

CHAPTER 4

Palm Ethnobotany and Caboclo Material Culture

Creativity, cultural knowledge, and ethnobotanical repertoire can be argued as basic survival skills for rural areas deprived of infrastructure and economic support, such as the river-forest landscape of the Amazon estuary. Without the romanticism usually held by outsiders, ethnobotany is a matter of practical knowledge, and while it is not always the preferred form of meeting one's needs, it nevertheless provides the necessary tools for daily life that otherwise are only available in the market. Evolving from indigenous and colonial histories, the ethnobotanical repertoire of the rural estuarine population is immense and rich as in few other parts of the non-indigenous Amazon. While agricultural systems display a rich array of agroecological knowledge and technological diffusion and experimentation, the ethnobotanical repertoire of the region is best expressed in terms of its importance for the local material culture and technology. The array of plant species used for house construction, household utensils, and to support economic activities such as fishing is impressive. This is particularly true for palm species. Over the centuries, local ethnobotanical knowledge has evolved as much as an adaptation to the local environment as a response to the political and economic disregard riverine residents have learned to endure. Even under conditions of change brought about by development projects and agricultural mechanization, farmers tend to maintain and rely on local resources and plant products (e.g., fibers, medicine, food, construction material, and fuel) to minimize their risk and to cope with ups and downs common to communities receiving development subsidies. In this context, arguably, palm species are the most important resource pool for the daily life and economy of estuarine populations as well as the Amazon region as a whole. Many researchers have described an infinite repertory of uses and potentials offered by these species, ranging from staple food to raw materials to medicines to marketing (for example, Wallace, 1853; Balick, 1988; Anderson, May, and Balick, 1991; Henderson, Galeano, and Bernal, 1995; and Goulding, Smith, and Mahar, 1996).

In Amazônia as a whole, and the estuary in particular, palms comprise an intrinsic part of the cultural identity of the region as they define the material culture, food habits,

and symbols that mediate the way local people perceive and talk about their livelihoods and about the regional landscapes. As mentioned by Kahn (1994), the importance of palms is such that they have become symbols of the three major Amazonian cities: *pejibae* (*Mauritia flexuosa*) in Iquitos, *tucumã* (*Astrocaryum vulgare*) in Manaus, and *açaí* (*Euterpe oleracea*) in Belém. This is also true for local communities throughout the region. It is at the local level that one learns to appreciate the ubiquitous presence of palms in Amazonian life. People tend, search, exchange, and fight for the right to use their resource—from fine fibers to sturdy trunks, and from sentimental and aesthetic to the practical value they represent. Without exaggeration, palms are “trees of life” in Amazônia.

4.1 Perception of Environmental Compartments and Ethnobotanical Resources

Knowledge about palm and other plant resources and their uses emerges in the context of how people perceive the wider landscape and its diverse array of vegetation types and composition (see chapter 3). As an intrinsic part of land use, understanding the spatial distribution of plants and their cycles of growth and production underlie many aspects of daily life, as well as resource tenure in the region.

Independent of age group and community of origin, farmers of the Amazon estuary have a refined understanding of the occurrence of plant resources according to topography, flooding pattern, soil, and vegetation cover.²⁶ Local residents recognize a variety of environmental compartments connecting the waterscape of the region to interior forests: *aningais*, mangrove, lower floodplain, higher floodplain, transition to upland, higher upland, transitions to grassland (also from the floodplain), lower and higher grasslands, and different types of edges of grassland-forest transitions. As an intricate part of the local economy, the perception and recognition of resources include not only raw material and food, but also the agricultural potential of different sites, medicinal plants, hunting niches, and environmental characteristics in general, such as susceptibility to flooding.

Transitional areas between vegetation types present the highest diversity of ethnobotanical resources when compared to other areas (Brondízio and Neves, 1997) including transitions from floodplain to upland forests, which besides having a wide array of useful plants are recognized by farmers as prime areas for agriculture. For instance, between a higher floodplain and the lower upland, one may find areas that only receive flooding

a few times a year, thus presenting an excellent soil for cultivation of rice, corn, and beans without the constant risk of flooding. These prime agricultural sites are called *muraituba* by many and are distinguished by their microtopography (e.g., bumps on the ground) and indicator species. In walking across different compartments, farmers call attention to a detailed soil taxonomy based on variations in color, texture, mottles (such as the presence of laterites or mottled clays), flooding, as well as the presence of organic matter and archaeological material (Murrieta et al., 1989; Brondízio, 1996). Selection of sites for agriculture including floodplain gardens and açai agroforestry are based on careful examination of these conditions. For instance, soils for manioc cultivation as well as the selection of manioc varieties are based on soil texture and water retention capacity, as much as on the type of vegetation needed for a successful burning and fertilization.

Broadly defined, forms of land use start at the river-water interface as riverine farmers use mangrove and lower floodplain areas for settlement, açai agroforestry, collection of a variety of plant material, and fishing. In higher floodplains, intensive açai agroforestry as well as cultivation of annual and biannual crops, logging, and use of plant resource provide a basis for riverine livelihood. Upland areas, besides being used for agriculture in general, provide some of the most significant amounts of fruits used for consumption during the winter season. The distinct phenology of many forest species allows for a variety of fruit yields during the off-season of açai and manioc when rainfall peaks. This is particularly significant for the local economy and particularly to local diet and food intake because of the low availability of staple crops during the rainy season.

Resources used and described as raw material are by far the most significant part of the local ethnobotanical repertoire, as they provide a basis for the local material culture as discussed below. Across age groups, our ethnobotanical experiments show that farmers are able to recognize from 30 to 40 different types of plant uses for raw material along a transect cutting across different vegetation types. Food items are no less important and diverse, including more than 40 species of fruits used in different intensities. While a diverse variety of herbs is commonly planted or tendered in house gardens, forests, and savannas offer different types of oils, saps, and resins of importance to the household as well as for commercialization. The total number of distinct resources recognized by farmers from different age groups and communities ranged from 48 to 80 items. Even farmers from cooperative communities relying on mechanized agriculture for decades have maintained

and transferred to young generations a diverse and large amount of ethnobotanical and agricultural knowledge (Brondízio and Neves, 1997).

