## **INSTITUTE OF CURRENT WORLD AFFAIRS**

GSH-20: Babassú

Apartado 8-3870 1.000 San José, Costa Rica March 1982

Mr. Peter B. Martin Executive Director Institute of Current World Affairs Wheelock House 4 West Wheelock Street Hanover, New Hampshire 03755

Dear Peter:

After our return to Belém, Brazil, from Jari (GSH-19), Lynne and I traveled with Anthony Anderson on his drive home to Bacabál in central Maranhão state (See Figure 1, GSH-18). I was particularly interested in learning about Anthony's and his wife Suely's research on the babassú palm. In central Maranhão, babassú-or babaçú in Portuguese--dominates the landscape and is the primary source of income to the rural poor. Perhaps nowhere else in tropical America is the forest-man relationship so direct as in central Maranhão.

Scientifically known as Orbignya speciosa--or Orbignya oleifera--babassú is in the cocosoid group of palms, i.e., it is a relative of the coconut. The genus Orbignya includes about 24 species in tropical America, including two in the West Indies. The closely related genera Attalea, Scheelea, Parascheelea and Maximiliana have an estimated additional 83 species in tropical America that sometimes grow in the same area as Orbignya and are occasionally difficult to distinguish in the field.

Throughout their range, Orbignya species are an important local source of oil extracted from seeds. The oil is used for shortening, vegetable oil, soap, and candles, as well as for fuel and lubrication. Vegetable oil from babassú seeds is of excellent quality, is almost colorless and does not easily turn rancid. It is similar to coconut oil and can be used as a substitute source of olein and stearin. Though babassú seeds contain 60-70% oil, the seeds constitute only 10% of the 150-200 gram fruit. As is often true of abundant palms, local people use them for many other purposes. The long leaves are commonly used as house thatch and occasionally for plaiting. The large terminal meristem (leaf buds sheathed by the leaf bases) is used for heart of palm (also called palm cabbage or palmito). Green fruit was previously used in the smoking of wild rubber; high quality charcoal is made from the very hard fruit endocarp enclosing the seeds; the outer fibrous pulp of immature fruit can be used as a substitute for farinha -- the starch staple prepared from manioc tubers (also the source of tapioca); and the Maranhão state Institute of Natural Resources reports that milk from immature seeds is equivalent to human milk and can be substituted for it. An alcoholic beverage is fermented from the liquid in the fruit stalk.

Babassú is especially abundant in Maranhão state, where it covers vast areas, perhaps more than a third of the 324,616 km<sup>2</sup> (125,335 mi<sup>2</sup>) state. Maranhão state produced 149,000 tons of babassú nuts in 1970, equivalent to 82% of national

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production; that production level ranked babassú first in value among extracted plant materials, even above rubber<sup>\*</sup>. Babassú oil used to be a major export from Maranhão, but national demand now absorbs the total production. For the rural people of Maranhão the extraction and sale of babassú seeds for vegetable oil production is the only source of cash income. Suely Anderson is investigating the socio-economic role of babassú in central Maranhão; she is also trying to determine the effects two new industrial seed extraction operations in Bacabál are having on rural people. Anthony is concentrating his research on the ecology and natural history of babassú. Both Anthony and Suely are conducting research for their doctoral degrees at the University of Florida.

The babassú palm is an attractive tree 15-25 m tall with a smooth trunk 30-40 cm in diameter topped with 9 m long, elegantly arched leaves (Fig. 1). From 200 to 600 fruits are borne in an elongated, pendant cluster that weighs up to 100 kg. A robust adult babassú can produce up to half a ton of fruits per year. The elliptic tan fruit (Fig. 2), 10-12 cm long by 5-7 cm across, contains 3-6 seeds superbly protected by the extremely hard, 12 mm thick endocarp (like the coconut "shell"). Mature fruits drop to the ground where they may lay



Figure 1. Babassú palms near Bacabál, Maranhão, Brazil. The tall palm in the center has a long cluster of fruit hanging below the leaves.

<sup>\*</sup>Brasil. Min. Rel. Ext., Brasilia. p. 622. 1972.



Figure 2. Opened babassú fruits showing the extremely hard endocarp (dark in color) enclosing the seeds; the uppermost seed is split in half to show the whitish endosperm rich in oil.

for years before the endocarp decomposes sufficiently to stimulate seed germination. None of the native animals is able to break the babassú endocarp to eat the seeds. Ecologist Dan Janzen (University of Pennsylvania) theorizes that such large, hard fruits may have been eaten by now-extinct wooly mammoths and giant ground sloths. Plants such as the babassú may have evolved a hard endocarp to protect the seeds during passage of the fruit through the gut of large herbivores. I carried a dozen babassú fruits back to Costa Rica for Dan to test hardness--the force required to break the babassú endocarp.

