market conditions. Also included is information gathered during earlier visits to Laos.

FAO commissioned the consultant to work altogether one month on this report. An invaluable source for the identification of products was Petelot's monumental four volume work "Les plantes médicinales du Cambodge, du Laos et du Vietnam". Among the other literature consulted, from trade periodicals via case studies to more general publications, Dr. Luang Van Tien's "country paper Vietnam", prepared for the FAO regional expert consultation on non-wood forest products, in November 1991 in Bangkok, deserves special mentioning.
Trade statistics for the region, as far as they do exist, are to be handled with much circumspection, as a very large volume of NWFPs are being traded unregistered. Under-reporting, double counting and the use of unrealistic prices are among the systematic shortcomings of these statistics. Where statistics on volumes and prices of NWFPs produced and traded were available, these were used as a starting point, supplemented by qualified guesses made by local and international traders and experts familiar with the trade in specific products. In other cases these qualified guesses were the only source.

Concepts

The term 'non-wood forest product' encompasses all biological materials other than timber and fuelwood which are extracted from natural forests for human use. These include fibre products such as bamboo and rattan; edible plant products, such as condiments and fruits; animal food products such as bushmeat, bird's nests and honey; non-edible animal products such as live animals, feathers and horns; medicinal plants; and extracts and exudates such as essential oils, resins, gums and dyes.

By 'forest' is meant a natural ecosystem in which trees are a dominant component. However, the trees do not exist in an ecological vacuum but, together with other plants and with animals, are part of a 'web of life'. Forest products are potentially derived from trees, but also from all plants, fungi and animals (including fish) for which the forest ecosystem provides habitat.

This report will deal with NWFPs which are collected in natural forests and indigenous plant species which are grown under forest cover and under an agroforestry system in homegardens. Hence, whereas managed secondary or degraded forests are included as sources of NWFPs, plantations are not.
In the past, Indochina disposed of vast forest reserves of different types. Although there are no exact figures for the size of the flora or the number of endemics, plant species richness is considered to be high. In the last decades the total land area under closed forest cover has declined rapidly in all three countries; Laos, Vietnam and Cambodia. The main causes of forest degradation and destruction have been uncontrolled or poorly controlled logging and shifting cultivation. Shifting cultivation in particular is a major cause of deforestation where lowlanders with poor agricultural practices inadequate for upland plots, have taken up upland agriculture in large numbers.

The extent to which the region can capitalize on its rich potential of NWFPs depends primarily on the extent to which the countries of Indochina will be able to reverse the negative trend of deforestation. On the other hand, strengthening the NWFP sector can also contribute to forest conservation, as this would enlarge the benefits from forests for rural people in the region, and therefore the impetus for resources conservation.

**Vietnam**

Vietnam has 65 million inhabitants, with an average population of 190/km². However, population densities vary widely between the different provinces.

In 1943 Vietnam had extensive tropical forest, with an estimated area of 14.3 million hectares, corresponding to a forest coverage of 43%. The latest inventory shows that the forest area in 1987 was 9.3 million hectares or 28% of the national land area.

According to estimates made by the Ministry of Forestry, the annual loss of forests is some 110,000 hectares. The rate of reforestation is 130,000 - 150,000 hectares per year. This rate compensates for the annual forest loss and has led to some expansion of the forested area. However, in terms of biodiversity, these new plantations are empty, if compared with the natural forest they gradually replace, as they consist of rather uniform stands of only a few exotic fast growing species. At present, large natural forests are only found in the Southern Highlands and in border areas with Laos (Ministry of Forestry, Socialist Republic of Vietnam 1991:33,34). Because of overlogging the forests of the Southern Highlands (central Vietnam) are at present becoming severely degraded.

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1 About 12,000 species of plants are estimated to occur in Vietnam of which only 7,000 have been described; up to 1,000 species are known to be endemic to the country (Vo Quy, quoted in Ministry of Forestry, 1991: 42)
Laos

Laos has a population of about four million people, of which 85% are living in rural areas. With an average population of 15 people/km², it has one of the lowest population densities in Southeast Asia.

There are large areas of more or less evergreen forest which originally covered about 160,000 km² or about 70% of the land area. Lowland and mountain rainforests occupied much of the northern part of the country, the Annamite mountains along the border with Vietnam, the Boloven plateau and the Mekong plains.

Data on forest cover and rates of forest loss in Laos are in short supply. Perhaps the best estimate is that approximately 29% of the land area is at present under closed forest cover and a further 25% is covered with degraded forest (Collins et al., 1991). There is no doubt that forest destruction and forest degradation have been serious in the recent past. Nevertheless, at present Laos still has considerable natural NWFP stocks.
3 THE HOUSEHOLD ECONOMY

Altogether it is estimated that there are 24.3 million people living in Vietnam on and near forest lands, accounting for 30% of the country's population (Van Tien, 1991:13).

The importance of NWFPs on the domestic level cannot be overestimated. This particularly applies to the ± 7.8 million people of rural ethnic minorities in Vietnam and the 1.8 million people of ethnic minorities in Laos, who make up 45% of the total population of Laos. Some ethnic groups (e.g. the Than and the Tai) spend up to 235 days per year on hunting and collecting forest products (Tran Van Nao, 1987). As is the case elsewhere in Southeast Asia, gathering, hunting, and fishing are all vital adjuncts of traditional forest farming. These activities, together with farming, form an integrated system of resource utilization. In rural households, NWFPs fulfil several functions. They provide food security, health care, materials for implements and construction, fodder, fuelwood, and income.

**Food and fodder**

Food from the forest, such as game, bamboo shoots, ferns, fruits and nuts, honey, and mushrooms, are consumed as side dishes and snacks. As such it provides a considerable supplement to agricultural crops. Various species of wild tubers, vegetables, and other forest foods are widely used as buffers against seasonal and emergency shortages. In many areas of Vietnam rural people rely entirely on the forest as the source of food and fodder for pigs and cattle for four months per year or more (Gammelgaard 1990:8, Tran Van Nao 1987:5).

The same phenomenon is reported in Laos. The provinces of Savanaketh and Sayaboury, for example, had a bad rice harvest for three consecutive years since 1987, because of droughts and pests. During this time most people relied on wild tubers and other forest food for about four months every year.

**Health care**

All over rural Indochina traditional practitioners represent the major medical facility which is available. A large part of the ingredients for traditional prescription originates from natural forest resources.

**Construction and implements**

In rural Indochina wood, rattan, palm and imperata leaves are used. Bamboo however, mainly from secondary forest, is a particularly important material. Houses, furniture, barns, fences and a whole range of implements
are made of bamboo. It is appropriately called the poor man’s timber (Rao 1991).

Fuelwood

In Vietnam an estimated 23 million tonnes of fuelwood are used annually. In rural areas, together with rice straw and other residues, it is the common fuel for cooking. In thinly populated areas which are still under closed forest cover, fuelwood collection is not considered a problem. In many other areas there is an acute scarcity of the product. In the rural areas of Laos fallen branches, litter, and dead wood are widely gathered from secondary forests and swidden fields to use as fuelwood. With its low population densities, Laos has no scarcity of fuelwood.