The preceding discussion emphasized the degree to which land use systems in the estuary are more than activities based on the direct transformation of the landscape such as those based on clearing and conversion of land cover more easily recognized in structural or spatial terms (for example, chapters 3 and 5, respectively). Land use systems based on timber and non-timber forest products are as important and key to the local and regional economy and livelihood as any form of agriculture. Forests and savannas, as they are, represent areas of use with their own calendar of harvesting and management. All of these elements, along with the intensification of açai agroforestry, are necessary to understand why deforestation trajectories in this part of Amazônia have taken a different path from those in other parts of the region.

4.2 Palm Ethnobotany and Material Culture: Cultural Knowledge and Creativity in Daily Life

Besides "your majesty" the açai palm (*Euterpe oleracea*), a wide range of palm species is used daily in rural areas, which, although less economically significant, secure access to multipurpose and otherwise unavailable resources. Nearly all aspects of the rural economy and livelihood are related to the use of palms: dwelling frames (roofs, walls, doors, floors, etc.), fishing and hunting gear, household utensils, medicine, food, beverages, and husbandry feeding (e.g., pigs). Palm products offer a secure resource base both in times of abundance and of crisis. Twenty-one palm species and more than 220 types of uses for all parts of the plant have been recorded for the region. Still, the role of palms and their economic uses have been mostly disregarded by development projects and extension services in the region. A summary of palm species, occurrence, and uses is presented in table 4.1 and a detailed discrimination of types of uses per species and parts of the plant is presented in appendix 4.1.

Palms grow widely and dominate many vegetation types in the study area (see chapter 3). The diversity of biotopes in this transitional environment offers numerous possibilities of vegetation, soil, and patterns of anthropogenic vegetation highly favorable to palm species. Most species occur in both upland and floodplain environments, although they vary from species to species in density, frequency, and dominance according to vegetation

Table 4.1. Ethnobotany and house construction: Most commonly used plants listed by residents using vernacular names (See Appendix 3.3 for list of species and botanical name equivalents for the plants listed here.).

	Support/bins	Floor	Walls	Roof	Annexes	Bridges
Palm Trees	Açaí Tucumã Bacaba	Açaí	Miriti Jupati Açaí	Ubuçu Inajá	Açaí Inajá Ubuçu	Miriti Açaí
Lianas and Shrubs	Escada jaboti Murateteca Camocai Mucunã Graxama Cipó d'alho Jacitara Maçaranduba Chururana Sucupira Peroba Murapiranga Pracuuba	Escada jaboti Murateteca Camocai Mucunã Graxama Cipó d'alho Jacitara Maçaranduba Chururana Sucupira Peroba Murapiranga Pracuuba	Miriti Jupati Açaí Titica Graxama Tracuã Cipó de fogo Escada jaboti Murateteca Jacitara Maçaranduba Chururana Sucupira Peroba Murapiranga Pracuuba	Ubuçu Inajá Titica Jupindá Graxama Tracuã Cipó de fogo Escada jaboti Murateteca Jacitara Maçaranduba Chururana Sucupira Peroba Murapiranga Pracuuba	Açaí Inajá Ubuçu Titica Camocai Graxama Cipó d'alho Tracuã Jupindá Cipó de fogo Escada jaboti Murateteca Jacitara Open tree list; selection based on availability of material and rights to harvest and use.	Escada jaboti Murateteca Camocai Mucunã Graxama Cipó d'alho Jacitara Ucuuba
Timber	Andiroba Ananim Tamaquaré Quaruba Marupã Sapucaia Angelim Louro Bacuri Ucuuba Virola	Andiroba Ananim Tamaquaré Quaruba Marupã Sapucaia Angelim Louro Bacuri Ucuuba Virola	Andiroba Ananim Tamaquaré Quaruba Marupã Sapucaia Angelim Louro Bacuri Ucuuba Virola	Andiroba Ananim Tamaquaré Quaruba Marupã Sapucaia Angelim Louro Bacuri Ucuuba Virola		

history and structure. The high density of açai palm may contrast with low-density species such as *muçajá* (*Acrocomia sclerocarpa*) and *paxiuba* (*Socratea exorrhiza*). Most palm species have a population structure that is, in addition to species ecology, highly associated with human management. This is not only the case of açai, but also of *inajá* (*Attalea regia*), *tucumã* (*Astrocaryum vulgare*), and *pupunha* (*Bactris gasipae*).

Transitional forests (forest-savanna transitional vegetation) are the preferred home to highly important species, such as the *jacitara-açu* and *jacitara-miri* (*Desmoncus macrocanthus* and *Desmoncus policanthus*, respectively), which are used as raw material in fishing gear and domestic utensils. The density of palms in the savanna is usually low, although density of floodplain species, such as *miriti* (*Mauritia flexuosa*) and *caranã* (*Mauritia* sp.) may be high in the transition between savanna and floodplain forest.

Secondary regrowth vegetation is extremely favorable to some palms. Secondary vegetation resulting from intensively used areas (repeated burnings following mechanized crop or pasture cycles) are commonly populated with *inajá* and *tucumã*, which are resistant to fire and even benefit from it. In some areas, abandoned pastures with a long history of fire use are now dominated by *inajá* and *tucumã*, thus greatly affecting the regrowth trajectory of secondary successional vegetation. Secondary vegetation resulting from swidden agriculture in upland forests can also be dominated by other palm species, in some cases more related to the phenology and composition of previous vegetation. Dominance varies from site to site, however, some species that commonly occur in these areas are *marajá-açu* (*Bactris piranga*) and *urucuri* (*Attalea excelsa*), although *inajá* and *tucumã* also appear.

