# Non-timber forest products and trade in eastern Borneo

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**This article** lists and describes a broad range of non-timber forest products of both plant and animal origin, which were or are collected from the Borneo rain forest and traded, their uses, and whether they are designated for local or international markets. The history of trade in these products is also reviewed on the basis of the sketchy available data. It focuses specifically on Bulungan Regency, the northern part of the Indonesian province of East Kalimantan.

River boat with three powerful outboard motors trading to Long Pujungan. The goods and empty boat must be portaged over the rapids.
*Pirogue fluviale équipée de trois puissants moteurs hors-bord, en route vers Long Pujungan. Les marchandises doivent être transportées à pied au-delà des rapides et la pirogue vide halée en amont.*
Photo B. Sellato, 1991.

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## RÉSUMÉ

**PRODUITS FORESTIERS NON LIGNEUX ET COMMERCE À BORNÉO ORIENTAL**

Un vaste inventaire des produits commercialisés d'origine végétale ou animale, extraits de la forêt équatoriale humide de Bornéo, est présenté. Ceux-ci incluent les résines, le latex, les rotins et les nids d'hirondelles. L'article aborde leurs usages locaux, régionaux, ou pour le marché d'exportation. Pour la partie septentrionale de la province indonésienne de Kalimantan Est, il tente de reconstituer l'histoire du commerce de ces produits, en se fondant sur diverses sources, écrites (archives néerlandaises, statistiques officielles indonésiennes, travaux d'érudits locaux) et orales (entretiens avec des Punan nomades, Dayak essarteurs, Malais des ports côtiers, commerçants chinois et arabes, maillons de la chaîne conduisant les produits de l'intérieur vers les marchés internationaux). Cette reconstruction historique suggère que, si le commerce international de certains produits remonte au tout début de notre ère, c'est seulement à partir du XVII[e] siècle qu'une exploitation systématique et destructive s'est instaurée. Celle-ci a créé un front d'extraction en mouvement progressif des régions côtières via les fleuves vers l'intérieur de l'île. L'exploitation a culminé dans les années 1990, et elle a entraîné un épuisement quasi immédiat des ressources concernées. Les communautés forestières locales (Dayak et Punan) ne sont ni des sages conservateurs, ni des primitifs destructeurs de la forêt, mais de simples acteurs économiques. Leurs stratégies sensées et pragmatiques leur permettent de survivre dans et de la forêt, localement et à long terme, au travers des péripéties affectant les marchés globaux.

**Mots-clés :** produit forestier non ligneux, commerce, environnement, front d'extraction, surexploitation, stratégie économique, Bornéo.

## ABSTRACT

**NON-TIMBER FOREST PRODUCTS AND TRADE IN EASTERN BORNEO**

A broad range of non-timber forest products of plant and animal origin collected from the Borneo rain forest and subsequently traded are presented. These products include resins, latex, rattans and birdsnests. The article discusses their local and regional uses and whether they are or have been targeted for local or international markets. The author also presents — for the northern part of the Indonesian province of East Kalimantan — a history of trade in these products based on various written (Dutch colonial archives, official Indonesian statistics, local scholarly texts) and oral (interviews with nomadic Punan people, Dayak swidden farmers, Malays in the coastal ports, Chinese and Arab traders, middlemen disseminating inland products on international markets) sources. This historical reconstruction suggests that — despite the fact that some of these products have been traded on world markets for almost two millenia — their systematic and unsustainable exploitation only began in the 17th century. Since then, the products have been extracted along a front that has gradually progressed from the coastal regions via the rivers towards interior parts of the island. This exploitation ended in the 1990s, with almost complete depletion of these resources. The local forest communities (Dayak and Punan) are neither wise conservationists nor primitive destroyers of the forest, but simply economic stakeholders. Their sensible, pragmatic strategies have enabled their long-term survival in local forests under any circumstances with respect to world market demand.

**Keywords:** non-timber forest product, trade, environmental history, extraction front, unsustainable exploitation, economic strategy, Borneo.

## RESUMEN

**PRODUCTOS FORESTALES NO LEÑOSOS Y COMERCIO EN BORNEO ORIENTAL**

Se presenta un amplio inventario de los productos comercializados, de origen vegetal o animal, extraídos del bosque ecuatorial húmedo de Borneo. Se incluyen resinas, látex, rotén y nidos de golondrina. El artículo describe sus utilizaciones locales, regionales o con destino a la exportación. Se intenta reconstituir la historia de dichos productos en la parte septentrional de la provincia indonesia del Kalimantan oriental, basándose en diferentes fuentes: escritas (archivos holandeses, estadísticas oficiales indonesias, trabajos de eruditos locales) y orales (entrevistas con Punan nómadas, Dayak que practican el desbroce, malayos de puertos costeros, comerciantes chinos y árabes que son los eslabones de la cadena que conducen los productos del interior hacia los mercados internacionales). Esta reconstitución histórica sugiere que, aunque el comercio internacional de ciertos productos se remonta al inicio de nuestra era, sólo a partir del siglo XVII se instauró una explotación sistemática y destructiva. Ésta creó un frente extractivo en movimiento progresivo desde las regiones costeras hacia el interior de la isla siguiendo los ríos. La explotación culminó en los años 90 acarreando un agotamiento casi inmediato de los recursos afectados. Las comunidades forestales locales (Dayak y Punan) no son ni sabios conservadores, ni primitivos destructores del bosque, sino que son simples actores económicos. Sus estrategias sensatas y pragmáticas les permiten sobrevivir en y del bosque, localmente y a largo plazo, sorteando los incidentes que afectan a los mercados globales.

**Palabras clave:** producto forestal no leñoso, comercio, medio ambiente, frente extractivo, sobreexplotación, estrategia económica, Borneo.

## Background

Kalimantan, the Indonesian part of Borneo, consists of four provinces that cover about a half-million km². In Dutch colonial times, South-East Borneo included today's South, Center and East Kalimantan provinces. The provinces are divided into regencies, which are further divided into districts. Until recently, local traffic in Bulungan (Map) was restricted to coasting trade between Tanjung Selor (the regency's capital), the offshore port of Tarakan, and various minor estuary ports, and to inland river trade. These ports are connected to other ports further south, including the provincial capital, Samarinda, which is in turn linked to the major East-Javanese harbor of Surabaya.