Income

As a source of income the sale of NWFPs, both in Vietnam and Laos, often exceeds income derived from the sale of agricultural products, such as rice. In some isolated provinces of Laos, NWFPs indeed do form practically the only source of income apart from opium.

For an example from north Vietnam, see the box below. A few other examples are discussed in the section on products (see also Van Tien, 1991).
NWFPs in the local economy; an example from North Vietnam

The following description of the use of NWFPs in the Bat Xat district in the province of Lai Chau, North Vietnam, is based on observations made by Karl Speth in 1991. This case should not be read as the description of 'the' typical Vietnamese forestal district.

Food: almost all meals are supplemented by vegetables collected in the forest. The forest is thus an important supplier of vitamins and minerals. Three small children accompanying the researcher during the walk came up with four different wild fruits and with edible stems of creepers.
Hunting is much practised in Bat Xat. The main game are wild boar, deer, wild goat, monkeys and many species of birds. Wildlife is however declining at an alarming rate.
Wild honey is collected commonly and consumed locally. The wax is used by the Mhong to make textiles shiny. Certain perrenials are collected from the forest floor as supplementary pig-feed.

Traditional medicines: there is a quite common knowledge of the medicinal uses of a wide range of bark, resin, fruit, root, flower or root from trees or herbs occurring in the area. An unidentified bark is locally used for incense.

Construction and implements: bamboos are commonly grown, sometimes covering areas of more than 200 hectares. Different species of bamboos are used for whatever purpose one can think of. It is widely used in construction, but also for purposes from
Income: the herb Tao Qua (*Amomum aromaticum*) produces aromatic seeds, which are used in China as a spice and in medicines. It is cultivated on the forest floor under a relatively closed canopy in difficult accessible areas. Raising Tao Qua from seeds takes about eight years, from sprouts two to three years. It is a labour extensive crop. Once a year in October-November the men go to the Tao Qua growing areas in the forest and stay there for a week; collecting and drying the fruits that are later on transported on horses. In spring the men have to return only once in order to clean the areas from grasses and the old Tao Qua plants. Apart from the Bat Xat area, Tao Qua is also grown in the districts of Sa Pa and Va Ban. In Bat Xat it is found in 19 of the 22 villages where many families are involved in cultivating and harvesting Tao Qua. A plot of one hectare can yield up to 300 kg of fruits. The fruits are sold over the border to China. One kilo of dried fruits containing the seeds is worth 8000 to 20,000 Dong (mid-1991 price = US $ 1 - 2.50).

On top of this, a considerable amount of a very valuable mushroom (possibly *Lentinus edodes*) is collected. In the town of Sa Pa dried mushrooms are sold at 25,000 to 45,000 Dong/kg dry weight.

Co thom, an unidentified herb, is collected from the forest floor and sold in dried form in Sa Pa for a price of 50,000 Dong per kilo. The latter two products are also exported to China. Finally, rattan is collected for the market in small quantities. Depending on the quality one meter of rattan sells for 200-250 Dong.
4 DOMESTIC AND EXPORT MARKETS

In Vietnam, the NWFP-sector as a whole, including cultivation, collecting, trading and processing, gives employment to hundreds of thousand of people (Van Tien, 1991: 14).

A significant part of the NWFPs harvested are entering the home market for direct consumption or for use in industries which produce for the homemarket. The overall economy of Vietnam is in rapid transition, characterized by the decentralization of control and liberalization of trade and industry. As a consequence more diversified trade channels can be used by producers and customers.

A considerable part of Vietnam's NWFP-export is in fact re-export from Laos and Cambodia (e.g. eaglewood). The export trade is in the hands of a few state and provincial companies and numerous small private traders. Until recently, the Soviet Union and Eastern Europe were the main export destinations for a large number of NWFPs. Trade was based on barter and quality standards demanded in this trade were low. Since the collapse of the Soviet economy, Vietnam is turning to other markets. In fact, the official export to China and a number of other destinations were on the increase already well before the collapse of the Soviet market.

Now Hongkong, Singapore, Japan, Taiwan, Thailand and France are becoming increasingly important customers for NWFPs from Vietnam. China is at the same time an important importer of NWFPs, as well as a major competitor on the world market for products, such as essential oils. Thailand, in the last decade, changed from a country exporting a range of NWFPs into an importer from Indochina. In order to be able to penetrate other 'new' markets a constant effort to keep up quality standards will be needed.

At present, world market prices for raw materials such as spices and essential oils are generally low as a result of a structural oversupply from producer countries and the current recession in North America and Europe. This is particularly true for products which are easily cultivated. On the other hand, the growing demand for natural products in the industrialized countries opens new markets for some specific products. For labour intensive products, such as pine resin, Vietnam has the advantage of comparatively cheap labour.

In the past Indochina as a whole enjoyed a special position on the world market as a supplier of NWFPs. Now, while the Indochinese countries are trying to re-establish international trade links, it should be possible to win back at least a share of their former markets. This obviously will be a long term operation.
Laos is also in the process of liberalizing its economy. A specific problem for Laos is that, being landlocked, it suffers from particular high transport costs for exports.

Although the actual capacity for processing NWFPs in Laos is limited, the NWFP based industry is nevertheless of importance vis a vis the smallness of the national industry as a whole. It includes rattan for the domestic and export market, pharmaceuticals for the domestic market, essential oils (eaglewood and star anise), and the distillation of pine resin for the export market.

Cambodia is at present exporting a range of NWFPs to Vietnam and Thailand. It has no processing capacity of its own. A major problem is that many of the forests where NWFPs used to be collected, are infested with landmines.
5 DISCUSSION OF SOME NON-WOOD FOREST PRODUCTS

In this section specific NWFPs occurring in Indochina are discussed. Again it must be stressed that this section is far from comprehensive. A few examples are given of NWFPs in various product groups. Some products are dealt with in some detail, whilst other products and product groups are discussed more briefly. Several other interesting products, e.g. mushrooms, ornamental plants, flowers, nipah palms and birds' nests are not touched upon here.

The following product groups are discussed below: extracts and exudates, medicinal products, fibres, edible plant products, and animal products.

5.1 Extracts and exudates

5.1.1 Essential oils and incense

Essential oils can be defined as a volatile mixture of organic compounds derived by physical means from odorous plant material, such as flowers, herbs, woods, fruits, and roots. Essential oils are the basic raw materials for perfumes on a large scale and for flavouring to a lesser extent, as for flavouring a wider range of other ingredients is available. Essential oils find their applications in the food and in the fragrance industry (perfumes, soaps, detergents), and in pharmaceutical products.

Vietnam is currently expanding its capacity for the production and export of high quality essential oils. A pivotal role is played by the Enteroil company, which was established four years ago within the CNRS (Centre National des Recherches Scientifiques). Enteroil is a specialised export unity. Distillation of essential oils is for the larger part done in smaller cottage industries near the areas where the raw material is harvested. Enteroil acts primarily as a centre of quality control and certification. It has adequate equipment and staff for this purpose. Much energy is invested in extension work aimed at bringing up quality standards with the collectors/cultivators and the cottage industries.

In Laos one sophisticated distillation unit exists in pharmaceutical industry nr. 3 at Vientiane. At present, the distillation unit reportedly operates far below its potential capacity.

