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Indigenous Adaptation to Amazonian Palm Forests*

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Human "adaptation" usually refers to the process whereby people survive and reproduce in given environments. Many specialists have tended to consider that most modern Amazonian Indians are adapted to "natural," primary forests (see Hames and Vickers 1983). On the other hand, prehistoric Indians once cleared and burned what, to the naive observer, seem to be primary forests that, in fact, have not yet recovered from past human disturbance (Balée 1987, Huber 1909, Saldarriaga and West 1986, Sombroek 1966, Sponsel 1986). Palms often represent a major component of the vegetation of such previously utilized forests in Amazonia. The adaptation of modern Amazonian Indians to palm forests, especially those dominated by the babassu palm (*Orbignya phalerata* Mart.), may represent no mere adaptation to nature, but rather an adaptation to the residue of other cultures, some of which have been long extinct.

Anthropogenic Palm Forests

Palms appear to be one of the most common components of the vegetation of undisturbed archeological sites in Amazonia. Palms often associated with archeological sites on well-drained forest include *Astrocaryum vulgare* Mart., *Elaeis oleifera* (Kunth) Cortes, *Acrocomia eriocantha* Barb. Rodr., *Maximiliana maripa* (Corr. Serr.) Drude, and *Orbignya phalerata* Mart. To a lesser extent, at least two other palms are associated with archeological sites in Amazonia. The peach palm (*Bactris gasipaes* Kunth), which is usually seen only under cultivation, indicates prior human occupation when present in unoccupied forest or along riverbanks (Balick 1984). The moriche palm (*Mauritia flexuosa* L.f.) generally forms monospecific stands only in undisturbed swamp forest; yet at least some monospecific stands of this palm, in the Orinoco Delta, appear to have resulted from the subsistence activities of the foraging Warao Indians, who were heavily dependent on its starch (Heinen and Ruddle 1974). The palms of most interest here, however, are those that tend to be dominant in well-drained forest.

On a prehistoric Indian mound on Marajó Island, in the Amazonian estuary, a spiny palm, which was probably common tucumã (*Astrocaryum vulgare*) densely covered the surface (Meggers and Evans 1957). Groves of common tucumã also characterize an archeological site near the Atlantic coast in Pará state, eastern Amazonian Brazil (Corrêa 1985). Common tucumã is a major component of some advanced secondary forests in the habitats of the Ka'apor and Guajá Indians in the basins of the Gurupi and Turiaçu rivers, in northern Maranhão state, Brazil (*Balée, 2173, 3481*). Wessels Boer (1965) pointed out that *Astrocaryum vulgare* is never encountered in primary forest and that it indicates previous human settlement in Surinam.

Several palm species exist on undisturbed sites of "black earth" (*terra preta*).

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Black earth results from long term human occupation, during which human, animal, and vegetal by-products accumulated in garbage pits and hearths of prehistoric Indian villages, greatly enriching the original soil (Smith 1980). Where the vegetation of black earth sites has not been slashed and burned for modern horticulture (Hilbert 1955), palms tend to be common.

For example, a "strict association" obtains between groves of the oil palm, "caiauê" (*Elaeis oleifera*), and numerous black earth sites along the Madeira and middle Amazon Rivers in Brazil, suggesting that extinct indigenous cultures played some role in the distribution of this palm (Andrade 1983). Another oil palm, "mucajá" (*Acrocomia eriocantha*), frequently occurs on black earth Indian mounds in the Amazonian estuary and near the city of Santarém (Anthony Anderson, pers. comm.); its sub-fossilized seeds have been recovered from some of these mounds (Roosevelt 1985). Indeed, *Acrocomia* appears to be absent from primary forest (Wallace 1853). *Acrocomia* is so frequently associated with sites of human disturbance that Huber (1900) described it as being semi-domesticated. I have observed numerous individuals of "inajá" (*Maximiliana maripa*), which tend to indicate sites of prior human disturbance (Pesce 1985, Schulz 1960), growing on archeological sites in the middle Xingu River basin (*Balée, 1637*) and in the habitat of the Ka'apor and Guajá Indians of the Turiaçu River basin (*Balée, 3377*).

