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Rattan: A Complement to Swidden Agriculture in Borneo

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ABSTRAK

Pelbagai strategi pertanian telah cuba diperkenalkan di kawasan hutan hijau tropika di mana kaedah pertanian pindah atau Swidden *diamalkan. Terdapat strategi yang menekankan pengeluaran tanaman makanan diperkenalkan, dan ada pula yang memberi tumpuan kepada tanaman kontan. Ada strategi tertentu yang mengganggu keseimbangan ekologi hutan hujan ini, sementara strategi yang lain dikembangkan bertujuan mengekalkan kestabilan ekologi itu. Jarang sekali pengeluaran tanaman makanan dan kontan wujud serentak sambil dapat mengekalkan kestabilan ekologi. Penanaman rotan di kawasan hutan hujan tropika tenggara Borneo merupakan satu sistem asli yang bertujuan menghasilkan kedua-dua tanaman makanan dan kontan tanpa mengganggu ekologi.*

ABSTRACT

Various agricultural strategies have been tried in areas of tropical rain forest devoted to Swidden or shifting cultivation. Some have focused on food production, others on cash crops. Certain strategies have disrupted the ecological balance of the rainforest, while others were developed with ecological stability in mind. Rarely have food production and cash cropping existed simultaneously while still maintaining ecological stability. Rattan production in the tropical rainforest of southeastern Borneo is an indigenous system of producing both food and cash crop without ecological disruption.

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INTRODUCTION

Considerable effort has recently been expended in attempts to change swidden or shifting cultivation practices in tropical rainforest regions of the world. Most had been directed at raising the level of agricultural productivity in these areas to above simple subsistence.

Previous agricultural work was based upon the erroneous belief that all forms of swidden cultivation were inherently destructive; hence attempts were made to achieve permanent annual food-crop production instead of temporary swidden plantations. Since many tropical rainforest where swidden cultivation methods are used have relatively thin topsoil overlying a highly evolved and weathered land-form, annual cultivation of food crops could not, it was found, be sustained without extensive capital inputs. Soil fertility levels declined rapidly, making annual food-crop production possible only through the massive application of fertilizers.

Since the early 1950s there has been increasing interest in tropical rainforest regions and, with it, a better understanding of their ecology. Research work (Brush 1975; Carsiero 1960; Clarke 1966; Conklin 1957) had shown that, properly practised, swidden agriculture can be an ecologically sound system of agricultural production in balance with a tropical rainforest. Land is used for only a year or two and then allowed to lie fallow long enough for secondary forest to regenerate.

It had been argued that swidden agriculture in a tropical rainforest could be maintained in an ecologically stable state indefinitely. However, ecological stability can be maintained only if crops are grown for periods of one or two years and then the land is kept fallow for between 7 and 15 years. With rare exceptions, little can be done to improve production of food crops dramatically in tropical rainforest regions. The best that can be hoped for is the systematization of swidden land use, as with the "corridor system" tried by the Belgians in the Congo. Under this system the forest was divided into 100-m strips, oriented east to west to maximize sunlight penetration. Every year alternate corridors were cleared, leaving forest fallow on either side of the cleared strips. The number of corridors in a management unit was the sum of the number of years in crops and the number of years in fallow. While this system had the advantage of controlling the crop-fallow ratio, it fell into disuse because it required overly sophisticated control methods (Sanchez, 1976).

Agriculture in tropical rainforests has seen a shift in focus from annual crops to perennials. Rather than change the forest ecology, the idea has been to simulate. The rainforest is cut down and replaced with crop forest. Rubber, coffee, coconut, oil palm or other crop trees take the stead of the forest trees. While this has proved to be relatively stable

ecologically and to provide people living in such regions with a steady cash income, what such a system does not do is improve the food situation. In fact, it may even worsen it. Should too much land be devoted to tree crops, the land left available for food-crop production under a swidden system of cultivation may become severely restricted. The fallow period on the remaining swidden land may be cut too short to maintain an ecological balance, or food-crop production may cease entirely.

