Urban Ecosystems, 6: 67–97, 2002

The urban market of Açaí fruit (*Euterpe oleracea* Mart.) and rural land use change: Ethnographic insights into the role of price and land tenure constraining agricultural choices in the Amazon estuary

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Received January 7, 2002; Revised June 20, 2003; Accepted June 20, 2003

Abstract. This paper examines the recent development of the açaí fruit economy in regional Amazonian urban markets (as a staple food) and more recently among national and international consumers (as a fashion food) and the consequences for agroforestry intensification by Caboclo communities in the Amazon estuary. The paper is based on long-term ethnographic research and field experiments; the açaí fruit economy is discussed from agricultural, social, and economic perspectives; attention is given to its historical development, the structure of açaí fruit production, its agents, the relationship among themselves and the urban market. Decadal price performance is presented for açaí fruit and açaí transportation costs and compared to major agropastoral products for the Eastern Amazon region. Dominant views about the 'economic rationality' of rural producers' decision-making are discussed. Açaí fruit has performed as well as and in some cases surpassed most agro-pastoral products of the Northern region. Economic returns for producers reflect linkages between price signals from urban markets, harvesting decision, and land tenure condition of the producer. Urban markets for the fruit is expanding and bringing new participants to the açaí fruit economy further conditioning the ability of rural producers to take advantage of external markets for forest products. Discussion of factors conditioning agricultural development and integration between urban and rural areas conclude the article.

Keywords: Amazon estuary, urban markets, forest products, açaí fruit, *Euterpe oleracea,* Caboclos, land use, agricultural prices, land tenure

Introduction

Market demands for forest and agropastoral products have been historically one of the most significant elements underlying social and environmental change in Amazonia with strong implications to land use and livelihood strategies of rural populations. Although

international and national markets have historically dominated this process, more recently, regional factors, such as internal migration, urbanization, and, consequently increased demand for regional food sources have also assumed a greater role (Browder and Godfrey, 1997). The açaí palm fruit (*Euterpe oleracea* Mart.) provides an excellent example to this process. Population growth in urban Amazônia has created a market for regionally preferred food sources such as the açaí fruit, which is a key regional staple food and demanded by rural migrants living in urban centers. In the past few years, advertised as "healthy and fashionable food," açaí juice boomed in markets elsewhere in Brazil (Brondizio, in press). Impressive intensification of the production system has followed, thereby changing considerably the regional rural economic profile.

Interactions between these factors and land use are usually many-fold. On the one hand, urban population growth leads to changes in consumption patterns, which alter the demand for agro-pastoral products and natural resources. Directly (e.g., through internal demand) or indirectly (e.g., to attend external markets), urban areas in the Amazon estuary serve as hubs for transformation and service industries, by mediating consumption and production areas. On the other hand, it leads to changes in infrastructure, land value, and tenure arrangements in peri-urban and connected rural areas. However, explanations of how these changes spread from urban to nearby rural landscapes can rarely be generalized.

Urban growth and market demand have differentially influenced land users' decisions regarding intensification of the açaí agroforestry production system depending on several factors affecting and mediating production and market areas. For instance, market "signals" (e.g., increased prices) created by urban demand for a food product may lead to either intensification or extensification of land use activities in rural communities. Nevertheless, this is a decision actually "filtered" by household variables such as one's land tenure, access to production areas (e.g., floodplain areas), agroforestry experience, available technology, and household labor availability, thereby creating a diverse social response even within a single community. Thus, variation in market incentives and economic return among producers facing different constraints affects the rate, extent, and direction of land use change and intensification within the estuarine region.

Living in the Amazonian floodplains, Caboclo communities, the largest native, non-Indian population of the Brazilian Amazon, have experienced these processes for the past 150 years, mostly as "secondary participants" subordinated to large landowners as sharecroppers or as small farmers combining market and subsistence-oriented production. Dedicated to agriculture and agroforestry, forest extractivism, fisheries, and cattle ranching, they have been the main labor and production force providing the bulk of staple food and raw material goods for small and large urban centers in the region, and especially for exportation (Padoch et al., 1999). A clear example of that is the participation of Caboclo populations in the production of açaí fruit as discussed in this paper. Açaí is a top-ranked staple food in urban and rural areas of the Amazon estuary with major economic importance at both household and regional levels. It represents up to 30% of rural Caboclo's energy intake and it has become one of the most important export products of the Amazon estuary to other parts of Brazil. The consumption of açaí juice in the capital city of Belém, for instance, is twice as that of milk (Rogez, 2000; Poullet, 1998; Murrieta *et al.*, 1999; Siqueira, 1997). This paper examines the recent development of the açaí fruit economy in urban markets and

price change and its relationship to agroforestry intensification by Caboclo communities in the Amazon estuary. The paper is based on field experiments and ethnographic accounts of the socioeconomic structure of açaí fruit production, its agents, the relationship among themselves and the urban market.