One of the most important palms in the vegetation of Amazonian sites that were long ago disturbed by human beings for horticulture is babassu (*Orbignya phalerata*). Because of its cryptogeal germination, whereby the apical meristem grows downward at first, stemless babassu palms can survive forest burning (Anderson 1983, Anderson and Anderson 1985, May et al. 1985*a*, 1985*b*). Upward growth begins only many years later (Anderson 1983). Although burning for horticulture eliminates trees and seedlings above ground, young babassu palms may subsequently emerge and form dominant and/or monospecific stands in former horticultural fallows (Anderson 1983, Anderson and Anderson 1985, May et al. 1985*a*, 1985*b*). With an estimated lifespan of 184 years (Anderson 1983), babassu is a long-lived disturbance indicator.

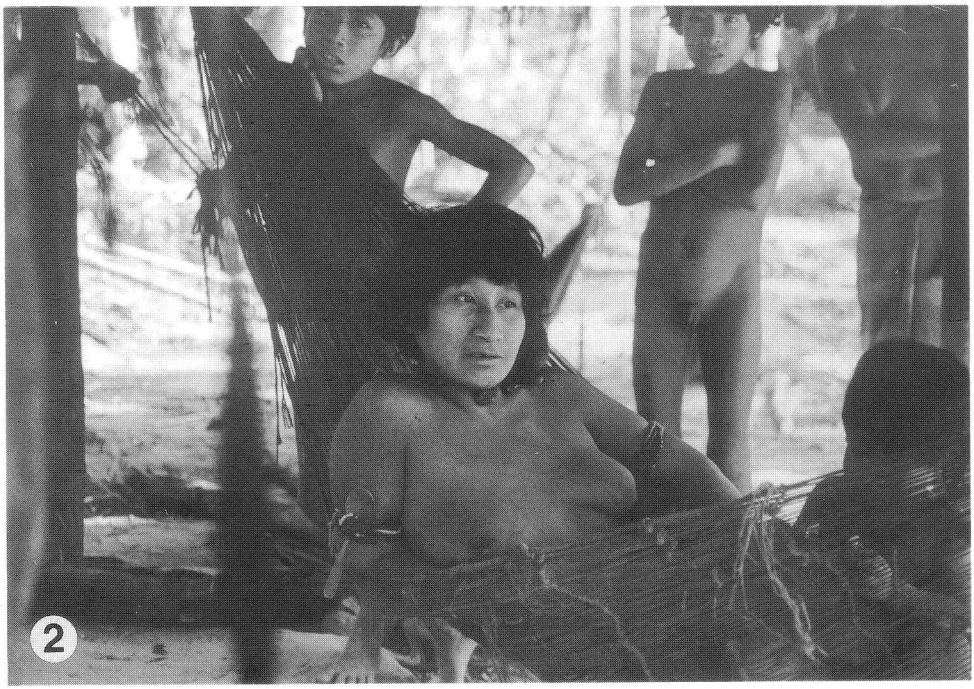
Babassu palm forests occupy about 196,370 km^2 in Brazilian Amazonia alone (May et al. 1985*a*), or about 5.9% of the well-drained land of that region (cf. Pires 1973). In terms of the adaptations of some modern Amazonian Indians, babassu is one of the most significant resources available to them. Babassu kernels are rich in protein, with especially high concentrations of the essential amino acids arginine, phenylalanine, and valine (May et al. 1985*a*, fig. 8). Babassu mesocarps, which are abundant in starch, supply carbohydrates in many indigenous diets (May et al. 1985*a*).

Babassu Palm Forests and Cultural Adaptation

The Guajá, Araweté, and Asurini indians of eastern Amazonia, who speak different languages of the Tupi-Guarani linguistic family (Rodrigues 1984/85), depend on babassu palms in their subsistence.