What has not been fully explored is the possibility of a system in which swidden production of food crops is maintained in conjunction with a short-term perennial cash crop. With such a system, production of food for home consumption is retained and people living in the forest have a source of cash income. The problem with such a strategy is identifying appropriate perennial crops. What is needed is one that has a productive life span of about 7 to 10 years but also maintains the swidden system's ecological balance. Tree crops such as rubber or oil palm maintain the ecological balance and provide a readily marketable crop, but have a productive life span that is far too long if swidden production of food crops is to be maintained. With all the time and capital involved in establishing rubber trees or oil palm, one does not cut them down after only 7 to 10 years to plant a swidden garden. Fast-growing fruit trees such as papaya might be considered, but, besides providing inadequate ecological stability, such fruits have only a limited market. However, there is one perennial cash crop used by swidden cultivators in southeastern Borneo (the Indonesian provinces of East and Central Kalimantan) that does provide the necessary ecological mesh with a swidden system. This is rattan.

RATTAN IN BORNEO

Rattan has long played an important role in the daily lives of the peoples of Borneo, as well as elsewhere in Southeast Asia. In his study of palms, Corner (1966) noted that the Portuguese introduced them to Europe with the opening up of the Orient. Long before this, Corner writes, "the rattan were so invaluable to village-life that one can speak of the rattan civilization of Southeast Asia as one can speak of the tree-palm civilization of India and the bamboo civilization of Indochina, China and Japan".

Because of its flexibility and its long stems of great strength, rattan is a primary binding material. In unsplit form it has been used like rope for tying up livestock, securing boats and constructing bridges and for clothes-lines. In places where nails have been unavailable, it has been

used to lash the structural beams of houses. Once split, rattan has highly varied uses. In the construction of houses it is invaluable; split bark or bamboo walls are tied to the upright structural beams with rattan strips, and bamboo slats are tied with rattan to make the floor. Even the roofing thatch, whether made of doubled-over palm fronds or *alang-alang grass* (*Imperata cylindrica* Beauv), is held in place with split rattan.

Besides its use as a binding material, rattan in its split form is an essential ingredient of many necessary household and agricultural items. For household use, split strips of the shiny epidermis are woven into sleeping mats, and baskets of all sizes and shapes. Some baskets are woven so tightly that they can be used to haul water from the rivers. For working in the fields, large stiff baskets for carrying *padi* (rice) are made of the coarse inner core of rattan, and winnowing trays are constructed for cleaning grain from chaff. The heads of axes are held tightly in place with rattan strips, and finely split rattan is tightly woven around the haft of a *parang* (large jungle knife) to provide a better grip, as well as to hold the blade securely in place. The versatility of rattan in daily village life is tremendous.

Wild rattans have been used in Borneo probably for as long as people have inhabited the island. The cultivation of certain species is impossible to date, but it appears to have begun well over a century ago. During a recent visit to the upper Luang River, ancestral homeland of the Luangan (Lawangan) Dayaks, I encountered rattan gardens originally planted before the area was depopulated in the 1890s. According to oral tradition, one of the earliest-known areas of rattan cultivation was the Pasir region in what is now the Indonesian province of East Kalimantan. The spread of rattan cultivation into the interior of the island supposedly occurred when a sultan of the Kutei Kingdom, based in Tenggarong, ordered the people of the interior to plant rattan so that woven mats could be supplied to the royal palace. This led to the creation of a thriving local market for rattan seed from the Pasir region. Until the past decade the prices paid for rattan remained relatively low, especially when compared with the prices paid for other commodities such as *damar* resin (*Hopea micrantha Hook*), rubber (*Hevea brasiliensis Muell*) and other forest products. Rattan gardens were harvested primarily for home use or for the local market. By the early 1970s the rattan market began to pick up as rattan items, such as wicker furniture and split-rattan floor mats, gained in popularity in Europe, North America and Japan. At the same time, rattan output from the Philippines has declined, and that country, formerly the main supplier of rattan for the export market, has now banned exports of rattan cane. During the past few years, the price of high-quality rattan cane has doubled and even tripled. In many up-river communities of East and Central Kalimantan

rattan has become the major source of cash income, frequently surpassing the combined revenue of all other cash commodities.

BOTANICAL PROPERTIES

Rattan is a woody vine whose natural habitat is tropical rainforest. As it grows it climbs the forest trees, securing itself by means of barbed whips which protrude laterally from the main stem and from the leaf tips. Its growth is rapid, with as much as several metres being added to its length in a single year. Left undisturbed, some rattans have been known to reach lengths in excess of 150 m (Burkill 1966). Several hundred species of rattan are known, ranging from those with a diameter of less than a centimetre to at least one specie with a diameter of over 20cm (DRC 1980).