In Amazonia, considerable attention has been paid to the economic performance of forest and agroforestry products in relation to other activities such as cattle ranching and logging (Peters *et al.*, 1989; Hecht, 1992; Anderson and Ioris, 1992; Homma, 1993; Pinedo-Vasquez et al., 1992). Less attention however, has been given to the medium- and long-term price performance of local products, and how these behave in relation to macroeconomic indicators such as inflation rates. Also, intra-seasonal and annual price performance, are important components of regional products that are not usually considered, and are frequently substituted for season-long and year long average prices (Muniz-Miret *et al*., 1996). Such indicators can provide good insight on long-term agricultural tendencies as well as a basis with which to evaluate levels of economic return for rural producers. However, the main difficulty in understanding the dynamics of a rural economy is the characterization of regional products with their own particularities, such as seasonality, production structure, and market peculiarities.

Using ethnographic accounts of market and production, archive and field experiments, this paper aims to discuss these issues at two main levels. First, at a regional level, it will focus on the relationship between daily and monthly changes in the price of açaí fruit over a period of ten years (1984–1995) and the regional increment in fruit production resulting from the intensification of açaí agroforestry. Data on the evolution of açaí prices will be compared to those of other major agricultural products of the region. A significant methodological contribution of this paper is to provide a strategy to analyze daily price data over a 10-year period where 5-currency changes (and an immensurable inflation rate) took place in Brazil. An Açaí price index and a transportation cost index were developed and are discussed. We structure our analysis within a nested framework, in order to organize levels of socioeconomic structure of the production system (e.g., regional market—middleman and market broker—producer [owner and sharecropper]) and processes linking these levels. Two main variables are particularly considered. First, price change representing "signals" from the regional market to the producer, and second, the producer's land tenure working as "filters" mediating a producers response (planting or harvesting) to price. Second, at a local/household level, we use data derived from eight experimental açaí production sites to discuss the revenue obtained from açaí fruit production as related to land tenure arrangements and the marketing of fruit production along the harvesting season. These data are compared to weekly and monthly açaí fruit price fluctuation along the harvesting season and the ability a producer has to decide (in the context of land tenure and access to urban markets) on when to place its yield on the market.

The discussion in this paper touches on important conceptual issues of Amazonian development. First, it presents a case where national and regional urban markets led to local land use intensification without leading to deforestation as elsewhere in the region. Based on locally developed technology, Caboclo communities have successfully increased the regional fruit production to attend an exponentially growing demand without the support of government subsides and development projects. Second, it shows the active insertion

of Amazonian Caboclos in regional economy while responding to long- and short-term market opportunities rather than being passive participants of regional labor force. Land tenure and access to market, however, remain significant factors constraining Caboclo's economic return for agricultural products. Finally, the açaí production system is an interesting case to show that in contemporary Amazônia market and consumption activities occur within a continuum rather than as opposing and conflicting activities. Up to recently, regional urban market has provided a relatively reliable venue for local products without disruption of rural household economy and consumption. However, the development of a large-scale economy is bringing new challenges to rural producers. As the production and consumption basis expands to urban areas elsewhere in Brazil and abroad, their ability to negotiate prices decreases even further. Access to transformation industries and new forms of commercialization will define the long-term benefits of this economy to the region and to rural livelihoods.

Background

The açaí fruit economy

One begins to understand the importance of açaí in the Amazon estuary (figure 1) when hearing people talking about the "magical flavor" of its juice and its importance in everyone's diet from babies to the elderly. Açaí is indeed, in addition to manioc, a regional staple food, and a vital energy source for regional populations (Murrieta, 1994; Murrieta *et al.*, 1999; Siqueira, 1997). Of equal magnitude are the dozens of uses provided by the plant as a whole (Anderson *et al.*, 1985; Strudwick and Sobel, 1988). It is used as raw material in buildings,

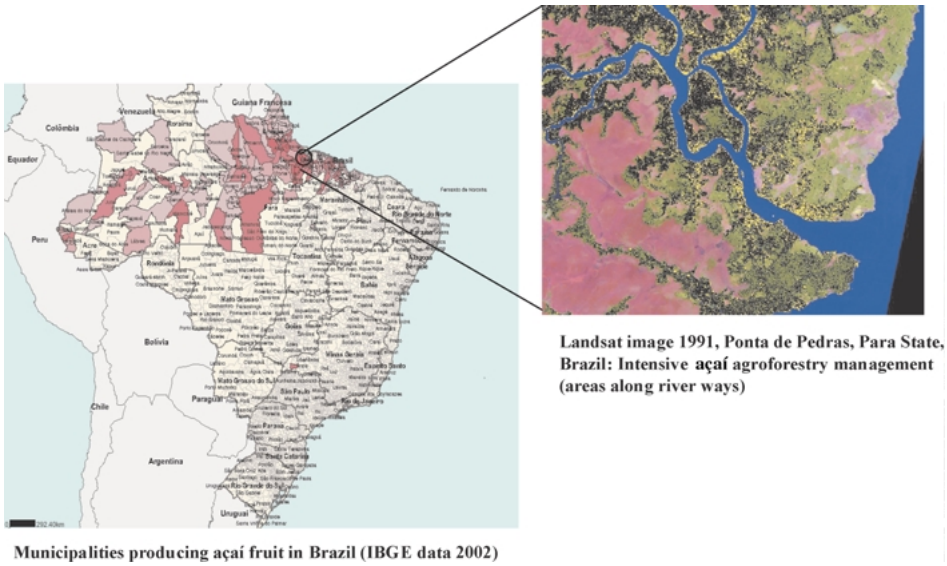

Figure 1. Açaí fruit production areas in the Amazon (IBGE data) and the study area.

household utensils, and medicines, among other uses, making it an essential component of estuarine daily life.