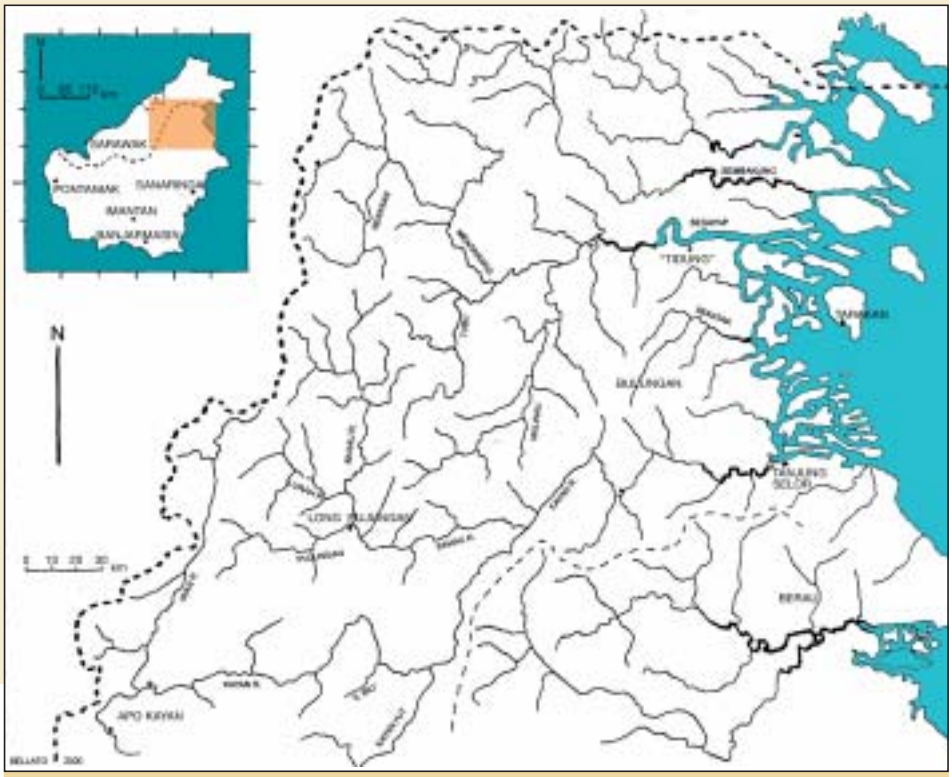
In 1997, Bulungan Regency is reported to have exported some USD 213 million worth of goods. Forestry accounts for a substantial portion of its economy. In the same year, Bulungan — which is divided into three forestry sectors (North, Center, and South Bulungan) — had 43.5% of its forests classified as production forest, in which 33 concession holders held rights over almost 5 million ha. Log production has been fluctuating over the last 20 years between 0.4 million and 1.6 million m³, with peaks in 1980 and 1989-1990. 1997 production officially stands at around 1 million m³. Production from illegal logging was never taken into account. The major forest type, i.e. lowland mixed Dipterocarp forest, has already been intensely logged.

Trade was formerly carried through coastal kingdoms and sultanates, which connected the interior river networks to the inter-island and international trade networks. Borneo's products thus found their way to China, India, and the Persian Gulf. For some products, such trade links likely date back to the first centuries AD. The Dutch began interfering with local trade in the mid-19th century. However, it was not until the early 20th century, with the enhancement of inland control, that the region's economic networks opened up significantly, especially with regard to non-timber forest product trade. Indeed, the eradication of warfare and headhunting led to increased safety, more trading trips by upriver people, and ultimately a much larger volume of trade in lower-river harbors — which was the Dutch colonial administration's goal.

Although logging in coastal regions goes back a long way, it was only with the timber boom of the 1960s that it started in inland regions, first as wildcat logging (Banjir Kap) by local people, then under the new state-regulated system of forest concessions[2]. Today, logging has reached all but the most inaccessible areas of the international border zone.

Bulungan's population, now about 300 000 (1998; up from 120 000 in 1971), includes local Islamized peoples (Malays), mostly living in coastal and lower-river regions; interior tribal groups (Dayak; the larger group is known as Kenyah), most of which are swidden rice farmers and a small fraction are forest hunting-gathering nomads (Punan); and large numbers of Banjar Malays from South Kalimantan and migrants from Java and Celebes, as well as a small minority of Chinese very active in trade (particularly in non-timber forest products).

[2] The *banjir kap* technique consists of felling trees by rivers in upstream areas, marking the logs, and waiting for the next big river flood to wash them downstream. There the logs gathered in natural pools are retrieved by self-styled timber companies with payment going to the lumberjacks. In 1970, new national regulations, altering the Basic Forestry Laws (Law N°. 5) of 1967, were issued — PP 21 ("On the right to exploit the forest and the right to collect products from the forest") and PP 33 ("On forestry planning") — prohibiting small-scale logging and centralizing the timber concession system. Interior people, however, lured by the high price of timber compared to non-timber forest products, carried on with *banjir kap* for several more years, with some damage to their forests (much valuable timber was never carried away by floods; otherwise valuable species, such as illipe, were felled for timber). In the context of corruption and relative law-and-order vacuum (late 1990s), *banjir kap* has eagerly resumed in many areas.




Bulungan in East Kalimantan province (Borneo).
*Le Bulungan dans la province de Kalimantan Est (Bornéo).*

Traditionally, the chief non-timber forest product collectors were Dayak tribesfolks, operating mostly within their territories and banning access to outsiders. Since the turn of the 20th century, however, and increasingly after the Pax neerlandica was established (1920s), teams of collectors from coastal regions have roamed the interior, sometimes triggering bloody frays with the Dayak. After the timber boom of the 1960s, and even more so in the 1990s, the Dayak were no longer able to check incoming collectors, which resulted in a cutthroat rush for non-timber forest products and unsustainable collecting practices.

A typical Dayak hamlet and farms in the mountainous forested interior.
*Exemple de hameau dayak entouré d'essarts dans l'intérieur montagneux boisé.*
Photo B. Sellato, 1993.

## Non-timber forest products and their trade

In Indonesia, the expression used for non-timber forest products (*Hasil-hasil Hutan Non-Kayu*, or HHNK) covers virtually anything that comes out of the forest, apart from timber, and has some, even marginal, value on local or wider markets. Faunal or floral non-timber forest products range from the unassuming, locally traded *bekkai* leaf relish to the famous, internationally-sought edible birdsnests — and even, in some official reports, include charcoal and silk (!).

Clearly, the current non-timber forest product concept highlights a continuity from pre-colonial maritime trade patterns — as exemplified by a description of trade in 1812 in the kingdom of Tidung, a town of 2 000, part of the trade network centered in the Sulu archipelago and noted for its exports, listed an annual trade of 50 *kati* (31 kg) of white birdsnests and 100-200 *pikul* (6-12 metric tons) of black nests, 300 *pikul* (19 t) of wax, 2 *pikul* (125 kg) of camphor, 1 *pikul* (62.5 kg) of gold, and lots of rattans. This list, which only included products of value on international markets, reads very much like the standard Sulu shopping list throughout most of the 19th century. The same items likely had been on ship captains' lists since the 17th century.