Some species are closely associated with human settlement and cultivation, and their occurrence may indicate particular historical patterns of settlement and archeological sites (Roosevelt, 1980, 1989). This is especially the case with *pupunha* (*Bactris gasipae*), a palm always associated with human settlement, however there are other species that may also be associated with human settlement, such as *coco* (*Cocos nucifera*), *bacaba* (*Oenocarpus bacaba*), *miriti*, and açai. Old settlements (locally called *tapera*) may be recognized by the presence of these species. It is commonly said that a *pupunha* tree (*Bactris gasipae*) indicates a *tapera*, even though no visible remains are left of a dwelling. Palm species offer opportunities to maximize use and increase production of market- and household-related products in areas otherwise not suitable to agriculture without generating a negative environmental impact while securing resources for household use. Commercialization of

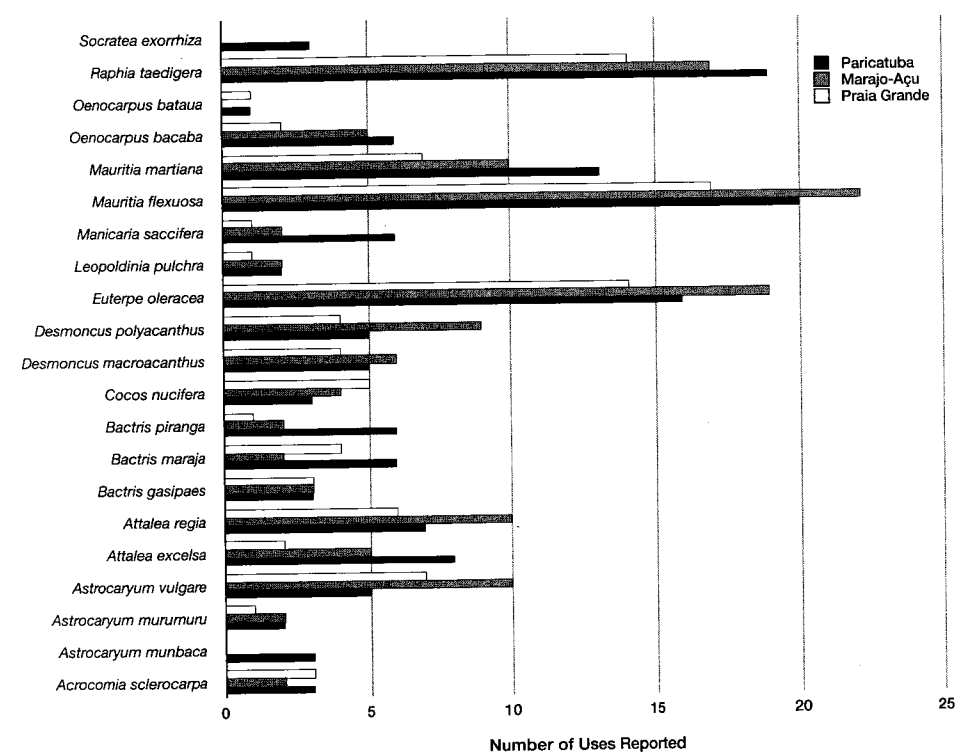


Figure 4.1. Number of different uses for palm species as reported in three communities.

palm resources varies. Raw materials such as *ubuçu* leaves (preferred for roofs), *jupati* stalks, and *jacitara* fibers are sought after and are important commodities when scarce in a particular area. Most significant is the commerce of palm-based artifacts, such as açai baskets (*rasas/paneiros*) and shrimp traps (*matapi*), both of which find an immediate market in the region.

Figure 4.1 presents a comparative summary of palm uses among local communities. It is interesting to note the how patterns of palm use indicate the type of economic and land use systems communities have adopted. In Paricatuba, 142 uses have been reported for 21 species, when compared to 132 and 97 uses from 19 species in Marajó-Açu and Praia Grande, respectively. On the one hand, it shows that independent of economic profile (as in these communities) there is a diverse and extensive use of palm resources contributing to estuarine households. The wide range of species and types of use reflect an elaborate specialization of types of uses and purposes.

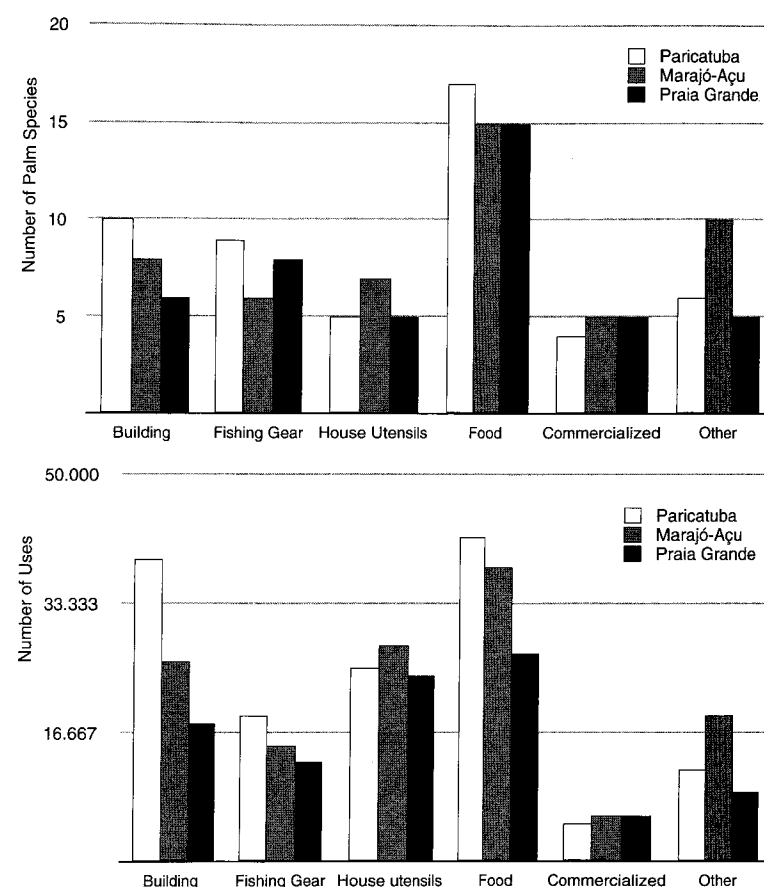


Figure 4.2. Number of palm species used and number of uses for palms in three communities.

Figure 4.2 summarizes different palm species and their uses among the three communities. The employment of palm materials usually follows specific characteristics of each part of the plant, such as resistance, flexibility, durability, and palatability (Fig. 4.3). Varying combinations of species, parts, and uses can form a seemingly endless range of alternatives. However, uses (including for consumption and commercialization) may be aggregated into major categories: food, building, fishing gear, domestic utensils, and miscellaneous. Detail uses of specific palms are presented in figures 4.4 (*miriti*), 4.5 (*jupati*), and 4.6 (*inajá*).