For analytical purpose, the expansion of the açaí fruit economy can be divided into five main phases relating to the progressive growth of its consumption basis and market (Brondizio, 2001; in press). In reality, these phases represent more of a continuum, than separate stages. The "pre-Columbian" phase represents the use of açaí resources by floodplain populations known to have occupied large areas of the estuary. The "rural staple food" phase represents the use of açaí products by post-1700's floodplain occupants living in isolated households, small rural communities and towns that developed during the missionary years and expanded after 1750 throughout the estuary. These populations actually constitute the production basis of açaí fruit then and now. The "urban staple food" phase is characterized by a boom in consumption of açaí as a staple food in large regional urban centers, particularly following post-1970 population growth and coinciding with urban expansion of the region as a whole. The urban "fashion food" phase began in the mid 1990 along with the popularization of other Amazonian fruits outside the region. The advertised energetic value of açaí juice has become a lure for youth's consumption in urban areas throughout the country. Finally, yet importantly, the "international fashion food" phase is still emerging as açaí is reaching international markets (Brondizio, in press).

Descriptions of the importance of açaí can also be found in European travelers' accounts such as those of Bates (1863/1983) and Wallace (1853). Bates notes the presence of açaí palms around riverine households as the most significant economic plant (1983:62). However, the uses of açaí can be traced to even earlier in estuarine history. Roosevelt (1989, 1992) describes the presence of carbonized açaí seeds in archeological sites such as *Aterro dos Bichos* on Marajó dating from the Marajoara phase (ca. 800–1000 AD). Considering its current domestic, regional, industrial, and export uses, açaí is the most important estuarine species, and indeed one of the most economically significant of all 232 Brazilian palm species.[1]

Despite its historical importance, it is only during the last 25 years that the so-called "açaí boom" has begun. The estuarine economy has gone through multiple cycles during the past 150 years, but one can argue that since the end of the rubber economy in the 1910s, only açaí resources (fruit and heart of palm) have involved as many people and had a strong economic significance.[2] Agriculture in estuarine floodplains, despite its potential (Lima, 1956), has been relatively modest in economic terms. Some important cycles were: rice, starting about 1917; sugarcane, starting 1920, with a peak between 1960 and 1975, followed by its decline; and lumber, beginning in 1956. To date, açaí fruit shares a top position in the regional economy.[3]

The so-called *açaização*[4] of the estuary symbolizes the importance that açaí agroforestry has gained during the last 25 years in the region (Hiraoka, 1994, 1999). The growth of the açaí economy is represented by two main industries, namely açaí fruit and heart of palm. Although sharing a common resource basis, *Euterpe oleracea* Mart., these industries have taken relatively independent paths and are based on socioeconomic structures not necessarily integrated. Despite other potential industrial uses, such as paper pulp (trunk), oil (fruit/pulp), animal food (fruit/seed), and ink (fruit/pulp) (Calzavara, 1972; Lopes *et al.*, 1982; Strudwick and Sobel, 1988), there has been no significant commercial application

of açaí besides heart of palm and fruit. However, it is important to consider the role açaí played during the 1960s in supplying fuel (use of stems as charcoal) to the brick (*olarias*) industries that prospered in the estuary during that decade, and even today in some areas, such as in Abaetetuba (Calzavara, 1972; Hiraoka, 1994).

The growth of the açaí fruit market can be traced to the late 1960s because of a number of processes taking place in the region. The most notable one relies on the expansion of the urban market, especially in the state capital, Belém. The rate of rural migration began to increase drastically in the region during the late 1960 and early 1970s, bringing to the urban periphery a large contingent of rural families. Belém's population has grown from approximately 300,000 in the 1950s to nearly 2,000,000 today, mainly composed of low-income inhabitants living in floodplain areas surrounding the city. To the city, rural inhabitants brought their food intake habits, strongly based on açaí. In addition to its overwhelming consumption by low-income populations, açaí is valued by other socioeconomic urban classes, not only in the form of staple food, but as a delicate dessert (ice cream, pudding, liquor, cake, among others). For a detailed ethnographic account of açaí uses see Strudwick and Sobel (1988).

