Chapter 17

Domestication of rattan (*Calamus tetradactylus*) in the buffer zone of Ke Go Natural Reserve Area, Cam Xuyen district, Vietnam

Vu Dinh Quang[1]

Common names	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
May nep, Rattan	Stem	Wild/Cultivated	Medium	International	Small

OVERVIEW

Farmers living in the buffer zone of Ke Go Natural Reserve Area in Cam Xuyen district harvest a small-diameter rattan species, *Calamus tetradactylus* Hance (known locally as *may*), from both planted and wild resources. The availability of wild *may* has been decreasing owing to overharvesting. In 1998 a project was introduced promoting the cultivation of *may*, amongst others, by providing seedlings. The *may* from the study area feeds into a large pool of rattan used for the production of furniture and handicrafts near Hanoi. Most end products are produced for export. The demand from new international markets for rattan furniture and handicrafts is growing, partly as the result of political reforms aimed to open Vietnam to foreign markets. Households in the Ke Go buffer zone make baskets from *may* for domestic use, but there is hardly any local processing for the market. Local awareness of the possibilities of adding value is limited because of the complexity and length of the trade chain.

INTRODUCTION

Cam Xuyen district is located in Ha Tinh province in north-central Vietnam. It is one of the poorer districts in the country, mainly caused by a lack of rice fields and the prevalence of poor soils. Forests cover 29% of the district and have been heavily disturbed. The Ke Go Natural Reserve Area (NRA), established in 1996, is the only forest of any significance remaining in Cam Xuyen. The NRA

has a core area of 24,801 ha where no people are living and extraction of forest products is strictly prohibited (classified as Special Use Forest) and a buffer zone surrounding the strictly protected zone. Almost the entire reserve has been heavily logged and undisturbed primary forest is virtually absent. Most of the buffer zone area is barren or scrub, with only some forested parts.

This case study focuses on two communes[2] of Cam Xuyen district: Cam Son, consisting of 12 villages with 1,382 households; and Cam My, consisting of 10 villages with 1,131 households. Cam Son is located in the buffer zone of Ke Go NRA, while Cam My lies partly in the buffer zone and partly in the core area (Figure 1).

The non-timber forest product project

The non-timber forest product (NTFP) project, which started in 1998 with the objective of improving people's livelihoods and reducing the pressure on natural resources, has pilot sites in Ha Tinh and Bac Kan provinces. The pilot site in Ha Tinh province is formed by the communes Cam My, Cam Hung and Cam Son. The project[3] in Ha Tinh is funded by the Royal Netherlands Embassy and implemented by the NTFP Research Centre (an agency of the Ministry of Agriculture and Development), the Centre for Natural Resources and Environmental Studies and the World Conservation Union. The main project activity is the promotion of rattan cultivation. Since 2000 more than half of the villagers in the communes located in the project area have received support in the form of *may* seedlings, fertilisers and technical training. Villagers themselves selected the households to receive support in participatory village meetings, based on the criteria of labour availability, land availability and labour skills. Among households meeting these criteria priority was given to the poorest households. The project activities have resulted in a substantial increase in the number of people with planted rattan on their lands.

THE PRODUCTION-TO-CONSUMPTION SYSTEM

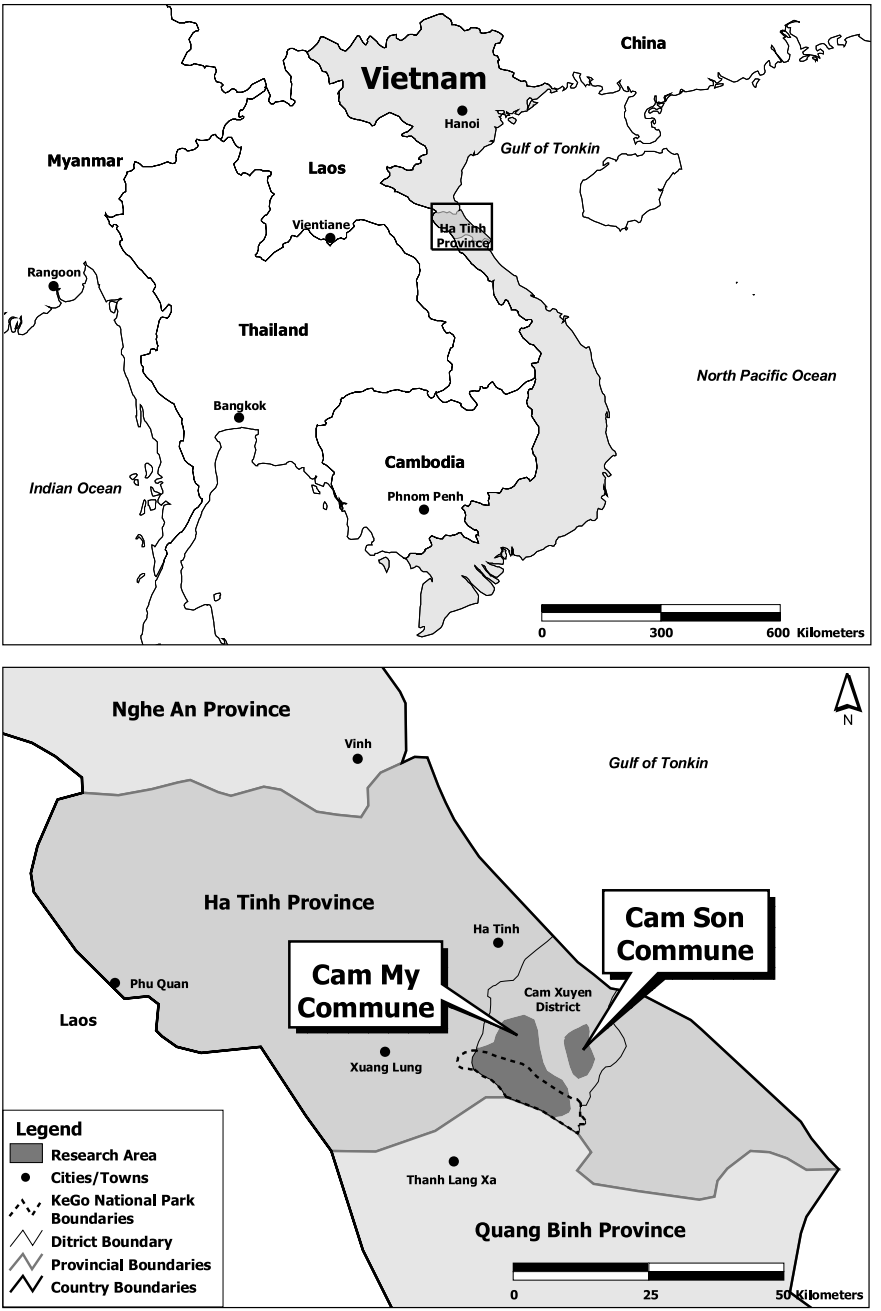
May, a small-diameter rattan

There are a number of rattan species used commercially in Vietnam (Table 1). All small-diameter rattan species are commercially known as *may* here, while large-diameter species are called *song*. The most important small-diameter rattan species in the research area, and the focus of this report, is *Calamus tetradactylus* Hance, locally known as *may tat*, *nep*, *may ruot ga*, or simply *may* (Vu van Dung and Le Huy Cuong 1996). *May* is commonly found in Cam Xuyen district, especially in Ke Go NRA.

Extraction of *may*

About 60% of the harvested *may* comes from home gardens, the rest from wild resources in the buffer zone and the protected area. It seems that the poorest households, with scarce labour and land, are the most dependent on rattan from the wild. Households may harvest *may* throughout the year, as a sideline

Figure 1. Location of study area



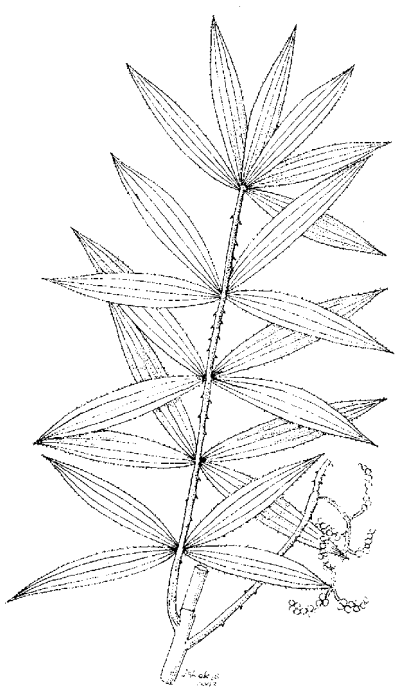
Source: ESRI Data and Maps 2002.

Table 1. Commercial rattan species in Vietnam

Local name	Scientific name	Commercial name
May tat, nep, may ruot ga	*C. tetradactylus*	*May*
May dang	*C. tonkinensis*	*May*
May tau	*C. dioicus*	*May*
May cat	*C. viminalis*	*May*
Song bot	*C. poilanei*	White *song*
Song mat	*C. platyacanthus*	*Song*
Song la bac	*C. Plectocomiopsis*	*Song*
Heo	*C. scutelaris*	*Song*

Source: Vu Van Dung and Le Huy Cuong 1996.

activity, but collection from the wild resource occurs mainly in the dry season from December to July, because access to the forested areas is limited during the rainy season. Most of the cultivated *may* is planted in fences bordering fields, since it serves as good protection against buffaloes and other animals. Bamboo is also considered good fencing material, but farmers prefer rattan because bamboo is said to compete with crops for soil nutrients. In fences the *may* is usually intercropped with tree species as it has a preference for partial shade and needs support to climb.



(*Calamus tetradactylus*)

May cultivation needs relatively little labour for maintenance and harvesting. Cultivated *may* requires four to five years before the first harvest (approximately 1–1.5 kg per bush). After 10 years, productivity will be in the range of 10 kg to 20 kg per bush per year, and about 15 to 20 years are required for the plants to reach full productivity of 80 kg to 120 kg per bush per year. Although a farmer may need to wait up to five years for the first harvest of cultivated *may,* it can be harvested approximately five years earlier than wild *may*. The difference between wild and cultivated rattan is caused by the beneficial effects of shade regulation when the rattan is planted and by occasional application of fertilisers.

In 2000 a total of 45,000 *may* seedlings were planted with the support of the NTFP project. The project provided on average 100 rattan seedlings to each supported household (NTFPRC 2000). As a result of the NTFP project activities, the supply of rattan should increase significantly from 2004 onwards.

The producer household

Most households in the study area are farmers with paddy fields and small home gardens. The most important cultivated products are rice, peanuts, fruit, vegetables, sweet potato, pepper, tea and rattan. Of these, rattan and peanuts are cultivated largely for cash income, while of the other products only the surplus is sold. One of the most important activities for cash income is animal husbandry. In addition to *may,* a number of other forest products are harvested including bamboo culms, bamboo shoots, palms, medicinal plants, fuel wood, wildlife and *song*. The average annual total household income in the research area is US$570[4], and households in the study area earn approximately 60% of their total income in cash. About 20% of the population in the research area extracts rattan for commercial purposes. *May* contributes about 15% to the total cash income of these households.

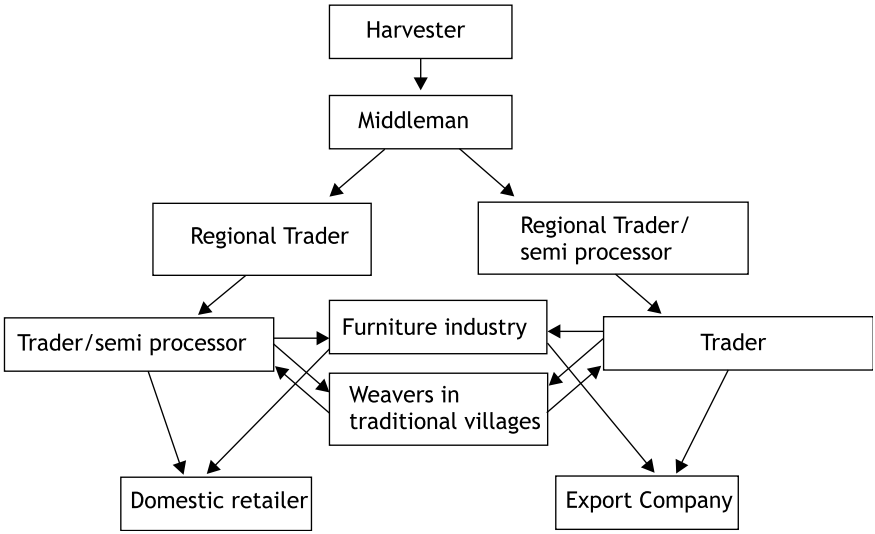
Trade and processing

Most of the *may* is used for the weaving of handicrafts such as baskets. Smaller quantities of *may* are used for furniture in combination with large diameter rattan and wood. The *may* trade system is complex and involves many steps. Figure 2 shows a simplified version of the trade flow in 1998.

In the communes in the buffer zone of Ke Go NRA, farmers collect rattan and sell it to middlemen or directly to one of the two big regional private traders in the neighbouring Thach Ha and Huong Khe districts[5]. Regional traders buy raw material from different parts of Ha Tinh province, either collecting the rattan by truck from the villages or having farmers and independent middlemen deliver it by bicycle or motorbike. Middlemen are usually farmers and work on an opportunistic basis, in their spare time. They collect rattan from farmers in their own and neighbouring villages. When a rattan owner has no time to harvest, the middleman may do the harvesting instead.

Regional traders treat the rattan with sulphur to protect it against fungi. The regional trader in Huong Khe has a semiprocessing factory 70 km from the study

Figure 2. Trade chain for rattan from Cam Son and Cam My



Note: The diagram presents a simplified version of the trade flow in 1998.

area, where the rattan is also cut, boiled and split before being resold. The regional trader in Thach Ha does not have semiprocessing facilities and sells the treated raw material to traders who arrange for the semiprocessing themselves[6]. The semiprocessed material is then sold to furniture factories or distributed to households in the weaving villages of Ha Tay, Thai Binh and Hung Yen province for handicrafts production. The raw material used for furniture and handicrafts comes from small farmers from all over Vietnam.

About 70% of the *may* processed into handicrafts and furniture is exported. Exports used to be dominated by state companies, but as a result of economic reforms in Vietnam state companies are now in strong competition with hundreds of private companies. The domestic trade in rattan handicrafts takes place mainly in the larger cities. Hanoi and Ho Chi Minh City have several 'rattan streets' packed with numerous outlets for rattan products. Demand is increasing from both the domestic and international markets.

For household purposes people in Cam Xuyen use split *may* as rope and to weave baskets, pillows and seat surfaces. This local processing is done mainly by older men and women. Hardly any commercial processing takes place in the research area, although it can be reasoned that more processing would increase local benefits from rattan. The lack of local processing activities is related to the nature of the trade chain, which is complex and long, with individual farmers contributing only small quantities of *may* into a relatively large processing system located far from the production area.

Photo 1. Furniture making (Photo by K. Kusters)

Photo 2. Rattan handicrafts (Photo by K. Kusters)

Land use rights

The core area of the reserve is managed by the Ke Go management board, which is directly accountable to the Ministry of Agriculture and Rural Development. Extraction and manipulation of resources of these lands is strictly prohibited. However, even though there are five inspection stations in the reserve, timber and NTFP are still illegally harvested from the protected area. Each year forest guards nab a few illegal harvesters, but they represent only a small proportion of the people entering the forest.

There are several types of land use rights in the buffer zone of the reserve, the most important ones being: (1) Agricultural lands (e.g. paddy fields and home gardens) for which villagers have long-term land use rights and which have been under the management of villagers for a long time. (2) Since 1995, as part of the government's land allocation program, households and organisations have been given conditional land use rights for barren scrub lands (most lands in the buffer zone are barren or degraded). These allocated lands are classified as 'production forest' and are to be used for agroforestry purposes. A certificate holder has the right to support from the state to encourage reforestation and agroforestry. The average size of allocated lands is 7 ha to 8 ha and special privileges are given to certain households (e.g., war veterans), who may have up to 30 ha. Seventy percent of all households in the study area have been allocated forestland located in the buffer zone of Ke Go NRA. (3) Forested lands in the buffer zone under the management of the Cam Xuyen State Forest Enterprise (SFE). The SFE has the formal land use certificate for these lands and can contract the land to households and organisations for protection, regeneration and planting. For example, the SFE has contracts with households for the management of pine plantations, which obliges the household to tap resin and sell it to the SFE. The SFE also has 'protection contracts' with villagers, which means the households receive US$3.4 per ha per year for protecting a designated piece of forestland or plantation. The holders of such contracts do not receive full land use certificates and are obliged to follow the instructions of the SFE. Villagers are allowed to collect NTFP from SFE managed lands for domestic use (MARD 1996; Christ and Kloss 1998; McElwee 2001).

TRENDS AND ISSUES: DEVELOPMENT AND CONSERVATION LESSONS

The trend towards *may* cultivation

There has been a trend towards the cultivation of *may*, following the decline of wild resources in the 1980s. The decline of wild *may* was a result of overharvesting due to fierce competition amongst gatherers for the wild resources, the lack of regulations and management, a situation of *de facto* open access and the slow regeneration pace of wild *may*. The NTFP project—borne out of interest in the potential of NTFPs by the government and development and conservation organisations—followed up on the existing trend towards cultivation. The project activities have resulted in a sudden increase in planting from 2000 onwards.

While there has been an increase in *may* cultivation in the buffer zone area, in the plains of Cam Xuyen district people have been shifting away from rattan cultivation towards the cultivation of fruit trees. This shift seems to be related to the scarcity of land in the plains, which makes this area less suitable for extensive land uses such as rattan cultivation. The situation in the buffer zone of Ke Go NRA on the other hand is very different, since more land has become available to households as a result of the allocation of barren and scrub lands in the buffer zone to households.

A feasible sideline activity

The cultivation of rattan is a feasible option for households in the Ke Go buffer zone for several reasons. First, households have been allocated lands that are to be used for forestry activities. Second, the cultivation of rattan (stimulated by the government) fits into existing trends of intensifying cultivation. Third, the production of rattan demands little time, which suits the subsistence character of most household economies. Fourth, rattan has a dual purpose by serving as fencing while being commercially valuable. And fifth, rattan has good market prospects, with expanding export markets.

Box 1. Extraction of *song*

The production of the large diameter *song* still depends totally on wild resources. The availability of *song* has decreased considerably since the late 1970s as a result of increased harvesting activities. Prior to 1978, 80% of the rattan produced in the study area was *song*, while in 1998 it accounted for less than 30%. Because *song* takes 20 years before it is ready to be harvested, people are not interested in planting it.

Rattan exports

In the 1970s and 1980s, most rattan from Vietnam was exported as finished products to the former USSR. With the collapse of the USSR, this market was lost and the emphasis shifted to the export of raw and semiprocessed materials to neighbouring countries like Thailand, Taiwan, Hong Kong, Japan and China. From 1993 to 1995 raw rattan exports declined as a result of Decree 90, a government regulation forbidding the export of raw and semiprocessed materials in order to stimulate national processing industries. The regulation was proclaimed in 1992, but trade in these products continued until 1995. Following the ban, the rattan industry in Vietnam experienced numerous problems owing to a lack of processing technology and skilled craftspeople, but by 1996 the Vietnamese rattan-processing sector had become an advanced industry. Since 1996 the export of finished products has continued to increase partly as a result of Vietnam's economic reforms. The country is in the process of *doi moi*, or gradual economic liberalisation and opening to the West. As a result

new export markets such as Germany and the United States are gaining importance. In 1998, rattan handicrafts and furniture were important export products and the estimated export value of rattan products (including mixed rattan-bamboo products) was about US$30 million. Demand for *may* is expected to continue to rise as a result of growing export markets. To keep addressing new markets, however, high-quality finished products are needed and the lack of skilled labour, up-to-date technology, modern designs and processing materials may be constraining factors. Shortage of capital is a big problem for both farmers and processors.