Rattan belong to the palm family, constituting the dominant portion of the subfamily *Lepidocaryoideae*. Until recently, no attempt was made to make a definitive inventory of rattans across the tropics, but recent reports indicate that there are 13 genera, with approximately 600 different species (Dransfield 1979; IDRC, 1980). Of the many species of rattan found in Borneo, about 12 to 15 are used regularly, and only 7 or 8 have a consistent market demand. The most sought-after species is commonly known as *rotan sega* (*Calamus caesius* Blume), and is the species most often planted (Dransfield 1979, photo identification, 1981; IDRC 1980). It averages between 0.5 and 1.5cm in diameter when harvested, has a pale golden colour when cured, and splits well. It is the cane most often woven into baskets and mats, and it is also used to make furniture. Other species of the genus *Calamus* are also planted, such as *Calamus trachycoleus* Becc. (Dransfield 1979; IDRC 1980; Peluso 1981). In some areas a market exists for very slender species of rattan referred to as *rotan jepun* or *rotan mea* (species unidentified). These average about half a centimetre in diameter and are generally used unsplit. They are often coiled to form the bottom of certain styles of chairs or adopted as trim on various types of furniture, as well as being used as twine. Occasionally there is a market for some of the very large rattans as legs or structural parts of furniture or as walking canes and handles. While these species are planted in Peninsular Malaysia (Dransfield 1979), in Borneo the price for large rattan is low, so it is collected from the jungle only when the price incentive is great enough.

THE RATTAN/SWIDDEN CYCLE

Not all the peoples of Borneo cultivate rattan. The extent of the practice of rattan planting in swidden systems in not known. The rattan swidden system described here is that used by the complex of people known as the Luangan Dayaks. They inhabit the area between the middle reaches of the Barito River in Central Kalimantan and the middle section of the Mahakan Rive in East Kalimantan. The Luangan claim to have planted rattan gardens for as long as anyone can remember, and certain Luangan sub-groups such as Tiwoian (Taboyan) Dayaks on the Teweh River and the Bentian and Benua Dayaks on the Lawa and Kedang Pahu rivers are famous in east central Borneo for their high-quality rattan.

As is typical of swidden cultivators, the Luangan clear a section of forest, burn it and plant their crops. After being used for food-crop production for one or two years, the land is allowed to regenerate into forest. The difference between the Luangan swidden practices and those reported for swidden cultivators in other tropical rainforests is that the Luangan have a tradjtion of planting rattan before leaving the land fallow. When the land is again ready to be used for swidden cultivation, typically in 7 to 15 years the farmer returns not to "empty" forest but to a mature rattan garden. The rattan is then harvested for home use or for sale and the forest is again cut and burned and planted with rice and other food crops.

If the cycle of making a swidden and then planting a rattan garden afterwards is maintained, the farmer completes the system after 7 to 10 years and every year from then on makes a new swidden and harvests another mature rattan garden. Between 7 and 10 years is regarded as the minimum period necessary to complete the system; the variation reflects the difference between planting rattan as seedlings and planting rattan seeds directly in an old swidden field. Typically, seven years after rattan seedlings are planted, a harvest of three cuts, each approximately 6m in length, can be expected from each plant. When seeds are planted, it generally takes about 10 years for the plants to reach this length A garden not harvested for 15 years is said to be even better, with yields reportedly being triple those of a seven-year garden and containing a higher-quality rattan. In all cases, maturation time and yield vary with environmental conditions. Reportedly, and as might be expected, rattan gardens in swiddens made on formerly virgin jungle land produce far better than rattan gardens planted after a swidden made in secondary forest regrowth.

A properly managed rattan/swidden system has several distinct advantages over other agricultural systems tried in the tropical rain forest. Since rattan grows naturally in a rainforest environment, it does

not upset the ecological balance or appreciably alter it. Left alone, various wild species of plants would appear in the secondary forest regrowth, so the planting of rattan seeds and seedlings ensures that rattan gets a head start and dominates over less desirable jungle flora. The 7-to-10-year growth necessary for a good rattan harvest meshes perfectly with the minimum fallow period required for a stable swidden system in the region. Hence food production is not disrupted. Once the cycle is established, the farmer is assured of a regular income from rattan sales. With today's high price, the income from a rattan garden can be sizeable. While there is no standard size of rattan garden, an average one yields approximately one tonne when harvested, normally after 7 to 10 years. Older gardens, with longer and more mature cane, can yield up to three tonnes per year. Prices vary, depending upon how great are the difficulties of transportation and the distances from market centres, but a farmer harvesting a rattan garden in Kalimantan in 1980 could expect to earn at least US$180 from the harvest. The harvest of an older garden yielding three tonnes of rattan could produce several thousand dollars of income annually.