Food is one of the most important uses of palms, and it includes fruits, beverages,

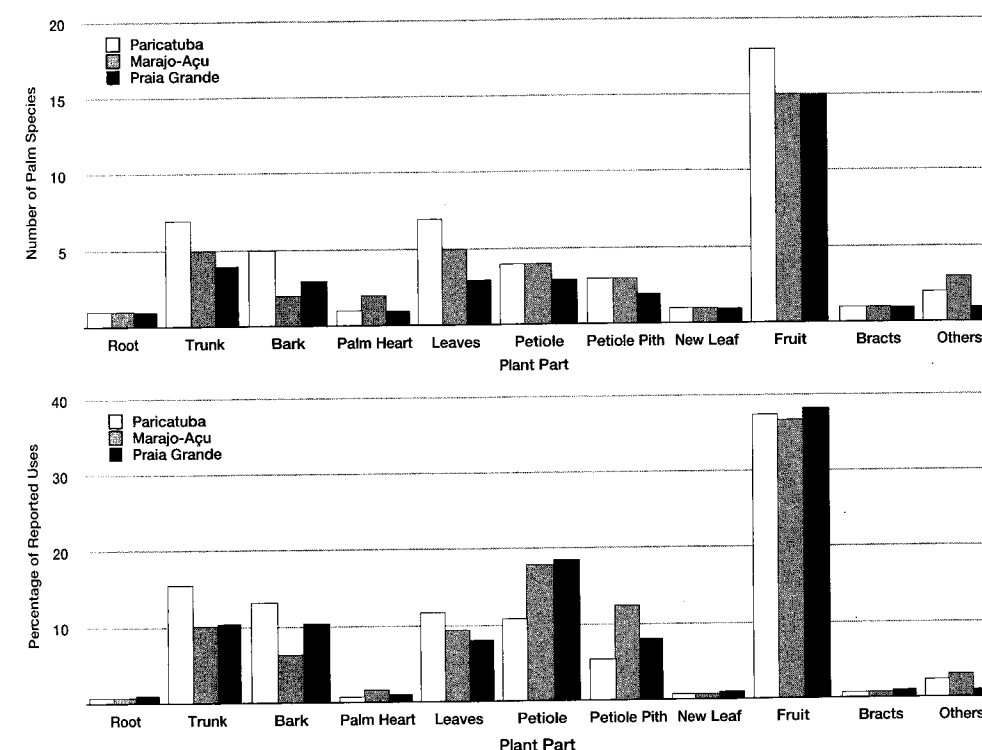
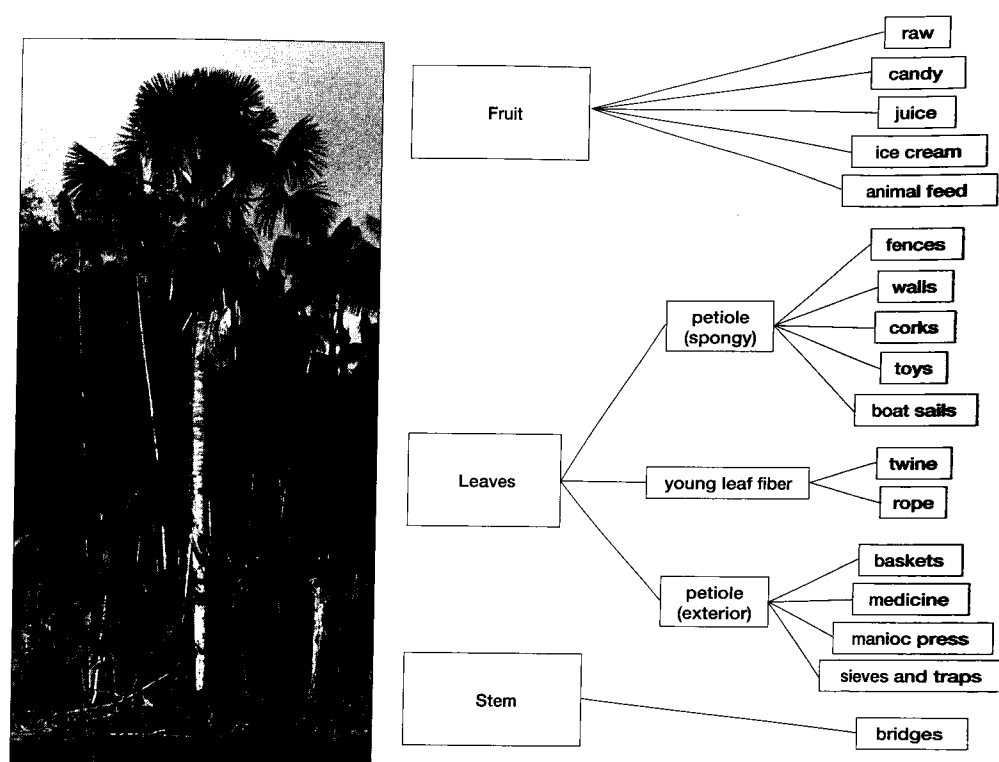


Figure 4.3. Number of palm species sought for different plant parts and percentage of reported uses for different plant parts in three communities.

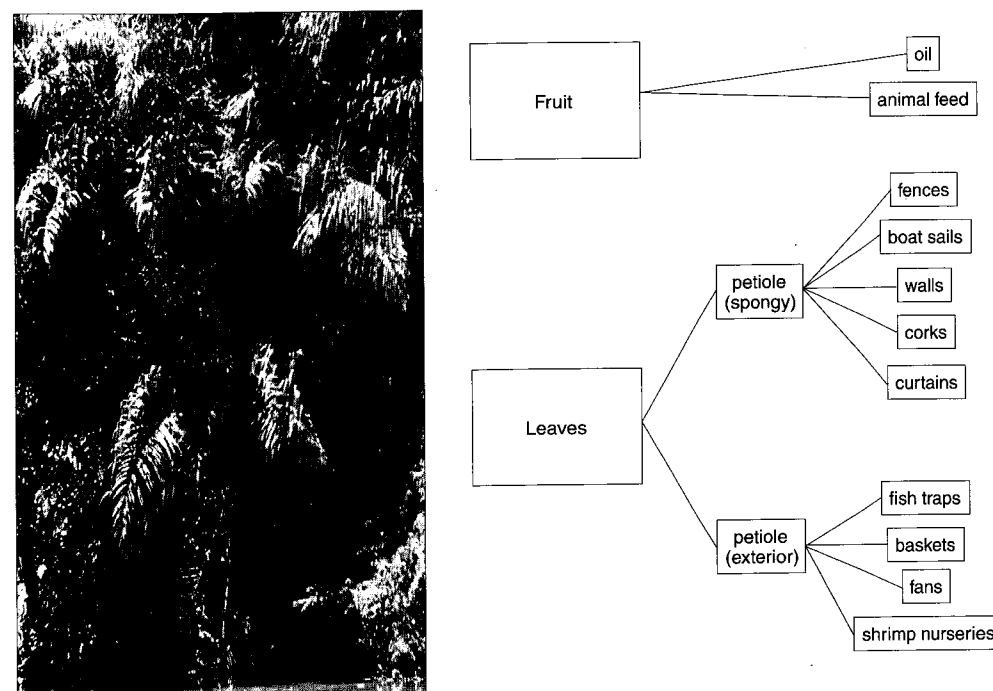
edible oils, and heart of palm.²⁷ Besides açá, which is a staple food in the region, other species such as *tucumã*, *bacaba*, *pupunha*, *inajá*, *miriti*, *caraná*, and coconut are appreciated and common in the rural diet, representing a considerable part of household dietary intake, and in some cases income depending on the season. Although heart of palm is a top export for the regional economy, it is not appreciated as a food item locally. Different parts of palms are used to construct houses as mentioned above. Some species are recognized for their adequacy for specific uses: for example *ubuçu* leaves for roof covers, *tucumã* trunks for building framing, açá stems for floors and walls, and *jupati* and *miriti* stalk core (*bagago*) for walls, doors, windows, and drapery.