Future rattan supplies

Though trade and processing of *may* products is big business, traders and processors seem to pay little attention to the production side. Wild resources are overharvested because of a lack of regulations and management, and future supplies rely, to a large extent, on *may* cultivated in agroforestry systems. Land allocation by the government is considered an important incentive for the establishment of agroforestry systems, which could result in an increase in rattan production. However, the lack of resources (money and labour) to invest in allocated forestland is limiting the possibilities. This underlines the specificity of the study area, where *may* planting activities have relied to a large extend on external input provided by the NTFP project.

ENDNOTES

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2. The 'commune' is the lowest administrative unit in Vietnam and is best described as a subdistrict.

3. Most of the data for this paper was collected during work for this project. The data in this report is from 1998 unless mentioned otherwise.

4. Exchange rate 1998: US$1 = VND14,500

5. Since 2000 more big rattan traders have emerged. In 2002 one of the two regional traders dissolved his business.

6. This may involve contracting out the semiprocessing activities. Buyers may also work for weavers.

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Chapter 18

Case study of *tendu* leaves (*Diospyros melanoxylon*) in Harda district, Madhya Pradesh, India

Arvind A. Boaz[1]

Common name	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
Tendu	Leaves	Wild/Managed	Medium	International	Large

OVERVIEW

The leaves of the *tendu* tree (*Diospyros melanoxylon* Roxb.) are an important non-timber forest product for the Indian state of Madhya Pradesh. They are used in the rolling of *beedis*, a local cigarette. After this product was commercialised in the early twentieth century, its economic importance for local communities has increased, particularly during the last four decades. The government established state control over the collection and trade of *tendu* leaves in 1964. In 1989 the government adjusted its regulations and established a co-operative structure for the collection and trade of *tendu* leaves. The majority of leaves collected in Harda district, located in the state of Madhya Pradesh, are harvested from disturbed primary forests and there is no cultivation of the tree. Some areas are pruned, to get a flush of fresh leaves. Sometimes fire is used to clear the undergrowth, which negatively affects other flora and fauna in the collection areas. The co-operative structure and additional government interventions have been successful in raising the wages of *tendu* leaf collectors. The author claims that investments in research are needed to explore marketing opportunities and sustainable harvesting methods. Furthermore, the author stresses the need of extension services focusing on improving pruning and harvesting practices.

INTRODUCTION

The leaves of the *tendu* tree (*Diopyros melanoxylon* Roxb.), collected from the forests of central India, are used in the rolling of cigarettes called *beedis*

because of their soft aroma and smooth, continuous burning characteristics (Tewari 1981). A *beedi* is a mixture of blended tobaccos, wrapped in *tendu* leaves. The state of Madhya Pradesh in central India is the largest producer of *tendu* leaves in India, with nearly 50% of the total production of the country, i.e., 4.5 million to 5 million bags (each bag being about 32 kg) annually. Harda district in the state of Madhya Pradesh is the research area (or 'raw material production area') for this case study. Most of the data for this case study are from 1998, except the population census data, which come from the 1991 census, as there is only one census every 10 years in India.

Harda district

Harda district (see Figure 1) is located between 21°53' and 22°36' latitude north and 76°47' and 77°20' longitude east. It is bounded in the north by the districts of Dewas and Sehore, in the east by Hoshangabad district, in the south by Betul and East Nimar (Khandwa) districts and in the west by East Nimar and Dewas districts. The total area of Harda district is 2,644 km^2 with a total forest area of 1,060 km^2 (40%). The mean elevation is 425 m a.s.l. (Jain 1999).

The study area can be divided into the following regions: (1) the Narmada Plains, (2) the Satpura Hill series and (3) the Budhimai Plateau. The area is partially flat in the Narmada river basin with small hills dotting the northern end. A portion of the Namada Plains will be submerged as a result of the Narmada Sagar Dam under construction near Punasa. The Satpura Hills are undulating and comprise several small hills and spurs protruding in different directions. The highest hilltop, known as Mirchibari (730 m), is situated in this hill series. An overview of the major agricultural land uses in the study area, recorded in terms of absolute area, is presented in Table 1.

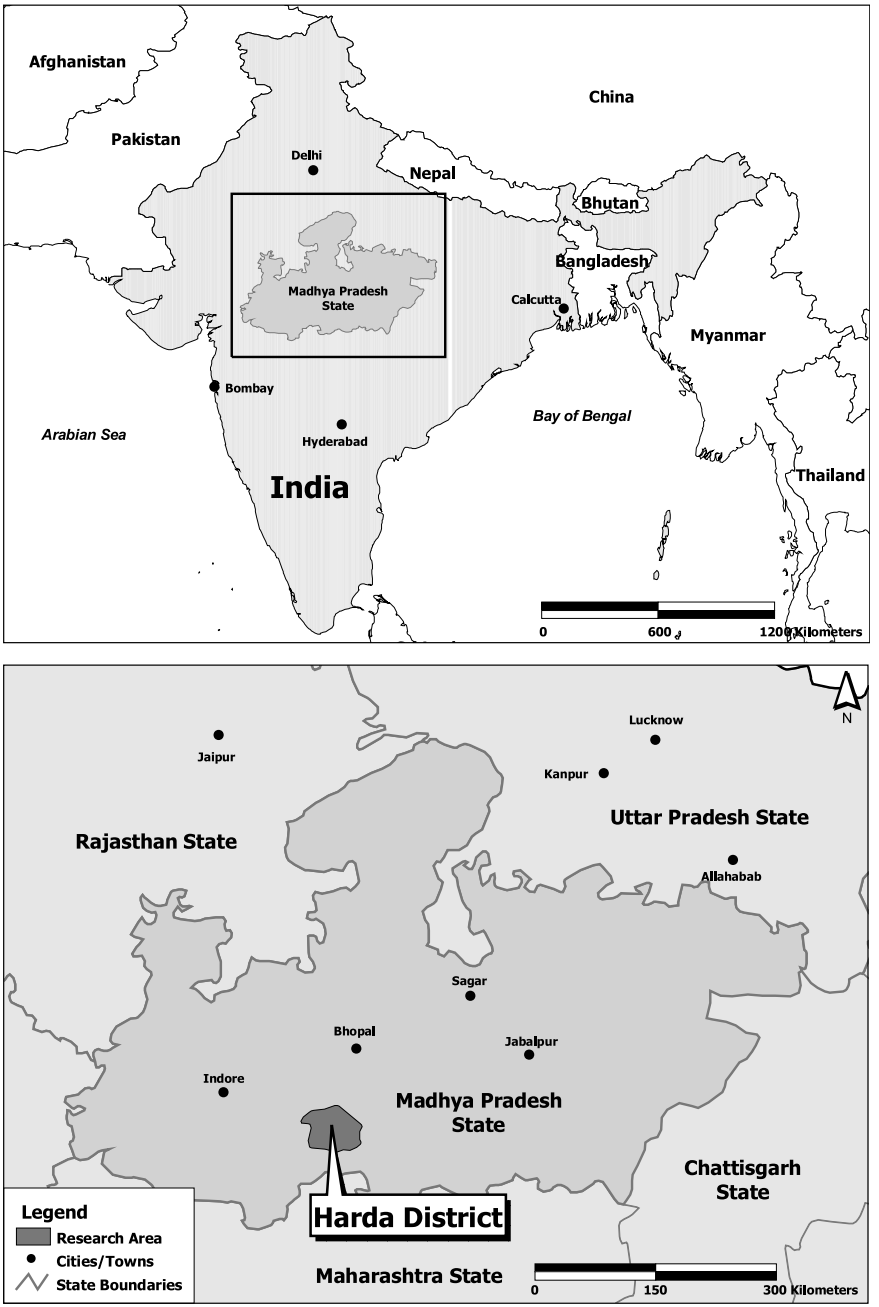
Table 1. Land use in the study area

Land use	*Area*
Rain fed/dry crop production	1,576.88 km^2
Irrigated crop production	1,272.38 km^2
Permanent crops	1,698.27 km^2
Pasture	215.44 km^2
Swidden fallow	40.36 km^2

Note: Some categories may overlap.

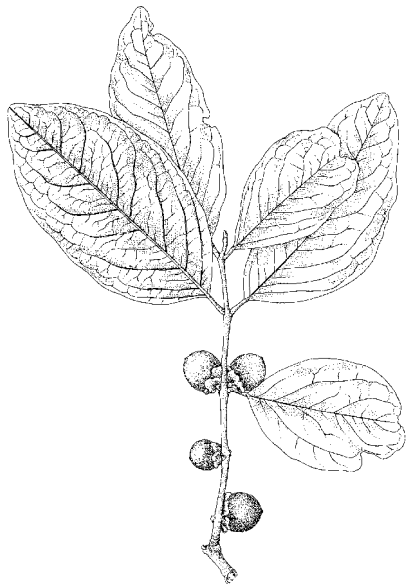
In the study area, the average annual temperature is 26°C (78°F) and the annual average rainfall is 1,210 mm (48 inches). The rainy season is from mid-June to mid-September, when 92% (1,115 mm) of the total annual rainfall is received. The winter rains (November to February) are meagre and the summer months of March to June are dry. According to the Holdridge

Figure 1. Map of the study site



Source: ESRI Data and Maps 2002.

classification system, the dominant forest types are tropical dry and tropical moist forests. The bulk of the study area contains teak forests in which the occurrence of teak (*Tectona grandis*) is more than 50%. The major associates of teak are *Saja* (*Terminalia tomentosa* W. ed. Am.), *Bija* (*Pterocarpus marsupium* Roxb.), *Dhoara* (*Anogeissus latifolia* Wall.) and *Tendu* (*Diospyros melanoxylon* Roxb). *Dendrocalamus strictus* Nees is the only bamboo species found in the area.



(*Diospyros melanoxylon*)

The total population of the district as per the 1991 (latest) census was 380,762 people in 76,152 households. There are 3 towns and 497 villages. Of the total population, 80% lives in rural areas (Government of India 1991) and about 40% is literate. The scheduled castes are the people who are recognised by the Indian government as 'socially deprived', being descendants from former deprived castes. Scheduled tribes are the people belonging to different tribal groups of India.[2] The study area has a scheduled caste population of 64,104 (17%) and a scheduled tribe population of 92,064 (24%) (Government of Madhya Pradesh 1998), the main tribe being the Gonds. Harda district is quite well connected by road and has 1,566 km of motorable roads. The Bombay–Howrah railway line also passes through the district (Government of Madhya Pradesh 1999).

The average total annual household income from subsistence, barter and cash in the raw material production area is estimated at US$147.31.[3] The national annual total household income for 1998 was US$199 (Economy Watch 2000). Seventy percent of the average total income of households in the raw material production area is earned in cash. Household earn cash

through the sale of agricultural and forest produce as well as through wage-labour in agricultural and forestry operations. In 1998, the average daily wage for a labourer in the study area was US$1.13. In the same year 17,901 households, or 28% of the total population, were registered as *tendu* leaf collectors in the study area.

THE PRODUCTION-TO-CONSUMPTION SYSTEM

Tendu leaves

Tendu leaves are obtained from the *tendu* tree, which belongs to the family *Eberaceae* and is endemic to the Indian subcontinent. The total area (global) over which the species is distributed extends from the north Indian sub-Himalayan tracts to the Indus plains, Gangetic plains, Madhya Pradesh and eastern coast up to Coromandal in southern India. *Tendu* trees grow in both moist and dry deciduous forests. In the study area three types of forests occur: southern Indian deciduous slightly moist teak forests, southern tropical dry deciduous dry teak forest and southern tropical dry deciduous mixed forest (Champion and Seth 1968). The *tendu* tree is an under-story species in all three types of forest. It also occurs naturally on land that has become largely barren as a result of biotic interference such as firewood collection, logging, grazing and fires. *Tendu* manages to survive on these lands, because it is highly adaptive and responds to disturbance such as ground fires and root damage by sprouting new root suckers (Ghosh *et al.* 1976). It is a medium sized tree and bears leathery leaves and round fruits. The bark, fruits and leaves possess medicinal properties. Reproduction of the species is through seeds that are dispersed mostly by mammals (e.g., monkey and deer) and birds, as the fruit is sweet and edible. The time from germination to reproductive maturity is 10 to 15 years and the average life span of mature individuals is 60 to 80 years.

The author laid down several 0.25 ha plots in the study area in 2000 in a stratified random survey to count the average number of economically harvestable individuals per hectare in pruned areas. The results gave nearly 500 individuals per hectare, mostly root suckers. The survey showed that there were nearly 25 mature individuals per hectare in well-stocked areas but in some areas near habitation there was a preponderance of dense shrubby growth and hardly any mature trees.

Leaf collection in Harda district

Of the *tendu* leaf production in Harda, 95% comes from public forests. The remaining 5% comes from so-called 'revenue wasteland', public lands not classified as forest. *Tendu* trees occur naturally in the area and there is no trend towards cultivation of the product as it is abundantly available in the forest areas. Most leaves are collected from disturbed primary forest (see Table 2). About 70% of the annual production in the raw material production area is collected from the wild, naturally reproducing population in nonmanaged (nonpruned) disturbed primary forest, where the *tendu* is collected from

young trees and naturally occurring shrubs. The remaining 30% is collected from a managed population in a forest environment, where the plants are pruned for better leaf production.

Table 2. The percentage of annual production of *tendu* leaves in the raw material production area per forest type

Type of Forest	Percentage of Tendu leaves
Primary forest	10%
Disturbed primary forest	70%
Secondary forest (>10 years old; part of forest system)	10%
Savannah/woodland	10%

Roughly, there are two types of management: (1) maintaining the tree as a shrub by regularly pruning the branches; and (2) injuring the roots of the tree/shrub, which results in the sprouting of new root suckers; these shoots are maintained at ground level by regular pruning of the plant. The leaves from freshly pruned shrubs and shoots are of better quality as pruning gives rise to larger, papery thin leaves, which are preferred for *beedi* rolling and fetch a better price. They also are easier to collect than the leaves from mature trees. Pruning activities increase both quality and quantity of harvestable leaves. The increased production in Harda between 1997 and 2000 (Table 3) can be partly attributed to pruning activities.[4] Ground fires improve the growth of harvestable leaves as well, since the fire burns the small shrubby growth and injures the root structure, giving rise to new root suckers. Sometimes, collectors deliberately start fires. The management practices do not allow trees to mature (e.g., grow tall and bear fruits) and have led to an increase in the shrubby form of the tree. Pruning activities are carried out from the end of February to the middle of March and it takes 45 to 50 days from the time of pruning to maturity of a fresh flush of harvestable leaves (Prasad and Bhatnagar 1991).

Table 3. *Tendu* leaf production in Harda district

Year	Number of Standard bags
1996	26,840
1997	23,838
1998	32,133
1999	33,379
2000	36,815

The collection of *tendu* leaves is seasonal work and lasts about six weeks. Collection in the study area starts in the middle of May and continues till the first week of June. The process of picking *tendu* leaves consists of five major closely related steps: (1) Collectors leave early in the morning to avoid the heat of summer (April to June) and walk to the forest; (2) they pick leaves

all day and (3) take the leaves to their homes; (4) at the collectors' homes the leaves are graded, whereby all infected, immature, torn and small leaves are rejected and the remainder tied in small standardised bundles of 50 leaves usually with a twine of *Dhak* (*Butea monosperma* Lank Taub); and (5) collectors then walk to the purchasing centre (*phad*) in the evening taking the bundles to the purchasing agent (*phad munshi*) (Gupta and Guleria 1982).

Tendu leaf collectors

The majority of *tendu* leaf collectors are the rural poor; marginal farmers (owners of less than 2 ha) or agricultural wage labourers, including tribal people and scheduled casts. In the study area, as in all production areas, women do most of the collection work though teenagers, small children and men may help as well. There are no costs involved other than labour. Collectors are job rate labourers, not earning a daily wage but a fixed amount for each bag delivered. During summertime (the time of *tendu* leaf collection) there is little agricultural activity in the study area and the collection of *tendu* leaves is particularly important as it contributes a major share to the income of many people in this lean agricultural season. Not all villages along the forest fringe have collectors. The activity depends on the presence of a collection centre, and the presence of a collection centre is dependent upon the amount of *tendu* in the locality, since *tendu* trees are not evenly distributed but occur in pockets. In villages in and near collection areas almost all the families participate in the collection work.

The number of households involved in raw material production in Harda district increased from 14,270 households in 1997 to 17,901 households in 1998. This increase followed a campaign by the Madhya Pradesh government to involve more people in collection, which led to the consequent increase in production (in Harda district) from 23,838 bags in 1997 to 32,133 bags in 1998. The average total annual household income of producer households is US$103 (Jain 1999), 16% of which is derived from the product. Though most of the collectors are rural poor for whom *tendu* provides a relatively large contribution to their cash income, relatively rich farmers (with irrigation facilities and two crops per year) are involved in the collection of *tendu* as well.

Box 1. Collection of other NTFPs in Harda district

Many producer households are also involved in the commercial extraction of other nontimber forest products (NTFPs). Some of the important species are *Ocimum* species, *Azadirachta indica* seeds, *Maduca latifolia* flowers and seeds, *Cassia tora* seeds and *Phyllanthus officinalis* fruits. There has been a gradual increase in the relative household income from NTFPs in the study area over the past 10 years. This is mostly attributable to the increase in demand for medicinal plants and food plants in the herbal cosmetic and pharmaceutical industry, both nationally and internationally. Not only the quantities in demand have increased but also more species are being added to the herbal basket each year.

Primary processing of *tendu*

Primary processing takes place at the purchasing centre (*phad*), where men, mainly on a contract basis, do the work. At the purchasing centre the leaves are spread out in open fields for air-drying. The hot, scorching sun dries the leaves, which are turned over on the third day to ensure proper drying on both sides. In some areas, where there are termites, some insecticide is spread over the fields prior to the spreading of bundles for drying. After the sixth or seventh day, the leaves are collected together in heaps of 5,000 to 10,000 bundles. The packing of bundles is an art and is often done by 'packing parties', groups of five to six people who specialise in the packing of *tendu* leaves. These parties come mainly from Gondia, a district in the neighbouring state of Maharastra and a centre for *beedi* manufacturing. People in the study area are also learning to pack. Packing is extremely important as the dry leaves become brittle and are easily damaged. On the packing day, the heaps are watered and covered with jute bags (*bhhakkus*, as they are locally called), and left to soften for three to four hours. The leaves soften in this period because of the moisture and the subsequent steam generated by the heat of the sun-dried leaves. In the evening, the softened leaves are counted and packed in thin jute bags of 90 cm x 125 cm. Each bag can hold around 500 to 800 bundles depending upon the size of the leaves. The bundles are packed layer upon layer. This avoids leaf breakage during the initial packing and at a later stage when the leaves dry out and are subject to rough handling during transportation to distant places. After the jute bags are filled, they are stitched up with twine and left to dry in the open for about two days. After drying, the bags are transported to a storage place (*godown*), where they are stored till their disposal (Boaz 1998–2002).

Photo 1. Bundle of dried leaves (Photo by K. Kusters)

Photo 2. Transportation of bags containing tendu leaves, with packed jute-gunny-bags in the foreground (Photo by A.A. Boaz)

Beedi rolling

Beedi manufacturers, who usually have several small or medium scale factories for *beedi* processing, purchase *tendu* leaves, cotton thread and tobacco (grown mostly in the state of Andhra Pradesh), blend the tobacco and then let agents distribute the materials to *beedi* rollers. *Beedi* rolling is done by poor rural households at home, usually including the whole family, and goes on the whole year round. Not all of the *beedi* rolling is done in Harda. Some are rolled in the adjoining districts of Khandwa, Damoh and Jabalpur. *Beedis* are flat at the smoking end and round at the burning end. They are tied at the flat end with thread of a particular colour chosen to identify the manufacturer.

The rates paid to *beedi* rollers are low. The *Tendu* Leaves Regulation of the Trade Act contains a provision whereby villagers can keep a certain number of leaves for own consumption without registration. Sometimes, however, agents give fewer *tendu* leaves than they should to *beedi* rollers, which means that the rollers (who are gatherers themselves) have to make up the balance from their own collection. This is a form of illicit trade in leaves and it basically means that the manufacturer gets these *tendu* leaves for free. The *beedis* are collected from the rollers by manufacturer agents and taken to processing factories. These factories are all located outside of Harda and usually have fewer than 50 employees, mostly men. The *beedis* are roasted over a charcoal fire in a specially designed chamber to remove moisture and to give them a unique flavour. The *beedis* are tied in bundles of 20 or 25 with a thread and wrapped in labelled paper. Twenty packs are bundled in a particular coloured paper denoting the brand name. Ten such bundles are then tied with jute thread and put in a bag, sealed, stencilled and dispatched to the market.