Not only is the size of this income significant; its timing is fortuitous. If last year's swidden was poor for one reason or another, the household rice stocks might be low early in the new agricultural season. Extra money from the sale of rattan garden coming right at planting time leaves the farmer with cash in hand. If rattan prices are low, the farmer can cure the cane and store it for up to two years before selling it.

Rattan gardening has an added attraction from a legal standpoint. According to adat (customary law), the person who originally clears virgin jungle, and later the person's descendants, will have permanent use rights to that land, even though the Indonesian Government does not recognize this system of land tenure. As the law now reads, only land that produces *hasil* (yield) can be claimed (Weinstock 1979). If the land no longer produces *hasil* , as in the case of swidden land in fallow, then no one has a legal claim to the land and it reverts to the public domain. If rattan has been planted in an old swidden before it has been left fallow, the farmer can legally maintain a claim to the property in the eyes of the law: it still has a *hasil* – rattan. In this manner, perpetual claim can be sustained for swidden lands.

ECONOMIC FACTORS

This rattan/swidden system is the ideal one, but not necessarily the norm. It may be that the cycle of making a swidden garden then planting rattan is not, for various reasons, pursued continuously until the system is

complete. Social and ritual obligations may preclude completion of the cycle. This happened in the case of one young Bentian Dayak, who set out to clear virgin forest for 10 successive years in order to make swiddens followed by rattan gardens. Everything went as planned for the first five years, but then he decided to get married and had to sell his gardens to pay for the wedding. Similarly, rattan gardens may be sold, or harvested prematurely, it help defray the cost of ritual obligations such as secondary funerary rites among members of the traditional religion, Kaharingan; or, for devout Muslims, to make a pilgrimage to Mecca.

Intervening economic factors can also throw the system out of balance. Current market forces and practices have caused the greatest disruption. Avarice and conspicuous consumption have led to an overall degradation of the system. Areas that only a few years ago produced large quantities of high-quality cane now yield only limited amounts of low-quality, immature cane.

High prices during recent years have led to the commercialization of rattan and have created a tremendous upswing in the amount of cane being harvested in Borneo. This has also led to the creation of two classes of non-farmers whose livelihoods are based upon rattan trade; the cutters and the traders, who have moved in large numbers into the traditional up-river growing areas to seek their fortune. While some farmers still cut their own rattan for sale, they are increasingly selling their gardens in advance to traders. The traders, in turn, hire professional cutters to harvest the rattan. The traders induce advance sale of rattan gardens in exchange for luxury goods such as cassette radios and Swiss watches. A double profit is made on these goods: the farmers pay the traders' high mark-up prices for luxury goods and sell their rattan at the fixed purchase rate. Frequently farmers buy the luxury goods in advance on credit, with the result that the trader can press for advance sale of a rattan garden. Consequently, a rattan garden may be sold and harvested before the farmer intends to use that particular parcel of land again for a swidden field. This breaks the rattan/swidden cycle.

A rattan garden is usually sold to a trader on the basis of shares. Where competition is in favour of the cutters, as it is in the upper Teweh River, a *bagi tiga* (divide-in-three) system is used. The person who does the harvesting receives two-thirds' of the yield and the owner of the garden gets one-third. All the rattan is bought by the trader who arranged the deal. In some areas there is more competition because there are more people seeking work as cutters. This is the case on the lower Lawa an KedangPahu rivers, where the farmers demand and get a *bagi dua* (divide-in-two) system. The cutter splits the yield evenly with the owner of the garden. As with a *bagi tiga* system, the trader who arranged the deal purchases all the cane. In each case, the cutter is responsible for

clearing the cane and delivering it to the trader's house after it has been properly dried.