As shown in figure 2, according to IBGE (Instituto Brasileiro de Geografia e Estatística) data, açaí fruit production increased five-fold during the period from 1975 to 1991.[5] As mentioned before, there seems to be a close correlation between fruit production and urban population expansion. Today, açaí consumption in Belém and connected urban areas is twice as that of milk, or an impressive average amount of 60 liters/person/year (Rogez, 2000). Of the total Brazilian production, more than 95% comes from the state of Pará.

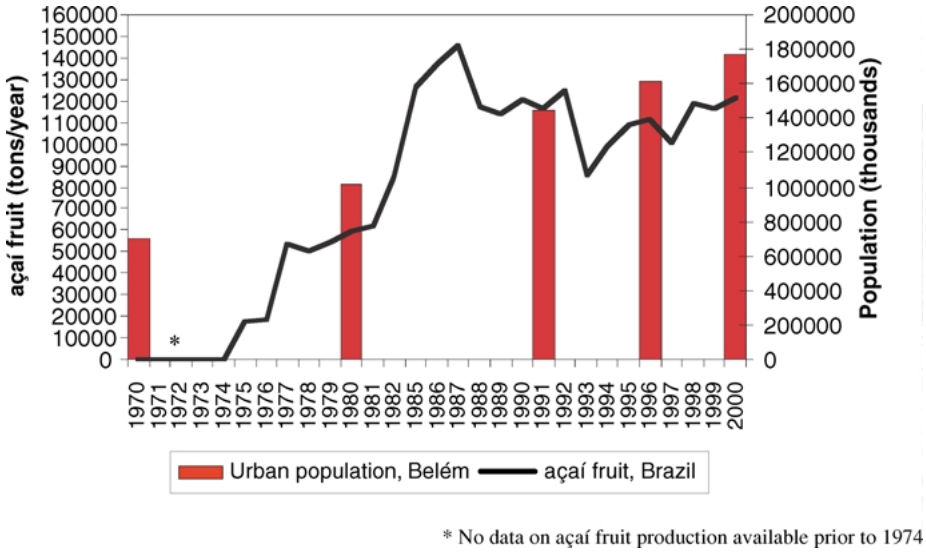

Figure 2. Açaí fruit production (1974–2000) and population growth in Belem and surrounding urban areas (1970–2000) Source: IBGE.

An important advance in the growth of the açaí economy was the development and dissemination of electric machines used to process açaí pulp to make *vinho do açaí* (açaí juice, not a fermented product). These machines replaced the *amassadeiras de açaí* (women who crush the fruit by hand), and hand processors made of wood in the commercial setting, but are still the main means of processing in rural households. Manual açaí processing requires hard labor and could not handle large quantities of fruits as required by the large urban market.

Today, açaí fruit is the most important income source for a vast majority of riverine households. One can confirm this by looking at data from the regions of Ponta de Pedras (POEMA, 1994), Abaetetuba (Hiraoka, 1994), and the islands (e.g., Ilha das Onças) (Anderson and Ioris, 1992). In a Ponta de Pedras community for instance, açaí represents 64% of household income generated from agricultural products (including rice, beans, and coconut). In Abaetetuba, açaí fruit is responsible for 50% of the household income of families involved in agroforestry, whereas in Ilha das Onças, açaí reportedly represents 63% of the income generated by commercial products (POEMA, 1994).

Along with its key economic importance, açaí production is overcoming a series of constraints. First, its consumption area is growing recently beyond the estuary. In recent years, one can find açaí juice in any major and medium-size Brazilian city, a scene non-existent just a few years ago. Second, it is highly perishable and is unusable for consumption three days after harvesting. However, with the increased value of the fruit in relation to other regional products, production areas are expanding, as well as conservation methods are being improved. Now-a-days, one can find production areas in more isolated areas of Marajó island, that lie sometimes three to four days from Belém by boat. In addition, freezing and drying methods are being improved to cope with export demands to other parts of Brazil (Rogez, 2000). In summary, the açaí fruit economy has created a complex network of production, transaction, processing and consumption providing a socioeconomic fabric in whom rural and urban areas connect producers and consumers in several ways (figure 3).

Intensification of management and production

Açaí agroforestry management has been the focus of a considerable number of studies in the Amazon estuary, especially after the 1980s when a marked increase in fruit production could be perceived (Calzavara, 1972; Lopes *et al.*, 1982; Anderson *et al.*, 1985; Jardim and Anderson, 1987, 1988; Murrieta *et al.*, 1989; Jardim, 1991; Anderson, 1990, 1991, 1992; Anderson and Ioris, 1992; Peters, 1992; Neves (ed.), 1992; Jardim and Kageyama, 1994; Hiraoka, 1994; Brondizio *et al.*, 1993, 1994, 1996; Moran *et al.*, 1994; Brondizio and Siqueira, 1997; Brondizio, 1999). Despite such attention, many aspects of açaí agroforestry systems are still to be revealed, such as a better understanding of levels of management intensity, spatial distribution of managed areas, and associated planting techniques.