There are barriers that make it difficult for new processing units to enter the industry. These are mostly economic barriers as the costs of entry (e.g., investment in a roasting chamber) are high. Other barriers are the skills in tobacco blending (a skill that identifies each brand), and the need to develop household processing and a marketing network. State intervention in processing of the product has increased in the past 10 years. In Madhya Pradesh, high taxes and regulations protecting the labour force make production expensive, and this is enticing manufacturers to move to other states. *Beedi* manufacturers have been spearheading a movement to pressurise the Madhya Pradesh state government to reduce taxes and change regulations.

Trade and marketing

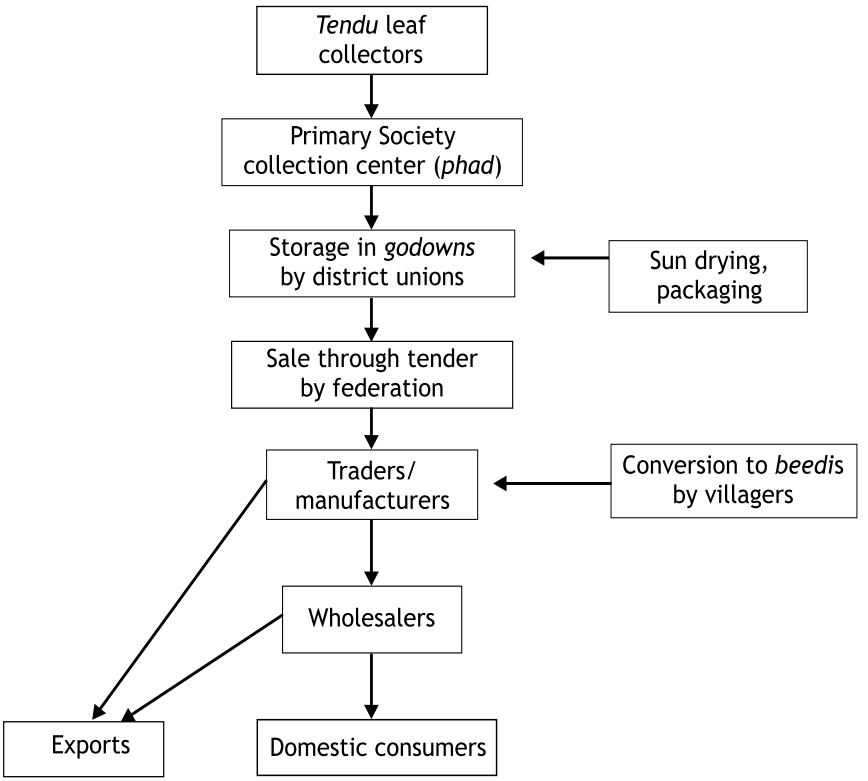
Tendu leaves are a nationalised product and only the Madhya Pradesh State Minor Forest Produce Cooperative Federation (the agent appointed by the state government) may buy leaves from collectors. Thus, raw material producers have no choice as to who they sell their produce to. Collectors take the bags to the local purchasing centres, after which the product is transported by truck or cart to storage centres.

Leaves are normally used within one year. Leaves aged more than one year lose their aromatic flavour and colour, consequently losing 50% of their value, and are then used for inferior quality *beedi* rolling. From the storage centre the federation sells the *beedis* to traders and manufacturers. There are six to eight traders in the raw material production area. Over the years, the number of traders has decreased and more and more manufacturers have started buying leaves directly from the federation (see trade diagram, Figure 2). Manufacturers pay *beedi* rollers by the number of *beedis* they roll and, after roasting and packing, usually sell the *beedis* to domestic wholesalers or retailers. *Beedis* are bought all over the country in packets of 20 or 25, for which the price varies from US$0.049 to US$0.12.

In 1998, the average price of the raw material was US$26.05 per bag of about 32 kg leaves, which is equivalent to US$0.81 per kilogram. The collection of *tendu* leaves in the study area in 1998 was 32,133 bags, and sold for US$811,735. In 1998 the total national trade was estimated to be about 10 million standard bags with an annual value of US$238 million. The value of the raw material is 20% of the value of the final product in the main market.

A relatively small proportion is sold for export. The value of the total national export of *tendu* leaves and *beedi*s (sometimes further processed at the destination) is estimated at US$2 million and US$3 million, respectively. *Tendu* leaves are exported, for example, to Bangladesh and Pakistan, where they are used for rolling cigarettes. *Beedis* are exported to a variety of countries in the region and Arab countries. In the last decade exports to Europe and the United States have also increased, driven by the notion that *beedi* rollups are less harmful than normal cigarettes and by their novelty status in these countries.

Figure 2. The production-to-consumption chain



Policy environment

The collection of *tendu* leaves on a commercial scale started in the early twentieth century. Initially, even though most of the *tendu* trees were found on government lands, the government had no control over the picking. Collection from these lands was rampant, and traders exploited the forest dwellers who picked the leaves. Therefore, with a view to controlling the collection of *tendu* leaves from public forests and to ensure that pickers, mostly the rural poor, were paid a proper wage, the state government enacted the *Tendu* Leaves Regulation of the Trade Act in 1964 (Madhya Pradesh *Tendu* Patta, Vyapar Viniyaman, Adhiniyam). With this act the government took over the trade of *tendu* leaves through the establishment of a state monopoly ('nationalisation'). It is obligatory for collectors to sell their produce to the government appointed agent. The *tendu* leaves producing areas of Madhya Pradesh were divided into 1,826 units and the government appointed purchasing agents for each unit. The agent collects and delivers the leaves to the purchaser at the collection centre. The venue developed into a highly exploitative system in which middlemen and traders exploited collectors and ate away most of the profits.

In 1980 the state government, in a pilot program, appointed the Madhya Pradesh State Cooperative Marketing Federation as its agent in some units in order to protect the pickers from being exploited by private individuals and companies. In 1984 the Madhya Pradesh State Minor Forest Produce Cooperative Federation was formed to strengthen the position of collectors of minor forest products. However, during the period 1984 to 1988, the activities of that federation with regard to the *tendu* leaves trade were confined to a few districts. In 1989 a new scheme was introduced in the form of a three tier co-operative structure, which still exists today. At the primary level of the co-operative structure 1,947 Primary Forest Produce Co-operative Societies were constituted (Boaz, O. 1998). In the study area eight such societies were established, each comprising on average 30 small villages. Since it is the only option, all collectors are members of these primary forest co-operatives. The membership fee is only US$0.25 (INR10) and is easily obtained by simply taking *tendu* leaves to the *phad* and getting oneself registered as a collector. There are no social, economic, technical or regulatory barriers that make it difficult for new producers to enter. At the secondary level, 86 District Forest Produce Cooperative Unions were formed. The study area has one such union. The Madhya Pradesh State Minor Forest Produce Cooperative Federation is at the apex level of the three-tier structure.

From 1989 to 1994, the primary societies were paid a commission of US$0.21 (INR10) per standard bag of leaves collected. After 1994 the federation redistributed 20% of its profits to the societies. In 1996 all net income (profit) was distributed to the societies, who in turn redistributed 80% of the net income, after deduction of their expenses as deferred wages, to the collectors on top of their job rate. This was an important decision from the point of view of making these societies, and through them the actual collectors, owners of the product. Later, in the year 1998, the Madhya Pradesh government decided to transfer the entire net profit to the primary co-operatives, which were obligated by government order to redistribute 50% to collectors and utilise 20% for development of forests and 30% for village infrastructure development (MPMFPF 2000a). An amount of US$0.16 million was distributed to collectors in the study area during 1998.

The restructuring of the new organisation into a co-operative system has been effective in curbing exploitative practices and organising the collectors. It has been beneficial to collectors, not only in ensuring due wages are paid, but also in obtaining higher bargaining power. It has also been successful in developing an effective mechanism for redistribution of profits amongst its members and to ensure a good flow of funds for village infrastructure development and resource (forest area) development.

Another important government intervention has been the establishment of the 73rd Panchayat Amendment Act 1996, which gave the local population user rights over NTFP in forest areas. Ownership of the land remains with the government and raw material producers therefore have no legal rights to change the land use to another production system. The raw material producers in the community are generally aware of the nature of their legal rights to harvest the product for commercial purposes.

Major emphasis on joint forest management came with the 1988 forest policy and the Joint Forest Management Resolution of the Madhya Pradesh State Government in 1991. Two types of Joint Forest Management (JFM) committees have been established—forest protection committees in well-forested areas and village forest committees in understocked forest areas. In the committees the forest department and people work together for protection, management and development of resources. In some cases (e.g., in the research area) the District Unions and societies are starting to collaborate more intensively with JFM committees. For example, in some cases the District Union has paid JFM committees for pruning activities. Another example would be the role of JFM committees to combat fires by taking action against any person setting fire to the forests. The forest department encourages the committees to get involved in combating fire.

Next to the existence of the co-operative structure and the growing importance of JFM committees, an important feature of the study area is the level of government control and enforcement, mainly through a network of forest guards, which has stopped encroachment and illegal logging to a large extent.

TRENDS AND ISSUES—DEVELOPMENT AND CONSERVATION LESSONS

Importance of *tendu* for the local population

The gathering of *tendu* leaves is an important economic activity in the production area. It provides a major share of collectors' income and gives them opportunities for wage earning during the peak summer months, when there is no other employment. The main beneficiaries are the landless and marginal farmers. Without the trade in *tendu* leaves, part of the population of the research area would most probably start migrating in search of alternative employment in the lean summer season.

Next to the commercial use of *tendu* leaves for *beedi* rolling, the *tendu* tree is also used for domestic purposes. Traditional medical practitioners use the dried flowers to treat urinary, skin and blood diseases, while the bark has astringent properties and its decoction has been used in the treatment of diarrhoea and dyspepsia. The bark also contains up to 19% tannin, which is used for curing leather. Ripe *tendu* fruits are very sweet and villagers eat them as a fruit. During the summer the fruits are sold in village markets (Boaz, A.A. 1998). Recent findings revealed that *tendu* seeds may have great medicinal use in the treatment of cancer. The seed is now starting to be traded by some pharmaceutical companies in north India, but its use is still in the experimental stage. In the near future this effort may have far reaching effects on the commercialisation and consequent conservation of *tendu* in the research area.

Dynamic changes

It is thought that the commercialisation of *tendu* leaves for *beedi* rolling started from Jabalpur in central India early in the twentieth century. In 1964

a state monopoly was established, but this could prevent exploitation of raw material gatherers only to a limited extent. Over the last few decades the government has been trying to empower the collectors, amongst others, by giving collectors the right to use NTFP. The government's interventions have also been successful in raising the wages of collectors and have brought about equitable sharing of benefits. Collection wages (excluding bonuses) rose from US$3.68 (INR150) in 1989 to US$9.82 (INR400) in 1998 (MPMFPF 2000b). Reinvestment of income in local community assets has improved village infrastructure and has helped build social security for the community. The decision of the state government to invest 20% of the income for the development of forest resources has stimulated several conservation efforts such as the creation of firebreaks. The collection of *tendu* leaves has also helped to prevent seasonal out-migration of labourers from the production area in search of work.

Several tax and wage reforms carried out by the government have led to an increase in production costs and as a result, the price of *beedis* has increased slightly. *Beedis* are, at present, suffering stiff competition from *Gutkas,* a form of chewing tobacco available in pouches, so the demand for *beedis* has not increased with the rising population. Ever since introduction of the co-operative, production has stabilised at around 4.5 million standard bags per year.

Customary regulations

There are local traditional and customary nonstatutory rules governing access to and management of the product. These rules are traditions that have developed over the years in the tribal communities in the study area. Some of these rules have to do with the collection of leaves by families from specific areas and respect for the territory of other families, collection of only mature leaves, picking of leaves one at a time and not stripping stems of all the leaves, pruning of only small branches, no cutting down of major branches, etc. The effect of traditional rules governing access and management of *tendu* leaves is generally positive in promoting sustainable exploitation and equitable access to the resource. The customary rules may even help to increase the total production and quality of *tendu* leaves because of better pruning habits. In tribal community managed areas, the raw material producers generally respect the traditional rules governing access to and management of the product. In other, more plural communities, customary rules are seldom respected and collectors tend to harvest as much as possible and as early as possible, because of fear that other collectors will harvest all the leaves if they leave any and so they will be deprived. Tribal villages are small and mostly inside the forest or on the fringe, while plural villages are larger and on the fringes, within 5 km of the boundaries.

Conservation issues

With regard to conservation, two major problems exist today. First, the setting of fires by villagers in early summer to encourage development of root suckers that give better quality leaves is harmful to the forest ecosystem

as it destroys the humus and ground flora. Furthermore, fires are detrimental to animals inhabiting and nesting in the area. The occurrence of human induced fires every year results in the forest floor being devoid of nutrients and consequently the growth of the forest is adversely affected. Government initiatives to stop human induced ground fires through involving Joint Forest Management Committees at the village level are reasonably successful. Second, pruning in order to enhance leaf production areas prevents trees from maturing. This practice decreases the availability of fruits (since shrubs do not produce fruits), negatively affecting the propagation through seeds, which is important in terms of genetic diversity. It also affects the food chain of animals that depend on the edible fruit during the summer months. Furthermore, preventing trees from maturing affects the breeding habitats of small animals (including reptiles) because the mature tree is a good shade bearer with a large, dense crown that can harbour small animals making use of the mature trees for nesting.

Though pruning has its negative effects on the local forest environment, it is recommended for quality enhancement of the leaves. The benefits and negative effects of pruning have to be viewed in light of the objectives—conservation of forest areas or enhancement of economic benefits for the local population. If the objective is to increase the economic benefits through opening new markets, better quality and a higher quantity of leaves, then pruning is necessary, even though it has certain negative effects on the ecology of the pruned area.

The forest environment is under some pressure from pruning, fires and fuel wood collection. The fringe of the forested area in the study area is, however, reasonably stable, and illegal logging of timber is limited, which can be attributed to a long standing system of forest guards and, more recently, the involvement of local communities in Join Forest Management Committees. *Tendu* leaf collection itself does not seem to give direct incentives for forest conservation, since the shrubs do not need the forest cover; actually the quality of leaves for *beedi* rolling is even better from *tendu* that grows without forest cover.

Lessons for the future

Stern steps need to be taken to stop people from setting fire to the forests so as to encourage new growth of *tendu* leaves. The steps taken by the forest department towards encouraging the Joint Forest Management Committees to play their role in combating fire is a welcome start. Fierce competition between collectors, coupled with apathy of the regulation staff, leads to stripping of whole branches. This practice decreases quantities of useable leaves, leaves that could have been used if only individual mature leaves had been picked. It is important that an extension programme be launched to educate collectors about proper harvesting practices of *tendu* leaves and help them to understand that the proper picking of mature leaves will lead to better returns by allowing young leaves to mature. Furthermore, it is thought that considerable improvements can be made in pruning activities,

which is important for quality enhancement of the leaves. The author proposes a working plan adopting pruning cycles of five years. Such a working plan would ensure better utilisation of the money the federation sets aside for pruning, which was US$0.21 per collected standard bag in 1998.

As well as the need to improve harvesting techniques, there is a need to implement better drying, grading and packaging techniques to reduce spoilage and breakage of leaves during packing. Up to now there has been little effort to improve harvesting, processing and marketing of the product on the part of the federation, which is only collecting and selling the product. With the present stable market, new markets should be explored to make increased quantity and quality of production worthwhile. At present a greater yield would influence the delicate supply-demand balance and lead to a crash in prices of the product. Export markets are available, and it is thought that *beedis* may be able to jump on to the 'herbal bandwagon' to ensure global acceptance and thereby increase international demand.

ENDNOTES

1. Chhattisgarh Forest Development Corporation, D-252-253, Devendra Nagar, Raipur, Chhattisgarh, India. E-mail: Draboaz@sancharnet.in

2. Scheduled castes and scheduled tribes are the people belonging to social classes as notified under the statutory lists in pursuance of articles 341 and 342 of the Constitution of India.

3. The exchange rate in January 1998 was INR38.99 = US$1 and in December 1998 it was INR42.58 = US$1. The average of 40.73 was used as conversion rate.

4. Fluctuations in production also depend to a large part on temperature, water availability and the occurrence of thunderstorms, hail, floods and insects attacking the leaves.

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Chapter 19

Rattan (*Calamus* spp.) extraction in the Philippines: the case of Manggapin and Kalakwasan watersheds, Palawan

Honorato G. Palis[1]

Common names	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
Yantok, Rattan	Stem	Wild	Medium	International	Medium

OVERVIEW

This chapter is based on a study of rattan extraction from the Langogan and Kalakwasan watersheds in the eastern portion of the Philippine province of Palawan. Rattan is being extracted from the natural forest and traded in Manila and Cebu, where it is used in the production of rattan furniture. Laws and regulations meant to protect the resource have not yielded any significant positive results. The tribal communities in the research area have been granted user rights to their 'ancestral domain', but these are not exclusive, since the same area is being leased out to a concessionaire. The concessionaire has not complied with the regulations regarding allowable cut and the results of the study indicate that rattan gathering is exceeding the resource's regeneration capacity. As a result harvesters have started extracting premature rattan canes, which are less valuable. Serious government implementation of policies could turn the tide in favour of the rattan industry.

INTRODUCTION

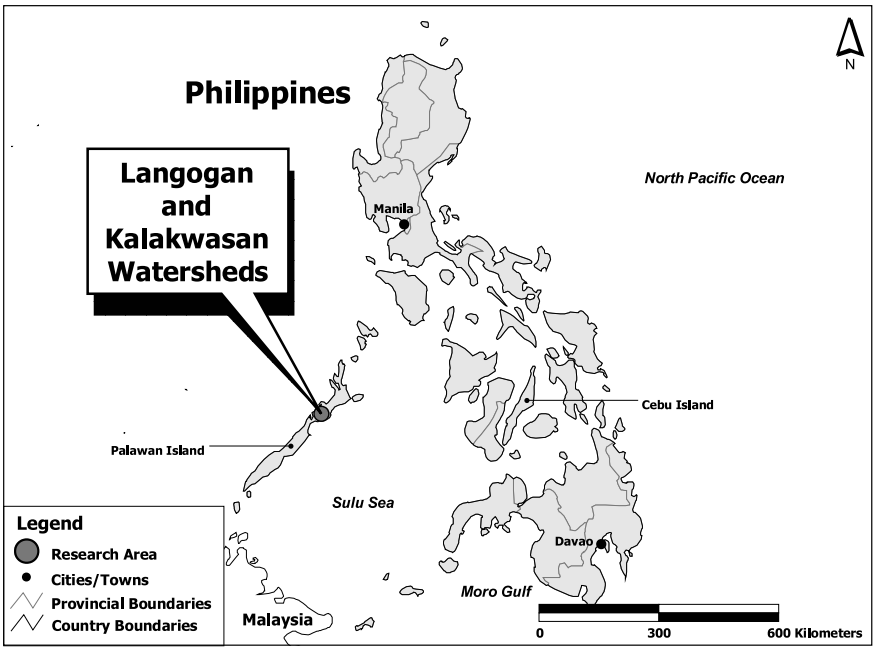
Rattan is one of many economically important plant species naturally growing in the old growth and residual forests of the Philippines. It is considered one of the most economically important non-timber forest products in the country and is used as raw material for various end products for the domestic as well as the international market. The most important among these end products is

rattan furniture (PCARRD 1991). The rattan sector is generating significant amounts of foreign exchange and rural employment. Among the tribal group known as the Batak, in the island-province of Palawan, rattan is an important source of income (Palis *et al.* 1998).

The case study area

The study site consists of two neighbouring *sitios*[2] located north of Puerto Princesa City on the island of Palawan (Figure 1). The two *sitios* are inhabited by the Batak and a few migrant lowlanders. The raw material production area is composed of two adjacent watersheds: the Langogan and Kalakwasan watersheds. The climate in the research area can be classified as climatic type III of the Corona's classification, dry from November to April and wet during the rest of the year. Most of the area is covered with dense rainforest, with small amounts of tropical grass, coconut and orchards.