Market trends and consumer preferences

In general, this is not the best time for a producer of essential oils to enter new markets. On the one hand there is a considerable oversupply of certain products. Particularly China is dumping large volumes of some
oils on the world market.

On the other hand especially the fragrance industry is badly affected by the recession in North America and Europe. In combination this has led to very low prices for a range of essential oils.

From the demand side, prospects in the flavours industry look much better. The reduction of saturated fats, calories, sugar, salt and other components in processed food, has created a strong demand, particularly in the USA, for flavours which are needed to offset diminished palatability. Perhaps even more importantly, natural ingredients are more and more preferred by consumers in the industrialized countries.

*Cinnamomum cassia, Cinnamomum loureiri* (Cassia)

Cassia trees occur naturally in large parts of Indochina, but most abundantly in north and central Vietnam (e.g. Hoang Lien Son province), where it is also widely cultivated. Wild stands of Cassia trees occur in the eastern provinces of Laos. About 2000 tonnes of Cassia bark are exported from Vietnam annually, at US $ 2,000 - 3,000/tonne. In addition a small amount of cassia oil is exported (about 10 tonnes, at US $ 27 per kg). The volume of export has steadily increased during the 1980s.

Laos: Cassia bark enters local markets (e.g. Pakse, bark from the Baktian district, Champasak province). Cassia in its ground form is used in North America, Europe and Japan in bakery products, in meat and fish seasoning and generally in spice mixes. The oil is used in small quantities by the flavouring industry (e.g. cola type soft drinks). The quantity of cassia entering world trade is in the order of 20,000 to 25,000 tonnes annually, with Indonesia and China being the main suppliers. In the past 'Saigon' cassia from Vietnam was regarded in the USA as the superior quality spice. Although Chinese cassia is now the standard, it is to be expected that Vietnam stands a fair chance to win back a share of the US market after the ban on imports from Vietnam will have been lifted there. This is expected soon after the presidential elections in the U.S.A.

In the areas where cassia is cultivated or collected it forms a very valuable source of income for the local population. Reports from Van Yen district in the province of Hoang Lien Son learn that the local Dao economy, which is focused towards cassia cultivation, thrives very well. The Dao have currently 1000 ha (out of a total of 2400 ha) for *Cinnamomum cassia*, which area is steadily expanded (Van Tien, 1991:13, H. Bovil, J. Brands, pers. comm.).

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2 The difference between the two species is very small.
**Cananga odorata (Ilang Ilang)**

This is a large tree, cultivated in home gardens, all over Vietnam. The flowers are used for worship. Domestically the oil is used as a fragrance for soap. At present there is no export of this essential oil. The world market is less than 100 tonnes and is stable, but not growing. In France, the best quality is used in high-class perfume of the floral and heavy oriental types, in which the oil blends well with other essential oils.

**Melaleuca leucadendron (Cajeput oil)**

In the past melaleuca forests took up a large area in the Mekong delta and along the coast of central Vietnam. In the Mekong delta the total area with stands of Melaleuca has shrunk during the last three decades to less than 100,000 hectares. The Melaleuca forests in central Vietnam also have diminished considerably. Some cajeput oil is used in the domestic pharmaceutical industry and a small quantity (± 50 tonnes) is exported to Singapore. For cajeput oils as an export commodity the future looks bleak because world market prices are falling rapidly, following the collapse of Eucalyptus oil prices.

**Illicium verum (star anise)**

This small tree, belonging to the family Iliciaceae which grows in the evergreen forests of southern China and the mountainous regions of Indochina, is being cultivated in the Vietnamese province of Lang Son and in the mountainous regions of Eastern Laos.

Vietnam produces more than 2000 tonnes of star anise seeds per annum. A small quantity is used domestically in tonicums. About 1600 tonnes of seeds are exported to Cuba, China and the Soviet Union. On top of that 200 - 250 tonnes of essential oil are shipped to France and Czechoslovakia. In China, the largest supplier of star anise to the world market, Vietnam star anise is blended and then exported to France. In France it is used as a raw material in the production of alcoholic beverages.

The world market price is at present approximately US $ 7.50/kg for star anise oil, down from US $15/kg a few years ago. The price appears to have stabilized now and star anise oil is considered a fairly good product. Vietnam has one distillation plant for star anise at Lang Son and about eight manual production lines around Caobang and Lang Son. In Vientiane, Laos, a small quantity of star anise oil is distilled annually.
Aquilaria crassna (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 Southern 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.

The ethnic minorities, collecting eaglewood, make small holes in the trees they encounter to investigate its content. If no eaglewood is found, they leave the tree alone. The scars stimulate the production of eaglewood. A few years later the same trees are investigated again. Only if the tree contains eaglewood, the whole tree is cut.

First grade eaglewood from Indochina values up to US $2000/kg in Singapore. From lesser grades the essential oil is distilled in small factories in Ho Chi Minh-city and Vientiane. Eaglewood from Cambodia and Laos is shipped via Vinh and Ho Chi Minh-city. About 100 tonnes of eaglewood is officially exported from Vietnam, but the real export must be much more.

Jasminum sambac oil

This is the product of the flower of a small tree, cultivated in home gardens all over Vietnam. The essential oil is domestically used for flavouring tea.

Fokienia hodginsii (Pemou oil)

Pemou oil is derived from a large tree, up to 30 m. It grows naturally in Vietnam in the northern province of Dai Son, in the central highlands and in the Lam Dong province in the south. Nowadays the tree has become quite rare. The essential oil is extracted from roots and stumps. The timber is exported to Taiwan, where it is used for the manufacture of coffins and furniture. Pemou oil is used as a fragrance in cosmetics (e.g. soap). Its fragrance is described as very good and unique.

Up to 20 years ago pemou oil was exported to Western Europe (a.o. Germany) at a price of US $20/kg. This trade ended after supplies dried up during the war. At present 50 tonnes of oil are exported annually to Czechoslovakia. From the south another 50 tonnes of powder is exported to Hongkong and Singapore at US $350/tonne f.o.b. Ho Chi Minh-city.
Homalomena aromatica

*Homalomena aromatica* is a herb naturally widely distributed in Vietnam. The essential oil is distilled from the root and is domestically used in perfume. The dried root is being used in Vietnamese medicine against skin diseases.

Litsea cubeba oil

This oil is derived from a tree which naturally occurs mainly in the northern provinces of Vietnam. *Litsea cubeba* is also planted as a shadow plant, e.g. for tea. The oil is obtained from the fruits of the tree. Currently Vietnam exports over 30 tonnes per year. Apart from Vietnam, China is the only producer. China used to export 200-300 tonnes per annum, but exports from this country have fallen sharply in recent years. *Litsea cubeba* oil is a competitor for lemon grass oil. The oil is used in its own right in cheap fragrance work, but is more commonly employed as a source of citral and thence as a source of vitamins. The future of this unique oil depends on developments in the price and quality of synthetic citral and changes in perfumers preferences. The main markets are the USA, Western Europe and Japan.
5.1.2 Resins and gums

Naval stores: pine oleoresin and derivatives

The term 'naval stores' denotes the products obtained from the oleoresin of pine trees and includes gum rosin, wood rosin, tall oil rosin, turpentine and a whole range of chemicals derived from turpentine. Various modified forms of rosin are extensively employed in paper sizes, adhesives, printing inks, rubber compounding and surface coatings. Turpentine is nowadays mostly processed to isolate its components which form the basis of a growing chemical industry. Pinus merkusii is by far the more important source for pine resin in the area, Pinus khasya is a minor one. The main production areas in Vietnam are the provinces of Lam Dong and Quang Ninh, in Laos these are the eastern provinces.