Seeds that do eventually germinate have a remarkable strategy presumably to protect the seedling from the more or less annual fires that are so prevalent in these seasonally dry ecological zones. The germinating babassú seed puts down a long tap root and translocates the seed reserves stored in the endosperm down into the root. The starch reserves produced by leaves are stored below ground where they are used to produce larger leaves, trunk and roots, or to replace leaves consumed by fire. For several years the palm remains in a "grass" stage while building the trunk below ground. When sufficient reserves have been accumulated and the final trunk diameter attained, the fully-developed trunk emerges from the ground. The nearly full complement of leaves produces sufficient quantities of starch to permit the palm trunk to emerge fairly rapidly from the ground. During the trunk a few meters tall, the palms are susceptible to fire. Tall palms are virtually immune to grass fires. This remarkable capability to withstand mild annual burning contributes to the abundance of babassú in central Maranhão. We observed some areas covered with babassú palms still in the "grass" stage (Fig. 3). The palm trait of trunkbuilding below ground and resistance to fire is fairly common among palms that invade pastures in Latin America, e.g., *Acrocomia totai* in eastern Paraguay, *Acrocomia vinifera* in the Pacific lowlands of Central America, *Orbignya cohune* in northern Honduras, Belize and the Yucatán peninsula, *Scheelea rostrata* in Costa Rica's El General valley and *Scheelea* and *Orbignya* species on the Brazilian Shield in eastern Bolivia (see GSH-11).

Anthony made a key discovery of a relatively undisturbed patch of forest on a private ranch. This remnant forest patch has very few babassú palms and essentially no babassú regeneration in the forest. Adjoining this patch of natural forest is a stand of well-developed babassú palms with scattered nonpalm trees (Fig. 4). Anthony was able to document that the forest in this area was cleared about 32 years ago. The evidence is quite good that forest clearing permits the babassú to regenerate well and dramatically increase in density. Apparently the regeneration of babassú palms comes from an abundance of viable seeds accumulated over several years on or in the forest soil. The absence of significant seed predation by animals or insects permits the accumulation of seeds on the soil. Forest clearing and burning appear to stimulate seed germination and the spectacular density of seedlings.

The low density of babassú palms in natural forest is indirectly related to the city named Bacabál--presumably named for the bacaba palm (*Oenocarpus bacaba*). Even though Anthony has yet to find a single bacaba palm in the Bacabál area, it seems unlikely the town founders would have confused the two palm species. The bacaba palm is strikingly less robust, with leaves half the length and much smaller fruits than babassú.

The vast dominance of babassú palms in Maranhão is truly impressive. Even from the air, babassú palms extend to the horizon. Apparently the babassú dominance of Maranhão has confused Brazilian interpretors of LANDSAT satellite images of the state. In a government study of deforestation in legal Amazonia, comprising 78% of Maranhão state even though not a part of the Amazon drainage system, only 2.8% of the Amazonian portion of Maranhão was reported as deforested before 1979. Considering that we saw only one patch of uncut forest on our drive from Belém to Bacabál, it would seem more acceptable if the government study reported 2.8% of Maranhão state still in natural forest. The inescapable conclusion is that the vast stands of babassú in Maranhão state have been interpreted as natural forest, hence excluded from the calculations of area deforested. Such errors of interpretation are one of the prime sources of the growing discrepancies over rates of tropical deforestation (see GSH-15).

Manual extraction of babassú seeds is done almost exclusively by rural women. Though they sometimes extract the seeds in the field, the fruits are more commonly carried home for seed extraction. We visited a house where two women were intently (slips are physically costly) and efficiently extracting seeds under a portico (Fig. 5). To extract the seeds, a woman uses an axe held upright by a leg over the handle; the fruit is held on the axe blade and whacked with a short, sturdy stick. It takes two or three strikes to make the initial break in the very hard endocarp, plus a few more lighter hits to extract the elongated seeds. The extracted seeds are sold by middlemen to centralized facilities for pressing out the oil.



Figure 3. (Top) Abundant babassú palms in a pasture near Bacabál. Note the numerous young babassú still in the "grass" stage with uniformly tall leaves (center and right) following pasture cutting and burning. The fairly uniform height of the adult babassú in the background may indicate these individuals got their start with the cutting of the natural forest. See text for further explanation of the ecology of babassú.

Figure 4. (Bottom) Anthony Anderson is in a nearly pure stand of babassú palms near Bacabál. Anthony has determined this area was cleared of natural forest about 32 years ago.



Figure 5. Manual extraction of babassú seeds near Bacabál. On the axe blade held upright by her left leg over the axe handle, the fruit is whacked with a short, sturdy stick leaning against her right leg. Extracted seeds are accumulated in the basket (lower left) woven from babassú leaves.

Two whole-fruit babassú processing plants opened in 1980 in Bacabál. A year later, the one functioning plant was buying whole fruit from an 80 km radius. The tough endocarp reportedly causes frequent breakdowns of the cracker. Industrial extraction of seeds is seriously depleting available fruits for cottage extraction. According to the U.S. National Academy of Science's book "Underexploited Tropical Plants with Promising Economic Value", the hand-cracking of babassú fruits accounts for 57% of the production cost for babassú vegetable oil. Since the sale of extracted babassú seeds is the primary and often only source of cash income for a large proportion of the rural population in Maranhão, the switchover to industrial extraction of seeds will have serious economic repercussions on the rural poor. Local ranching practices are also complicating the home extraction of babassú seeds. Consolidation of ranches has forced the rural poor to live along road edges. Some ranchers prohibit non-employees to collect babassú palms in a wide swath along the ranch borders.

In a poor, highly-populated state like Maranhão where agriculture is marginal and the natural resources are so few, the demise of home extraction of babassú seeds may devastate the meager rural economy. Without a market for extracted babassú seeds, the rural poor may have no alternative except migration to an urban slum. Government interest in legitimate rural development based on the babassú palm could greatly benefit the rural poor of Maranhão.

Sincerely,

Harry

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