Figure 1. Location of the research area



Source: ESRI Data and Maps 2002.

Sitio Mangapin belongs to *barangay*[3] Langogan and is located in the Langogan watershed, 84 km north-east of Puerto Princesa City. Mangapin has 58 households, 75 % of which belong to the Batak ethnic group. The Langogan watershed area, estimated at almost 22,000 hectares, is generally undulating to moderately steep with a maximum elevation of 1250 metres above sea level.

Sitio Kalakwasan in Barangay Tanabag is part of Kalakwasan watershed and is located 78 km north of Puerto Princesa City. Kalakwasan has 22 households, all of which are Batak. The watershed measures almost 6,000 hectares. There is a swamp just inside the watershed, near the mouth of the river. A large portion of the area is below 500 meters in elevation, while the highest elevation is 1500 meters above sea level. Almost 55% of the area is rolling to moderately steep with a small portion (0.11%) of very steep terrain.

The two watersheds are part of a rattan concession area instituted by the government. It is the only rattan extraction area of importance for the inhabitants of Kalakwasan and Mangapin.

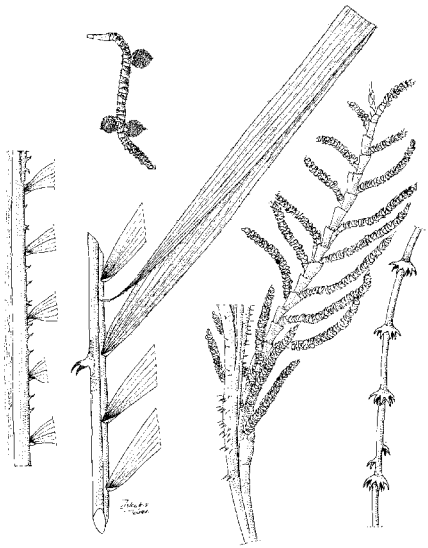
THE PRODUCTION-TO-CONSUMPTION SYSTEM

Resource base

Rattan, a member of the palm family, is a climbing plant. Its leaves and climbing organs are variously covered with thorns or spines, hairs and bristles. The climbing organs appear as long barbed whips with thorns. There are two major types of climbing organs, which anchor the plant to the supporting tree: Some species have climbing organs that are whiplike extensions at the apex of the midrib, called cirri or tendrils; and other species have climbing organs, known as flagella, which are filament-like appendages that originate from the leaf sheath in the same positions as the inflorescences. Flagella look like extensions of an infertile inflorescence. As rattan matures, its stem becomes relatively smooth with more or less regularly spaced scars left by the fallen leaves. These scars are called nodes. The dreaded thorns that characterise rattan are found only at its tip, where the leaf sheaths and the leaves with their climbing organs are located. The stem, without its young portion at the tip, is commonly called cane (PCARRD 1992).

In the case study area, only three rattan species (*Calamus merrilli, Calamus ornatus* and *Calamus mindorensis*) are extracted commercially. These species produce large-diameter canes (diameter of 2 cm or more), which is the most popular size on the rattan market, notably in the manufacture of furniture. Their canes are hard and durable, yet flexible, and fit the size requirements of most furniture shops (PCARRD 1991). These species occur naturally at a wide range of elevations (140–700 m a.s.l.) in the natural dipterocarp forests of the Langogan and Kalakwasan watersheds. Several tree species are found to be associated with these rattan species, e.g., *Pterocymbium tinctorium, Buchania nitida, Nephelium mutabile, Drypetes megacarpa, Gymnacranthera paniculata* and *Agathis philippinensis*.

These rattan species flower during the dry months from February to May and produce fruits from June to December. Flowering covers a period of two weeks to two months before pollination and eventual fertilisation. The flowers are fragrant, which attracts insects such as beetles, bees and flies. Insects, rather than wind, are the principal vectors of pollination. These species usually produce ripe fruits from August or September until November or December. Flowering in the genus *Calamus* is dioecious (PCARRD 1991).



(*Calamus merrillii*)

Calamus merrilli is the most common rattan species in the research area. It is estimated that Langogan watershed has a total of 468 lineal meters of *Calamus merrilli* per hectare. The Kalakwasan watershed has an estimated 161 lineal meters per hectare. Langogan watershed is near the research communities while Kalakwasan is near the lowland settlements. Because of its location, rattan gathering has been more intensive in Kalakwasan than in Langogan, which explains the lower number of lineal meters.

Extraction

In Mangapin 80% and in Kalakwasan 100% of the households are involved in rattan gathering on a regular basis for commercial purposes. Batak and non-Batak inhabitants of the area as well as non-Batak gatherers from outside the watersheds gather rattan from the research area. The area in which the rattan is being gathered is a rattan concession area, located in old growth forest, where the rattan occurs naturally. There has been little effort to plant rattan in the research area.

The canes are pulled down by hand and cut with a *bolo* (machete). It was observed that substantial merchantable lengths were wasted in the process of harvesting and cutting stems into standard sizes; wastage in the form of unutilised tops is prevalent. Size, specifically thickness, is important as this often determines the usefulness of canes for specific purposes. Strength, elasticity and lightness are critical cane attributes for the manufacture of furniture. These characteristics are primarily determined by the species harvested. Similarly, manufacturers demand consistent colour and shape. Few formal grades

or standards are recognised and local buyers typically provide delivery specifications when placing an order.

Vegetation data, from sampling done in the old-growth forest of Palawan by Palis *et al.* (1998), show a relatively low count of commercial rattan of merchantable length. This is attributed to too frequent and unregulated harvesting. The Batak blame lowlanders for the depletion of the resource. According to the Batak, the area has been subjected to rattan harvesting almost every month during the past three years. Harvesters have not respected a fallow period (at least five years after each cutting) necessary to enable the rattan to regenerate. In effect, the rattan species cannot grow to harvestable age and commercially acceptable size.

Raw material producers and socio-economic context

There are two groups that gather rattan in the research area: the Batak and the lowlanders. The Palawan Batak are a Negrito tribal group thought to be related to the Batak of Sumatra, indigenous peoples of the Andaman Islands, and a small group of Negrito hunter-gatherers in north-east India. The Batak tribe is one of four remaining indigenous tribes on Palawan Island. Its population was estimated at around 1,000 people in 1900. In 1990, the census revealed only 420 Batak. Most of their original territory has been lost as a result of logging activities and the settlement of migrants from the lowlands. The Batak have therefore been forced to move deeper into the forest, where they have become vulnerable to malaria.

The Batak were originally nomadic hunters and gatherers, but through their contacts with other indigenous tribes such as the Tagbanua and Kuyonon they adopted swidden cultivation practices in the late 1800s or early 1900s. Later, under the influence of a government programme promoting the cultivation of agricultural crops, they gradually became sedentary. At present, the gathering of non-timber forest products (e.g., rattan, resins and honey) is still their main activity and constitutes, for most of the families, their main source of income.

The average annual total household income (including subsistence value) in the research area is around US$180[4], approximately 40% of which is earned in cash. Rattan contributes up to 60% to a household's cash income. It was observed that rattan gathering households in the research area (e.g., households with one or two members working for the concessionaire) are generally richer than those not involved in rattan gathering.

The old growth forest located in the research area is a rattan concession area, issued by the government to a private individual. The rattan concessionaire hires men and women from the research villages as gatherers. During the gathering season they are given an advance (cash or in kind) for food and other provisions they need while in the field. This system is called *destino*, referring to the 'destination' in the forest. All these expenses are summed up and considered as advance payment: a credit, which is deducted from the total value of the harvest upon delivery to the dropping points. A foreman, locally called *kapatas*, and a trusted person of the concessionaire,

oversees the hired people at the gathering site and makes sure that all the harvested rattan is taken to the concessionaire. The concessionaire also hires people from the lowlands under a similar system of employment. Many of these lowlanders originate from the islands of Luzon, Visayas and Mindanao.

Most harvesters are hired under the *destino* system. A few, however, harvest rattan on an individual—and illegal—basis, usually outside of the concession area. Paid labourers cut an estimated 80% of the total amount of extracted rattan, and illegal cutters cut the remaining 20%. The illegally cut rattan is mostly sold to the concessionaire, who is the only big buyer in the area. There are a few smaller buyers (usually well-off individuals) of illegally cut rattan, but the quantities they buy are marginal compared to the concessionaire.

Trade and processing

Gatherers conduct the first stage of preprocessing still in the cutting areas. This involves scraping the canes with a machete and stacking them vertically for a short drying period. For durability, rattan should be thoroughly dried and scraped to remove the silica. The length of the drying period, which ranges from a few days to two weeks, is determined mostly by the market for canes and weather. After drying, the canes are cut into 6 m lengths and tied in bundles. From the extraction site, the rattan is taken to a dropping point in Sitio Manggapin or Sitio Kalakwasan either via waterways or by physically carrying the harvest. The canes are temporarily stored near the foreman's residence. When there are enough canes they are transported to a warehouse in a neighbouring *barangay*. The warehouse is owned by the concessionaire and is located near the main highway. The next stage of preprocessing involves straightening, grading according to diameter and rebundling at the warehouse. The canes are then transported to another warehouse in Puerto Princesa City, which is also owned by the concessionaire. Transactions between the concessionaire and buyers take place either in Puerto Princesa or Manila depending on the agreement concerning transport. After the necessary permits to transport the canes are complied with, the straightened canes are loaded into 20-foot container vans and transported to Manila or Cebu by ship. There the canes are processed into splits, wickers, and sanded canes, the size of which depends on the specifications of the furniture industry. Furniture manufacturers in Manila or Cebu purchase the semiprocessed rattan to produce furniture for the domestic and export markets.

The price the harvester receives depends on the size of the cane. Prices range from US$0.01 for a 1 cm cane to US$0.12 for a 2.5 cm cane. The price the concessionaire receives in Puerto Princesa may be double the price the harvester gets paid.

Some Batak households use split rattan as tying material and for weaving baskets and mats, which are then sold in neighbouring village markets. The local processing is a marginal activity, and the rattan used for it is usually gathered illegally from the concession area.

Photo 1. A small-scale enterprise in Palawan dries rattan splits for handicraft making (Photo by H.G. Palis)

Photo 2. Batak women clean rattan splits to be used as tying material for roofing (Photo by H.G. Palis)

Policy environment

The Department of Environment and Natural Resources (DENR) is the government agency in charge of managing the natural resources of the country. The rules and regulations governing the Philippine rattan subsector generally are found in DENR policies, memoranda and circulars. The DENR is responsible for the license agreements that set specific requirements for concessionaires in terms of cutting limits and replanting. The DENR is also responsible for monitoring concessionaires' compliance with regulations. The Board of Investments provides industry incentives and credit facility programmes, while the Bureau of Export Trade Promotions takes care of import and export policies and procedures.

The most important rules and regulations affecting rattan harvesting and trade are in DENR Administrative Order No. 4-1 of 1989, since it contains special provisions for the processing of rattan within areas occupied by cultural minorities and also provides a special permit for all tribal groups to utilise the rattan resource in their locality. In 1993 a new administrative order was issued to further empower local tribal groups by identifying, delineating and recognising ancestral land and domain claims, which established the rights to their occupied lands. This led to the birth of the Certificate of Ancestral Domains Claim (CADC) for indigenous peoples and tribal groups. Since its implementation in the mid 1990s, the arrangement seems to be working well, based on regular DENR monitoring.

Both research communities have this certificate, which means they are entitled to using the forest and non-forest resources within the boundary of their ancestral lands. The certificate gives them exclusive rights to utilise forest products in the CADC area. The situation in the research area is a special case, however, because of the existence of the concession area in the very same area as that of the CADC. The CADC is not officially related to the extraction rights of the concessionaire, but ever since the CADC was issued, the concessionaire is obliged to first hire inhabitants from the communities for extraction activities. Only if there are too few CADC workers may the concessionaire hire labour from the lowlands. The concessionaire is also supposed to consult the leaders of the communities regarding the extraction activities. The practice shows that this has not prevented the rattan resources from being overexploited.

The Philippine government issues extraction permits for lands that are classified as forest production areas (which may include CADC areas). The concession in the research region is renewed every three to five years. Before issuing a permit, the government determines an annual allowable cut which the concessionaire is not allowed to exceed. The permit for a concession shows how many lineal metres may be harvested and the concessionaire must pay the regional office in the concession area for every lineal meter of rattan harvested. Also, as per the approval permit, the concessionaire is supposed to follow the guidelines concerning regulations and harvesting methods of rattan canes, i.e., leaving two or three immature canes per clump. There is no requirement for the concessionaire to plant or conduct enrichment planting but simply to follow the fallow period until such time as young canes left have reached maturity. The DENR is supposed to monitor the cutting practices regularly but in reality this is not being done, hence there is no control of harvesting

practices. Because of the lack of control and competition between gatherers, young canes are cut and the allowable cut is usually exceeded.

TRENDS AND ISSUES—DEVELOPMENT AND CONSERVATION LESSONS

Declining resources

In traditional Batak culture the 'ancestral lands' and all living entities occupying these lands are considered sacred and to be respected. The Batak's traditional beliefs and culture, in combination with low population densities and a subsistence economy, prevented the rattan resource from being overexploited. As rattan became economically popular and valuable, and demand increased on both the local and international markets, non-Batak gatherers invaded the rattan areas and the Batak themselves started to get involved in commercial gathering as well. In particular the entry of the legal concessionaire has intensified extraction. The concessionaire often exceeds the allowable cut, since control is lacking, and also buys illegally cut rattan. As a result of increasing scarcity of good rattan in the concession area, gatherers are starting to cut rattan from forestlands outside the concession boundary.

On a national scale, rattan exports—which became one of the country's export winners during the 1970s and 1980s—was in decline in terms of volume and value from 1989 to 1993. The share of rattan furniture of total furniture exports fell from 68% in 1989 to 56% in 1993. In 1993, the total volume of furniture exports was only 3,013 tonnes, valued at US$114.21 million FOB, about 20% lower than the peak value of US$137.75 million in 1989. The export of rattan baskets and wicker ware showed a 31% decline from US$106.3 million in 1988 to US$73 million in 1993 (Pabuayon and Espanto 1995). The decrease in furniture exports was mainly due to a low supply of raw materials as a result of overexploitation, the precarious dollar–peso exchange rate, and the shift of foreign buyers to other supplying countries.

There is no evidence to suggest a reversal in the declining trend of exports in rattan furniture from the Philippines in the near future, even though total world demand for rattan continues to increase (Kilmer 1994). Unsustainable harvesting of the resource further contributes to the sad state of the resource in the country, specifically in the forests of the island-province of Palawan.

Economic importance for producer households

In this case, the concessionaire and traders take most of the profits from the commercialisation of rattan, not the gatherers (Batak or non-Batak). Being at the higher level of the market hierarchy, traders and concessionaires are more knowledgeable of the trading system and capable of taking advantage of the 'ignorance' and 'no choice' condition of the gatherers. Still, rattan gatherers earn 25% of their total income, which is 60% of their cash income, from rattan extraction. The latter is thus a very important source of income.

Socio-economic and ecological consequences of commercialisation

The growing rattan market, since the 1970s, has opened the door for commercial exploitation in the research area. For the Batak, commercialisation of rattan and influx of lowland gatherers have had important consequences in terms of socio-economic development as well as sustainability of extraction practices. It can be argued that the Batak have been positively influenced by their contacts with lowland rattan gatherers, who have introduced them to 'modern' perceptions on health and education issues. At the same time it can be argued that the contacts with lowland gatherers, and the introduction of the Batak to the market economy, has resulted in a loss of the Batak's traditional culture and practices, including sustainable methods of rattan gathering. Efforts to achieve a 'modern' lifestyle have led to the search for short-term monetary gains, which—in combination with competition for the resource with lowland gatherers—has resulted in overharvesting of the rattan resources.

Though policies have been introduced in order to prevent overexploitation of the Philippine rattan resources, uncontrolled harvesting is rampant because of loopholes in the policies. Batak and non-Batak rattan gatherers also cut immature canes into wrong lengths, for which only low prices are paid. In effect, rattan canes available in the market are of a low quality, negatively affecting the position of Philippine rattan products on the international market. Regulations set by DENR to insure the sustainability of the rattan resources have so far not resulted in sustainable harvesting of rattan in the study area. It was observed that laxity on the part of the government to monitor is often the very reason why resource sustainability is not achieved.

The Batak communities in the research area have been granted official land use rights in the form of CADC and this could be a good avenue with which to effect the conservation and development of the rattan resource. In the research area these use rights are not exclusive, however, since a cutting permit has been granted to an outsider. The concessionaire exceeds the maximum allowable cut and buys illegally cut rattan, resulting in a depleting resource. To reduce the pressure on the remaining resources, outsiders should not be entitled to cut in the CADC areas.

ENDNOTES

1. Ecosystem Research Development Bureau (ERDB), Laguna 4031, The Philippines. E-mail: hgpalis@laguna.net
2. *Sitio* is the Philippine term for village or settlement.
3. The *barangay* is the lowest administrative unit in the Philippines.
4. Exchange rate 1998: US$1 = PhP40.

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Chapter 20

The kitchen utensils home industry in Sukaraja subdistrict, Java, Indonesia: wood (*Agathis borneensis*) from a state owned plantation used by local enterprises

Pipin Permadi[1]**, *Syarif Hidayat***[2] **and *Dede Rohadi***[3]

Common names	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
Damar, Agathis, Damar pilau	Wood	Cultivated	Medium	National	Medium

OVERVIEW

The forested areas in the subdistrict of Sukaraja, West Java, are plantations managed by the state owned company Perum Perhutani. The company hires local people for planting, maintenance and logging activities. *Damar* (*Agathis borneensis*) is one of the species grown and is the main wood species for the production of kitchen utensils in the area. There are four kitchen utensil enterprises, each employing 10 to 15 workers. Often the production of kitchen utensils takes place in a worker's home, usually as piecework paid as per the amount produced. Workers are farmers, for whom the work provides an important part of their cash income (about 45%). Most products are sold to traders, who then sell them on to large department stores in Java. In the 1970s there were more enterprises in the area producing kitchen utensils, but with the economic crisis of 1998, many lost their businesses because of a decline in demand and rising wood prices. Those that survived the crisis have received support from Perum Perhutani in the form of soft loans and assistance on marketing and management issues. This assistance falls under a government programme obliging the company to use 5% of its profits to support small, home enterprises. The author argues that such aid schemes improve the local economic situation and as such reduce illegal logging activities.

INTRODUCTION

Wooden kitchen utensils such as pestle and mortars, spoons, spatulas and forks are common in Indonesia. The production of these handicrafts has long been a cottage industry in many parts of the country, using traditional, manual tools. Now, however, some enterprises employ modern machines. Some of the wood species commonly used are *damar* (*Agathis borneensis* Warb.), pine (*Pinus mercusii*) and mahogany (*Swietenia macrophylla* King).

The wooden kitchen utensil home industry in Sukaraja subdistrict of West Java is an interesting case study, particularly from the point of view of the *anak-bapak angkat*, or son-father relationship, between the home enterprises and the state owned company, Perum Perhutani, in which the latter gives assistance to the kitchen utensil cottage industry. The cottage industry came into being in the 1970s and initially involved many households, but because of the economic crisis of the late 1990s only a few enterprises remain. The main handicaps are lack of capital and a limited market. Moreover, the relatively small quantities of wood required by these enterprises are of little interest to the state company, which usually does business with larger companies requiring larger amounts of timber.

The study area: Sukaraja subdistrict

Sukaraja subdistrict is one among 30 subdistricts within the district of Sukabumi in the province of West Java (Figure 1). To the north the area (6°50' to 7° south, 106°50' to 107°5' east) borders Gede-Pangrango National Park, to the south the city of Sukabumi and the Geger Bitung subdistrict and to the east the district of Cianjur. The altitude ranges between 550 and 1,300 m a.s.l. Based on the Schmidt and Ferguson climatic system, the subdistrict area falls within type B with temperatures ranging between 10°C and 30ºC and an average relative humidity of 40%. The annual rainfall is high, i.e., between 3,000 mm and 5,500 mm. The soil type is dominated by andosol and brown latosol, which make the area fertile.