In Vietnam natural pine forests are tapped, but pine trees are also much planted. A few hundred tonnes of pine resin are used domestically in Vietnam in the paper industry and for the production of varnish. Laos exports a few hundred tonnes of pine resin to Vietnam. Vietnam exports at present about 4500 tonnes of pine resin and derivatives. Japan is now the main customer.

The present prospects for producers in developing countries of rosin and turpentine are favourable, since tapping is labour-intensive. World demand is strong, while the level of production is declining. The largest exporter, China, is increasingly producing for the domestic market and the production of Portugal, the second largest exporter, has declined dramatically with about 50% in recent years.

Unfortunately for the country, Vietnam has already gone into long term (20 years) delivery contracts with Japan on the basis of relatively low world market prices in the past.

Laos produces over 500 tonnes of pine resin per year, mainly in the provinces of Khammouane and Ziangkhoang. After distillation the resin is exported to Vietnam and Thailand. There appears to be room for a moderate expansion of the industry, based on the tapping of natural stands of Pinus.

Liquidambar formosana

This is a large tree, occurring naturally in the north of Vietnam. Experimental planting by FIPI has revealed that the tree is excellent for soil improvement. The resin has a light fragrance of incense. It is used domestically in cottage industries. There appears to be interest from traders in Hongkong for this resin.
**Benzoin. Styrax tonkinensis**

The tree Styrax tonkinensis is found in the Northern provinces of Laos. It also grows exceptionally in north Vietnam. In the province of Oudamxai and in the North of Luang Phabang the Styrax forests form part of a shifting cultivation cycle with long fallow. Only under specific circumstances the tree produces the very valuable benzoin resin.

Laos produces over 100 tonnes of benzoin annually, which is exported to France and China. Prices paid in provincial towns to the tappers in the producing areas in April 1991 were about 2000 kip (US $3)/kg, down from 5000 kip/kg a few years earlier. The price for top quality benzoin paid in China in the beginning of 1991 was reportedly 119 Renminbi ($22)/kg. At present the price for top quality benzoin in Europe is between $15 and $20/kg.

Vietnam exports about 10 tonnes per year to France. The only other exporter of benzoin is Indonesia, but the resin is of a lesser quality. The resin is mainly used in the fragrance industry as a basis material for high-class perfumes and balms.

**Damar. Dipterocarpus spp.**

The Malay word 'damar' was adopted into European trade language to signify 'resin', primarily the type produced by the dipterocarps of Southern Asia. In Indochina damar is produced by various dipterocarps, most importantly *D. alatus*, a very tall tree occurring in south and central Vietnam, and *Shorea vulgaris*, occurring in Cambodia, south Vietnam and Laos.

The oleoresin is used as raw material for the production of natural paints, varnish, printing ink and glue and for caulking boats. The annual production by the forestry sector in Vietnam is (including yang oil) about 500 tonnes.

In Laos the production of damar is estimated at between 500 and 1000 tonnes a year, most of which is exported to Thailand. Some damar from Indochina enters the European market (Germany and France) via Thailand and Singapore. Although the price and volume traded are low (Singapore $1,000/tonne, export Singapore, 1989), the market for damar is

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3 Thailand also exports a small quantity of benzoin, but this originates probably from Laos.

4 Figures given for the 'forestry sector' are related to production volumes of state enterprises and cooperatives under the responsibility of the Ministry of Forestry. The private sector, but also production under other state institutions (e.g. Ministry of Health) are not included herein.
Canarium copaliferum (cham resin)

The tree Canarium copaliferum, 12-15 m high, grows in the wild in north Vietnam. Its resin is domestically used for caulking boats and because, of its fragrance, in the preparation of joss sticks. The annual production of cham resin by the forestry sector is between 60 and 150 tonnes, some of which is exported.
5.1.3 Industrial oil

*Aleurites montana (Tung oil)*

This large tree occurs naturally in north and central Vietnam, but is also much cultivated. The seeds contain between 50 and 58% of a quick drying oil. There is one factory for the refining of Tung oil at Cao Bang, with a capacity of 200 tonnes per annum, and numerous small-scale manual processing units at localities where tung seeds are available. The oil is used for varnishes and is mixed with lac.

Registered production of the forestry sector of Tung seed increased between 1986 and 1988 from 1,378 to 4,082 tonnes. The oil is partly used in the domestic lacquer industry, partly exported. Until recently the USSR was an important customer, but Naforimex also ships 1000 tonnes of oil per annum to Japan, at US $ 1700 per tonne, whilst 500-1000 tonnes of seeds are exported to China via private traders.

5.1.4 Tannins and Dyes

This group of products will only be shortly discussed. Tannins, extracted from several mangrove species (e.g. *Rhizophora conjugata*), is used in the domestic leather industry in Vietnam. There is a small factory in Ca Mau town, where about 8 tonnes of mangrove tannin is produced. During the war natural mangrove forests were badly damaged by dioxin bombing. Over-harvesting of wood from mangrove forests for charcoal further has added to the destruction of these forests. *Rhizophora conjugata* and other species are now being planted for the production of tannin.

A many-splendoured variety of forest plant pigments lend colours to paints and dyes for commercial and home use. Particularly some of the ethnic minorities in Laos and Vietnam still use natural dyes in the production of cloth. The export of high-quality woven textiles, painted or printed with natural dyes, may profit from the revival of the interest in natural colours in up-market segments of the world market.

5.1.5 Insecticides

43 natural insecticides occurring in Indochina are listed by Petelot (1964: IV 31). Three promising natural insecticides are discussed below (two of which, *Cinnamomum parthenoxylon* and Peuak Bong, are not mentioned in Petelot for its insecticidal/insect repellent properties).
Azadirachta indica, syn.: Antelea azadirachta (neem)

This tree is rather common in south Vietnam, Laos and Cambodia. It is often cultivated as a shade tree. The seeds and leaves are very efficient as a store pest control. Both the cold pressed neem oil and the oil-free part of the seed kernel can be used for pest control. The leaves of the neem tree also contain insecticidal and repellent substances, although in much lower concentrations (Schmutterer and Ascher, 1987). In India also soap is made from neem oil.

Sassafras

Vietnam produces a small quantity (a few dozen tonnes per annum) of sassafras oil. The source of Vietnamese sassafras oil is *Cinnamomum parthenoxylon*, a small tree of 12-18 m, which grows naturally in the province of Quang-tri, in central Vietnam, and in the mountain range along the border with Laos and Cambodia, further to the south. The tree occurs commonly in these mountainous areas, in some places in pure stands. The oil is derived from the roots and lower parts of the trunk.