In the last 20 years of the 19th century, with new products coming into heavy demand, mostly from the industrializing West, the Dutch moved to better control regional trade (e.g. establishment of a government post in Tanjung Selor). During the 1880-1920 period, roughly put, traditional trade channels somehow continued, side by side with the emerging Dutch-controlled trade channels, although the Taosug (Sulu) trade monopoly over northern Bulungan had been dismantled. In the 1920s, the bulk of the non-timber forest product trade came under the Dutch administration's control, although it can be assumed that a notable fraction still evaded it.

While some qualitative information on trade along the Bulungan coasts in the 19th century is available, quantitative data are scarce, with very little in the archives before the mid-1920s, and stopping *ca* 1940. Figures released by the Indonesian government and presently available to me only start *ca* 1970. Statistics, regarding volumes or prices, are scattered, inconsistent, and altogether not very reliable. Moreover, it is well known that a substantial part of the volume of the non-timber forest product trade went and still goes unrecorded. Some secrecy surrounds the non-timber forest product question, on the part of both traders and government officials, not to mention discreet government- or army-linked business corporations. Finally, certain products, like birdsnests or cinnamon, are not always included in non-timber forest product lists. This underscores the indecision and lack of coordination of the various relevant government agencies and also

the hazy boundary between non-timber forest products and cash crops, between forest collecting and agroforestry, between wild and cultivated (*cf.* rattans, below).

Moreover, prices vary considerably with time, with sharp fluctuations in international demand (e.g. the Gulf War for eaglewood, the opening of the mainland China market for birdsnests) and exchange rates (*cf.* the Asian monetary crisis); with traders, as some offer higher prices to lure collectors away from other traders, while collectors focus on products bound to guarantee the best return on labor; with the place of transaction, from remote upriver settlements to coastal market towns, due to high costs of transport; and with certain notions of product grade or quality, sometimes only designed by traders to confuse collectors. Traders' profits are generally high, but also depend on the number of middlemen along the trade chain, with major traders in Tarakan and Tanjung Selor dealing directly with Surabaya or Singapore. Conversely, although they try to cut down the number of middlemen, collectors are often caught in the *bon* or *ijon* (credit) system, whereby they remain forever indebted to traders who sponsor their collecting expeditions.

As it stands, it would be difficult to accurately and significantly reconstruct Bulungan's non-timber forest product trade through the 20th century based on the fragmentary and often inconsistent data available (covering only the 1920-1940 and 1970-1998 periods). The pages below, however, afford a rather impressionistic glimpse of the picture (note that all prices given below are current prices; DFl refers to Dutch guilders, Rp to Indonesian rupiahs.)

## Exudates (resins, latexes, and gums)

Exudates from wild plant species in Borneo are highly scattered and rather unpredictable resources requiring significant time and capital investment. Collecting teams must spend long periods in the forest, covering considerable distances in search of trees, and they may return empty handed.

Eaglewood (*aka* incense wood, aloe[s] wood) or *gaharu* (in local vernacular: *sekkau*, *lelah*) is obtained from *Aquilaria malaccensis* (accounting for much of the top-grade produce) and 10 other species of the same genus, as well as from several other genera (including *Gonostylus*). It is said that less than 10% of trees actually yield *gaharu* as a result of parasite infestation of the wood. The trade name *kemedangan*, in forestry reports, refers to low-grade resin-impregnated ligneous products of all species (shipped to Jakarta and Singapore), as opposed to *gubal gaharu*, the high-grade resinous product. Before the mid-1980s, *gaharu* was divided into a few grade categories (two for official reports, three for traders), but more quality grades were created later, leading to a rather confusing situation, with trade names thus varying with regions and individual traders. While some local medicinal uses have been reported, eaglewood in all its forms is mainly used, from the Middle-East to the Far-East, to manufacture incense. Eaglewood (probably mostly from *A. malaccensis* and *A. filaria*) is exported principally to Singapore, while smaller volumes are shipped directly to Japan, Taiwan, and Saudi Arabia.

Although it is known to have a much longer history, the eaglewood trade apparently only became really important after *ca* 1800 and remained so during much of the colonial period. Records show a marked increase in production during the 1920s — as much as five-fold, to reach 66 t in 1928 for South-East Borneo — along with a substantial decrease in prices — from DFl 3.2 DFl per kg in 1925 down to DFl 0.4 in 1928. With the Depression, prices remained low through the 1930s (DFl 0.5-0.6 per kg), while production in Bulungan dropped progressively from about 14 t (1931) to less than 1 t by the end of the decade. Prices stayed low during the 1940s and 1950s but, after *ca* 1970, they rose again. Business-oriented army units reportedly interfered heavy-handedly with the eagle-

River expedition by Dayak (Kenyah group) in 1910.
*Expédition fluviale dayak (groupe Kenyah) en 1910.*
(Source: Through Central Borneo, by C.S. Lumholtz, New York, 1920).

Birdsnests purchased by a Chinese trader in Samarinda. On the scales, "white" nests; left, a bag of "black" nests.
*Nids d'hirondelles chez un commerçant chinois de Samarinda. Sur la balance, des nids « blancs » ; à gauche, un sac de nids « noirs ».*
Photo B. Sellato, 1993.

wood trade in the region and elsewhere *ca* 1985. Forestry records for 1987 show eaglewood only divided into two grades, with prices of Rp 35 000-70 000 and Rp 15 000-25 000 per kg respectively — but neither these categories nor these prices necessarily reflect traders' reality. By *ca* 1990, prices began skyrocketing. A 1993 study carried out in Long Pujungan District showed prices (paid to the collector) for top-quality grade product reaching Rp 800 000 per kg — it also found as many as 14 different grades in use. At about the same time, it was reported that companies based in Samarinda, with suspected government or army connections, were dropping teams of collectors in largely uninhabited border areas and removing the produce by helicopter.

Forestry reports on non-timber forest products are rather elusive regarding eaglewood production figures for 1988 to 1996. Clearly, much of the produce traded evaded official channels and taxes. I have yet to come across reliable, consistent records of volumes and prices in government reports covering the last 2 decades. A few figures regarding local prices are available, however. In 1996-97, Long Pujungan District exported some 700 kg of eaglewood at prices ranging from Rp 75 000 to Rp 2 million (the higher figure referring to top-notch super grade product). For 1997-98, the figure was 1 000 kg, with prices ranging from Rp 0.8 million to Rp 4 million. For the same year, forestry reports list *kemedangan* production as reaching over 3 t. More recently, prices for top-grade produce reached Rp 8-11 million per kg, to slump back (late 1998) down to Rp 6 million or even Rp 2.5 million.