Palms are used as raw material to manufacture fixed and transportable fish and shrimp traps and shrimp lures. In this category are included *cacuri*, *pari*, *cerco*, *matapi*, *curral*, *viveiro*, and *poqueca* (the last is a shrimp bait made from coconut fruit and grain fibers

Figure 4.4. Multiple uses of the miriti palm (*Mauritia flexuosa*).

wrapped in açai leaves). Some species are particularly desirable for specific uses, such as *jupati* and *jacitara* for durable shrimp and fish traps; *jupati* leaf stalks are used to build traps, while *jacitara* stems are used to tie together the frames.

Domestic utensils built from palms include different types of baskets (*atura* and *paneiro*), ropes and fibers, bowls, mashing screen and sieves, and *tipiti* (the tool used to squeeze out manioc dough during flour processing). Handicrafts and toys are commonly made from palms and offer additional income to some families. Numerous other examples of miscellaneous uses of palms exist. For instance, açai root has a medicinal use as an anthelmintic, *murumuru* seed is used to smoke rubber and as a charcoal, *jupati* oil is used for firelight, *jupati* and *miriti* fibers (*bagaço*) are used to fix boats (*calafetar*), and

Figure 4.5. Multiple uses of the jupati palm (*Raphia taedigera*).

açai seed is used to build up organic soil. These are just a few among many other examples.

The hundreds of uses for palm material represent a "hidden harvest" of invaluable economic and social importance. While some materials are substituted when alternatives are available, palms are always appreciated for their durability, esthetics, and cost. We found there is a concern on the part of families to transmit their ethnobotanical knowledge to younger generations (Brondízio and Neves, 1997). However, we also found that as market value and scarcity for some palm species increase, the tenure of these resources tends to tighten. For centuries, estuarine populations have demonstrated a great capacity for managing and concentrating desirable resources in order to improve the value of their surroundings, to take advantage of market opportunities, and most important to provide for their livelihood. Palm species and their resources have allowed families to intertwine a safe-net for daily life in the Amazon estuary.

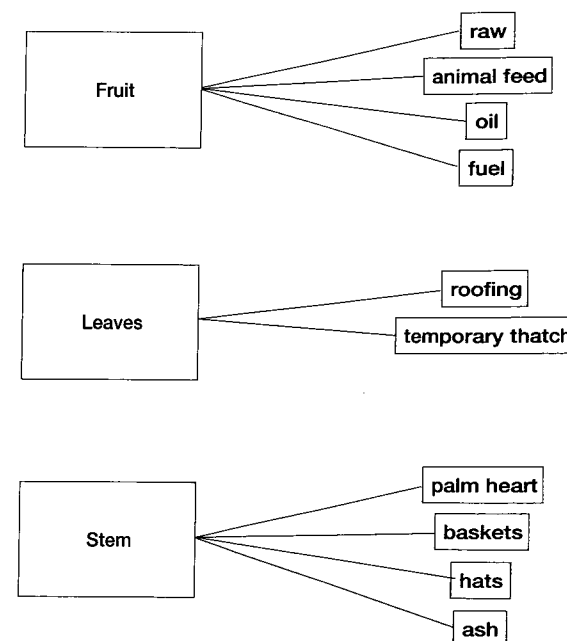
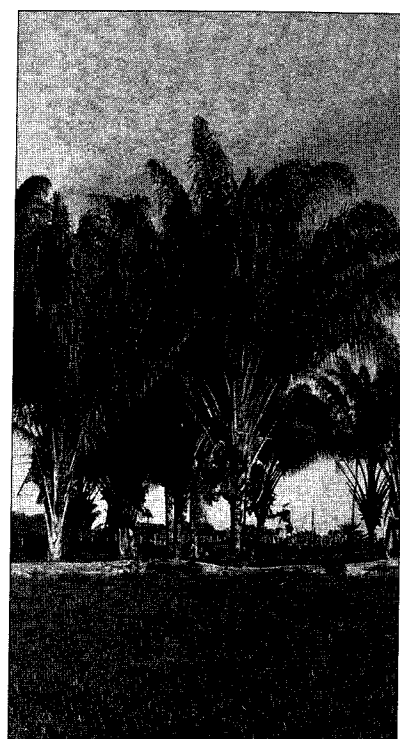


Figure 4.6. Multiple uses of the inajá palm (*Attalea regia*).

4.3 Palms and Other Plants Used for House Construction and Infrastructure

While the political and economic history of the estuary and the spatial distribution of resources have influenced patterns of settlement and land tenure arrangements in the region, housing and architecture in the estuary also represent the diversity of environments, ethnobotanical resources and landscape as well as households' wealth status. The location of houses near a stream or river allows for efficient transportation, as well as access to water and fishing. They are built on stilts in order to cope with the variations of the daily tides, which can reach about 2–4 meters twice a day, while air circulation helps to create comfortable temperatures within the house.²⁸

In general, there is at least one smaller annex building (flour house, animal shelter, or general storage shed) in addition to the residence. Each dwelling is surrounded by a

house garden filled with a large number of native and exotic species for variable uses, such as seasoning, medicine, food, and flowers. These items are cultivated near the house in the understory of an açai grove or in a suspended garden, locally called *giral*. In predominantly upland communities such as the community of Praia Grande dwellings, however, are not surrounded by açai groves. Their house gardens are predominantly similar in terms of species composition; one can find a large array of fruit trees such as banana (*Musa* sp), *cupuaçu* (*Theobroma grandiflorum*), guava (*Psidium guajava*), cacao (*Theobroma cacao*), and lime (*Citrus* sp.) and palms such as *pupunha* (*Bactris gasipae*), *inajá* (*Attalea regia*), and coconut (*Cocos nucifera*) as well as medicinal plants.