Natural safrol was traditionally used for heliotropine manufacture, but recently this application has been overshadowed by its importance as a starting material for the production of piperonal butoxide, a synergist for natural pyrethrin insecticides. The major commercial sources for natural safrole are China and Brazil (resp. *Cinnamomum camphora* and *Ocotea pretiosa*). Chinese suppliers have been erratic of late while the source for Brazilian sassafras oil, exported until recently at levels of some 1,500 tonnes per annum, has dried up as a result of a Brazilian government ban on felling wild resources of *Ocotea pretiosa* in the province of Santa Caterina (Green and Home, 1991:11; ITC, 1986: 64).

With very tight supplies and a burgeoning demand in Japan, the United States, Italy, Spain, France and the UK, world market prices have gone up rapidly during the second half of 1991. The current world market price of sassafrass oil is about $7/kg. It is recommended that a survey of existing stocks of *Cinnamomum parthenoxylon* is carried out, that a plan for sustainable harvesting is made and that the possibilities for enrichment planting are investigated.

Peuak Bong

From the province of Oudom Xai in Laos, annually about 47 tonnes of Peuak Bong, the bark of an unidentified forest plant is exported to Thailand, where it is used for insecticides. The price paid to the collectors is 140 kip/kg. The plant survives the harvesting of the bark.

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5 Because of increasingly domestic consumption and diminishing wild resources.
5.2 Medicinal plants

In the whole of Indochina, numerous forest plants are used in medicinal formulas, prescribed by traditional healers. Other plants are processed by the domestic pharmaceutical industry in Vietnam and Laos for the home market. A more limited number of medicinal plants is collected or cultivated for the export market.

Medicinal plants still form a numerically large group of economically important plants. Although worldwide several hundred different genera are used medicinally, most are used in herbal remedies. Either the whole plant, a plant organ, or its extracts are used. There is a much smaller number of plants from which individual constituents are isolated and used as medicines, either alone or in combination, or that contain constituents isolated and used as precursors for drug synthesis.

The world trade in medicinal plants and their derivatives has declined in many industrialized countries owing to the growing volume of competitive synthetic products currently marketed. On the other hand, a renewed interest in traditional medicine in Asia and the expanding market for homeopathic and phyto-therapeutical products in the industrialized countries provide new outlets for a number of botanical products.

The major market for herbal medicines from Indochina lies however in Asia, i.e. Thailand, which has insufficient forest resources left to supply its domestic pharmaceutical industry with raw materials, China, Hongkong, and in the future perhaps Indonesia, which booming Jamu industry has a serious lack of raw material from domestic resources. A few selected medicinal plants are discussed below.

Amomum aromaticum (tsao kwa)

This plant produces aromatic seeds, which are used in China as spice and in medicines. It is cultivated in the northern Vietnamese province of Lai Chau, under a relatively closed canopy in difficult accessible areas. The official export went down from 153 tonnes in 1986 to 19 tonnes in 1988, which probably only means that the export is carried out increasingly by small private traders. The price in the production area is between US $ 1 - 2.50 for one kilo of dried fruits containing the seeds (see further page 10).

Hibiscus sagittifolius (Sam nam)

This ginseng-like herb grows commonly in south Vietnam, particularly in the provinces of Vin Phu and Lam Dong. The roots are widely used in the Chinese pharmacopoeia. There is some export to China and to Singapore.
**Morinda spp.**

These are rather common tree species, cultivated and growing in the wild. The bark of different varieties of Morinda contains antiginone, a substance with anti-bacterial and cytotoxic effects. It is widely used in the traditional Vietnamese pharmacopoeia (cholera, tetanus). Annual production of the forestry sector is between 30 and 114 tonnes.

**Polygonum multiflorum**

This perennial climbing plant is widely found in forests and savannes in mountainous areas of Northern Vietnam. The root is much used in Vietnam and in China, as a tonicum for longevity and as a cholera medicine. The annual registered production of the forestry sector in Vietnam is about 20 tonnes.

**Camphora officinarum (syn.: Cinnamomum camphora)**

This 10-15 m high tree occurs in the wild[^6] in the central highlands. Camphor is used in the domestic pharmaceutical industry as a basis chemical for a range of drugs. The estimated need for domestic use is about 100 tonnes of camphor per year. At present the natural stands of *C. officinarum* can not supply the domestic demand. The import price would be in the order of DM 10/kg for camphor crystalline (Hamburg price). As both the stem and the roots of the tree are used for the distillation of camphor crystalline, the whole tree is cut for the harvesting of camphor.

The Faculty of Pharmacology, University of Hanoi, has been carrying out research on *C. officinarum*. From the results of this research it appears to be a very interesting tree for enrichment planting in existing forests or mixed planting on barren hills. The tree grows well on poor soils, its large foliage gives good coverage and, where the leaves in fact also can be used for the distillation of camphor, the first harvest can already take place after two years. Particularly on higher altitudes the tree gives a high yield of the essential oil.

**Artemisia spp.**

*Artemisia annua*, an annual herb, common in northern Vietnam where it occurs naturally, is also easy to cultivate. In the traditional Vietnamese pharmacopoeia, the seed oil enters drugs against skin diseases and jaundice and is used as an anti diarheticum. In the framework of an international research programme, this plant, together with other species of

[^6]: According to Petelot (1954: III 42), *Cinnamomum camphora* is not indigenous to Vietnam. Possibly the natural stands mentioned are the remnants of plantations established by the French in the early forties of this century.
Artemisia, is currently being developed into a new anti-malaria drug.

**Strychnos nuxvomica**

This 12-13 m high tree is characteristic for the forests of south Vietnam, Laos and Cambodia. The nut is processed into poison, tonicums, is used as a bitter flavouring for medicinal purposes and as raw material for the synthesis of muscle relaxant drugs. There is some export from Vietnam and Laos to Hongkong, Taiwan, Germany and France. The price of the nuts (January 1992) is about US $ 600/tonne f.o.b. South-east Asian port. There is a stable market for this product with presently India and Sri Lanka as the main suppliers.

**Momordica spp**

*M. conchinchinensis* and *M. charanta* occur naturally and are also widely cultivated all over Indochina. The seeds of both species contain a glucoside. The seeds are used as bitter flavouring for medicinal purposes. The University of Hanoi has developed a drug, Gacavit, which has Momordica seeds as a major constituent. The drug is said to reinforce the immune system, to repair DNA and is being tested as a cancer medicine.

**Smilax glabra, Smilax spp.**

This climbing plant occurs naturally all over Indochina. From the provinces of Oudom Xai and Luang Phabang in Laos there is some export into Thailand. The roots are used in traditional medicines against a whole range of diseases. They also can be used as a raw material for the production of steroidsaponines.

**Drosera rotundifolia**

This is a wild herb, common in humid areas all over Vietnam. In Europe it is used in phytotherapeutic and homeopathic drugs against whooping cough and as an antispasmodicum. World demand is estimated at over 100 tonnes per year. China is exporting this product. The sales price in Hamburg is DM 27/kg.

**Dioscorea deltoidea**

This tuber is growing in the wild in the province of Son La, north Vietnam. It is used for the production of diosgenin, a valuable raw material for steroid drugs. The rather small resources of *D. deltoidea* are wholly used in the domestic pharmaceutical industry.