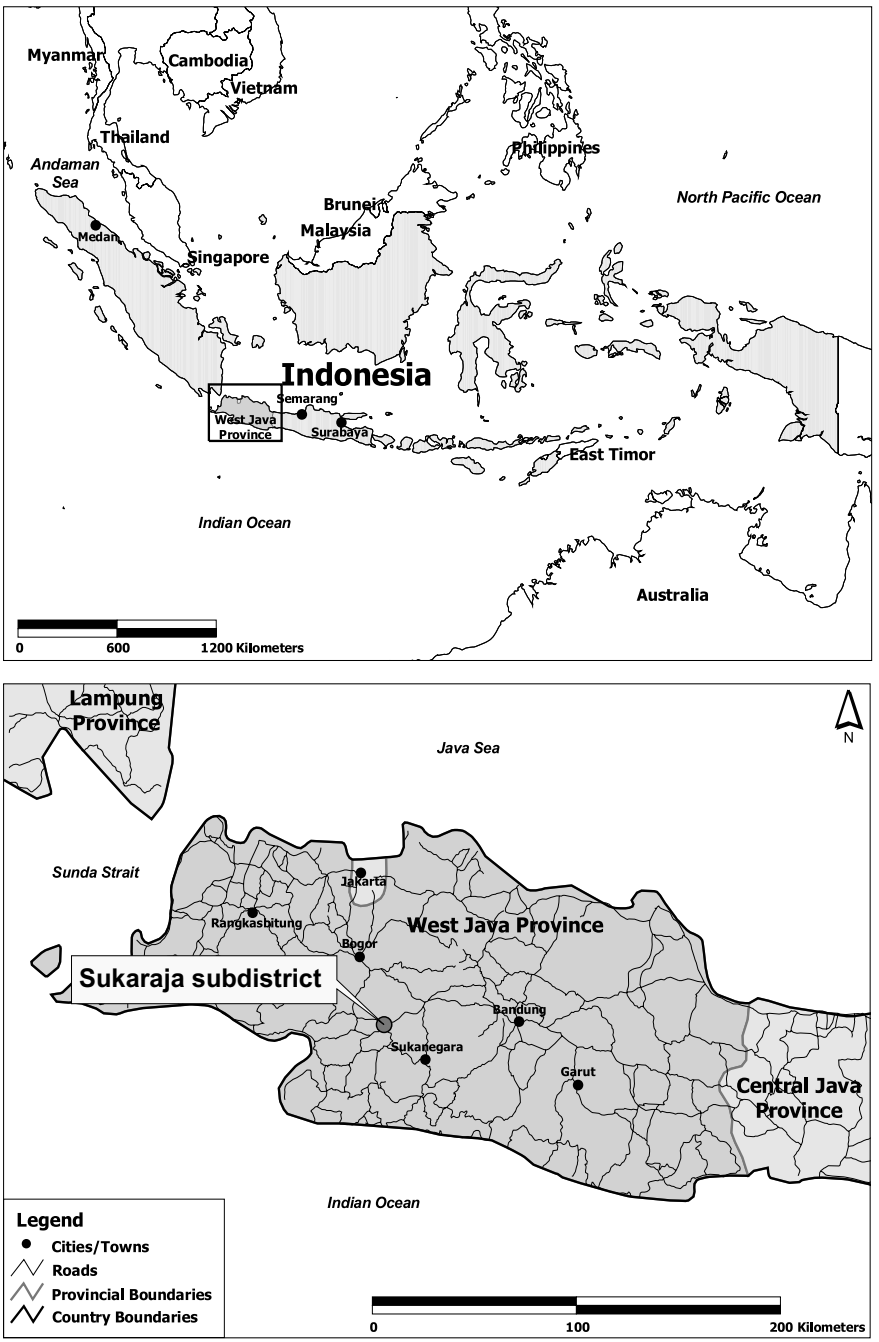
The total area of the subdistrict is 9,900 ha. It comprises 650 ha of forest, 3,900 ha of *sawah* (wet paddy fields) and 1,175 ha of residential area (Anonymous 1999a). Details of the land use system are presented in Table 1. Sukaraja has 25 villages with a total population of 195,265 individuals. The area has good access and a good road system. The provincial highway, Bogor-Sukabumi-Cianjur, goes through the subdistrict.

Table 1. Land use system in Sukaraja subdistrict, Sukabumi district

Land uses	Area (ha)	Percentage
Sawah	3,981,463	40.0
Dry land	4,131,805	41.7
Residential and home gardens	1,172,649	11.8
State forest	650,322	6.5
Total	9,936,239	100.0

Source: Anonymous 1999a.

Figure 1. Location of the study area



Source: ESRI Data and Maps 2002.

All the forest area has been planted and is managed by the state owned company Perum Perhutani. Around 113 ha of this forest have been planted with *damar* (*Agathis borneensis*), whereas the remaining area is mixed species such as mahogany (*Swietenia macrophylla*), pine (*Pinus merkusii*), teak (*Tectona grandis*) and others (Anonymous 2000).

THE PRODUCTION-TO-CONSUMPTION SYSTEM

The raw material

Damar is the main wood species used for the production of kitchen utensils in the area. Other species used are mahogany, pine and *sengon* (*Paraserianthes falcataria*). Most of the wood (89%) is derived from Perum Perhutani plantation forests and the remainder is from private gardens. Perum Perhutani manages the plantations on the basis of a continuous rotational system.

The quantity of *damar* wood used for kitchen utensils is considered small, i.e., only around 600 m^3 per annum. It is large factories in Jakarta that use the most *damar* for construction purposes (about 1,100 m^3 per annum) and for furniture (about 550 m^3 per annum).

The plantation forests in the study area that supply wood to home enterprises are administered by Perum Perhutani, West Gede region. The company has received the government mandate to manage state production forests, including planting and extraction. Perum Perhutani hires local people as either workers (*buruh*) or partners (*pesanggem*) for all its activities, from planting to logging. Hired locals usually work in groups. For example, there are separate groups for felling, skidding and transporting.

Workers are hired as either company staff (*buruh tetap*) or contract workers (*buruh borongan*). The latter usually do piecework, which is paid according to the quantity produced. For example, for logging activities, the wage paid is based on the cubic measure of the log felled, skidded or transported to the timber yard. Even for contracted workers, there are strong linkages between the workers and the company. In fact, almost all of the contracted workers are maintained in the company's activities; newcomers do not find it easy to join these groups. Women make up around 20% of the total workforce.

In the partnership model, the locals are given access to land for agricultural activities through an intercropping (*Tumpangsari*) system. Each person (or household) is permitted to use 0.2 ha of forestland a year for intercropping activities. The contract may be extended for up to five years. The locals grow rice or other crops on the land for their own consumption and maintain the timber seedlings in return. There are currently 2.8 ha of forestland under this system in the study area (Anonymous 1999b).

As mentioned earlier, most work in the *damar* plantations in the region is done by contracted workers who receive an average income of about US$1 to US$2.5 per day depending on how much work they finish that day.[4] This amount is comparable with the average wage of the area, which is US$1.25 per day.

Box 1. Long term contracts

A partnership model called *Pengusahaan Hutan Bersama Masyarakat* is similar to the *Tumpangsari* model, except that the contract is given for the whole timber cutting cycle (usually 40 years). Local people receive fertiliser, pesticides and other materials and tools to maintain the timber seedlings. They also receive approximately US$5.20 per hectare per year for timber maintenance. Under this system, local people also have a permit to grow perennial trees (e.g., fruit trees) on the forestland for their own consumption. This system benefits both sides: for the company it reduces the production costs of timber plantations, secures timber maintenance and reduces conflict between it and the local people; for the local people it provides them with land for agriculture as well as with input such as fertilisers, pesticides etc. The main difference between this model and the partnership model applied in the research area is the duration of the partnership contract. The *Pengusahaan Hutan Bersama Masyarakat* model is not currently practised in the study area.

The kitchen utensil industry

There are 90 wood based enterprises registered with the District Industrial Office (*Dinas Perindustrian*) in Sukabumi district, although there may be more than 100 such enterprises currently operating in the district as many small home enterprises are not registered. In Sukaraja, 15 small wood based enterprises are now operating, four of which are small kitchen utensil enterprises and the rest furniture factories and sawmills. The number of workers in the kitchen utensil industry ranges between 10 and 15 per unit, most of them being family related. The number of workers in the kitchen utensil home industry in Sukaraja is about 60 persons, mostly family members working from their homes on piecework. Most of the workers are farmers living near the production unit, who work part time to supplement their income. Although the contribution of this home industry to the national economy is small, woodcarving does play an important role in increasing local income. Compared with households engaged only in farming, those that undertake woodcarving may well have twice their cash income. In general woodcarving households have higher incomes than those employed in other activities in the area. Around 30% of the workers are women. The owners of the kitchen utensil enterprises are relatively rich and own large houses and cars.

The four kitchen utensil enterprises mentioned above are the only surviving enterprises from about 10 enterprises that existed previously in Sukaraja. Perum Perhutani provides the surviving enterprises with assistance in the form of investment capital, management, marketing and promotion of the products. Above all, kitchen utensil enterprises may buy small quantities of wood from Perum Perhutani.

Photo 1. Wood being cut into rough forms (Photo by P. Permadi)

The wood extractor, the state company Perum Perhutani, sells the wood as sawn timber to the kitchen utensil enterprises at US$0.4 per kilogram. The timber is cut into various rough forms (see Photo 1) and then shaped into final products either manually or by using machines such as a lathe or an electric saw. Finally the products are sanded, sun- or oven-dried, resanded and packaged. The finishing and packing is often done by women (see Photo 2). Around 40 different types of kitchen utensils are produced in the production area.

Production fluctuates according to demand. Because of limited capital, enterprises rarely keep surplus stock and generally only produce to order. Wood consumption ranges between 10 m^3 and 15 m^3 per month per enterprise. Labour costs vary by product (Table 2). Workers are paid according to the quantity of items they produce. Average daily income ranges between US$1.5 and US$2. Although the number of people working in the enterprise unit may be limited to only two to four people, the number of people involved in kitchen utensil production is much larger, because many woodcarvers take the material provided by the enterprise to their homes. They return with finished items, which are paid as piecework.

The marketing chain is depicted in Figure 2. The biggest buyers are usually the larger department stores in Java. Enterprises seldom sell directly to department stores. Instead they go through agents or traders from whom they can expect quick cash for their products. Approximately 5% of all kitchen utensils produced are sold in the local market or in the nearby cities of Sukabumi and Bogor.

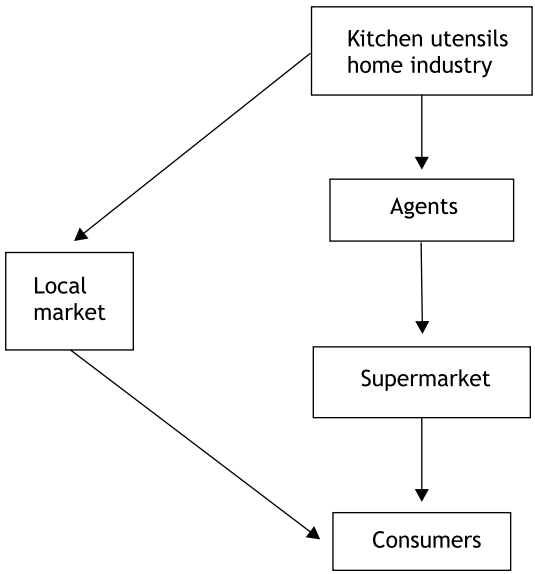
Photo 2. Women working in a small kitchen utensil enterprise in Sukaraja, Sukabumi (Photo by P. Permadi)

Table 2. Production costs of various kitchen utensils and profits derived

Items	Quantity produced from 1 m^3 of wood	Labour cost per unit (Rp)	Selling price per unit (Rp)	Selling price per m^3 of raw material (Rp)	Profit* per m^3 of raw material (Rp)
Bowl (*cowet*)	330	225	3,500	1,155,000	580,750
Spoon (*sendok*)	1,000	150	1,500	1,500,000	850,000
Dish (*talenan*)	500	175	2,500	1,250,000	662,500
Turner (*cukil*)	1,000	150	1,500	1,500,000	850,000
Sawn timber	0.5 m^3	20,000/m^3	1,200,000/m^3	600,000	80,000

* Profit = selling price minus costs of raw material (Rp500,000/m^3) minus labour costs. Exchange rate (2001): US$1 = Rp10,000.

Figure 2. The kitchen utensil trade diagram



Policy environment

The kitchen utensil enterprises in Sukaraja are considered small home enterprises and therefore are not subject to taxation. Registered enterprises can apply for financial aid from Perum Perhutani, which, like other state owned companies in Indonesia, is obliged to give 5% of its revenue to help small enterprises[5]. Perum Perhutani aids about 150 small enterprises around Sukabumi. It need not necessarily be a kitchen utensil enterprise to be considered for the aid programme so long the enterprise can convince Perum Perhutani that it is small. Perum Perhutani makes the selection based on the 'suitability' of the applicant, that is, the feasibility of the applicant's business proposal. Besides financial aid in the form of soft loans the state company also helps with promotional and management issues.

This system is locally called *anak-bapak angkat*, referring to the role the state owned company plays as a foster father for small enterprises. The objective of this policy is to develop small enterprises and to strengthen a number of different industries. All four kitchen utensil enterprises in Sukaraja receive such aid.

TRENDS AND ISSUES—DEVELOPMENT AND CONSERVATION LESSONS

The kitchen utensil industry started in Sukabumi in the 1970s. At that time around 10 enterprises were operating in the area, employing more than 200 people. Increasing demand caused the enterprises to expand and they reached

a peak in 1995, when at least 12 enterprises were operating in the area. The enterprises provided significant income opportunities for local people. The average annual income of producer households from the production of wooden kitchen utensils was around US$650, which was higher than the average income from other activities in the research area, including farming.

The availability of wood has not been a constraint for the enterprises as Perum Perhutani provides wood from its plantation forests in the area. However, with the economic crisis of 1998, the market declined. Several enterprises lost their businesses because of declining demand and an increase in the price of wood. The few enterprises that survived did so because of assistance from Perum Perhutani. The company started in 1998 to provide soft loans for enterprises to buy wood and other production tools. Most loans run three years (but some carry longer terms) and provide a maximum of US$1,000 per enterprise at only 3% interest per year.

Lessons from the case

The case of kitchen utensils in Sukaraja provides an interesting lesson on how a big company may play a significant role in developing a local community's economy. The investment need not be high, as Perum Perhutani sets aside only 5% of its profits for this aid programme. This small aid in the form of soft loans and managerial, marketing and promotion assistance has had some positive impacts on the development of the kitchen utensil enterprises in the area. The provision of soft loans has been helpful since one of the major constraints the kitchen utensil enterprises had to face was a lack of capital to invest in expansion, while getting credit from commercial banks is difficult and not preferred. The assistance in marketing is valuable for the kitchen utensil industry because these are usually small-scale enterprises with limited possibilities and skills to market their product on their own. The assistance the state company has given has benefited not only the small-scale enterprises but may well have benefited Perum Perhutani by improving the economic situation of the local people and thus reducing the occurrence of illegal logging in the company's plantation forests.

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4. Exchange rate (2001): US$1 = Rp10,000.

5. Other state owned companies, such as Perusahaan Listrik Negara or the National Electricity Company, provide programmes similar to the aid programme run by Perum Perhutani to develop various other home handicraft enterprises in the district.

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Chapter 21

Bamboo (*Neohouzeaua dullooa*) production and trade in Cho Don, Vietnam: NTFP extraction from allocated forest lands

An Van Bay[1]

Common names	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
Nua, Bamboo	Stem and Shoot	Wild	Medium	International	Large

OVERVIEW

The culms and shoots of the bamboo species *Nua* (*Neohouzeaua dullooa* (Gamble) A. Camus) are harvested by farmers in the district of Cho Don, Vietnam. The shoots are sold as food and the culms are sold for paper processing and the production of handicrafts, largely for export. Households may earn more than half of their cash income from the sale of *Nua*. The annual cut of mature *Nua* culms does not threaten the resource base since the culms regenerate quickly. The harvesting of shoots is an important source of income for farmers in need of cash, but limits the availability of mature culms, which are much more valuable. Farmers harvest *Nua* from forested lands for which they have been granted a use permit by the government as part of a large-scale land allocation programme. The Cho Don State Forest Enterprise and the local government co-operate to control harvesting practices (e.g., by issuing harvesting permits) and trade. The Cho Don State Forest Enterprise itself is the most important buyer and is in control of all *Nua* trade in the district, since private traders may buy *Nua* only with permission from the state enterprise. The allocation of forest lands in combination with strong and committed local government institutions has stimulated forestry activities such as the harvest of *Nua*. At the same time it can be argued that the high level of state control may limit possibilities for farmers and removes incentives for more active management activities.

INTRODUCTION

In Vietnam bamboo is found throughout the whole of the country. It has many domestic uses: the seeds are eaten as grain, the cooked young shoots of some bamboo species are eaten as a vegetable, and bamboo stems have numerous purposes from buckets to scaffolding. Next to the extraction of bamboo for domestic purposes, several species are being extracted for commercial purposes and as such are of economic importance for many rural households.

Cho Don District

The focus of this study is on Cho Don District in the northern part of Bac Kan province (Figure 1). Cho Don district, comprising 90,770 ha, is located 150 km from Hanoi and is the largest bamboo raw material production area in the province. The area has a monsoon tropical climate with two seasons (a hot and humid season and a dry and cold season) and a mean annual rainfall of 2,000 mm. The total population of Cho Don is 46,000 and human settlements account for only 4% of the total land area, while the forested area (including fallow lands) accounts for about 70% of the total area. Population growth is 3% annually and there is substantial in-migration from the lowlands and from the Vietnam-Chinese border area (Pham Thanh Tinh 1997).

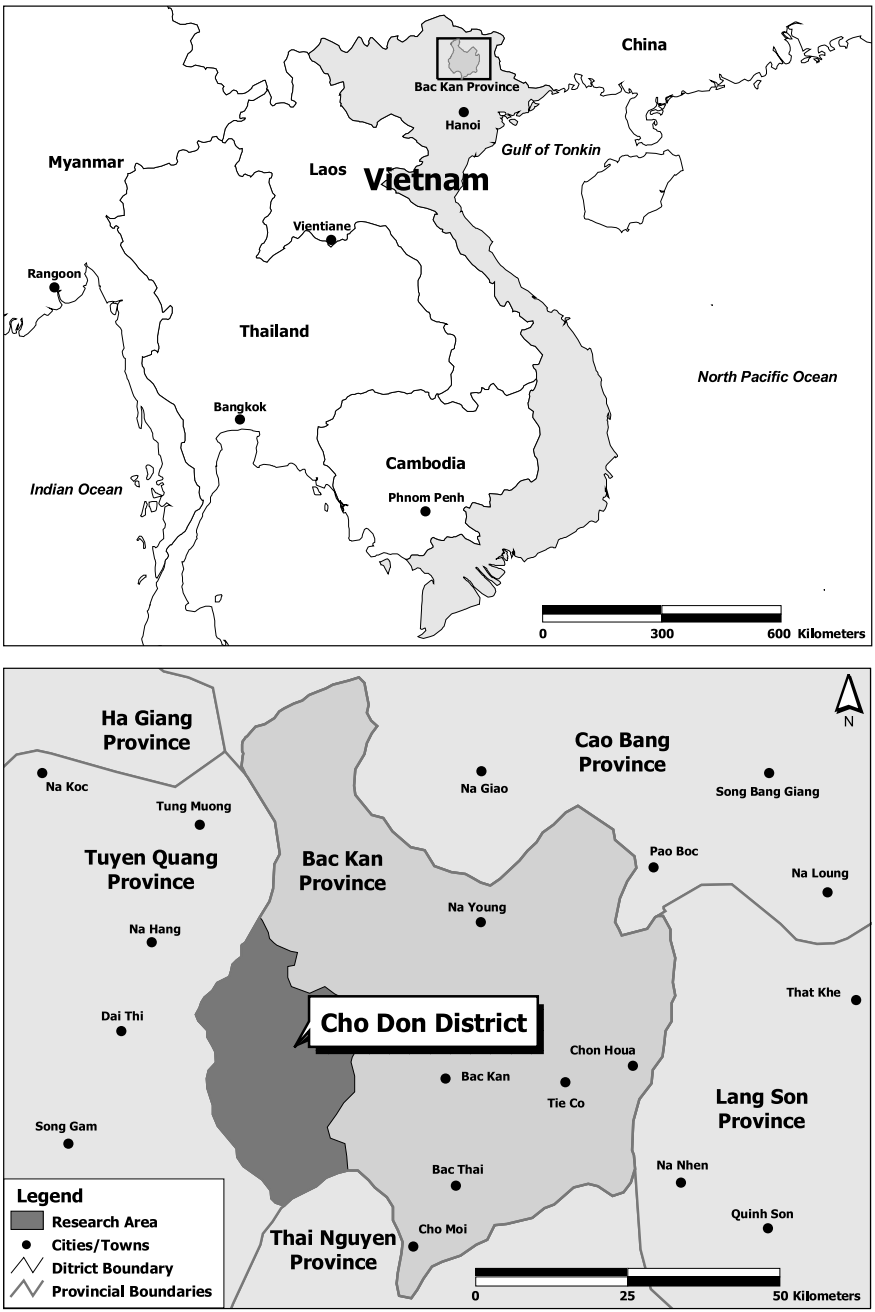
THE PRODUCTION-TO-CONSUMPTION SYSTEM

Nua bamboo

There are many species of bamboo growing in Bac Kan province (Table 1). The most dominant species are *Truc* (*Phyllostachys pubescens*), *Vao* (*Arundinaria spathiflora*) and *Nua* (*Neohouzeaua dullooa*). *Nua* accounts for more than 60% of all bamboo extracted in the province and this case study focuses exclusively on this species. *Nua* is abundant in the forested area of Cho Don and thrives in disturbed and secondary forest because it prefers an open canopy. The time from germination to reproductive maturity of *Nua* is about 7 to 10 years. *Nua* regenerates quickly, growing to its full height within one year after cutting. The cutting of mature culms does not affect the clump's capacity to regenerate.