Açaí palm occurs in abundance in estuarine floodplain forest, varying in density and distribution depending on environmental and anthropogenic factors. Different management and planting strategies transform these areas into açaí agroforestry, or as termed locally *açaizais*. The term encompasses different intensities of management, tree, sapling, seedling

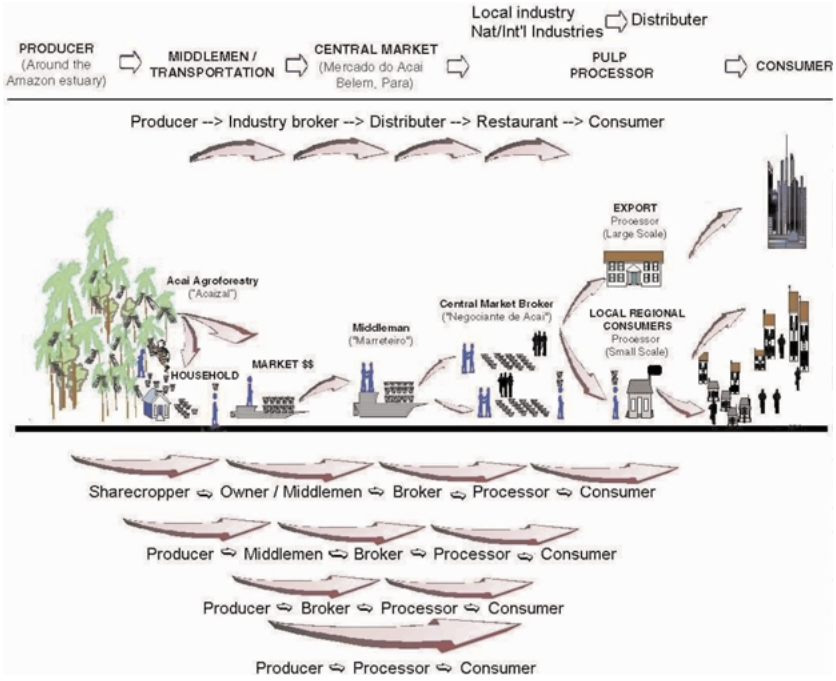

Figure 3. Producer-consumer commodity chain of açaí fruit. Adapted from Brondizio and Siqueira (1997).

population densities and structure, as well as a diverse range of species composition. Despite its variability, the *açaizal* is designated in this work açaí agroforestry. The term agroforestry is used here to designate the temporal and/or spatial association between wood species (e.g., açaí, rubber, coconut, hardwood) and non-wood species (e.g., banana, medicinal plants), and husbandry (e.g., swine and ducks) in a given area under human management. This description follows the international definition of agroforestry systems accepted by the International Center for Agroforestry Research (ICRAF, 1983).

The three main means of açaí agroforestry development are: (1) management of native stands; (2) planting of açaí stands following annual or biannual crops, that is, *roçado de várzea*; and (3) combined management and planting in native stands. Management of native stands can be understood at two different levels: forest stands and plant levels. At the forest stand level, thinning and weeding techniques are used. At the plant level, management focuses on pruning techniques. Planting, however, involves both the forest and plant levels. Nevertheless, one needs to account for the use of these techniques in similar fashion in planted açaí agroforestry. During the development of the açaí stands, weeding and pruning are used to encourage the development of seedlings and to control the density of stems per clump. These techniques are maintained continuously over the years during the formation of a mature açaí stand, which over time is also subjected to thinning of wood species such as in other managed sites. In unmanaged floodplain forests, açaí stems contribute less than 15% to total stand basal area, and represent less than 20% of total individuals.

As management proceeds, this contribution tends to increase to a level of 50% of total biomass, and up to 90% of total number of individuals (Brondizio, 1996). Few changes in basal area occur in the first three years of management, but açaí tends to reach the density and significance mentioned above in five years. It is interesting to note the maintenance of basal area in similar levels in both floodplain forests and açaí agroforestry. Management does not radically change stand biomass but instead influences which species contribute to it. Basal area ranges from 29 to 31 m^2/ha in floodplain forest. In açaí agroforestry, it ranges widely from 22 to 41 m^2/ha (Brondizio, 1996; Brondizio *et al*., 1996; Brondizio and Siqueira, 1997).

As previously discussed, one of the main targets of management is balancing the proportion of stems per clump. Anderson *et al.* (1985) found that floodplain forests average 9.5 stems/clump while açaí agroforestry generally averages 6.5 stems/clump. Calzavara's (1972) management recommendations argue that five stems/clump is best for fruit production, but a higher number may be suitable for heart of palm production. The main goal is to maintain productive individuals in the clump, while at the same time given growing stems a place to develop. In general, açaí clumps growing in closed areas tend to have a larger number of stems per clump but unbalanced distribution of DBH classes within the clump. One may find up to 15 stems per clump in such situation although this is not the rule. It is also common to find only a couple of mature stems surrounded by a large number of offshoots per clump in floodplain forest. The main difference, however, is the number of productive individuals in relation to growing stems. While in floodplain forest one may find a large number of mature tall stems in açaí agroforestry the shorter stems dominate. However, one may also find a large number of stems per clump in açaí agroforestry. As producers often say, a clump can hold a large number of productive and short stems when properly managed. In general, however, most producers maintain 4 to 5 stems per clump depending on clump age and stem height.