Production, it seems, declined substantially during the 1990s. Regional reports (Central Bulungan area), sometimes lumping *gaharu* and *kemedangan* together, give a production of 50 t for 1992-1993, 25 t for 1993-1994, and only 6.6 t for 1994-1995. For South Bulungan, likewise, they show a steep decline in production (10 t in 1990, 1.9 t in 1994, and 1.4 t in 1998). Local (district) reports, however, indicate 1 250 kg production in 1995 for the remote Apo Kayan area alone but, as the eaglewood was flown directly to Samarinda, it was not recorded at Tanjung Selor, nor in South Bulungan reports. All of this indicates that *gaharu* was almost totally depleted in the Bulungan region by the end of the 1990s. Traders interviewed in the late 1998, however, hinted at the fact that areas exploited and depleted in the 1970s and early 1980s were ready to be revisited for exploitation.

*Jelutung* or *jelutong* (*getah susu*; locally, *getah akar*), a high-quality latex, is obtained from several species of the genera *Dyera* and *Alstonia* (both Apocynaceae). The Punan distinguish two or three taxa of latex-bearing lianas. Traditionally used among interior groups to make footballs, *jelutung* was exported to make golf balls and submarine cable insulation. The *jelutung* trade apparently started only *ca* 1900, to reach peak production between the 1910s and the 1930s — records for South-East Borneo show a high of almost 6 000 t per year for 1926 and 1927 — and then declined to almost nil in the 1960s, as it practically disappeared from the world market. According to recent reports, national *jelutung* exports were 2 100 t in 1997, from a low of 300 t the previous year, although it is not clear what lies behind these figures.

Gutta percha (*getah pertja*, *getah hutan*, or *karet hutan*), the common trade name for exudates from several species of the genus *Palaquium* (Sapotaceae), was used as a substitute for Para rubber. While *Palaquium gutta* provided the best gum, the bulk of the guttas exported from Borneo was lower-grade *hangkang*, from *P. leiocarpum,* and *ketipai* (or *pulut ketipai*, *tekipai*, *nyatu*, *nyato*), from several other species. The gutta trade began in the 1840s, developed with the use of this latex for surgery and electric cable insulation at the end of the century, and exploitation intensified *ca* 1920. Although the use of trade names in reports is sometimes confusing, it appears that Tanjung Selor experienced a powerful rush for all guttas in 1919: exports increased ninefold from 1918 to 327 t, to then stabilize at around 20-60 t per year in the early 1920s. Meanwhile, Banjarmasin exports climbed from 500 t in 1918 to 1 100 t in 1925 and remained high in the late 1920s (average DFl 1 per kg), and Samarinda increased its *hangkang* exports from 4 t in 1918 to 208 t in 1924.

However, true gutta production soon seemed to decrease: records show, an abrupt drop from some 100 t (1926) to less than 2 t (1928) for the whole of South-East Borneo, possibly partly due to depletion, with *hangkang* remaining strong. Gutta exports then generally declined sharply when

planted Hevea, acclimated to Southeast Asian colonies, began production, to come close to nil in the 1930s. They increased again, for some reason, from the 1940s to the 1960s, to then cease for good. After Independence (1949), *ketipai* was no longer exported. Today, it is still marketed locally, as small balls (Rp 2 000 a piece) to glue machete blades to their handles.

Copal (*damar daging* or *damar matakucing*; locally *tumuh*, *nyatong*), the translucent whitish resin from *Agathis borneensis,* mostly growing in the highlands, was used by Dayak for lighting and exported abroad for varnishes. *Damar merah* or *damar tanah*, a lower-grade, brownish resin, possibly from other species (*Shorea* spp., *Dipterocarpus* spp.) growing in both the highlands and lowlands, was also collected in the past for export, and remains in use locally for caulking canoes. Trade in copal and other *damar* products may have started *ca* 1900. For South-East Borneo, production (all *damar* categories included) was between 2 000 and 3 500 t per year (1925-1928), with a steady price of DFl 0.2 per kg. For copal alone, production increased dramatically during the late 1930s, and prices remained rather stable (between DFl 0.12 and DFl 0.19 per kg). Meanwhile, the export of lower-quality *damar* also increased but, with prices declining sharply (from DFl 0.08 down to DFl 0.03 per kg), it also ended up declining. According to some sources, copal production actually peaked between the 1940s and 1960s. In the 1970s, prices fell, and one forestry report for Bulungan gives a production of 50 t in 1976 and 2 t in 1977. National exports of copal, however, were recorded as 1,600 t for 1997, a relatively stable figure throughout the 1990s. Exports of other *damar* products, in contrast, rose from some 2 300 t in 1993 to above 18 000 t in 1997 — but this was probably due more to the development of plantations elsewhere (Sumatra) than to collecting in Kalimantan.

## Rattans

Contrary to exudates, rattans are predictable, clustered resources. A notable proportion of the rattan traded actually comes from planted gardens, although rattans remain listed as non-timber forest products, not as cash crops.

Some 146 species of rattans have been recorded in Borneo, possibly 10% of which have been or are traded. Trade names vary with places and periods (colonial and post-independence), and they are not congruent with the taxa in local tongues, nor with the scientific taxonomy. Dutch reports often list "rotan" without discriminating among species. Indonesian reports (Bulungan) list five marketed categories: *segah*, *belerang*, *utar-2 biasa*, *utar-2 belerang*, and *bengkuran*. The trade name *belerang* may refer to semi-processed rattan (possibly of the *segah* category), bleached with sulfuric acid. Some forestry reports list *rotan segah*, as opposed to *rotan campuran*, "mixed rattans" (of other types). A category known as *rotan sutera* ("silk rattan") is collected, and even planted, in the lower Malinau drainage area.

Trade names and scientific taxa can only be more or less equated for a few species. *Rotan segah*, for instance, actually includes *segah* proper *(Calamus caesius)* and *segah batu (C. marginatus)*. The *rotan pulut* categories *(pulut putih, pulut merah)* cover several species, of which *C. javensis* and *Ceratolobus concolor* seem the most common. The *rotan jalayan* category corresponds to the Kenyah taxum *tebungan (C. ornatus)*. As for the *rotan utar-utar* categories, they seem to include at least one species of Korthalsia. Thick rattan vines, used to make furniture, are also collected, including *rotan manau (C. manan)* and *semambu (C. scipionum)*. Although there have been quite a few studies undertaken on various aspects of the collecting, processing, transport, and trade of rattans, in upstream regions (e.g. Bahau, Apo Kayan) as well as in harbor cities (e.g. Samarinda), a thorough botanical identification of all trade categories in various regions (four of the five trade names listed in Bulungan do not appear among those recorded in Samarinda), equated to their names in the major local vernaculars, would be useful.