The Guajá (Fig. 2) are one of the last foraging (non-horticultural) peoples of South America. The Guajá population is roughly estimated at 226 people; at present, only about 60 Guajá Indians maintain unarmed contact with Brazilians at two government Indian posts, one in the Pindaré River basin and the other on the upper Turiaçu River.

The Guajá traditionally foraged in bands of 5 to 15 people across primary forests dominated by hardwoods in the families Lecythidaceae, Burseraceae, Sapotaceae,



1. The site on the upper Turiaçu River where the Guajá Indians were first contacted in 1975. Babassu palms (*Orbignya phalerata*) dominate the scene. 2. Members of a Guajá band. The hammock (foreground) and woman's skirt (right background) are made from the leaves of *Astrocaryum vulgare*, a spiny palm.

3. Araweté woman opening a babassu fruit to extract beetle grub (Bruchidae).

and Leguminosae (Balée 1986). Never felling and burning forest for horticulture, the Guajá always made camp only in enclaves of babassu palm forest. Babassu palms dominated the site on the upper Turiaçu River where authorities of the FUNAI (Brazilian National Indian Foundation) first made peaceful contact with some of the Guajá in 1974. The Guajá obtain much of their dietary protein from the kernels and many of their calories from the mesocarps of babassu palms. They supplement this diet by hunting, fishing, and the collection of less important plant foods. In addition, they thatch their houses with babassu fronds. Other disturbance indicator palms which occur in the babassu forest enclaves inhabited by the Guajá are *Astrocaryum vulgare* (*Balée, 3481*) and *Maximiliana maripa* (*Balée, 3377*). The Guajá use fiber from the young leaves of common tucumã to make hammocks, infant-carrying straps, rope, bowstring, and other objects. They make a thick porridge from the mesocarps of "inajá," which is an important dietary item.

The babassu forest enclaves in which the Guajá make camp and between which they trek, nearly always conceal the vestiges of previous settlements and horticultural fields of other indigenous groups, such as the Ka'apor (whose language is also affiliated with Tupi-Guarani), who border the Guajá to the east and north. On the upper Turiaçu River, at the site where peaceful contact between the FUNAI and some of the Guajá first took place, the FUNAI workers recovered the remains of a ceramic manioc griddle of the Ka'apor. Ka'apor Indians told me that their ancestors abandoned this site two or three generations ago.

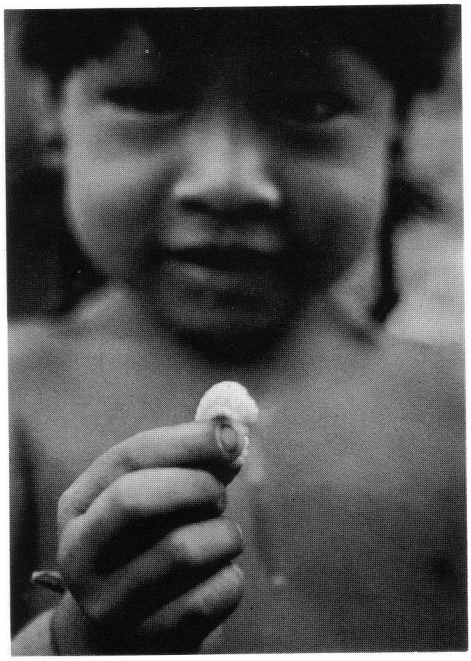
The Ka'apor historically raided the nomadic Guajá, mainly for women (Huxley 1957). In the 1870s, Dodt (1939) portrayed the Guajá of the Gurupi River as

a people who were "persecuted" by all surrounding Indians, including the Ka'apor. According to a Ka'apor man, who killed five Guajá Indians in his lifetime, the Guajá could not clear and burn forest, plant and raise crops, and establish genuine villages because the Ka'apor, who were always more numerous, would not allow them to do so.

Although the Guajá could not practice horticulture, as did all other surrounding Indians, they did utilize the vegetation which resulted from the occupations of those other groups, namely, the enclaves of babassu palm forest. Insofar as the babassu forests which the Guajá occupy and exploit represent previous settlements and fields of other Indians, the Guajá have adapted to forests that are mainly cultural in origin. Such adaptations to cultural forests occur elsewhere in Amazonia.