The flowering of *Nua* is locally known as the *Khuy* phenomenon and happens once every 30 to 35 years, after which the bamboo dies en mass. In the years after flowering, young plants start to appear from the seeds dispersed following the flowering (Nguyen Tu Uong 2000). In Vietnam there has been limited research on the flowering of *Nua* and on the impact of this phenomenon on *Nua* extraction and the forest ecology. It is only since the late 1980s that *Nua* extraction has become an important source of income for households in the research area and so far there is no recorded experience of the socio-economic impact of *Nua* flowering.

Figure 1. Location of the research area



Source: ESRI Data and Maps 2002.

Table 1. Common species of bamboo in Bac Kan Province, Vietnam

Local Name	Species	Characteristics	Typical uses
Nua	*Neohouzeaua dullooa* (Gamble) A. Camus	Medium sized bamboo, straight culm	Paper pulp, baskets, handicrafts, light construction, mats, beds, shoots for food
Truc	*Phyllostachys pubescens* Mazel ex H. de Lehaie	Medium sized bamboo, straight culm	Baskets, handicrafts, light construction, mats, beds,shoots for food, chopsticks, mats, paper, fishing rods
Vau	*Arundinaria spathiflora* Trin	Large straight culms that are pliable	Baskets, handicrafts, fishing rods, shoots for food
Mai	*Dendrocalamus latifollus* Munro	Long straight culm that are very strong; shoots highly valued for food	Construction, paper, baskets, composite boards, handicrafts,shoots for food, ladders, chopsticks, mats

Nua harvesting

Nua production (extraction for commercial purposes) is concentrated in the south of the district. *Nua* is harvested either by the Cho Don State Forest Enterprise (SFE) from forested lands that are managed by the SFE or by farmers who have land use rights to pieces of forestland.

Nua *harvesting by individual farmers*

It is estimated that about half of the households in the southern part of Cho Don (the communes Bang Lang and Phong Huan) are involved in *Nua* production. Collection takes place throughout the whole year, depending on the available time of household members and demand. The preferred harvesting season is the dry season (from August to February), since high humidity during the rainy season increases the chance of cut culms being damaged by insects. For the making of handicrafts *Nua* needs to be at least two years old, while for papermaking one-year old culms can be sold as well.

Farmers usually cut culms aged one year or older, which in practice means about 50% of the standing culms per clump. The collection of bamboo shoots takes place during the wet season and is mainly done by women. Ideally, only those shoots that grow close to mature culms —and are therefore unlikely to grow out to straight, mature culms— are harvested. However, households in need of cash in the wet season rarely take the future availability of valuable culms into consideration and harvest to meet their needs. Some *Nua* extractors try to manage the *Nua* on their lands, for example by removing unwanted nonvaluable vegetation to give *Nua* room to grow.

Nua *harvesting by the SFE*

The Cho Don SFE harvests *Nua* from an area of 4,700 ha that it manages exclusively. The annual production from this area is estimated at 1,000 tonnes to 1,500 tonnes of mature culms. SFE staff as well as hired labourers are involved in the cutting of culms from the SFE area. The cost of labour for harvesting is estimated at US$13 per tonne of culms.[2] Each year about 25% of the standing culms are cut selectively. *Nua* shoots are not harvested by the SFE and extraction of shoots from the SFE area is prohibited.

Photo 1. Farmer harvesting *Nua* (Photo by K. Kusters)

The importance of *Nua* for producer households

Households harvest *Nua* as part of a range of activities, such as the cultivation of rice, maize and cassava. Most farmers in Cho Don are subsistence oriented, with half of their total income earned in cash. They usually have a small area (<1 ha) of agricultural lands and an allocated piece of forested land for utilisation. For households that have substantial amounts of *Nua* on their allocated land *Nua* is the most important part of cash income, contributing up to 80% of the household's cash income. The rest may come from selling agricultural surplus, fuel-wood, sugarcane, fruit, fish, *Vao* and livestock.

Box 1. Domestic uses of Nua

In the research area *Nua* is used domestically in many different ways. The culms of this bamboo species are, for example, used for housing, telephone and clothes-drying poles, animal shelters, fencing, baskets, bird cages, damming paddy fields, ladders, tobacco pipes, lighting sticks, picture frames, kitchen utensils and fuel.

Trade and processing of *Nua*

Nua culms are used in the production of handicrafts and paper. Less *Nua* from Cho Don is sold for paper processing than for handicrafts. There are mainly two types of traders in the district; the SFE on the one hand and private traders on the other. It is estimated that 70% of the culms collected by farmers are sold to the SFE, while the remaining 30% goes to private traders. Private traders active in the area need to have official permission from the SFE to buy *Nua* in Cho Don, and in this way the SFE is in control of all trade within the district.

Photo 2. Trader loading truck with *Nua* (Photo by K. Kusters)

Individual farmers receive an order from the buyer (SFE or private trader) and arrangements are made regarding the number of culms and place of transaction. The buyer usually buys from several households over a period of some weeks, after which the *Nua* is collected from a central storage area near a roadside or river by truck (see Photo 2). There is continuous demand for *Nua* for the processing of paper and handicrafts; however, since farmers have variable amounts of time available throughout the year, the price may rise in periods when labour demand for farming is high. Private traders sometimes pay farmers in advance, when placing their order. This prepaid arrangement, even though it often yields a lower price for the bamboo, is an attractive option for farmers who need cash immediately. The average farm gate prices for bamboo are shown in Table 2. Bamboo chips (split culms) provide the best price, this being marginally more than large diameter culms. Figure 2 presents a simplified trade diagram for *Nua* culms harvested in Cho Don.

Figure 2. Trade diagram for *Nua* culms harvested in Cho Don

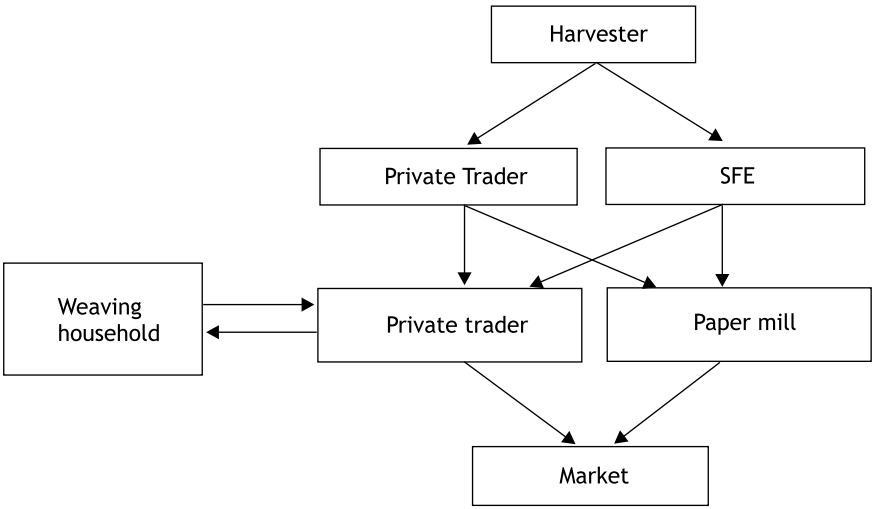


Table 2. Prices of raw material at the farm gate

Product		Price per kilogram,1999 (US$)
Nua culm	Diameter >10 cm; length 5-7 m	0.02
	Diameter >5-7 cm; length 3-5 m	0.02
	Diameter > 3-4 cm; length 4-5 m	0.01
Split *Nua* culm for handicrafts		0.03
Boiled *Nua* shoot (five shoots per kilogram)		0.003

Sources: NTFP-RC 1999; field research 2003.

Paper industry

Nua from Cho Don (in combination with other bamboo species) is used for the production of paper by the Hoang Van Thu paper mill in Thai Nguyen province. The SFE has a contract with the paper company and supplies approximately 2,000 tonnes of *Nua* per year. The role of private traders selling *Nua* from Cho Don to the paper industry is small. Only 'lower quality' *Nua* (small-diameter culms with nodes less than 50 cm apart) is used for papermaking. Farmers sort the *Nua* before selling it to the SFE as the latter culms are less valuable than the culms used for the handicrafts.

The SFE processes the culms into bamboo chips using simple chipping machines, which are moved around the district. The harvester brings the culms to the nearest chipping machine where the transaction takes place between the harvester and an SFE employee. A chipping machine nearby is an incentive for farmers to cut *Nua*. Thus, by moving the chipping machines around, the SFE controls, to a certain extent, where and when *Nua* is being harvested. After chipping, the SFE takes care of the transport to the paper mill in Thai Nguyen.

Handicrafts

Split *Nua* is used for the weaving of handicrafts. After harvesting the farmer selects the 'high quality' culms, which are sold in their full length or first split by the harvester. Splitting is relatively simple: the culm is cut at the nodes (0.5-1 m) and split with a knife into four pieces (Tran Tuan Nghia 1999). The decision to split the bamboo—often done by women—depends largely on time and labour availability within the household. It is an attractive activity for harvesters since the selling price per kilogram of split *Nua* can be up to three times higher than the selling price of culms per kilogram (see Table 2).

Traders who come to Cho Don buy the bamboo either from individual farmers or from the SFE. The trader will then transport the material to another province (usually Ha Tay) and contract individual households in the so-called traditional weaving villages, providing them with the semiprocessed material. The trader buying Nua in Cho Don may also sell the material to another trader in Ha Tay province who takes care of distributing the material to weaving households.

The actual processing of the handicrafts (e.g., the weaving of *Nua* baskets) takes place in individual households in the weaving villages of Ha Tay province. Most of the handicrafts are produced for the export market (e.g., Japan, Hong Kong, Taiwan, USA and the EU). In Bac Kan province no processing of handicrafts for the international market takes place, which can be attributed to a lack of skills and understanding of international consumers and their tastes.

Shoots

Women collect bamboo shoots, which are a particularly important source of additional income during the rainy season. After collection, the shoots are boiled, dried and packed in baskets. They are then sold to travelling merchants who sell the shoots in city markets. The middlemen may also sell the shoots to other traders from cities such as Bac Kan and Ha Noi. There used to be a state factory where shoots were sealed in cans after blanching at high temperatures to kill bacteria and preserve colour. The factory closed in the early 1990s, however, as a result of poor management, even though the international market for bamboo shoots was growing.

Box 2. The processing of *Vao* (*Arundinaria spathiflora*) and *Truc* (*Phyllostachys pubescens*).

In Bac Kan (the capital of Bac Kan province) there is a bamboo processing plant run by the Bac Kan Forest Processing Enterprise. Here *Vao* is used to make chopsticks (600–700 tonnes per year) and the waste of this product is used to produce paper (2,000 tonnes per year). Papermaking involves chopping the raw material into small pieces and boiling the material to soften the fibres. The pulp is then dried to the required thickness and texture of the paper. The paper is of low quality and is exported to Taiwan, where it is used to print 'fake money' to be burned while praying. The Bac Kan Forest Processing Enterprise is also involved in the semiprocessing of *Truc*; the poles are cut in pieces of approximately 2 m, dried and straightened before being exported. The poles are used to make fishing rods, amongst other uses. The Cho Don SFE faces a number of constraints; it is unable to respond to changing demands from the market and there are limited incentives within SFE to improve the processing.

Government regulation

Since the 1990s Vietnam's forestry legislation and administration system has been rapidly evolving. Various incentives to rehabilitate and develop forest resources and increase forest production have been introduced. The most striking example is the Prime Minister's Decision No. 661/QD-TTg (29 July 1998) on the Five Million-Hectare Reforestation Programme, which intends to increase forest cover to 43% of the national territory by 2010. The aim of the programme is to protect the environment, decrease the severity of natural disasters, increase water availability, protect biodiversity and strengthen the forestry sector (Vo Nguyen Huan *et al.* 2001). Tighter controls on forest destruction and the illegal trafficking of forest products have also been introduced.

Land allocation policies

For the bamboo collecting households in Cho Don, the government's land allocation programme is of particular importance. According to Decision No. 02/CP (15 January 1994), the state will allocate forestland to organisations, households and individuals for stable and long term use according to specific conditions in each category of forest. The programme was first implemented in 1995. (Before 2000, the Forest Protection Department (FPD) was responsible for the allocation programme. Since 2000, land allocations have been conducted by the Land Department.) Land allocation means that a household, individual or organisation is granted a long term, exclusive user rights certificate (referred to as a 'red book') for a certain area of forestland. The allocation contracts are for periods of 50 years, after which the state will determine, for each case, whether the holder of the certificate (i) has used it for suitable purposes and (ii) still needs the land (MARD 1996). The certificate holder must comply

with a particular set of rules regarding use and management of the land. Contracts, in which the rights and obligations are laid out, are signed for the management of the allocated area. The rules depend on the category within which the allocated land falls: production forest, protection forest or special use forest. Production forest is allocated for the production of forest products. Protection forest has a specific function for watershed protection, soil erosion control and regeneration and is largely located on steep slopes. Special use forest is forestland for environmental conservation, tourism, educational purposes, and other special uses (VFFSCP 1997; Tordoff *et al.* 2000).

The forested area of Cho Don (76,089 ha) is classified as protection forest (23,098 ha) and production forest (52,991 ha). There is no special use forest in the district. Most of the production forest, which is the most important source of *Nua,* is allocated to households. About half of the protection forest in the district is allocated to households with strict regulations with regard to utilisation, aimed to maintain or restore the function of the forest. To harvest *Nua* from allocated protection forests, the household needs to apply to the commune and the SFE for permission. The procedure on average takes two weeks, but sometimes it may take as long as two months. Most households in the southern part of Cho Don have land use certificates for between 2.5 ha and 5 ha of forestlands (protection or production forest) per household. Households that do not have *Nua* on their allocated lands are usually involved in plantation programmes, planting acacia, pine and eucalyptus.

TRENDS AND ISSUES—DEVELOPMENT AND CONSERVATION LESSONS

Increasing importance of *Nua* production

The commercial production of *Nua* started in the late 1980s and has continued to increase over the last decade. This increase can be attributed to several factors: First, the increase is a direct result of increasing demand from the paper and handicrafts industries. The increase in demand from the handicraft sector is partly a result of the introduction of political reforms (*'Doi moi'*) in 1986, which meant the start of a gradual transition from central planning to a market economy in Vietnam and has opened the country to new foreign markets. Second, the increase in the commercial production of *Nua* cannot be seen separately from the overall government efforts to halt deforestation and to stimulate sustainable forestry practices, reforestation and rehabilitation of forestlands. As a result of these efforts forest cover in Vietnam increased from 26% in 1993 to 33.2% of the land area in 2001 (FSIV 2001). In particular the allocation of long term and exclusive land use rights for forestlands has facilitated the increase in the commercial extraction of *Nua*. Third, due to the division of the province in 1998, Cho Don district received more money to spend on infrastructure development. The improvement of infrastructure in the district has made the transport of *Nua* by truck much more attractive and as such has stimulated trading activities. Lastly, the SFE has played an important role by functioning as the most important trader with contacts with a paper mill and traders from other provinces.

The role of the SFE

As well as being the most important trader for *Nua* in Cho Don, the SFE also (i) issues permits and so controls the private trade, (ii) semiprocesses large amounts of *Nua* into bamboo chips, (iii) issues permits to collectors to harvest from protection forests, (iv) operates chipping machines that move around the district and so influences where and when harvesting takes place, and (v) plays a role in implementing government policies aimed at stimulating forestry by providing practical support for *Nua* harvesters (for example, the provision of 'harvesting schedules' to advise farmers where and when to harvest). Though SFE activities have contributed to the growing importance of *Nua* production in the study area, at the same time it can be argued that the dominance of the SFE, as described above, leaves little room and gives little incentive for individual farmers to become more involved in the management of *Nua*.

Sustainability of *Nua* production

The regular harvesting of *Nua* does not severely threaten the resource base since *Nua* has strong regeneration capabilities. However, some practices are detrimental: while cutting 30% of the culms (only those aged two years or older) is recommended to maintain full productivity of the plant, farmers are in fact usually harvesting about 50% of the culms (including the one year old culms) and some farmers even cut up to 80% of the standing culms; young culms are often damaged when mature culms are cut, which decreases the number of harvestable culms in the following years; and the harvesting of shoots limits the availability of future mature culms, which are much more profitable than shoots. Where 10 shoots (most of which would have grown out to be good culms) fetch about US$0.007 (VND100), the price of one culm is at least US$0.03 (VND500). There is a need to further study the trade-offs between the harvesting of shoots and the harvesting of culms.

Unique characteristics of the system

The *Nua* case has some unique features, which may be characteristic of the present situation in Vietnam: The combination of a large-scale land allocation programme, a reforestation programme, a strong and committed local government apparatus and the dominant role of the State Forest Enterprise has resulted in a production system that is subject to strict government rules and regulation, top-down oriented and at the same time very well-organised. The production system is further characterised by individual harvesters who behave more as employees than managers, and by the reasonably effective enforcement of regulations. The latter seems largely the result of the co-ordination between local governments and the SFE, controlling both harvesters and traders.

ENDNOTES

1. Non-Timber Forest Products Research Centre, 8 Chuong Duong Do, Hoan kiem, Hanoi, Vietnam. E-mail: bay11352@hn.vnn.vn

2. Exchange rate (1998): US$1= VND14,500.

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Chapter 22

Rattan (*Calamus* spp.) gardens of Kalimantan: resilience and evolution in a managed non-timber forest product system[1]

Fadjar Pambudhi[2], *Brian Belcher*[3], *Patrice Levang*[3] *and Sonya Dewi*[3]

Common names	Part of the resource used	Management	Degree of transformation	Scale of trade	Geographic range
Rotan, Rattan	Stem	Cultivated	Medium	International	Large

OVERVIEW

Rattan cultivated as part of the traditional swidden agricultural system has been a major source of internationally traded rattan raw material and, more recently, the basis of a strong domestic furniture and handicrafts industry. The rattan gardens of Kalimantan provide an example of an intermediate non-timber forest product management system that is well adapted to the local economy and ecology. Over the past two decades, however, important changes have taken place, changes that tested the resilience of the system. Government policies designed to encourage the domestic processing industry and monopsonistic manufacturing association have sharply depressed demand and prices. New developments in the region, in the form of roads, industrial plantations, mining, and other new economic activities, have both actively displaced existing rattan gardens and offered attractive alternatives which have led some rattan farmers to shift to new activities. Recent widespread forest fires have destroyed large areas of rattan gardens, effectively forcing some rattan farmers out of business. Under current conditions, with low prevailing demand and prices, rattan gardens are a marginal activity in purely financial terms. They remain important, however, where competition for land is low because they fit well with the swidden cultivation system that is the economic mainstay in the region. Moreover, rattan gardens provide valuable ecological services, in terms of biodiversity conservation and other forest functions. As rattan remains an important commodity in Indonesia and internationally, the rattan garden system may remain viable, at least in the medium term.