The rattan trade goes back a long way, although volumes may have been limited. In the 17th century, Batavia (present-day Jakarta) recorded rattan imports on average less than 500 kg per year. Prices bet-

Entrance of a cave where birdsnests are collected, 1983. Nowadays they are protected by armed guards.
*Entrée d'une grotte où les nids d'hirondelles sont collectés, 1983. Aujourd'hui, on y verrait des gardes armés.*
Photo B. Sellato.

A collector displays his eaglewood harvest. The dark, precious *gubal gaharu* is closest to him, lower-grade material on the right, and the cheap *kemedangan* in the left foreground.
*Une récolte de bois d'aigle. Le sombre et précieux* gubal gaharu *est juste devant le collecteur, les produits de qualité intermédiaire sont à droite, le* kemedangan *de basse qualité est au premier plan, à gauche.*
Photo B. Sellato, 1993.

ween 1650 and 1800 remained very stable. Recorded exports fell somewhat between 1800 and 1830, then a boom started *ca* 1835, soon involving Borneo's east coast, in relation with the Dutch conquest of the sultanate of Berau. The 1860-1900 period witnessed the creation of large rattan plantations in South Kalimantan — which may have triggered a decline in Sarawak's (wild) rattan exports, starting in the 1910s. During the late 1920s, production of South-East Borneo reached almost 20 000 t per year (DFl 0.02 per kg), with the South Kalimantan plantations accounting for much of it. Exports from the northeast coast remained modest, less than 1 000 t in 1930, while Samarinda exported almost 3 000 t per year, and Banjarmasin almost 5 000 t. Tanjung Selor increased its exports from 75 t in 1929 to 448 t in 1930, with a price close to DFl 0.03 per kg. In the late 1930s, however, the northeast coast exported only a coupleof hundred tons of hundred tons (DFl 0.06-0.07 per kg). Indonesian rattan exports peaked at about 35 000 t annually in 1938-1939.

Exports (or records) resumed in 1947 at a level of about 15 000 t (DFl 0.5 per kg), to reach 27 000 t in 1953 (Rp 1 500 per kg). During the late 1970s, rattan prices on the world market skyrocketed, to continue rising till the mid-1980s. In 1987, among five rattan categories marketed, *belerang* was given as the most expensive (Rp 1 200-1 400 per kg), above that of *rotan segah* (Rp 700-800 per kg). The 1988 ban on the export of semi-processed rattan caused prices for raw rattan to fall, and East Kalimantan's production dropped from an all-time high of 13 500 t (1988) to 1 549 t (1991), while Bulungan's production fell from 900 t (1988-1989) to 30 t (1991-1992). In South Bulungan alone, *rotan segah* production fell sharply from 213 t in 1988-1989 to 47 t in 1990-1991. South Bulungan seems to have recorded no production between 1992 and 1996, but 1.7 t were recorded for 1997, and 14 t for 1998 — indeed, *rotan segah* was picking up again, informants stated in 1998. "Mixed rattans", however, apparently were no longer exported after 1992.

## Other plant products

The illipe nut (*tengkawang*) comes from over a dozen species of the genus *Shorea* (Dipterocarpaceae). This nut, with a very high fat content, is and has been widely used in West Kalimantan — as cooking oil and lighting fuel, as well as for ritual purposes. It is exported as a substitute to cocoa butter. *Tengkawang* species are subject to mastfruiting (with major crops on average every 3-4 years, yielding 20 kg per tree), which makes the illipe nut one of the most erratic non-timber forest products.

Whereas the illipe nut export trade, dating back to *ca* 1850, has always been strong in West Kalimantan, where the tree is locally cultivated, it has remained, for no obvious reasons, a marginal non-timber forest product in East Kalimantan — until recently, upriver people traded nuts over the watershed to West Kalimantan. It was mentioned as an export from Tanjung Selor in 1924, but it obviously remained a minor one in terms of volumes. Overall, South-East Borneo exported at most some 550 t (1926; DFl 0.1-0.2 per kg). The combined production of Bulungan and Berau peaked at 660 t in 1935 (DFl 0.03 per kg). After 1970, exports seem to have stopped altogether. One reason put forth is that most trees were felled for timber during the Banjir Kap period. Three decades later, Bulungan, according to informants, is again rich in illipe trees. Indeed, mastfruiting (*musim raya*) occurred in April-May 1998, and forestry records mention 620 t production for Central Bulungan, purchased by Chinese trading companies based in Pontianak. Meanwhile, national exports were given as reaching highs of 4 000 t (1995) and even 10 000 t (1996) and lows of about 500 t (1994) to 1 000 t (1997) — reflecting irregular mastfruiting.

Another non-timber forest product, listed in Dutch trade reports as *katiau* (or *ketiau*), refers to tree species (*Ganua motleyana, Payena* spp., Sapotaceae) producing a latex, but mostly known (like *tengkawang*) for their high fat content seeds (motley). *Katiau* seeds were exported from South-East Borneo in the late 1920s, in volumes ranging from 1 400 to 2 600 t annually, for a price of DFl 0.4-0.6 per kg. I found no further trace of it at later dates. It is possible that, although prices differed notably in the 1920s, it was later lumped together with *tengkawang* nuts.

True cinnamon *(Cinnamomum zeylanicum)* was introduced from Sri Lanka to Sarawak by the Brookes. Other species *(C. iners, C. javanicum),* possibly endemic to Borneo, were reported in Apo Kayan, and their bark is used as a substitute for true cinnamon. The fragrant bark, removed from the felled trunk, is exported as a spice, though it was not used by the local people until very recently. Cinnamon trees (*kayu manis*) occur in the wild, but clustered, on upper Bahau River, and it is not known which species they belong to, nor how (or when) they got there in the first place. Cinnamon plantations, also of undetermined species, were started along the Bahau (Long Pujungan District) in the 1980s. Cinnamon, however, was usually listed as a non-timber forest product in forestry reports. Its production in Bulungan seems erratic: production is recorded only for 1977 and 1988 at 1.8 and 1.1 t, respectively. The 1987 price was given as Rp 750-1 000 per kg. A South Bulungan forestry report lists production of 116 kg in 1989 and 300 kg in 1991, jumping to 10 t in 1994, which suggests that planted cinnamon was then taken into account. Since 1993, cinnamon has also been listed as a cash crop in agricultural reports, but it appears to be restricted to Long Pujungan (100 ha in 1997), for production of 30 t.