Materials employed for house construction reflect the myriad plant resources used by local people. A variety of timber, trunks, and leaves are used in the structures, walls, floors, and roofs, but their value cannot compare to the special value of palms—from structure to walls, floors, and several utensils inside the dwelling (Fig. 4.7, 4.8, 4.9; Table 4.1).

Houses can be built entirely with local plants resources or one can combine them with other materials, such as clay, cement, bricks, and tin roofs. Houses built with plant parts maintain a comfortable temperature inside. Parts of the house built with plant resources (such as roofs built with palm leaves and walls and floor with palm trunks) have to be replaced periodically (about every 3–10 years) depending on the material and use. Bricks and cement allow the construction of houses that last longer, and households who can afford them are currently opting for them, particularly in Praia Grande.

Usually a riverine house has few compartments: a front or back porch, a living room, a bedroom, and a kitchen. The bathroom ("pot-house") is separated from the main building, located in the back of the property close by the fields or palm groves. Houses do not have piped water and must fetch it from the nearby river or stream, except in Praia Grande, which received a piping project in 1994. The porch and living room are the locus of working activities (mending fishing nets and crafting baskets and shrimp traps) and storage for agricultural and forest products and utensils, as well as entertainment (TV sets and radios) and socialization. Walls are decorated with family and religious pictures, calendars, flags and banners of soccer teams. In the living rooms, palm baskets and wrapped hammocks are also seen hanging on the walls. The latter are unfolded during the night, turning into the bedding of household members. Also in the living room is usually a shrine corner, where saint images and candles are displayed.

The bedroom is usually occupied by the household couple and their youngest



Figure 4.7. Palms in daily life. A. Family crafting açaí fruit transportation baskets using fibers from *Raphia taedigera* and *Desmoncus* sp. B. Weaving a basket for local markets using fibers from *Mauritia flexuosa*. C. *Raphia taedigera* used for making a fish trap. D. *Euterpe oleracea* leaves are used to prepare a *moqueca*, a wrap used as bait for shrimp fishing. E. An experienced weaver combines several palm species to produce large baskets (*aturás*) for manioc transportation and other heavy jobs. F. *Manicaria saccifera* leaves are the preferred choice for palm thatched roofs. G. Palm leaves, fruit bunches, and utensils made of palm are presented at a religious ceremony to show appreciation for the importance of palm resources in daily life. H. Urban market stand shows a variety of utensils and products made from palm material. I. An experienced weaver produces a variety of precise and elaborate geometric patterns. J. *Raphia taedigera* petioles, *Euterpe oleracea* stems, *Mauritia flexuosa* trunks, and vine-like *Desmoncus* stems are combined to construct a long fishing trap to be placed along mangroves.

child. The kitchen is where food is prepared and consumed, usually two to three times a day. Small and medium palm woven baskets abound in this compartment, being perfect places to storage of a variety of foods (eggs, fruits, game, fish, shrimp, and meat). Fibers and fishing and agriculture utensils are also found hanging on the posts or walls of kitchens, and nearby it, outside, nearly every household has a *giral*—a raised bed/box of seasonings and medicinal herbs.

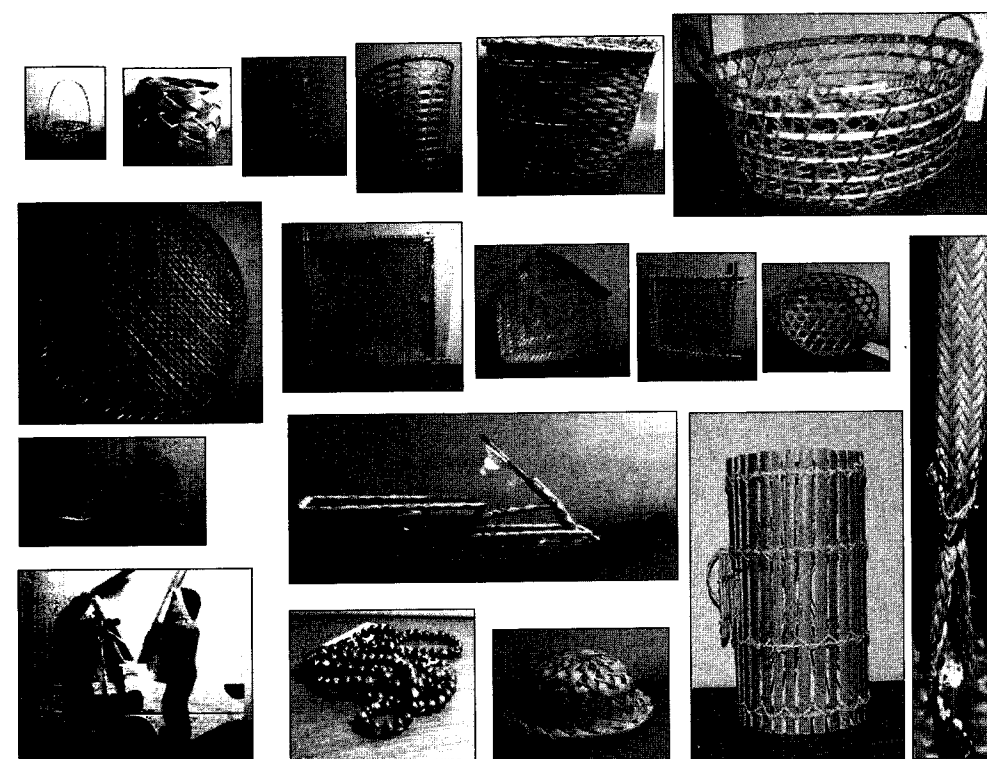


Figure 4.8. Examples of palm artifacts in local material culture. Baskets (top row) varying in shape, size, durability, and pattern serve a variety of functions. Similarly, sieves and fans (middle row) are crafted using different palm materials according to their intended use. A variety of other palm products can be found in most riverine households, including hats, adornments, toys, and tools for fishing and manioc processing.