INTRODUCTION

When travelling through rural areas of East Kalimantan, in the Indonesian part of Borneo, a visitor soon becomes aware of the importance of rattan, the spiny climbing palms. From baskets to mats to ropes or even as a side dish in meals, to mention just some of the multiple uses, rattan has played a fundamental role in Borneo since ancient times. It is ever-present in daily life, in the mats one sits on, the baskets carrying produce, the binding holding together houses and tools. Bundles of rattan stems can be seen drying, moving down river in small boats and being stacked in the warehouses of towns. Most rattans grow wild in the forest, but in this part of Indonesia several species are cultivated as part of the traditional swidden agricultural system. The rattan trade has long played an important part in the local and national economy, and the system itself provides a very interesting model of an intermediate management system for forest product production.

Here we will examine the system and its evolution, to understand better the factors that promote such an intermediate management system, the factors that may undermine such a system, and the reasons for the apparent resilience of this system in some places. This chapter provides a synthesis of recent research, drawing on several component studies with the aim of understanding more about the role and potential of this particular management system. The primary analytical approach is a comparison of intertemporal and interspatial differences in the importance of rattan in household economic strategies. We test the hypothesis that changing social and economic conditions are making rattan gardens relatively uneconomic, ultimately leading to abandonment of the system. The main questions we seek to answer are: (1) Are rattan gardens a viable economic option now and in the future? And (2) what are the general lessons about intermediate management systems for non-timber forest products?

Research area

The Center for International Forestry Research (CIFOR) and the Center for Social Forestry, University of Mulawarman have been involved in a collaborative research activity designed to investigate the changing role and potential of forest products in household livelihood strategies under rapidly changing socio-economic conditions. Research has taken place in villages in Pasir and Kutai districts, including Besiq village (see Box 1).

Box 1. Besiq village

Besiq village, Damai subdistrict, in Kutai district was one of the research villages and served as the study area for the Case Comparison Project. The Damai subdistrict covers an area of 343,870 ha and consists of 19 villages, mostly occupied by Dayak Benuaq people. The distance between Samarinda (the capital of East Kalimantan) and Damai village (the subdistrict principal) is approximately 357 km. Besiq village is located about 33 km upstream from Damai village. In Besiq the average population density is 2 persons/km^2 and the village covers an area of 585 km^2; it is the largest village in this subdistrict.

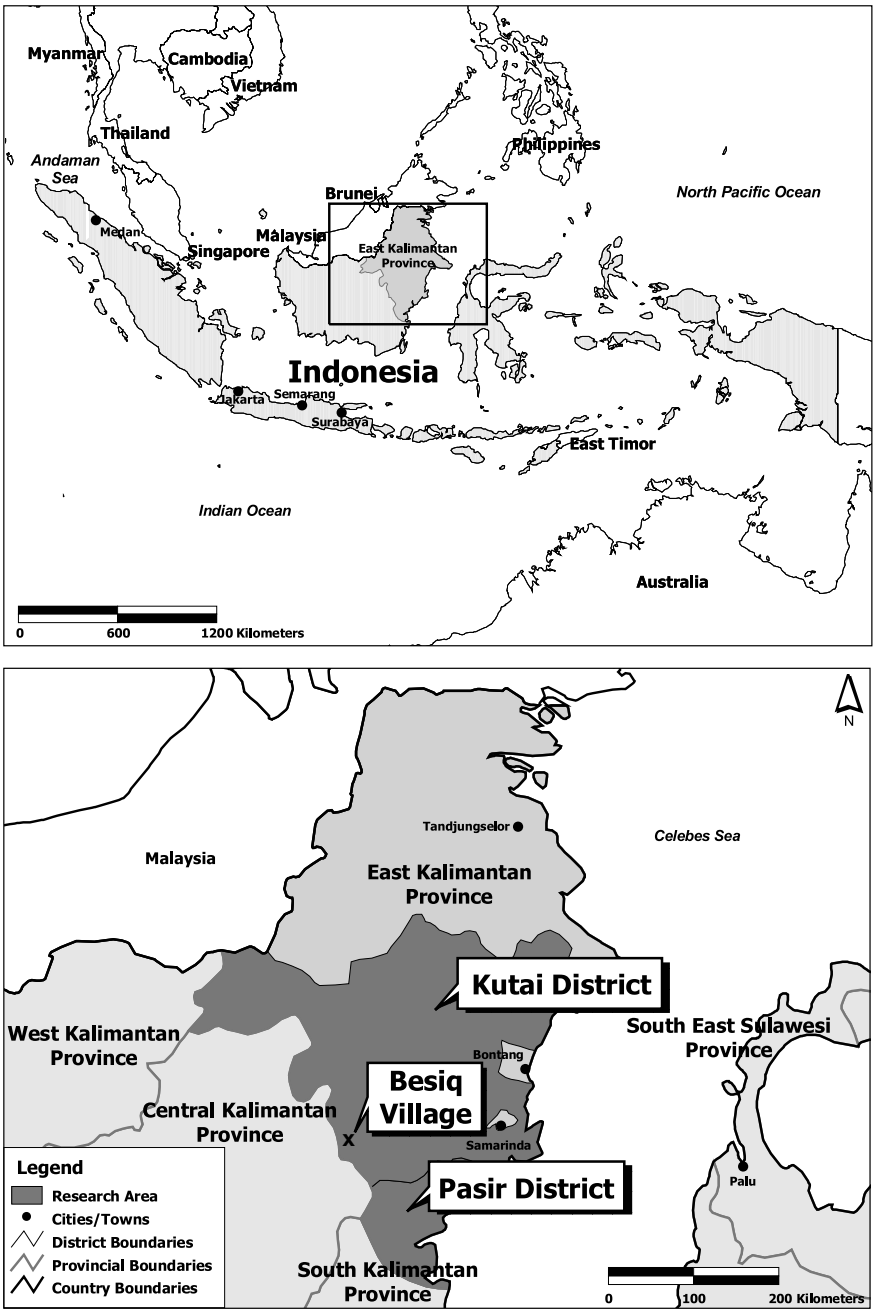
In Pasir and Kutai districts in the Indonesian province of East Kalimantan (see Figure 1) people are mainly indigenes (Dayak tribes) who live in scattered villages and practise swidden agriculture. Rice is the mainstay, but they grow several other field crops and supplement by hunting, fishing and collecting from the forest and increasing integration in the cash economy. The study area was selected because there is a high level of traditional forest use by people living in the area; the traditional rattan gardens of the area represent an interesting and important intermediate-intensity forest product production system; and the area is currently undergoing rapid externally generated changes such as building of new roads and large-scale establishment of oil palm and pulp plantations, which lead to new pressures and opportunities for people living in the area. This combination of factors makes the area interesting for a study of the changing role and importance of forest products.

The development of rattan cultivation

The origins of the rattan cultivation system in use in Kalimantan are not well documented. It probably dates back to the mid-nineteenth century (Van Tuil 1929). The evidence suggests that rattan gardens originated in the areas around Barito, Kapuas and Kahayan rivers in Central Kalimantan (Van Tuil 1929). From there the system spread to other areas in South and East Kalimantan. Most authors agree that in East Kalimantan rattan gardens were introduced first in the Pasir region in the late nineteenth century, when the Sultans granted land to promote its cultivation, and later expanded to the middle Mahakam area, favoured by the Sultan of Kutai (Weinstock 1983; Mayer 1989; Fried and Mustofa 1992). Village elders in the survey area recounted similar stories. They mentioned that it was the Sultan of Kutai who encouraged rattan cultivation, but they did not know when or how this occurred. However, most village elders reported that rattan was only a secondary forest product during the colonial period. Rattan was collected in the wild and occasionally traded. Other forest products, such as resins and gums, were the main sources of cash income for local people before independence in 1945. Rattan was sometimes planted in *ladang* (swidden fields) close to dwelling places, mainly to meet subsistence needs. During the colonial period, and even until the 1960s, iron was scarce in Kalimantan and nails were a luxury item. Rattan was indispensable as a binding material to tie up poles and beams in traditional construction and in the manufacture of many utility items.

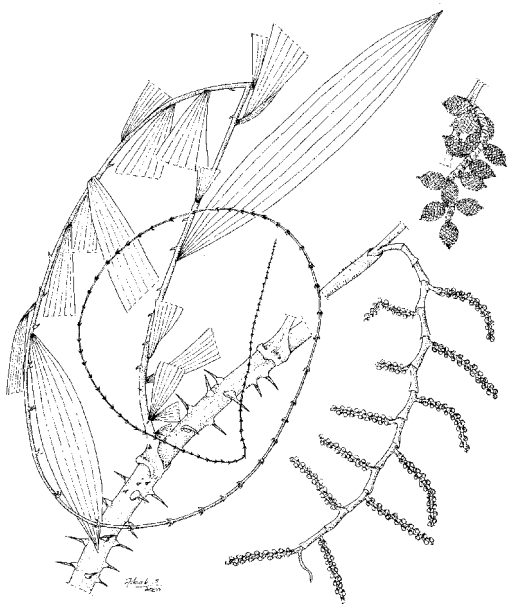
We can only speculate about the domestication process. It is a relatively small step from wild gathering to planting within a *ladang*. The rice-swidden system and the main cultivated rattan species have coexisted in the area over millennia. These rattans produce a large amount of fruit and the seeds germinate easily. They are multistemmed varieties, so repeated harvesting is possible. The rattan cultivation system fits extremely well with the current agricultural system, based on swidden farming with rice as the main staple crop. Rattan seeds or seedlings can be established simultaneously with the rice crop at very low extra cost. Our studies show that it requires an extra 7 or

Figure 1. Location of the study area



Source: ESRI Data and Maps 2002.

8 man-days in the first year, and small inputs for weeding and protecting the young rattan plants afterwards. Once established, rattan plants can be harvested periodically, with simple technology, over a long period of time for just the cost of harvesting labour (cutting and carrying). Most likely an intensification of the system to the current situation occurred with the entrance of rattan in the international trade in mid-nineteenth century.



(*Calamus caesius*)

PRODUCTION TO CONSUMPTION SYSTEM

The cultivation of rattan in a shifting cultivation system

The details of the current rattan planting practices vary from farmer to farmer and place to place, but the basic elements are consistent. The rattan cultivation system in Kalimantan has been described frequently in the literature (Weinstock 1983; Mayer 1989; Godoy 1990; Fried and Mustofa 1992; Peluso 1992; Boen *et al.* 1996; Belcher 1997; Eghenter and Sellato 1999). Farmers start the swidden cycle in May by slashing undergrowth vegetation, followed by felling the trees in a selected area of primary or secondary forest. In August, after a drying period of a month or so, the field is burned, and by September farmers start planting the hill rice that will be harvested in February. The main agricultural crop is upland rice, along with maize, cassava and banana among other food crops. Farmers plant rattan seeds, wildings or seedlings in a newly created agricultural field (or *ladang*) as part of this shifting cultivation system.

The main rattan species used is *Calamus caesius*, known locally as *rotan sega*. Several other species are also grown, including *Calamus trachycoleus*, or *jahab*; *Daemonorops crinita*, or *pulut merah*; and *Calamus pinisillatus,* or *pulut putih*. The young rattan plants are protected in the *ladang* and, when the farmer shifts to a new swidden plot one to two years later, the rattan is left to grow with the secondary forest vegetation to create a *kebun rotan,* or rattan garden. The average size of such rattan gardens is 1.4 ha and the density of rattan clumps ranges from about 50 per hectare up to 350 per hectare, with a mean of around 170 per hectare (García-Fernández 2001).

Harvesting of *C. caesius* typically commences 8 to 10 years after planting. *Daemonorops crinita* and *C. pinisilatus* mature more quickly. *C. caesius*, and most of the other cultivated species, have multiple stems and can sustain repeated harvests. Thus, the rattan gardens can be harvested periodically over time. Farmers report that production peaks between 24 and 30 years after planting and begins to decline between age 37 and 43 (García-Fernández 2001).

Photo 1. Collecting rattan from a garden (Photo by B. Belcher)

Socio-economic context

Based on a regional survey, the 53 villages in Kutai and Pasir districts were classified into three groups according to the economic importance of rattan at the village level as well as in terms of land use cover. The three groups are: (1) 'active rattan villages'—those which maintain a high level of activity in rattan growing, where the majority of households depend on rattan as the main income source and where rattan gardens are a major land use (see Box 2 for an example);

(2) 'stand-by rattan villages'—those which retain existing rattan gardens but have a lower level of economic activity in rattan, where rattan income does not play a major role in overall income but it is still important in terms of land use cover; and (3) 'ex-rattan villages'—where rattan is unimportant as a source of income and not a major land use, where people have shifted to other activities. A general description of the main differences among these groups is presented in Table 1, which summarises data from an extensive, detailed database built with the information collected in a regional survey.

Box 2. Besiq, an active rattan village

Besiq village can be classified as an 'active rattan village'. Out of little more than 350 households, 334 are commercial raw material producers. Based on a household survey more than 85% of the annual cash income per capita comes from rattan. There are nine first order traders (traders who buy from raw material producers) involved in trading raw material, who sometimes receive advance money from processing firms in Samarinda. Most of the raw rattan producers know accurately what the rattan is used for, but few know the price paid for raw material by second order traders. The co-operative agency Koperasi Sokaq Maju is concerned with rattan production in Besiq, but fewer than 40% of the producers participate, since many villagers find the agency unreliable. Ownership of rattan gardens is arranged according to traditional Dayak law, and all villagers are aware of and respect the traditional rules governing ownership. However, some of the traditional regulations on land ownership are in conflict with the state law.

Stand-by villages represent an intermediate stage between active and ex-rattan villages. On the one hand, active rattan villages show a more subsistence dependant strategy with less integration in the cash economy. They have lower monthly expenses and own fewer consumer goods (indicated by number of television sets). As well, people in these villages tend to have higher interest in trading other forest products, including timber, honey, *gaharu* and damar (unpublished data collected by the authors). On the other hand, in ex-rattan villages income tends to be more heavily based on cash crops and gold; rattan has been displaced by new, more profitable activities.

A spatial analysis showed clear patterns. Generally speaking, villages in Kutai were more likely to be active in rattan growing, while villages in Pasir were more likely to have abandoned rattan farming. The economic importance of rattan is correlated with variables such as the importance of rattan in the neighbouring village, ethnic make-up of the village, district, distance to the subdistrict capital by river, and distance to the nearest main town (trading centre) by river.

Table 1. Description of village groups (average values)

Groups	Number of villages	Number of households	Monthly expenses per household (US$*)	Percentage of households with TV	Number of students		Products that contribute to household income (in order of importance)
					Primary school	High school	
Active rattan	28	113	34.13	6	9	6	Rattan, fruit
Stand-by	15	124	37.50	13	10	7	Rattan, rubber, fruit
Ex-rattan	10	171	40.63	15	72	22	Gold, coffee, rattan, rubber

*Exchange rate used: US$1 = Rp8,000.
Source: Village survey 1999/2000.

Developments in trade and processing

The rattan stems are cut, cleaned and dried for sale through a network of traders. The main market for the primary cultivated species used to be the *lampit* (rattan mat) industry in South Kalimantan, which has since largely collapsed (as discussed below). Now the furniture and handicrafts industries, primarily located in Java, are important buyers. A substantial portion has also been smuggled to Malaysia (Haury and Saragih 1996, 1997) and on to other countries with large rattan furniture manufacturing industries (especially the Philippines and China).

Photo 2. Making lampit (Photo by B. Belcher)

Village elders report that rattan cultivation gained importance after independence, when rattan prices reached high levels. Rattan became a major economic crop at the end of the 1960s with the growing motorization of river transportation and an increasing number of traders and exporters. The main driving force were regular increases in rattan prices. At the same time, other sources of income were lost as forest products that had been important, such as resins and gums, became less valuable. The rapid development in Malaysia and Indonesia of *hevea* rubber plantations in the 1920s and 1930s meant reduced importance for the gums. Resins followed the same path with the development of synthetic substitutes around the time of World War II. Locally, village elders lay the blame on logging companies, who removed the big resin producing dipterocarps. By the end of the 1970s, rattan became the main source of income in most villages, as many farmers concentrated on rattan cultivation and purchased rice to meet their requirements.

The economic role of rattan was exaggerated in the 1980s with the rapid development of the *lampit* industry in South Kalimantan. In 1984 there were just 21 *lampit* manufacturing enterprises in Amuntai, the centre of the industry, producing 64,000 m^2 of *lampit*, valued at US$366. By 1987 the industry was at its peak, having swollen to 435 units producing over 1 million m^2 of rattan mats worth US$4,612 (see Figure 2).[4] The industry used cultivated *Calamus caesius*, and demand and prices reached unprecedented highs (see Figure 3). Farmers report that competition among buyers was fierce. Traders would come to the villages, offering advances of cash and consumer goods to secure rattan supplies. But good things don't last, and this boom was short-lived.

Government involvement and its implications

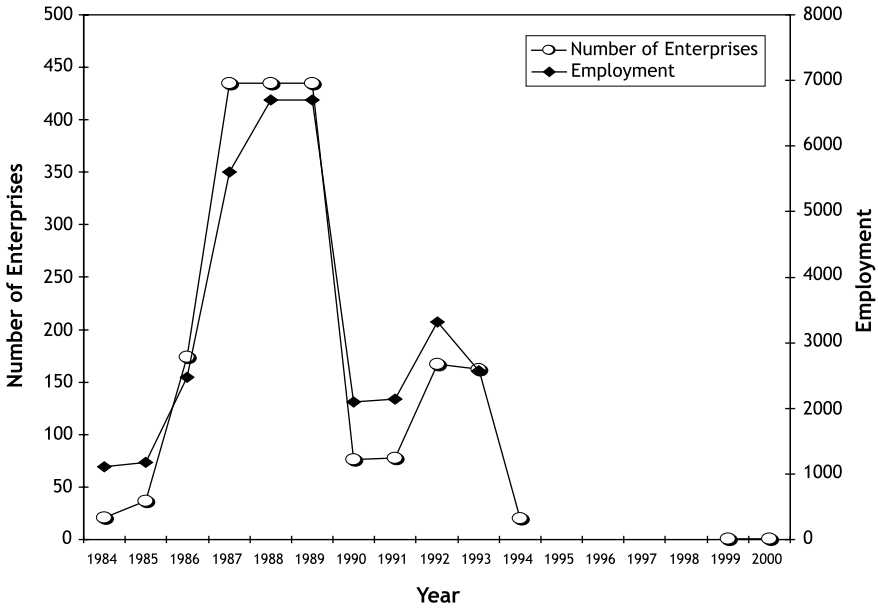
There has been a tradition in Indonesia of heavy government intervention in resource industries, often in collusion with powerful private interests (de Jong *et al.* 2003). The boom in the rattan sector in the 1980s attracted the attention of some of these people, and a series of regulations were swiftly put in place to try to capture some of the profits being generated. Some of these policy instruments affecting rattan in Indonesia were:

- a ban on the export of unprocessed (raw) rattan in October 1986
- a ban on the export of semifinished rattan in January 1989, replaced in 1992 with a prohibitive export tax
- the reclassification of rattan webbing as a semifinished product (from finished product) in 1992
- establishment of the joint marketing board Asosiasi Industri Permebelan dan Kerajinan Indonesia (ASMINDO), an approved exporters system and an export quota system for *lampit*, by a Ministry of Trade decree.