The *akar janju* — a corruption of Javanese *jamuju*; *Cuscuta australis,* Convolvulaceae — seems to have long been collected for Chinese medicinal uses, and one Punan informant, equating it with the *kecu'ang* liana, stated that it was used to treat jaundice and diabetes. The elusive *akar janju* was found mentioned in two forestry reports, one (Bulungan) recording 7 259 kg production in 1988, and one (South Bulungan) listing 87 kg in 1990, 1 539 kg in 1994, and 373 kg in 1996. Only one mention of prices was found, i.e. for 1987 (Rp 1 250-1 750 per kg).

Among other products of historical importance traded from Indonesia, including Borneo, as early as the first centuries AD, but apparently no longer traded from East Kalimantan — due to extinction? — are benzoin (*Styrax* spp.) and the Bornean "camphor" (*kapur barus*, *Dryobalanops aromatica*). Dutch reports indicated camphor production for the whole of South-East Borneo ranging from 20 kg to 200 kg per year in the late 1920s. (Camphor is still mentioned by local informants for the *ca* 1950 period.) Another product, widely traded before the mid-20th century, is dragonblood, a red dye extracted from the fruit of a rattan species *(Daemonorops draco)*.

Products still collected for trade include *pasak bumi* (*Eurycoma longifolia* Jack, Simaroubaceae), a medicinal root, exported to the coasts and Java, and other medicinal plants (mostly Zingiberaceae); the *bekkai* leaves (*Albertisia* sp.), used as a relish, and traded short distances within districts; very locally, and increasingly rarely, vegetable poisons (extracted from *Antiaris toxicaria* and *Strychnos* sp.) for blowpipe arrows; and roofing shingles (*sirap*), traditionally made of Bornean ironwood (*Eusideroxylon zwageri,* Lauraceae; *ulin* or *belian*), possibly now substituted by other timbers, also traded to the towns; shingles are found recorded in forestry reports at 12 882 pieces (1994), and an unlikely 150 000 pieces (1996).

Within the last few years, thanks to faster means of river transportation, fresh fruit has been traded from interior regions to coastal towns, including longan (*buah matakucing* or *isau*; *Dimocarpus longan,* Sapindaceae), as well as durian, mango, and jackfruit. Although longan tends to be viewed as a non-timber forest product, and often the tree is felled to get the fruit, it is not clear to what extent the varieties collected are not really cultivars — a question that also holds for other fruit.

A log hive at Pua', Long Pujungan. The Pua' are one of the very few interior groups practicing beekeeping.
*Une ruche faite d'une section de tronc d'arbre à Pua', près de Long Pujungan. Les Pua' sont un des rares groupes de l'intérieur qui pratiquent l'apiculture.*
Photo B. Sellato, 1993.

Birdsnests on display at a Chinese trader's jewelry shop. Black, mossy, white, and "pink" nests.
*Une présentation de nids d'hirondelles dans la bijouterie d'un commerçant chinois; on y voit des nids noirs, moussus, blancs et « roses ».*
Photo B. Sellato, 1993.

A bundle (*gulung*) of rattan transferred from a canoe to a trade ship at a middle-river port, on its way to the coast.
*Une charge (*gulung*) de rotin est transférée d'une pirogue à un bateau de commerce dans un comptoir fluvial intermédiaire, en transit vers la côte.*
Photo B. Sellato, 1979.

## Birdsnests

Edible birdsnests (*sarang burung walet*), a long-established "forest" product, are produced by the salivary glands of two species of swiftlets (*Collocalia* spp.) and used by the Chinese to prepare gourmet, aphrodisiac soups. Trade names include the standard "white", "black", and "mossy" (*sarang lumut*) nests, and others, more local, such as the "bald" (*sarang gundul*; gray, but with no down or moss) and "pink" nests. As far as I am aware, in Bulungan there have not yet been any serious attempts at "domesticated" production, common in Java.

The birdsnest trade is far too complex and politically intricate to be treated in detail here. The written record available offers some insight into the situation during the colonial period. The 1 812 figures given above for "Tidung" are interesting: some 30 kg of the rare and most valued white nests and a staggering 6 to 12 metric t of black nests are traded annually. Besides the white/black ratio of 1 to 200, the sheer volume of the Tidung nest trade is impressive, considering the Dutch figure of an average 25 t per year for the whole of South-East Borneo in the late 1920s, with the more southern ports of Berau, Samarinda, and Banjarmasin being prominent exporters. Prices dropped from DFl 5.7 per kg (1925) down to DFl 3.9 (1928). In the early 1930s, Bulungan exported an average 1.5 t per year, while in the late 1930s combined exports of Bulungan and Berau reached the same amount, while prices kept going down, from DFl 2.7 per kg (1936) to DFl 1.8 (1938) — rice (in the same year 1938) was worth DFl 0.06 per kg. The figures above seem to hint at a steady decrease in volumes exported by Bulungan, or certainly at least by Tidung, in the course of time. This may be due to over-exploitation of the caves, and possibly to plundering by marauding tribes.

Individual loads of copal (about 40 kg) collected from the forest are stored in a shed before being canoed downstream.
*Des charges individuelles de copal (environ 40 kg) collecté dans la forêt sont rassemblées sous un abri en attendant d'être transportées par pirogue vers l'aval.*
Photo B. Sellato, 1975.

After World War II, it seems that production and prices remained low. However, the last 15 years has witnessed an unprecedented boom, with very high prices. As early as 1987, top-grade white nests reached Rp 0.5-0.6 million per kg. While a number of caves have long been exploited — some controlled by royal families and others by Dayak chiefs — many more were discovered after 1990 with the increase in market demand. Since much of the trade is carried underground to evade tax (and bribes), official figures are quite meaningless — more generally, reliable quantitative information is quite hard to come by — and I have little data on exports from Tanjung Selor, save that the nests mostly head for Surabaya and Singapore, where Chinese-owned companies ship them to Hongkong and China. In any event, prices for top-grade nests reached Rp 8 million per kg in 1998. Production certainly increased remarkably during most of the 1990s, with the frantic, far-ranging search for new caves. It then started dwindling due to methodical over-exploitation of the caves — nests collected too often and too early, with eggs and young birds thrown out. Some caves now yield only 10-25% of what they did 5 years ago.