One of the most obvious disadvantages of the advance sale of a rattan garden is that the farmer gets only one-half of the yield and is forced to sell at the trader's price. The farmer may consider this a reasonable trade-off since the trader's purchase price is usually fairly competitive with prices offered by other traders in the region. Moreover, the farmer is saved the time and the labour involved in harvesting the rattan, a rather strenuous activity. A more serious matter is the actual harvesting process. Current high prices have led to pressure to overcut. Instead of farmers harvesting one garden a year just before making a new swidden field, harvesting goes on year-round as cutters look for work and traders for more rattan to sell. Gardens are being cut at shorter and shorter intervals. As a consequence, both the yield and the quality of cane decline.

In certain, more isolated areas, such as the headwaters of the Teweh and Lawa rivers, the population is smaller than in the past. The combination of migration and the requirement of the Dutch colonial government that people come down out of the hills to form villages along the main rivers has caused this decline. In some of the depopulated areas, the rattan gardens that were left behind have been maintained by the remaining population. Since the land is not needed for swidden fields, it has bee left permanently as rattan gardens. Through selective harvesting and care not to disturb the roots, the canes continue to grow, sending out new shoots from the old root-stocks. Permanent rattan gardens that are well managed are very productive because new shoots on old root-stocks produce mature, harvestable cane faster than newly planted rattan gardens. Many of these gardens, which have been turned over to hired cutters, have been severely damaged, because the professional harvesters have no stake in their continuity. Immature canes are cut and roots destroyed.

As export prices rise, so do prices in the interior. Traders and cutters have ventured deeper into the up-river country in search of cane to fulfil export demand. Fifteen to 20 years ago, the banks of the Montalat River in Central Kalimantan were reportedly covered so heavily with stands of rattan that it was impossible to land a canoe anywhere other than at a village landing. Today the river banks are barely covered by wild grasses and only small quantities of immature cane are seen in the market.

In the 1970s the rattan trade moved farther up the Barito River into the Teweh River region. The Tewey River is quite long and is divided into three *kecamatan*, or districts. Observations made in 1980 showed that all of these districts exhibited the full range of deleterious ecological consequences of the rattan trade. Kecamatan Teweh Tengah, the district at the mouth of the Teweh River, has only small amounts of rattan left;

these are primarily short, immature canes. Although the middle district of the Teweh River, Kecamatan Teweh Timur, is suffering a *krisis rotan*, or rattan crisis, it still produces some mature rattan. The people of the district became dependent on the income produced by rattan, but the rattan began to run out. During the period when rattan was plentiful, other agricultural activities were neglected, with the result that there was no alternative source of income. Swidden gardens had for several years not been well cared for, and their old rubber and coffee gardens were in poor shape, so people had run up rice debts with the traders. In 1980, farmers were just beginning to plant new coffee trees and rubber gardens, as well as new rattan gardens, but several years of waiting will be needed before the trees produce.

The last district, Kecamatan Gunung Purei, is located at the headwaters of the river above a series of dangerous rapids. Only after rattan began to disappear down river did the traders venture this far up river. During 1980 the people of the district were saying that the rattan supply was inexhaustible, even while the first couple of villages on the down-river side of the district were already showing signs of *krisis rotan*. As in other district, agricultural crops were not being tended and rice debts with the local traders were increasing.

Various agricultural development strategies have been tried in the tropical rainforest. Those based on changing the environment, such as attempts at instituting permanent annual food-crop production, have met with limited success and generally caused more harm than good. Those based on simulating the forest environment, such as the development of tree-cropping, have been more successful environmentally and have led to income generation in the rural areas, but such strategies do not address the basic problem of food production. A non-permanent perennial cash crop, combined with food-crop production through the continuation of swidden agricultural practices, appears to offer the best prospects. Growing rattan in the forest fallow of a swidden system in Borneo has been described here as one indigenous strategy for producing both a cash crop and food in a tropical rainforest. Unfortunately, market forces are at present disrupting this particular system.

Further research needs to be directed toward perennial cash crops that can exist coterminously with swidden food production in the tropical rainforest. Disruption of food production for the sake of cash cropping should be avoided wherever and whenever possible. Indigenous systems, such as the rattan/swidden combination exemplified here, should be explored and, if found to be ecologically sound, encouraged and/or maintained. There should also be investigation of other perennial cash crops that can grow in harmony with the fallow cycle of tropical rainforest swidden without causing ecological imbalances.

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