Experimental site data used in this paper and discussed elsewhere (Brondizio, 1996; Brondizio and Siqueira, 1997) closely corresponded to the patterns found in relation to level of management at the sites. The three basic groups of açaí agroforestry associated with clump density can thus be related to fruit yield/production. Group 1, occurring in unmanaged sites evidenced an average of 200 clumps/ha. In this group, the average production was about 1,390 kg/ha/yr, that is, an average of 115 fruit baskets/ha. Group 2, occurring in initially and intermediary managed sites had an average of 550 to 650 clumps/hectare. In this group, production varied between 2,600 to 3,800 kg/ha/yr, i.e. an average of 266 fruit baskets/ha. Finally, group 3, characterizing more intensively managed sites had an average between 900 and 1,200 clumps/ha. In this group, production varied more widely from 6,400 to 12,000 kg/ha/yr, an average of 760 fruit baskets/ha.

Some comparison can be made between the production figures from Ponta de Pedras experimental sites and other sites cited in the literature. For instance, considering the number of clumps/hectare presented by Jardim and Anderson (1987) (between 131 and 200 clumps/ha), output production is consistent between the two studies. While their estimates range from 1,158 to 2,437 kg/ha/yr, this work experiment an average of 1,390 kg/ha/yr for the same density of clumps. The same analogy seems to be true when compared to the work of Peters (1992).

Compared to Hiraoka's work (1994), however, similar density of clumps (between 550 and 650/ha) correlated with lower output production in Ponta de Pedras. While he estimates an average production of 8,250 kg/ha/yr, we found in Ponta de Pedras an average of 3,200 kg/ha/yr in areas of similar clump density. Moreover, it should to be considered that Hiraoka's estimate is derived using the assumption of average production of açaí baskets per hectare (approximately 550) and on an average basket weight of 15 kg. The average basket weight measured in Ponta de Pedras was 11.3 kg, not 15 kg. By changing this figure, his estimate drops from 8,250 to 6,215 kg/ha/yr, a figure closer to that of Ponta de Pedras. There is no data available to compare highly intensive sites, that is, those with clump densities greater than 900 individuals/ha. At this level, the data indicates an average production of 9,206 kg/ha/yr, a figure similar to that initially presented by Hiraoka. This suggests that his data may come from intensively managed sites.

Feira do Açaí—The urban açaí marketplace and the dynamics of daily price

The bulk of açaí fruit production goes to Belém, the state capital, while a smaller portion is sold to local dealers around the small towns in the estuary. Belém's main market, *Feira do Açaí*, concentrates production from all over the estuary and from the state of Maranhão, which makes it a rather large market compared to other regional products. At the peak of the harvesting season, the number of açaí baskets (paneiros) in the market reaches 10,000 to 15,000 per day, the equivalent of 150 to 180 metric tons/day of fruit being negotiated for local consumption and exportation to other parts of the country, such as Rio de Janeiro, São Paulo, and Brasília. Macapá (Amapá State) has also considerable production and is growing in importance nationally (Poullet, 1998).

Açaí fruit production has two main seasons around the Belem market: summer (August to January) and winter (March to July). Seasonality is closely associated with price fluctuation and economic return for the producer as later discussed. However, the expansion of production to the wider estuarine region (to the West in lower Amazon region, to the North in the state of Amapá, and to the East in the state of Maranhão) has allowed continuous supply of the market along the year. Still, demand tends to exceed production during the off-season of Southern Marajó Island and regions nearby the capital city of Belém. Also important in terms of price is the variation in quality of the fruit, particularly for the refined taste of regional consumers of açaí fruit juice ("vinho de açaí"), a problem less eminent for export market based on frozen pulp and addition of guaraná syrup and other fruits.

The market is organized around brokers that share different lots on the ground of an open area nearby the famous *Mercado do Ver-o-Peso* on the shore of Guajara Bay. Sharing space with the açaí brokers are an amazing number of boats and numerous stands selling food, coffee, cigarettes and liquors that gives a particular dynamic to the marketplace. To a much lesser degree, usually off to one side are dealers in fish, game, and all sorts of forest fruits and products. During the main season, one can find up to 100 brokers of all sizes and kinds and around 300 *carregadores* (manual transporters) working exclusively with açaí.

As for many other activities in the estuary, the açaí market is closely related to tidal variation, since the vast majority of açaí comes by boat. The market starts during the night, at no fixed time, other than that of the tides, which allows middleman and producers to dock.