The Araweté and Asurini of the Xingu River basin, who were traditional enemies, utilize forests which were inhabited by prehistoric Indian societies. The Araweté population is 155 and that of the Asurini, 55. The Araweté live on the Igarapé Ipixuna, a minor tributary of the Xingu; the Asurini live about 200 km downstream on the right bank of the Xingu itself. I recovered potsherds and stone axeheads from both settlements; these artifacts were made by cultures so long forgotten that the Araweté and Asurini believe them to be of divine origin. Moreover, black earth is found at both settlements. The forests which covered these settlement sites, before they were cleared in the late 1970s and early 1980s, were vine forests, which appear to be anthropogenic (Balée 1987). In two one-hectare inventories of vine forest, one near the Araweté and the other near the Asurini, which I carried out in 1985–86, babassu (*Balée, 1776a*) was respectively the sixth and second most ecologically important and dominant species.

Both the Araweté and Asurini depend on babassu. Both use babassu fronds to thatch their roofs. In addition, the Araweté



4. Araweté boy holding beetle grub (family Bruchidae), an important source of fats in the Araweté diet.

raise *Pachymerus nucleorum* beetle grubs (Figs. 3,4) in rotting babassu fruits in their houses. They eat these grubs and rub their fat on their bows, to make these more elastic. The Araweté rarely eat the babassu mesocarp, since to them this practice is "near savagery" (Viveiros de Castro 1986), to be resorted to only in times of food emergencies. For example, an isolated Araweté family of seven, which was under siege by Kayapó Indians some 200 km distant from the Araweté village on the Ipixuna and which was contacted by the FUNAI in September 1987, was found to be relying on babassu mesocarps, as well as other uncultivated plant foods. The Araweté, in general, are most dependent on maize, which they prefer to plant in black earth.

Other than for roofing thatch (Fig. 5), the Asurini now only employ babassu to produce a highly effective insect repellent, from the oil of the kernels. In the recent

5. Asurini man thatching roof with leaves of babassu palm (*Orbignya phalerata*).

past, however, the Asurini depended on babassu for food. In the late 1960s, the Araweté raided the Asurini, killing many people and destroying their settlement. According to Asurini Indians, the survivors of this raid abandoned their settlement and horticultural fields, trekking through the forest for a few years until they made peace with Brazilian society in 1971 (Müller 1984/85). The Araweté themselves came to peaceful terms with the FUNAI and Brazilian society in 1976 (Viveiros de Castro 1986). During their period of trekking, without horticulture, the Asurini, like the Guajá, relied heavily on the babassu palm as a source of protein and carbohydrates. Given that the region where babassu palms are dominant evinces previous human disturbance, the Asurini depended on vegetation modified by an earlier culture. Like the Asurini and Guajá, the Araweté depend heavily on babassu kernels and mesocarps only in times of emergency, i.e., in the absence of a major horticultural enterprise.

As such, babassu, which is an eminently "historical" palm where it is dominant, replaces cultivated crops such as maize and manioc (cf. May et al. 1985*a*) for modern indigenous groups who cannot maintain settled villages because of endemic warfare. Indigenous dependence on this palm reflects knowledge of the supreme utility of a natural resource which is at once a cultural artifact of the past.

Conclusion

Palms are a major feature of the vegetation of many undisturbed archeological sites in Amazonia. Modern Indians who occupy and exploit such sites also depend on the vegetation therein. The Tupi-Guarani speaking Guajá, Araweté, and Asurini clearly utilize forests which manifest the residue—both vegetational and other-

wise—of previous cultural occupations. In particular, the near total dependence of the Guajá and, historically, of the Asurini and Araweté on the babassu palm, which is one of the most dominant species in anthropogenic forests of their respective habitats, bespeaks a dependence not merely on nature, but on other cultures no longer present. The traditional view, therefore, that Amazonian Indians are adapted to primary forests, should be revised, to take into account those indigenous peoples that depend on and adapt to forests that resulted from cultural activities of the past.

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