There are five basic components in the construction of most riverine houses: stilts and support bins, floors, walls, roof, and annexes. Table 4.2 presents a list of the most commonly used plant materials in these functions. The vast majority of houses are built on stilts including those placed in upland areas. In the floodplains, tide variation along the year regulates height. The selection of material depends on the size of the house, cost and availability, and level of exposure to humidity. One can find several types of hardwood and palm trunks that are recognized to last in conditions of constant humidity. A combination of material and techniques can be used in fixation, such as nails, vines, and dovetails.

Floors are constructed from hardwood and or split palm trunks, preferably açaí

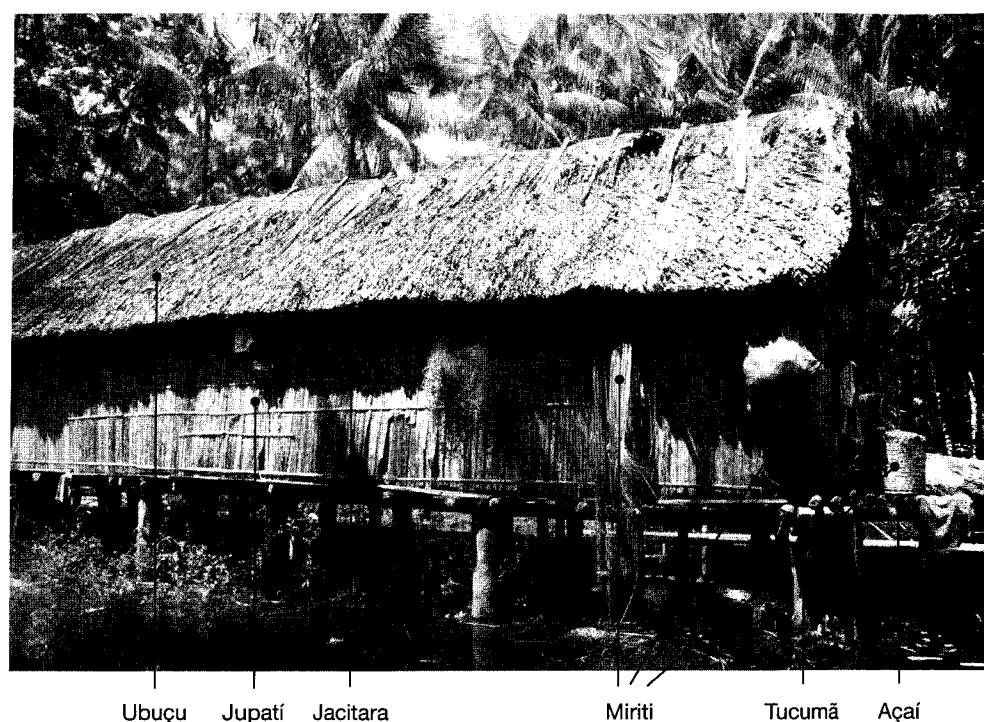


Figure 4.9. House of palms: Different palm species and structures used in local house construction. Ubuçu (*Manicaria saccifera*). Jupatí (*Raphia taedigera*). Jacitara (*Desmoncus orthocanthus*). Miriti (*Mauritia flexuosa*). Tucumã (*Astrocaryum vulgare*). Açaí (*Euterpe oleracea*).

stems depending on family funds and availability of resources. An elaborate combination of wood color and grain can be found in some floors. Riverine houses can be partially or completely closed: walls may not be present in one, two, or three sides of the house. Often, few divisions exist within the house; however, a separation between living room, bedroom, and kitchen may appear. Walls can be made of several materials. Palm tree leaves placed horizontally can be fixed with nails or vines. Split palm tree trunks can be arranged as a wall the same way they are prepared and laid out for the flooring. They are positioned vertically, side by side, and fixed by nails or vines. The cortex of palm tree leaves—characteristically light and fibrous material can be fixed vertically with nails or vines using sticks extracted from the same leaf stalk. It is also common and preferred to use hardwood for walls. They can be arranged vertically side by side or horizontally in an overlapping form. The doors and windows are not necessarily present in some houses.

Table 4.2. Palm species: Most common occurrence by land cover type and categories of usage.

USES:		Common name	Upland forest	Floodplain forest	Grassland Savanna	Transitional forest	Secondary vegetation	Pasture	Cultivated	Types of Uses
1	<i>Acrocomia sclerocarpa</i>	Mucajá	x	x						F,O
2	<i>Astrocaryum mumbaca</i>	Mumbáca	x		x		x			F,O
3	<i>Astrocaryum murumuru</i>	Murumuru	x	x			x			U,O
4	<i>Astrocaryum vulgare</i>	Tucumã	x	x	x		x	x		B,F,U,T,O
5	<i>Attalea exelca</i>	Urucuri	x	x			x			B,F,O
6	<i>Attalea regia</i>	Inajá	x	x	x		x	x		B,G,U,F,T,O
7	<i>Bactris gasipaes</i>	Pupunha						x		F,T
8	<i>Bactris marajá</i>	Marajá		x						G,U,O
9	<i>Bactris pinanga</i>	Marajá-açu	x	x			x			F,G,U,O
10	<i>Cocos nucifera</i>	Côco						x		F,T
11	<i>Desmoncus macroacanthos</i>	Jacitara-açu	x	x			x			B,G,U,O
12	<i>Desmoncus polyacanthos</i>	Jacitara-miri	x	x			x			B,G,U,O
13	<i>Euterpe oleracea</i>	Açaí		x				x		B,G,U,F,T,O
14	<i>Leopoldinia pulchra</i>	Jará	x		x					O
15	<i>Manicaria saccifera</i>	Ubuçu		x						B,O

(continued)

Table 4.2. (continued)

	Common name	Upland forest	Floodplain forest	Grassland Savanna	Transitional forest	Secondary vegetation	Pasture	Cultivated	Types of Uses
16	<i>Mauritia flexuosa</i>		x		x				B, G, U, F, T, O
17	<i>Mauritia maritima</i>	x	x		x				B, G, U, F, O
18	<i>Oenocarpus bacaba</i>	x		x			x		B, F, T
19	<i>Oenocarpus bataua</i>		x						F
20	<i>Raphia taedigera</i>		x						B, G, U, T, O
21	<i>Sorattia exorrhiza</i>		x						B, G
USES:									
B - Buildings (house, annex, etc.)									
G - Fishing gears (fixed and mobile traps, etc.)									
U - Household/farming utensils									
F - Food and edible oils									
T - Commercialized									
O - Other (tools, fuel, raw material, etc.)									