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7 This price is for 'Drosera petata' from China. Presumably this is the same plant.
Zanthoxylum rhetsa

This product derives from a small tree, quite common in south Vietnam and South Laos. The bark contains two alkaloids, canthinone and berberine, which are highly effective antibacterial substances particularly for gastrointestinal disorders. The seeds are also used as a hot spice in Chinese cuisine. Indonesia, among other countries, is exporting seeds to Europe. The price, if bought in Hamburg, is DM 3000/tonne.

Amorphophallus campanulatus (syn: Arum campanulatus)

This herb occurs naturally in Laos. The roots are exported to Japan where they are used as the main constituent of slimming pills.
5.3 Fibres: rattan and bamboo

Rattan are climbing palms (sub-family Calamoideae) which grow throughout the Southeast Asian region, forming a characteristic component of many forest types. In Indochina more than 30 species of rattan belonging to five genera are known to occur. At least 14 species are used commercially (Turbang 1989).

In Vietnam, rattan is important locally, but also as a raw material for the domestic industry. Unfortunately figures for total production and domestic use can not be given, because the estimates that circulate are too divergent. The export market for this product is very healthy. With strong demand and short supplies, prices are very good.

400 tonnes of rattan are exported from the north of Vietnam, mainly to Taiwan, via state trade firms. Another 2000 tonnes is exported by private traders to China. The consultant did not come across export figures for south and central Vietnam, but these areas also must have a considerable export. There are numerous small cottage type industries that produce furniture, baskets, and other products, mainly for the home market, and a few larger factories in Quy Nhon, Hanoi and HCM-city, which operate as joint-ventures with Taiwanese and Thai capital and produce for the export market.

The total export of rattan works for 1991 is estimated at 6 million articles, worth US $2,5 million (Van Tien, 1991: 8). Trade circles in Bangkok estimate that on short term Vietnam could become a more important supplier of rattan to the world market. However, with the current 'free for all' exploitation of natural rattan resources, exhaustion of the resource must be feared in the future. FIPI has recently started a pilot project for the cultivation of rattan in Lau Son.

In conclusion, it must be stated that reliable data are perhaps nowhere more painfully lacking as with such an important and valuable NWFP as rattan.

The present volume of various rattans harvested for the market in Laos is estimated at about 1,5 million pieces (4,5 m) per annum (Turbang 1989: 4). There are still large reserves of rattan in the more inaccessible areas across the country.

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8 Some of the rattan harvested in Central Vietnam is also exported to China by small traders.

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The rattan industry in Laos consists of rudimentary processing (cleaning and sorting of the raw material before export); handicraft, which is almost exclusively produced for the domestic market; and half a dozen small and medium sized furniture factories, which produce for the domestic and export market.

Bamboo

In Vietnam, bamboo is domestically widely used in construction. The quantity used for construction is estimated as in the order of 400 million stems per annum. Bamboo also complements wood as a raw material for paper pulp (Ministry of Forestry, Socialist Republic of Vietnam, 1991). Domestically, numerous other products are made from bamboo and bamboo shoots for consumption are widely traded on local markets. There is some export of bamboo toothpicks (36 tonnes per month) from Lam Dong to Taiwan.
5.4 Edible plant products

5.4.1 Edible oils and nuts

Seeds and nuts from forest trees are consumed locally or processed into edible oils for the home market, and as such they are very valuable. For certain varieties of nuts there is also a specialized export market with the potential for a moderate expansion. Another reason to value the significance of these oil seeds is that, unlike cultivated oil seeds, many forest species with oil bearing seeds do not place much demand on soil nutrients (see Gupta and Guleria, 1980:79).

Sterculia lychnophora (Malva nut)

This is a large tree which occurs naturally in south and central Vietnam, in the southern provinces of Laos and in the mountains of Cambodia. One tree gives about 40 kg of an excellent nut. The tree is particularly valued by forest dwellers, who actively protect it.

The registered annual production in Vietnam is 235 tonnes of nuts. Laos exports malva nuts to France. The price of 1 kg of malva nuts is around 1000 kip/kg (US $ 1.50) in Vientiane.

Sterculia foetida

This is a large tree, which is quite common all over Indochina, and sometimes cultivated. One tree gives about 20 kg of seeds. Locally pressed, one kg of seeds results in 20% of an excellent edible oil. The oil is locally used for cooking.

At present there is no export of the oil. World demand for medicinal purposes is estimated at about 100 tonnes of oil. Thailand, which exported the oil in the past, at present is not able to do so because of depletion of the resource (Mahidol University, 1980/1981).

Aesculus sinensis (Chestnut)

Chinese chestnuts occur naturally in north Vietnam and in the province of Luang Phabang and elsewhere in Laos. Boiled or roasted it is a much appreciated delicious side dish in Laos and Vietnam. It is also used as pig fodder. The registered production of the forestry sector in Vietnam is between 70 and 134 tonnes per annum.
Bassia pasquieri

This tall tree was formerly known as illipe de Tonkin. In the past Bassia pasquieri occupied a large area, growing in almost pure stands. Now, only about 300 ha is left in the province of Thanh Hoa, north Vietnam. The fruits are maturing little by little over a long period of years. In practice it is not possible for people to collect the fruits in the forest. However, fruit bats which roost in caves in the area drop the seeds of the fruits they have eaten in those areas. The seeds are collected there and pressed into oil. Bassia is a very good edible and cooking oil, comparable with olive oil. (Tran Van Nao 1986, Crevost & Lemarie, 1924)

Thea oleosa

This small tree occurs naturally in different areas of Vietnam and Laos and is also cultivated in Northern Vietnam. The seeds contain a fluid oil, which has a mild taste and a pleasant special smell, which differs per area. It is used in Vietnam as a high quality cooking oil. It is also suitable for the production of soap. In Qui Chau, where Thea oleosa is cultivated, yields vary from 20 kg of seed per tree per annum (4 kg of oil) for trees 5 years old, up to 30-35 kg of seeds for trees 8 years and older.

The price on local markets is 30 Dong per liter, 1987 price (equals about 1100 Dong November 1991). According to Van Nao (1987) this would be an excellent tree for enrichment planting.

5.4.2 Spices

Numerous forest spices are consumed locally in Indochina. Many of these spices are also used in traditional herbal medicine. Some spices are traded with neighbouring countries, whilst a few also enter international trade. Two of the latter, cardamom and galanga, are discussed below. Cassia, together with cardamom the most important spice, has been discussed in the paragraph on essential oils.

Generally, prices for spices have reached an all time low on the world market as a result of a structural oversupply by the producer countries. Although an important product as cardamom, or to a lesser extent cassia, is also affected by the general downfall of prices, this does not imply that the product would be less interesting from the primary producers point of view. Particularly where production costs are low and a good quality can be offered, certain spices are still well worth collecting or cultivating.
Cardamom (Amomum spp.)

A herb, growing under forest cover, of which the seeds are used as a spice. In Laos it grows naturally and is cultivated on the Boloven plateau in the south and in the province of Oudom Xai in the north. In Cambodia it occurs in the Cardamom mountains. A small quantity of cardamom is also produced from wild resources in north Vietnam (provinces of Son La and Hoa Binh). Cardamom is used in the Middle East as a coffee flavouring and in northern Europe and the USA in bakery products. Elsewhere it enters meat seasonings. The world market price is at present US $ 7/kg c.i.f. Rotterdam for top grades of cardamom.