Each broker usually works with a crew of *carregadores* that unload boats during the first hours of the morning and load cars and trucks as dawn approaches. On days with low tide, this activity can be extremely difficult, since they need to walk a long stretch in deep mud carrying a heavy load of baskets that may weigh to 40 kg or more on their heads. *Carregadores* arrive at the market before brokers to unload and prepare açaí stands before sales begin. Between midnight and the wee hours, one can find a number of *carregadores* sleeping on improvised beds on the ground waiting for the right time to unload the large contingent of boats waiting in the bay. A good *carregador* can transport from 200 to 400 baskets during a single day of work, which represents a good income during the harvesting season. It is common to find *carregadores* earning up to half the national minimum monthly wage per day during the peak of the season when "mountains" of açaí need to be transported in the market.

There are two basic arrangements between middlemen, producers, and market brokers. Generally, the same producers and middlemen supply brokers during the whole season, thus insuring a relatively stable supply that guarantees business between brokers and processors. The most common arrangement is set up on the basis of daily prices, whereas the use of fixed-price contracts can also be found between brokers and producers. During the winter season, when prices can increase considerably, producer-broker negotiations take place daily. Producers and/or middlemen want to take the best advantage of scarcity, while brokers want to guarantee continuous supply to provide processors with fruits, thus urban consumer demands. In some cases, brokers also agree to supply producers with basic needs, such as manioc flour, since it can be found in Belém at much lower prices, when compared to nearby towns' markets.

There are different types of relationships between broker and processor. Most processors prefer to work exclusively with one broker, but such exclusiveness is not always the case during the whole season. Large processors with more than one processing machine generally need to rely on more than one supplier to fulfill their demand, whereas small processors can select brokers on a daily basis. Although the most common transaction is based on daily payments at market prices, some larger brokers have created credit-like terms to supply certain processors season-long. In general, processors relying on broker credit pay slightly higher prices compared to others. A processor selection of a specific broker takes into account not only credit but also factors such as reliability, quality, and precedence of açaí fruit.

A more recent category of processor is the "exporter". Exporters are dedicated to buying, processing and freezing açaí pulp to export to Brazilian capitals such as São Paulo, Rio de Janeiro, and Brasília. This has become a profitable and growing business during the last few years with the increased demand for Amazonian fruits in other regions of Brazil, exemplifying the "fashion food" phase mentioned before.

Methods

Over a period of five years of research in Ponta de Pedras,[6] Marajó Island, Pará state (see figure 1) we have had the opportunity to observe different harvesting seasons of açaí fruit. This includes different parts of summer and winter seasons during different years from 1989 to 1995, and short visits in 2000 and 2001. However, the bulk of the data presented

here reflects the harvesting season (summer) of 1994–1995, during which the first and third authors had the opportunity to study açaí-related activities on a daily basis from August of 1994 to December of 1995. Data from January to April of 1995 were collected on a later visit to the area (June 1995). During all these periods, we took part in management and planting, market activities, harvesting, transportation, and processing. As part of the work, different interviews were carried out with different sectors of the açaí economy, such as small, medium, and large producers, and with different categories of sharecroppers, market brokers, *carregadores* (porters), local and itinerant middleman, and processors and exporters.

During this period, a number of small, medium, and large producers collaborated with the research by making available to us their valuable notebooks containing production data, the daily price of açaí fruit, the daily price of transportation, and the periodicity and schedule of harvesting during different seasons. This information is incredibly precise in relation to price and harvesting, since it was recorded each day for their personal accounts, and thus does not contain any "made-up" figures that might, for instance, be introduced to evade tax liability. It was possible to acquire reliable data from 1984 to 1994. Five producers collaborated with data for this period (or part of it), which made it possible to crosscheck price information among different producers. In case of variation, an average price of the five producers was taken. It was also possible to extract information about the beginning and end of each harvesting season in different areas and years. Archival research was done at IBGE headquarters in Belém.

Açaí price index (API), and Açaí freight price index (AFPI)—Adjustments, development and comparisons

The price of açaí fruit and transportation (from Ponta de Pedras to Belém) was adjusted in relation to currency changes over the past 10 years. The Brazilian currency has changed five times during this period, thus requiring rectification of values before any price index could be derived.[7]

Since the prices of açaí fruit and transport were available for different days of each month, the next step was to calculate a monthly average price comparable with other monthly indices, such as the agro-pastoral index provided by the Fundação Getúlio Vargas (FGV). Two indices were developed: Açaí Price Index (API) and Açaí Freight Price Index (AFPI). The most crucial step towards the calculation of these indices was the selection of an adequate baseline date for the index (e.g., Baseline Date = 100). Given the seasonal variation, the selection of a baseline date in the beginning of the harvesting season (i.e., lower prices) makes the index likely to present bias toward too high values in the following months, the opposite occurring if a price in the end of the season (higher prices) is chosen. For that reason, the average price during the 1994-harvesting season was selected as the baseline. In other words, the average price during the 1994 harvesting season was considered equal to one hundred (AVG 1994 = 100), and all variations in prices were based on that. Among other reasons, 1994 was selected as the baseline date because a larger number of price records were available for the period; prices were personally recorded by the first author and the season carefully observed during fieldwork, in addition, it was a relatively regular

season (i.e., no shortage or surplus was recorded). After currency adjustment, averaging, and selection of baseline date, both indexes (API and AFPI) were calculated for the period from 1984 to 1995.