They can be made of hardwood or a variety of palm tree material, including stems, stalks, and leaf stalk cortex.

The roofing is generally double-sided, with a 45% inclination according to the direction of the central axle/shaft of the house. The house axle/shaft is usually arranged perpendicularly to the direction/flow of the river. Roofs are made of palm tree leafs and or clay tiles. Palm leaves are positioned horizontally to the declivity, 5 to 20 cm apart from each other. They can be fixed with nails and or vines. Clay tiles of different styles are available. These are important commercial items in the estuary and many boat merchants are specialized on providing tiles, bricks and cement to rural areas. Amianthus and tin sheets are expensive items in the area, and are used in small pieces when available or needed.

Annexes are found in a variety of models and materials depending on their intended use. The selection of material depends on the degree of importance/interest of the construction, if it is seasonal for specific harvesting (açai, rubber), or permanent like the flour houses, shelter for animals. In most cases, there is a combination of palm tree material (trunk, leaves, and fibers) and available lumber. The most significant annex is the pot-house, usually located on higher ground and connected to the house by a bridge or a pathway. These are simple constructions (a wall enclosure with roof and a seat or just an opening) over a "dry" septic system.

Finally, there are the bridges, which are usually mobile and constantly adjusting to tidal level while connecting the watercourse with the house entrance. Usually, *miriti* trunks of up to 20 meters are attached (through perforations) to poles at both ends, thus allowing it to float up and down according to water level. Açai trunks are also frequently used either suspended and fixed or loose.

Since the early 1990s, families in the community of Praia Grande have invested considerable effort in constructing brick and concrete houses; by 1995, five houses had been rebuilt and by 2001, eleven of nineteen houses were built this way. Also by 2001, one Paricatuba family was constructing a brick/concrete house, built suspended and in the same style of their wood/palm house. Houses of durable material represent a symbol of status, and along with motor boats and second houses in the city, they are a preferred form of investment when possible. Even so, palms continue to play a central role in daily life and material culture (Figs. 4.7, 4.8, 4.9).

4.4 Palms and Fishing Gears and Techniques

Rivers, streams, and lakes are essential components of the Amazon estuary cultural and economic life. From the waters come important sources of food and economy. Fish is the main protein source for many rural and urban communities in the region. In the estuary, shrimp and fish are key components of local daily diets and household economies. Fishing techniques have evolved and adapted to exploit and take advantage of floodplain environments, tides, and diversity of rivers, expressing a deep understanding of fish ecology by local people. Fishing gears and baits involve use of local plants (palms, vines), synthetic fibers, and hooks. Shrimping and fishing require different techniques and strategies.

Matapi is the principal fishing gear used to catch shrimp. It is a cylindrical basket about 50 to 70 centimeters long, with small openings in each end. It is made of fibers from palm, *jupati* (*Raphia taedigera*), *miriti* (*Mauritia flexuosa*), and *jacitara* (*Desmoncus* spp.) and often tied with vines or synthetic threads. Matapis are placed along the rivers, tied on the mangrove vegetations with nylon ropes during fluctuations of daily tides. About 8 to 12 hours (depending on tides) after disposing the shrimp traps, the fisherman alone or with a helper return to collect his/her catch. In order to allure the shrimp, a *poqueca* bait made of grated coconut and wheat fibers wrapped in açai palm leaves is put inside a *matapi*. Children are encouraged to have their own *matapi* in order to learn the skills of shrimping. They also help daily their parents in the wrapping of *poquecas*. Once caught, shrimps are consumed in daily meals and or sold at the local market. Those not eaten or sold are kept alive underwater in *viveiros* (creel), or they are boiled or sun dried. In locally made and spacious creels (*viveiros*), shrimps are kept fresh until ready to be consumed. Viveiros are similar in the shape to *matapis*, only bigger (up to 1.75 meters in height and 30 cm in diameter). A piece of cortex from the *miriti* palm leave is tied to the cylinder to keep it floating.

Fishing techniques can be temporarily or permanently “fixed,” such as in the case of *cercos*, *curral*, *pari*, and *cacuri*. Gill nets, pools, lines, hooks are other common examples of fishing gears. *Curral* and *cercos* are “fenced loops” made of palms trunks and leaves and wood sticks tied with vines or nylon ropes into the form of an arm. They are built perpendicular to the river margin to capture the fish that come in when the tide is high and get stuck in the traps in the low tides. Fishing nets (*malhadeiras*) are usually made with nylon or plastic threads; their sizes and the size of their mesh vary widely depending in part on the emphasis a particular family puts into fishing. *Tarrafa* (“tossing nets”) is also

frequently used. *Espinhel* is an arrangement of hooks tied in a nylon thread (a nylon thread of 40 meters may contain 60 hooks), containing in one end a weight (usually a heavy stone) and in the other end a floating. It is used to catch fish of larger sizes, but at all depths in a particular river. Gears such as *zagaia* and *arpão de pesca* (spearheads) are most often used to kill fish trapped in nets or in fixed traps rather than being a stand-alone technique.

Montaria and *casco*, while used as exchangeable terms, may refer to canoes of different sizes. Both are also used for transportation. Made of hard wood, they usually measure 2–4 meters. Montarias are bigger than cascos, and also tend to be painted in colors and display a name on the gunwale (after the fisherman, or his/her lover or dreams and hopes). Montarias can be used with a small engine or adapted for sailing. *Cascos* are very small, often made of a single trunk, and are very agile for one or two paddlers. *Remos*, or canoe paddles, are all locally made using the light wood of the *pitaica* tree abundant in floodplain forests (*Swartzia acuminata*). *Canoas* and *barcos* usually refer to larger sizes of motor boats, most of which include separate rooms, some kitchen space, and cargo areas (including for cattle). Some of the larger boats, such as those used by large farmers in the area are extremely comfortable and require several crewmembers. Several shops in the area and from around the estuary specialize in building boats of all sizes.