Laos exports 400 tonnes or more of cardamom per year via Thailand and China, Vietnam some 10 tonnes to Japan, Hongkong and Singapore. Cambodia used to be an important exporter in the past, but no known quantities of the product enter the trade from this country today. The market price in Pakse, Laos, for top quality selected cardamom was 2000 kip (US $3)/kg in October 1991.

Galanga (Alpinia officinarum)

This herb occurs naturally in Northern Vietnam and in Laos, but is also much cultivated in home gardens. The root is commonly used in Vietnamese and Lao cuisine as a ginger like spice. It is also used in local medicine as an aromaticum, a stimulant and as an aphrodisiac. There is a market for galanga in Asia, whilst a small quantity is imported into the Netherlands (about 30 tonnes annually at US $ 750-1000 per tonne). At present, India is the main supplier for the Dutch market. In the past galanga was also imported from Vietnam and in principle there is an interest in re-establishing the trade relation for this product with Vietnam (or Laos).

5.5 Animal products

5.5.1 Honey and Wax

Forest honey in Laos and Vietnam is mainly produced by Apis dorsata, a bee native to tropical Asia. A large part of the honey is consumed locally at the household level. In Vietnam, about 200-400 tonnes of forest honey per annum are marketed. This is a small quantity compared to the thousands of tonnes of honey produced on rubber- and coffee plantations and elsewhere. However, pure forest honey makes a much better price on the domestic market because of its good taste and the medicinal qualities that are ascribed to it.
For instance, one litre of forest honey from the Mekong-delta costs 10,000-40,000 Dong (1991 price at collector's village), whilst one litre of ordinary honey at the same time would get a maximum price of 6,000 Dong.

The major area in Vietnam where forest honey is collected are the *Melaleuca* forests in the Mekong delta. It accounts for about half the quantity that is brought to the market in the country. According to connoisseurs the honey is of the best quality.

As an export commodity *Melaleuca* honey doesn't have much perspective, because - with an average water content of 27 & 28% - it doesn't fit the standards in most markets. With a healthy domestic market and a limited supply, there is certainly no need to explore foreign markets for this product. Unknown quantities of bees-wax are also sold on local markets, as a byproduct of honey collecting.

Several provinces of Laos produce very fine qualities of forest honey. At present, most honey is traded on local markets. Small quantities are sold over the border with neighbouring countries. In the province of Sekong a small factory for the processing and package of forest honey for the export to Bangkok and Europe will start to operate in March 1992.

### 5.5.2 Sticklac

Sticklac is the resinous secretion of a tiny insect, *Laccifer lacca*. Host trees, either wild or, more frequently, cultivated are inoculated with *Laccifer lacca* breed. In Laos (e.g. in the province of Sayaboury) the resin is also collected from the branches of trees in natural forests, without prior inoculation. Some of the more common host trees are: *Samania saman*, *Albinia lucidior*, *Cajanus cajan*, *Acacia catechu* and *Albizia odoratissima*.

Sticklac is the crude product as it is harvested from the trees, which is known as shellac once the resin has been extracted. Bleached lac is sticklac after having been bleached with a hypo-chlorite solution.

Lac finds a wide variety of uses, including paints and varnish and electrical insulation. In Vietnam the registered annual production by the forestry sector of sticklac in the second half of the 1980s varied between 89

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9 With the exception of Japan and Taiwan.

10 Not to be confused with 'lac', which is an exudate vegetal liquid produced by *Rhus succedanea*. This product is much used in lacquer works in Vietnam.
and 143 tonnes per year\textsuperscript{11}. On top of this 15-22 tonnes of lac per annum was produced for electrical insulation. Actual production (from cottage industries) most certainly is substantially higher.

A few years ago, with foreign assistance, a lac processing plant with a capacity of 150 tonnes per annum was established at Ha Dong. Reportedly, the plant does not produce lac that meets the required standards for the domestic industry. The latter industry is further supplied by cottage lac processing units throughout the country, supplemented by imports from India and Laos.

In Laos, the provinces of Sayaboury, Luang Phabang and Houaphanh produce an unknown quantity of sticklac. In a good year total production may well exceed 100 tonnes. Part of it is exported to Thailand, China and Vietnam.

\textsuperscript{11} Lac production can vary very much from year to year in relation to weather conditions (see Subansenee, 1986:1).
6 NON-WOOD FOREST PRODUCTS IN REFORESTATION IN VIETNAM

Whilst active measures are needed in Vietnam to conserve natural forests where this is still possible, there is no doubt that in other areas forest rehabilitation programmes are urgently needed.

At the same time, for NWFPs for which a strong demand exists, cultivation of the wild species is the only sure way to relieve the pressure on and promote the actual conservation of natural forest stocks. A large reforestation programme is well under way in Vietnam. With more attention to the role which NWFPs can play in this connection, the programme can become much more successful than it presently is.

Taking the needs and aspirations of the people living in or near these areas as a point of departure for reforestation in barren areas and for enrichment planting in degraded forest, holds out the best promise. Examples from all over the world show that when the people concerned are not convinced of the benefits of forest rehabilitation programmes, reforestation becomes a difficult and expensive venture.

Hence, one could proceed as follows: start by making an inventory of the NWFPs people use at the household level for food including game, fuel, medicine etc. Then include forest species relevant to these needs in the replanting scheme. Next, after a careful assessment of future domestic and foreign demand for commercial NWFPs, promote the trees and plants selected in the areas which are most suitable for their cultivation. The use of species indigenous to an area, rather than exotic species, as cash crops has the advantages of genetic conservation, conservation of extant biological diversity, and of ecological stability as well as cultural familiarity and value.

In this way a forest will regrow which is interesting from the point of view of the people living in the area; a forest that consists of mixed stands of multi-purpose trees and other trees and plants, some of which are more valuable for direct use in local households and others that are valuable commercially and sooner or later, depending on the species, will bring in cash income to the households involved.

True participation of local people in reforestation could so be achieved. Such an approach requires a great deal of patience, as well as thorough basic scientific research. Research into indigenous forest management systems as well as into biological and ecological aspects, extensive field trials and organized extension efforts to put research results into practice, are required.
7 RECOMMENDATIONS AND CONCLUSIONS

7.1 General

Indochina's forests are a very valuable source of a wide range of NWFPs. However, active measures to conserve and restore the resource base are urgently needed.

Where large natural forests still do exist, conservation must take first priority. The conservation of these forests is important not only because of the crucial environmental services they provide, such as watershed protection, soil stabilization, and climate regulation, but in the first place because of their role as repositories of biological and genetical diversity. The forests of Indochina are the source of the wild ancestors of many important cultivated crops and hence of potentially genetic inputs required for the maintenance or improvement of their productivity. They also harbour a host of plant and animal species whose benefits to humanity have not even begun to be explored.

In barren and degraded areas large reforestation programmes are being carried out, particularly in Vietnam. Indigenous tree species and NWFPs could play a larger role in these programmes than they presently do. A specific focus on the needs of rural households is warranted because it is here that dependence on the materials and income provided by NWFPs is most direct.