## Other animal products

Various animal parts have long been traded in Borneo, especially all parts of the Sumatran rhinoceros (notably its horns) and concretions (bezoar stones, *batu guliga*) found in the gallbladder of langur monkeys (genus *Presbytis*) and in the healed wounds of various species of porcupines, all of which, important items in Chinese pharmacopoeia, fetched very high prices. Deer antlers (of various species of the genera *Rusa*, *Muntiacus*, and *Tragulus*), also used in Chinese pharmacopoeia, are now more often marketed to the coast as trophy decorations, as are the horns of the wild cattle (*banteng*). The skulls of the helmeted hornbill *(Rhinoplax vigil)* were used by Dayak and Chinese alike as carving material.

Among Dayak groups, a number of animal products were traded, including the tail feathers of two species of hornbill birds *(Buceros rhinoceros* and *Rhinoplax vigil)* and of the Argus pheasant *(Argusianus argus),* and the honey bear's and clouded leopard's claws, fangs, and hides, all used as ornaments on dancing and war outfits or on baby carriers. Interestingly, elephant ivory and tiger skins and fangs were widely traded (from Sumatra and/or Malaya) to and within Borneo.

Beeswax and honey have long been traded, the former to long-distance networks, the latter to more local markets. Wild bees *(Apis dorsata)* nest on high trees (often *Koompassia excelsa, tapang* or *tanyit*; also *Lithocarpus sundaicus*), and local people thus preserve these trees when burning their fields — although the collecting itself is destructive of the hives. Some groups were and, to some extent, remain dedicated apiarists. In the early 19th century, wax (some 19 t) was exported by Tidung. The whole of South-East Borneo, in the late 1920s, exported 50-100 t per year at a price of DFl 1.3-1.5 per kg. Some 7-12 t per year was exported by Bulungan and Berau in the late 1930s, for an average DFl 0.3 per kg. The last mention I found in forestry records available is of 405 kg in 1977. Honey from the interior, however, is still often found in shops in coastal towns. Prices were given for 1987 as Rp 1 000-2 000 per kg, but they reached Rp 30 000 per 0.6 l bottle after the 1997-98 drought, possibly as a side effect of forest fires, combined with general inflation.

More recently, a live-animal market has strongly developed through open or underground channels catering to both local or provincial personalities and international animal-smuggling rings. This mainly concerns young specimens of orangutan and gibbon and certain songbird species (e.g. genus *Pycnonotus*) and hornbill birds (mainly *Buceros rhinoceros,* kept as pets). Finally, since *ca* 1995, faster river transport has made it possible to carry fresh game (mainly wild boar and deer) to town markets.

A successful hunt for the large, white-bearded wild boar (*Sus barbatus barbatus*), upper Bahau. *Une bonne chasse : un grand sanglier à barbe blanche (*Sus barbatus barbatus*).* Photo B. Sellato, 1991.

## Concluding remarks

The rough picture that emerges from the pages above only highlights broad trends: first, through time, in the varying fortunes of our non-timber forest products; and second, decade after decade, in the types of products most in demand. International trade in eaglewood, rattans, and wax predates 1850 and, to some extent, the advent of the industrialized world had little impact on it before the 1920s. Other products, mainly traded locally (*ketipai*, *damar*), suddenly found new technical uses, which led to a steep increase in trade in the 1920s and 1930s. After these new uses became obsolete due to further technological advances in the West, trade in these products resumed on a local scale. The trade in *gutta percha* and *jelutung* seems to have been created *ex nihilo* for modern technological uses, the former *ca* 1850 and the latter *ca* 1900. Once the West's need for them ebbed, these products just disappeared from the trade.

In the case of the birdsnest trade, which has been operational for over a millenium, unreliable figures only suggest a steady global decline throughout the 20th century — this decline had probably already started in the nineteenth century — despite a revival in the 1980s and 1990s. Caused by a sudden surge in international demand, leading to the discovery of new caves, this revival, though powerful, is most probably bound to be brief, as over-exploitation seems the common practice today. Such unsustainable practices, by local people and outsiders alike, and the hit-and-run posture that underlies them in a context of strong market demand and harsh competition for access, also pertain to eaglewood, which was depleted by the end of the 1990s. Started along the coasts in the 17th century, this type of exploitation has now reached the most remote corners of the island.

It should be noted here that, in the Bulungan setting of the 17th and 18th centuries, and even part of the 19th century, these unsustainable practices were not boosted by the colonial powers' trade networks, but rather by those of the regional maritime powers, principally the Taosug of Sulu, engaged in fierce competition with the Bugis of Celebes for the control of trade in the Straits of Makassar and beyond. Only around the turn of the 20th century did the Dutch actually take control of trade in Bulungan, and only from then on could their trade policy be held responsible for the perpetuation of earlier extractivist practices.

As for the local Dayak, they ultimately proved to be neither the wise conservationists environmental organizations once believed them to be nor the primitive destroyers of the forest the Indonesian government long accused them of being. Rather, through boom and bust in the non-timber forest product trade, they displayed sensible, pragmatic economic strategies allowing them, under any circumstances, to get the best out of their forests to earn a living.

Dancing with the tail feathers of the rhinoceros hornbill bird, a locally traded non-timber forest product.
*Danse avec les plumes du Calao rhinocéros, un produit forestier non ligneux commercialisé localement.*
Photo B. Sellato, 1979.

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## Synopsis

### PRODUITS FORESTIERS NON LIGNEUX ET COMMERCE À BORNÉO ORIENTAL

Bernard SELLATO

**Cet article décrit** un vaste inventaire de produits d'origine végétale ou animale extraits de la forêt équatoriale humide de Bornéo, qui furent ou sont commercialisés. Parmi les produits végétaux, il s'intéresse à plusieurs types de résines et de latex, dont le bois d'aigle (*Aquilaria malaccensis*, entre autres), le *jelutung* (genres *Dyera* et *Alstonia*, Apocynacées), la *gutta percha* (deux espèces de *Palaquium*, Sapotacées), le copal *(Agathis borneensis)* et le *damar* (quelques autres Diptérocarpacées), aux rotins de diverses catégories commerciales, incluant surtout des espèces de *Calamus*, à la noix d'illipe (*Shorea* spp., Diptérocarpacées) et à la cannelle (*Cinnamomum* spp.). Pour les produits d'origine animale, il considère le cas des nids d'hirondelles (des martinets, *Collocalia* spp.) et mentionne la cire d'abeille, le miel...

**Les produits et leurs usages**

Les produits d'intérêt local, échangés entre groupes ethniques de l'intérieur de l'île, sont distingués des produits d'intérêt régional, collectés dans l'intérieur à destination des royaumes côtiers, et des produits d'intérêt international, évacués à partir de ces royaumes côtiers vers les réseaux maritimes interinsulaire ou intercontinentaux jusqu'en Chine, en Inde, au golfe Persique, ou aux pays occidentaux.