These measures were ostensibly aimed at protecting the resource and encouraging the domestic processing industry. The ban on the export of unprocessed and semiprocessed rattan artificially reduced the demand for raw material, causing prices to drop, which acted as a subsidy for domestic processors. In this respect the policy was successful; the rattan processing industry in Indonesia has grown substantially. However, the depressing effect on raw material prices came at great cost to the people involved in raw material cultivation and extraction. The reclassification of rattan webbing as a semifinished product further reduced demand for cultivated rattan species used for this product.

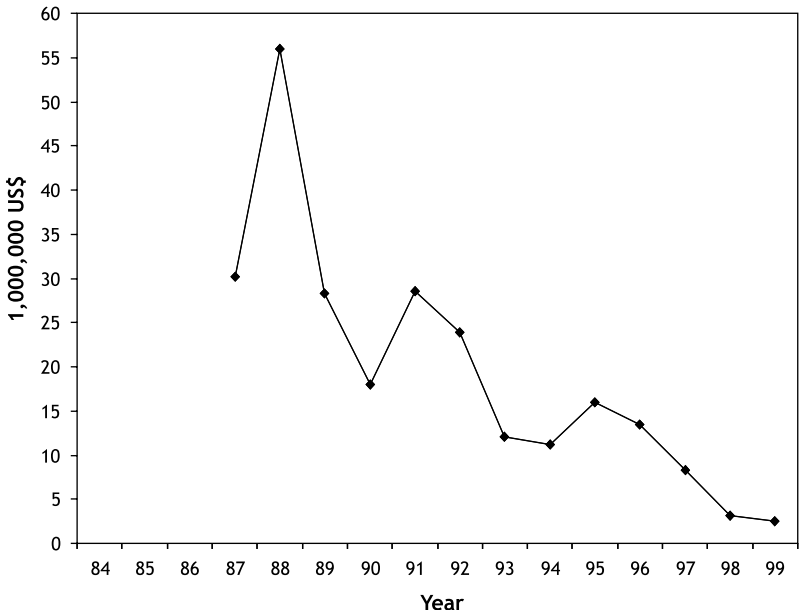
One of the most important changes for the rattan growers of Kalimantan was the establishment of ASMINDO, ostensibly to 'prevent unhealthy competition' among *lampit* exporters, following the same approach used by Asosiasi Panel Kayu Indonesia (APKINDO) to control the plywood industry (Barr 1998). Indeed, both associations were effectively controlled by the same person. ASMINDO imposed export restrictions on its membership in order to manage supply, in an effort to control quality and to increase unit prices. This strategy was based on the reasoning that, as the main supplier of *lampit*, Indonesia could control the market. Individual manufacturers reported that the quota was assigned based on political connections and payments.

Figure 2. Rattan lampit industry in Amuntai, South Kalimantan, 1984–2000



Source: Indonesia Central Bureau of Statistics.

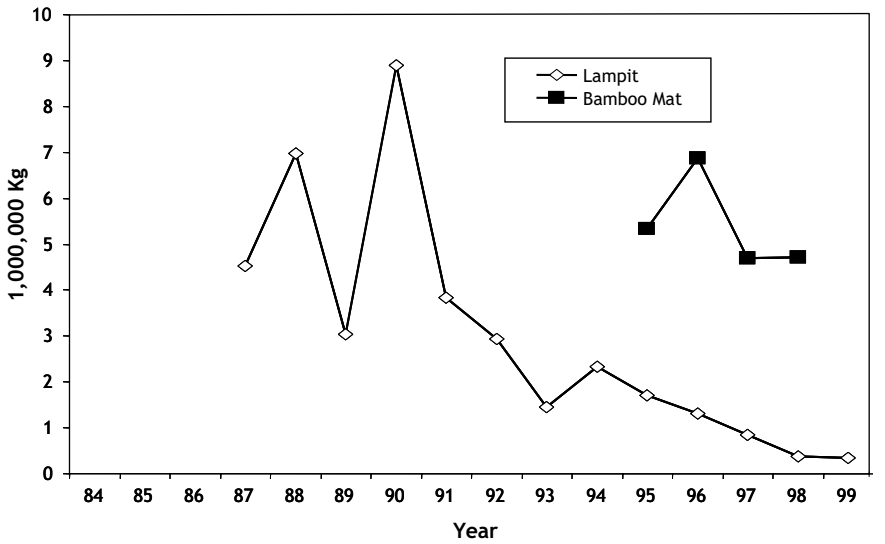
Figure 3. Lampit exports, 1984–1999 (US$, free on board)



Source: Indonesia Central Bureau of Statistics.

These measures led to severe reductions in manufacture and export of *lampit* (see Figure 4). There were also big fluctuations in value-added, as the unit price changed (in nominal terms) from US$6.38 in 1987 to as low as US$1.22 in 1990 and back up to US$8.39 in 1995. The number of enterprises had dropped to 20, and now, according to anecdotal evidence, the industry is almost completely destroyed, with only one *lampit* factory and a number of home-based manufacturers producing for the domestic market. ASMINDO officials lay the blame for this situation on changing tastes and decreased demand in the main importing country, Japan. In fact, Chinese manufacturers developed a bamboo based substitute for rattan *lampit*. This product was exported to Japan beginning in the early 1980s, but exports expanded dramatically to fill the gap created when the Indonesian prices increased and quantities decreased (see Figure 4).

Figure 4. Lampit exports from Indonesia and bamboo mats sales from China to Japan, 1984–1999 (kg net weight)



Sources:
Indonesia Central Bureau of Statistics.
Yearly Book of China Customs.

The drastic reduction in output has likewise reduced demand, and prices, for raw material. Raw material prices have changed little in nominal terms since 1987, and have decreased in real terms. Researchers in other rattan farming areas in Kalimantan report similar, though more pronounced, trends. In more remote areas, with higher transport and other transactions costs, there have been no buyers for several years.

The price slump following the introduction of restrictions on exports was a hard blow to all rattan farmers. Most farmers were unaware of the reasons for the price slump. They had already experienced ups and downs in prices of rattan, so they were waiting for the good times to come back. As the situation did not improve over time, more and more farmers have began to seek alternative sources of cash income. Villages with better access to alternative opportunities started to set themselves apart from the dominant rattan based model. These villages were mainly located in the eastern part of our survey area in Kutai and in Pasir as a whole. The biggest change in activities occurred in Pasir along the trans-Kalimantan road, where numerous immigrants from South Kalimantan started panning for gold on a large scale with motorised equipment. Though not directly linked to the slump in rattan prices, the development of gold panning, with very high returns to labour, quickly changed opportunity costs.

Oil palm plantations and pulp plantations

Another major change that has affected rattan growers is the rapid expansion of oil palm plantations in the province. These plantations typically cover several thousand hectares, often in rattan growing areas. In many cases there is direct competition for land, with oil palm concessions given on land that has been used and managed by indigenous people for swidden agriculture, including rattan gardens. In the village Modang the establishment of a large oil palm plantation in the early 1980s resulted in many people being displaced and large areas of productive rattan gardens being destroyed. More recent attempts to establish oil palm plantations have led to bitter, sometimes armed, conflict between villagers and company employees. For example, a severe conflict between the company P.T. London Sumatra and Lempunah villagers involved malicious destruction of rattan gardens and forest on the one side, and burning of vehicles and buildings and uprooting of newly planted oil palm plants on the other (C. Gönner personal communication).

But oil palm plantations also have a 'pull effect'. Oil palm growing is seen as an interesting new opportunity by local people who appreciate benefits such as regular cash income (oil palm fruits can be harvested every week), guaranteed market, and a more 'modern' lifestyle. Indeed, the main reasons for people's resistance seem to be the lack of adequate compensation for land they consider to belong to them and the wish to maintain a broad portfolio of economic activities. People do not want to limit their options. The oil palm companies, in contrast, want to encourage (or force) people to concentrate their efforts on oil palm growing, partly to ensure more efficient production and sufficient raw material to run their processing factories at capacity and partly, no doubt, to foster a dependence among growers. These issues notwithstanding, there is a strong desire among people in the area to get involved in oil palm growing.

The other big land use change has been large-scale planting of pulp plantations (HTI), oftentimes on 'degraded lands'. Under the Indonesian government's definition of degraded lands, the term applies to rattan gardens, which are seen as degraded forests. Indeed, our spatial analysis showed a strong correlation of rattan growing areas with HTI.

The fires of 1997

Another major impact on rattan gardens was the fires of 1997. During a period of prolonged drought associated with an *el niño* event, several million hectares of Kalimantan were burned by wildfires. The hardest hit areas were logged over forests and areas of new oil palm and HTI plantation establishment, which often coincide. In many places, fire was used as a weapon in land conflicts. For example, in the aforementioned village of Lempunah large areas of rattan gardens were burned (C. Gönner personal communication).

The fires did not affect all the villages of the area with the same intensity. The easternmost villages of Kutai and all of Pasir were the hardest hit. As these villages were also the ones with the best access to other opportunities, the trend towards change was reinforced.

In some villages, fires destroyed up to 90% of the rattan gardens. Beyond the physical damage, this event had a traumatic effect on local people. Rattan gardens had been seen as a source of security. While prices might fluctuate, the rattan could always be sold for cash when needed. The rattan kept growing, and in many ways people used their rattan gardens like a savings account. Many respondents use the analogy themselves, saying that a rattan garden is like having money in the bank. All of a sudden, with the widespread burning of rattan gardens, the sense of security was replaced by the recognition that rattan gardens too are vulnerable. This new reality, combined with the low prevailing prices, had a determining effect in many villages to abandon rattan cultivation.

In other areas the response was different. In the west part of Kutai some villages were spared the fires, while others were as severely hit as Pasir villages. People from villages in both categories seem to retain a high interest in rattan growing. Some have decided to convert from *sega* cultivation to *pulut merah* cultivation. This small-diameter species is relatively fast growing (compared to *sega*) and current prices are high. Farmers are able to harvest quicker, reducing the risk of total loss by fire. Furthermore *pulut merah* thrives in wetter areas along rivers, which are less prone to fires. The shift to this new species is so popular that *pulut merah* seeds are in high demand all over the area.

Other villages, especially those dominated by Benuaq and Bentian ethnic groups, still maintain their interest in rattan gardens, even after the price slump and the destructive fires. They still hope that prices will soar again. But this may be due to their limited choice. In these remote villages the only source of cash is rattan. No other commodity is traded in the area. They need to sell rattan, even at very low prices, if they are lucky enough to have a buyer. But they no longer invest in establishing large rattan gardens. They cut only small amounts on a regular basis in order to meet their basic subsistence needs. In villages closer to the primary forest, farmers look for wild rattans (*Calamus manan, Calamus scipionum*) still in higher demand by traders for the furniture industry. Provided that there are traders willing to buy timber, illegal logging is a favourite occupation for local people in need of cash all over the area.

Krismon

Another important factor came into play with the monetary crisis, or *krismon* (from *krisis moneter*), associated with the Asian financial collapse. With the massive devaluation of the local currency the relative value of export commodities soared. In Indonesia agricultural commodities—such as coffee, cocoa, pepper, rubber and palm oil—and mineral resources from oil to coal and gold appreciated in value, as did any labour-intensive industry. In our study area the impact was seen in Pasir with the rise of gold panning operations and in a trend towards increased coffee growing. There was also a short-lived boom in the rattan furniture industry, but the raw material demands did not result in much price increase for the small diameter canes grown in the study area.

TRENDS AND ISSUES—DEVELOPMENT AND CONSERVATION LESSONS

The occurrence of an intermediate management system

The rattan gardens of Kalimantan provide an excellent example of an intermediate management system for forest products. Tracing their development is difficult, as the historical records are sparse, but the evidence fits together well. Essentially, the rattan cultivation system was developed to fit with the traditional *ladang* (swidden) system. It offers the advantage of low cost establishment and maintenance with relatively high yields. The traditional system is highly diversified, and the rattan element fits well. Harvesting is highly flexible—the rattan continues to grow for years, so there is no penalty for delaying harvesting to coincide with labour availability or higher prices. Many villagers mentioned that it functions like a bank account, in that rattan can be harvested to respond to urgent needs for cash—to respond to medical emergencies, for example, or for ceremonial requirements.

The resilience of the rattan cultivation system

It is important to know whether such an intermediate management system is robust if we are going to recommend and support such systems. This case is interesting because it has been 'stressed' by several factors, including the low prices, in this case driven by the policy environment; fires and competing land uses leading to reduced rattan garden area; and the occurrence of new, financially superior alternative opportunities for land use (oil palm) and labour (wage jobs, gold panning).

In fact, the rattan gardens in East Kalimantan tend to be resilient, especially in areas where there are limited other opportunities. While this may seem obvious, there are some important lessons in the reasons for their resilience. These systems:

- Offer a valuable risk management tool in which the rattan is available as long-lived, low-maintenance source of savings or income. This is especially important in systems without other, well-developed risk management institutions (not everybody has a bank account, let alone insurance policies)

- Play an important 'marker' function for property 'ownership'. Within the traditional system, rattan gardens are respected as a sign of occupation. Under the present circumstances, with large-scale state-sanctioned land appropriation by oil palm, HTI and mining companies, rattan gardens have been used successfully to demonstrate ownership and claim financial compensation from the company (however meagre)
- Provide a source of cash income in areas where there are few other opportunities to earn cash
- Provide other valuable forest products and services as the rattan gardens function as secondary forests, giving habitat for medicinal plants, ritual plants, and plants and animals valued for food
- Retain important cultural values. Rattan gardens, many of which have been inherited from fathers and grandfathers, represent important traditions and provide links to ancestors
- Live long, with little input required. Thus they have a high degree of inertia.

Reasons to support the system

The question arises as to whether this system should be subsidised or otherwise supported, and if so, how? Clearly, as discussed above, rattan gardens are very important to a significant number of people and form an integral part of their livelihood systems. The stresses placed on the system have been, for the most part, generated from outside. Rattan trade policies have been designed to keep raw material prices low. Large-scale plantation agriculture has been pursued at the expense of people already living in the area. And the fires were largely human induced, many deliberately targeted to rattan gardens, even if they were facilitated by a natural period of drought. On this count, it seems that the system could be economically competitive if provided with a level playing field.

There are other benefits to be considered. The rattan garden system offers important ecological benefits in terms of biodiversity, forest cover, carbon sink and climate. Essentially, the financial value of rattan makes a long fallow period feasible. During the long fallow, the forest can regenerate and increasingly provide these ecological services.

From a national perspective, the strongest argument for removing barriers, and even for actively supporting the rattan cultivation system, is that it supplies a valuable export industry.

Policy measures needed

There are several policy options that could be pursued simultaneously. Simple measures include reducing trade barriers that depress domestic raw material prices (including internal barriers, such as the ubiquitous illegal fees charged to traders, and official export taxes). Industry has resisted this, fearing that higher raw material prices would threaten its competitiveness. Additional measures then would be needed to assist industry to become more competitive. This could be achieved through more efficient raw material production (through

research and extension to improve the cultivation system) and trade (especially through improved market information) and through improved design, quality, efficiency and marketing of manufactured products. Combined with these measures, there is a strong case in favour of more careful land use planning to ensure that important rattan growing areas are not displaced by industrial estate crops.

The future of the system

Under the current conditions of low demand and prices rattan gardens are a marginal activity in financial terms. New roads in the region, industrial plantations, mining and other new economic activities have displaced existing rattan gardens (push factors) and offered alternatives which attracted some rattan farmers to new activities (pull factors). However, rattan gardens remain important where competition for land is low because they fit well with the swidden cultivation system that is the economic mainstay in the region, because they have low establishment and maintenance costs, because they provide a mark of land 'ownership' and because they still serve an important purpose in economic risk management as a source of 'savings'. Moreover, rattan gardens provide valuable ecological services, in terms of biodiversity conservation and other forest functions. As rattan remains an important commodity in Indonesia and internationally, and as the current farm gate price for rattan appears to be artificially low—in large part because of the prevailing policy environment—the rattan garden system may remain viable, at least in the medium term.

Under the current circumstances, the young people interviewed in our surveys place their hopes on plantation crops. They acknowledge that their low level of education and know-how prevents them from being hired as salaried workers by large companies and even from migrating. Condemned to stay in the village, they long for the regular incomes from plantation crops: oil palm or rubber. Rattan is seen as a thing from the past, something rather backwards, inherited from their forefathers. But such negative perception may easily be overridden if prices go up and if returns to labour become favourable again.

ENDNOTES

1. Derived from Belcher, B., Levang, P., García Fernández, C., Dewi, S., Achdiawan, R., Tarigan, J., Riva, W.F., Kurniawan, I., Sitorus, S. and Mustikasari, R. (2000) Rattan (*Calamus* spp.) gardens of Kalimantan: Resilience and evolution in a managed non-timber forest product system. FPP team paper presented at Lofoten workshop, June 2000, Lofoten, Norway.

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Sources used for illustrations

Chapter 2: *Garcinia gummi-gutta*, based on a photo by Nitin D. Rai

Chapter 3: *Amomum villosum*, based on photos by Catherine Aubertin and Joost Foppes

Chapter 4: *Oecophylla smaragdina*, based on photos by Nicolas Césard

Chapter 5: *Tricholoma matsutake*, based on photos by Ying Long Chen

Chapter 6: *Lentinula edodes*, based on a Hidden Forest Designs photo from the Hidden Forest (Forest Fungi) website (http://www.hiddenforest.co.nz/fungi/index.htm)

Chapter 7: *Amomum villosum*, based on photos by Catherine Aubertin and Joost Foppes

Chapter 8: *Choerospondias axillaris*, drawn from a botanical specimen, Bogor Herbarium

Chapter 9: *Elettaria cardamomum*, drawn from a botanical specimen, Bogor Herbarium

Chapter 10: *Styrax parralleloneurum*, drawn from a botanical specimen, Bogor Herbarium

Chapter 11: *Debregesia longifolia*, drawn from a botanical specimen, Bogor Herbarium

Chapter 12: *Santalum album*, drawn from a botanical specimen, Bogor Herbarium

Chapter 13: *Shorea javanica,* drawn from a botanical specimen, Bogor Herbarium

Chapter 14: *Broussonetia papyrifera*, based on a photo by Catherine Aubertin

Chapter 15: *Phyllostachys heterocycla*, based on a botanical illustration in *Reforestation technology of main Chinese tree species* published by the Chinese Forestry Publishing House in Beijing, Jan. 1981

Chapter 16: *Paraserianthes falcataria*, drawn from a botanical specimen, Bogor Herbarium

Chapter 17: *Calamus tetradactylus*, drawn from a botanical specimen, Bogor Herbarium

Chapter 18: *Diospyros melanoxylon*, drawn from a botanical specimen, Bogor Herbarium

Chapter 19: *Calamus merrillii,* drawn from a botanical specimen, Bogor Herbarium

Chapter: 22: *Calamus caesius*, drawn from a botanical specimen, Bogor Herbarium

Forest Products, Livelihoods and Conservation

Case Studies of Non-Timber Forest Product Systems

VOLUME 1 - ASIA

Non-timber forest products (NTFPs) provide important sources of subsistence, income and employment everywhere there are forests (and sometimes even where there are none). With new emphasis on poverty alleviation and livelihood improvement in national and international development agendas, this group of products seems to offer means to increasing welfare in an environmentally sound way. And yet, despite more than a decade of research and targeted development projects, systematic understanding of the economic behaviour of NTFPs, and their role and potential in conservation and development, remains weak.

To help fill this gap, a large group of researchers combined efforts to compare and contrast individual cases of commercial NTFP production, processing and trade from throughout Asia, Africa and Latin America. The cases represent a range of product kinds, geographic, biophysical, social, and economic conditions. As a part of the research process, the cases were described in narrative reports.

This book, along with the companion volumes, presents the full set of 61 cases from Asia (Vol. 1: 21 cases), Africa (Vol. 2: 17 cases) and Latin America (Vol. 3: 23 cases). The reports are organized to present a standard set of information to support comparative analysis, but the authors also included rich detail, idiosyncrasies and analyses of issues and opportunities in their own cases. Individually, the cases provide a wealth of interesting and useful information. Collectively, they offer an invaluable resource for researchers, development practitioners and conservation workers interested in understanding the links between commercialisation, livelihoods and forest conservation.

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