In this context, it should be noted that both the degradation of NWFPs and also their development can cause hardship for the groups most dependent on the forest for their everyday lives.

It is therefore imperative that steps to enhance the role of NWFPs in forestry are accompanied by the formalization and enforcement of traditional forest dwellers' rights and the participation of all rural communities in the control and management of the local forest and its NWFP resources.

7.2 Market aspects and research: Vietnam

A wide range of NWFPs are collected or cultivated either for use in the home market or for export. A large part of the trade goes unregistered.

Export

Several decades ago Vietnam, together with the other countries of Indochina, enjoyed a special position in the world market as a supplier of NWFPs. Now, Vietnam is re-establishing trade links with the world market at large.
At present world market prices for raw materials, such as spices and essential oils, are generally low as a result of structural oversupply from producer countries and the current recession in North America and Europe.

On the other hand, the growing demand for natural products in the industrialized countries has opened new markets for specific products. As regards labour intensive products for which world demand is strong, such as pine resin, Vietnam has the advantage of comparatively cheap labour.

In general focusing on relatively small quantities of high-value products is recommended rather than on large volumes of a small range of products. In particular, it would be wise to try to avoid direct competition with (the giant) China.

There is considerable potential for marketing a wider range of products already identified and for developing new commercial and industrial uses as well as for finding new forests products. Traditional forest-dwellers, with their vast repositories of knowledge which they have accumulated regarding the exploitation of their forest environment, can act as guides to identify 'new' products and their useful properties.

One of the most fruitful areas to which indigenous knowledge can contribute, and indeed has already contributed, is the medicinal use of forest species. Pharmaceuticals is also a promising sector for further development, because Vietnam possesses very competent research units in this field, notwithstanding a severe lack of equipment and literature, for instance at the University of Hanoi. Other potential commodities based on traditional products include pesticides and insect repellents.

In addition, new industrial uses are still being found for forest products originally exploited for other purposes. To be able to take advantage of new possibilities, the active gathering of market intelligence is needed. Representatives of the trade in Vietnam should closely monitor developments in the major consumer markets and by bringing 'new' raw materials to the attention of manufacturers in the overseas market, explore the chances to enlarge the basis of exports.

In a country short of foreign exchange earnings, finding export markets is obviously an urgent need. Nevertheless the potential of the home market of 65 million people should not be overlooked. For numerous NWFPs for which it would be hard to find export markets (e.g. edible oils, forest honey), a good market either already exists or can be established within the country. In addition, the development of products for the home market contributes to the national economy in terms of import substitution.
Harvesting

Less wastage in the process of extraction and better regeneration of many NWFPs can be achieved by the development and application of improved harvesting techniques. Improved storage would result in less spoilage of raw materials, before they reach the processing stage.

Processing and quality control

A very large part of primary processing of NWFPs - pressing, distillation, drying - is carried out by small cottage industries in the countryside. Credit facilities to upgrade these production units are direly needed. Assistance given to small scale forest-based industries, as well as to the primary producers - collectors and cultivators - should also be directed at achieving consistent grading which meets buyers specifications (the example of the Enteroil company has been given in paragraph 5.1 on essential oils).

Market development for small scale manufacturers would be furthered by government agencies and trade associations promoting their products, supplying market information, and assisting in the development of products marketed to changing consumer preferences.

Research

Strengthening the NWFP-sector will demand considerable research effort. Vietnam possesses competent scientific institutes, such as the Centre for Natural Resources and Environmental Studies (CRES), the Institute of Ecological Economy and several branches of the University of Hanoi.

It is recommended to reinforce these and other institutes and bring them in to carry out research to the benefit of strengthening the NWFP-sector. A first step to reinforce these institutes might be to help them upgrade their libraries.

7.3 Market aspects and research: Laos

In Laos NWFPs are much collected for the domestic market, but all taken together they also form one of the major export commodities of the country. A very large part of the export goes unregistered. Much of what has been said in paragraph 7.2 in relation to Vietnam also applies to Laos.

Laos has a disadvantage because, being landlocked, it has comparatively high transport costs. However, it has a potentially strong position for the export of those products, which grow in the wild or under light forest management, because of its still relatively abundant natural forest resources.
Processing

The present capacity for processing NWFPs is small in Laos. It is recommended to stimulate the establishment of small-scale NWFP processing industries in the producing areas and assist existing operations with achieving consistent grading. Also, in Vientiane a centre where quality control can be carried out is direly needed.

Research

In Laos much research also needs to be carried out before a successful attempt can be made to develop the economic potential of the NWFP-sector in the country.

In October 1991, a small NWFP-branch was established within the Department of Forestry in Vientiane. Strengthening the research capacity of this branch of the Department of Forestry, as well as the research and monitoring capacity of other institutions, both on the national and the provincial level, should be given first priority.
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ANNEX I  LIST OF CONTACTS

Vietnam

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17. Prof. Dr. Nguyen Van Truong, Director Institute of Ecological Economy
18. Prof. Ton That Chieu, Institute of Ecological Economy
19. Prof. Nguyen Viet Pho, Institute of Ecological Economy
20. Dr. Luong Van Tien, Director Special Forest Products Research Centre, NAFORIMEX I
21. Hans Warfvinge, Senior Consultant, ORGUT Consulting AB
22. Mr. Bonami, country representative UNIDO
23. Karl Speth, forester
24. Vincent Mulder, beekeeping advisor, Committee Science and Technology for Vietnam
25. Jacqueline Eeuwes, anthropologist
26. Dr. Tamang, acting coordinator TFAP, Ministry of Forestry
27. Dr. Le Dien Duc, Senior Research Officer CRES
28. Dr. Phan Túy, Vice-director Faculty of Pharmacology, University of Hanoi
29. Dr. Van Nguyen, Faculty of Chemistry and Physics, foreign relations department
30. Dr. Van Khien, Head of the Unit for Research on essential oils
31. Prof. Hue, Director chemistry department

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32. Vo An Ha, Director NAFOBIRD
33. Nguyen Dinh Dien, Manager NAFOBIRD
34. Nguyen Phu Hoanh, Marketing Manager, Investment Development Tourist and Import Export (IDC)
35. Trinh Huu Hien, Liaison officer, FAO Focal Point
36. Ngo Ut, senior forester, forestry department, southern branch

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37. Lê Ngọc Hòa, Director Union Forest Industry and Agriculture Corporation, Bao Loc
38. Nguyen Huu Chau, Manager, Song Than Processing wood export factory, Thuan An-Song Be
39. Nguyen Nam Kha, Director provincial Production-Trading Import Export co., Dalat
40. Nguyen Va Trunh, Vice-director provincial Production-Trading Import Export co., Dalat
41. Mr. Ngan, Manager Forest Brigade no. 8
42. Mr. Pho, Director Provincial Forestry Lam Dong
43. Mr. Phong, Head of the forest control section, provincial Forestry Department

United Kingdom

45. David Crosthwaite, Fuerst Day Lawson Limited (FDL), London
46. Angus Hone, Natural Resources Institute, Chatham
47. Neil V. Shrimpton, managing director Vietnam Trading Corporation, Ascot, Berkshire

France

48. Dr. J. Vidal, Musée de l'histoire naturelle, Paris