Pour tous ces produits, leurs usages locaux (par exemple, les plumes pour les costumes de danse) ou régionaux (en particulier, la cire d'abeille pour l'éclairage) sont décrits, ainsi que les usages qu'en font ou qu'ont pu en faire les pays importateurs, dans la pharmacopée traditionnelle (par exemple, les pierres de bézoard ou la corne de rhinocéros) ou dans l'industrie moderne (en particulier, la noix d'illipe pour les cosmétiques ou le copal pour les vernis).

**L'histoire du commerce**

Pour la partie septentrionale de la province indonésienne de Kalimantan Est, il tente de reconstituer l'histoire du commerce de ces produits, en se fondant sur divers types de sources disponibles, écrites (archives néerlandaises, statistiques officielles indonésiennes, travaux d'érudits locaux) et orales (entretiens avec des Punan nomades, des Dayak essarteurs, des Malais des ports côtiers, des commerçants chinois et arabes, qui représentent les maillons successifs de la chaîne conduisant les produits de l'intérieur vers les marchés internationaux). Tandis que les données quantitatives des archives et des statistiques ne permettent de couvrir que les périodes de 1920 à 1940 et de 1970 à nos jours, les sources orales parviennent à combler partiellement les vides, sur le plan qualitatif seulement.

Ce travail permet de dégager les grandes lignes de l'histoire du commerce des produits forestiers non ligneux. Il met en évidence les destins historiques divergents des produits considérés et il montre, d'une décennie à la suivante, quels furent les produits en plus forte demande.

En termes qualitatifs, il apparaît ainsi que le commerce international du bois d'aigle, des rotins et de la cire existait avant 1850 et que l'avènement du monde industrialisé eut sur lui un impact relativement modeste jusqu'en 1920. D'autres produits (par exemple, le *damar*), dont l'usage était principalement local, se trouvèrent propulsés sur la scène internationale lorsqu'on leur trouva de nouveaux usages industriels. Cela conduisit à une forte poussée de leur exploitation dans les années 1920 et 1930. Lorsque ces nouveaux usages devinrent obsolètes par suite de progrès technologiques du monde occidental, le commerce de ces produits reprit à l'échelle locale. Enfin, pour d'autres produits encore, comme la *gutta* percha, un marché semble avoir été créé *ex nihilo* pour de nouveaux usages

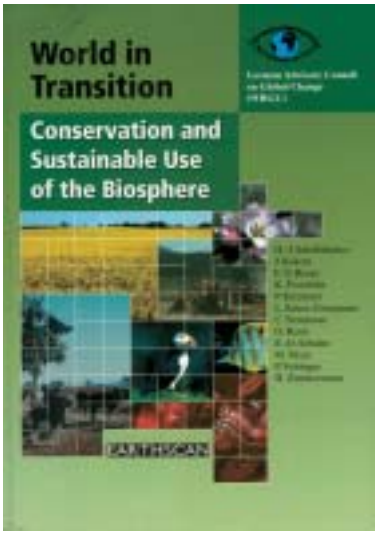
technologiques (vers 1850). Ces derniers produits ont simplement disparu lorsque l'Occident n'eut plus besoin d'eux.

**Une surexploitation s'instaure au XVII^e siècle**

En termes quantitatifs, cette reconstruction historique suggère que, si le commerce international de certains produits remonte au tout début de notre ère, c'est à partir du XVII^e siècle qu'une exploitation systématique et destructive s'est mise en place. Celle-ci a créé un front d'extraction en mouvement progressif des régions côtières via les fleuves vers l'intérieur de l'île, pour culminer dans les années 1990, dans le contexte d'un boom sans précédent, suivi d'un épuisement quasi immédiat des ressources concernées.

Dans le contexte du Bulungan, aux XVII^e et XVIII^e siècles et même pendant une partie du XIX^e siècle, cette exploitation intense ne fut pas induite par les réseaux commerciaux des puissances coloniales, mais bien par ceux des puissances maritimes autochtones, particulièrement des Taosug de Sulu en concurrence avec les Bugis de Célèbes pour le contrôle du commerce dans le détroit de Macassar et au-delà. C'est seulement à partir du début du XX^e siècle que la politique commerciale néerlandaise a été l'ultime responsable de la persistance de ces pratiques extractivistes.

Quant aux communautés forestières locales (Dayak et Punan), elles ne sont ni les sages conservateurs, que les organisations de conservation de la nature ont voulu voir en elles, ni les primitifs destructeurs de forêt que le gouvernement indonésien les a accusées d'être, mais de simples acteurs économiques. Leurs stratégies sensées et pragmatiques leur permettent de survivre dans et de la forêt, localement et à long terme, au travers des péripéties affectant les marchés globaux.

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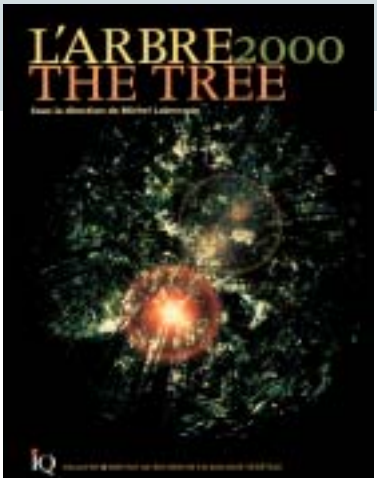


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Le 4^e Colloque international sur l'arbre a eu lieu du 20 au 25 août 2000 au Jardin botanique de Montréal. Créés en 1985 à Montpellier, en France, les Colloques sur l'arbre ont lieu tous les cinq ans et ont pour objectif de rassembler des scientifiques de disciplines diverses, ayant un intérêt commun pour la biologie de l'arbre. Ils favorisent ainsi la rencontre de diverses écoles de pensée et permettent des échanges stimulants et fructueux.
Le Colloque international sur l'arbre se tenait pour la première fois à l'extérieur de la France. L'Institut de recherche en biologie végétale, un centre de formation supérieure et de recherche entre l'Université de Montréal et le Jardin botanique de Montréal, a agi à titre d'hôte officiel de l'événement. Le comité organisateur du Colloque de Montréal a voulu préserver la philosophie mise en œuvre par les organisateurs des éditions précédentes. Le Colloque a attiré plus d'une centaine de participants venant de 15 pays étrangers. La présence de participants de pays et de disciplines aussi variés a permis d'élaborer un programme de conférences et de communications de haute qualité scientifique.