A second important step was the selection of other indices for comparative analysis of the evolution of açaí prices. One index was selected as the most relevant for comparison due to its regional characteristics: IPA-PA (Agricultural and Husbandry Price Index for the Pará state), published monthly by FGV. This index is the official indicator of prices received by farmers in Pará State for agricultural and husbandry products. Its regional focus is especially important since it more closely reflects the economic context faced by açaí producers. The index is based on the price received by farmers for 24 agricultural products (including annual, biannual, and perennial crops) and seven husbandry products (including beef and poultry). However, açaí is not included. The selection of these products was based on the Agricultural and Husbandry census of 1980 (Conjuntura Econômica, March, 1992:105). The same index could not be used for the period between 1984 and 1986, since it was based on a methodology differing from the period of 1986 to 1995.

The selected index (IPA-PARA) was adjusted to the same baseline date as the API and AFPI, (i.e., average 1994 = 100). Two types of comparison were carried out. First, direct comparison of each index showing the evolution of prices for the period. Second, ratios API/IPA-PARA and API/AFPI were developed to show, roughly speaking, the evolution of açaí's relative prices. Relative prices show the relationship between the prices of two sets of goods. By comparing these price indices, we try to measure the performance of açaí prices as compared to other prices in the economy. This is especially important in a high inflation country, as was the case of Brazil during the period under study. If the ratio is equal to 1, it means the prices of açaí are keeping up with the prices of other agricultural products in the state of Para. If it is greater than 1, it means açaí prices are rising more than those for other products, and thus there is a relative price change favoring açaí, and vice-versa if the ratio is less than 1. It is important to note, however, that price indices such as IPA-PA represent an average, including products that maintain both vigorous and weak price performances.

Production experiments

Four açaí producers, two small owners, one cooperative member, and one sharecropper, agreed to set up experiments in areas of açaí agroforestry and floodplain forest subjected to different levels of management. This process started in August of 1994, before the beginning of the harvesting season. Experimental plots were located based on the producer's indication of the site and on the analysis of area boundaries and characteristics. At each site, a 25×25 meters plot was marked. For plot delimitation, a rope was used to "fence" the plot out and restrict the use of the area only for experimental purposes. A subplot of 10×10 meters was set up inside the plot and marked in the same way. Subplot location was based on a random selection. Description of each site, location, data collection, and producer characteristics can be found in Brondízio (1996).

Each producer was trained according to our experimental procedures. A notebook was prepared for each producer to use during the harvesting season. The orientation involved a

clear statement of the goals of the experiment, including how to use a scale for weighing and how to take appropriate notes concerning the weight of fruit bunches, individual fruits and baskets, as well as how to account for the number of trees and bunches harvested. A 20-kg-spring scale with 250-grams intervals was used. The producers agreed to monitor (weigh) the yield from that plot. However, the vast majority of time (80% of harvesting days), the first author was present to measure yield with the producer during the harvesting at all the sites. Harvesting date was the producer's decision and based entirely on their marketing schedule. The beginning and end of each harvest was recorded.

Production estimates and revenue

In order to estimate production revenue obtained from of each site, two factors were taken into account: percentage of monthly production in relation to total production harvested during the season, and average monthly price. Açaí prices fluctuate considerably during harvesting season, and thus one needs to take into account such variation when measuring the potential receipt/revenue from production. The producer's ability to schedule harvesting distribution can result in higher income, and such ability depends on land tenure structure. To account for that, the estimate of receipt in the experimental sites was based on the distribution of harvesting during the season. The producers agreed that harvesting would only take place depending on their own market schedule. This allowed us to estimate the differential prices during various harvesting days. Based on that, a monthly percentage of total production was calculated. The monthly percentage of production was then multiplied by the average monthly price of açaí fruit at the Belém market. Production cost includes mainly the cost of transportation. When present, contracted labor was paid in açaí fruit yield, therefore allowing us to subtract its equivalent from one's daily harvest.

Results: Comparing price performance: Açaí fruit price index (API), açaí fruit freight price index (AFPI), and agro-pastoral products price index for the state of Pará (IPA-Pará)

Açaí price: Coping with long-term and regional trends

The açaí price index for the period 1984 to 1995 is presented in figure 4. As the figure shows, the pattern of increase is strongly marked by seasonal variation of fruit production. It reflects a general pattern of supply exceeding demand during the peak of the production season followed by the opposite trend towards the end. This tendency of continuous price increases towards the end of the season follows a pattern similar to that of other agricultural products. However, other factors strongly influence price variation in açaí fruit. First, one needs to consider the levels of national inflation as associated with price adjustments in addition to supply dynamics. Second, açaí has been only recently subjected to storage (e.g., large scale freezing methods), as have other fruits or grains, and thus entering into a new phase of market regulation by manipulation of stock and commercial control. Still, this represents a limited portion of the total production, which is sold fresh in the

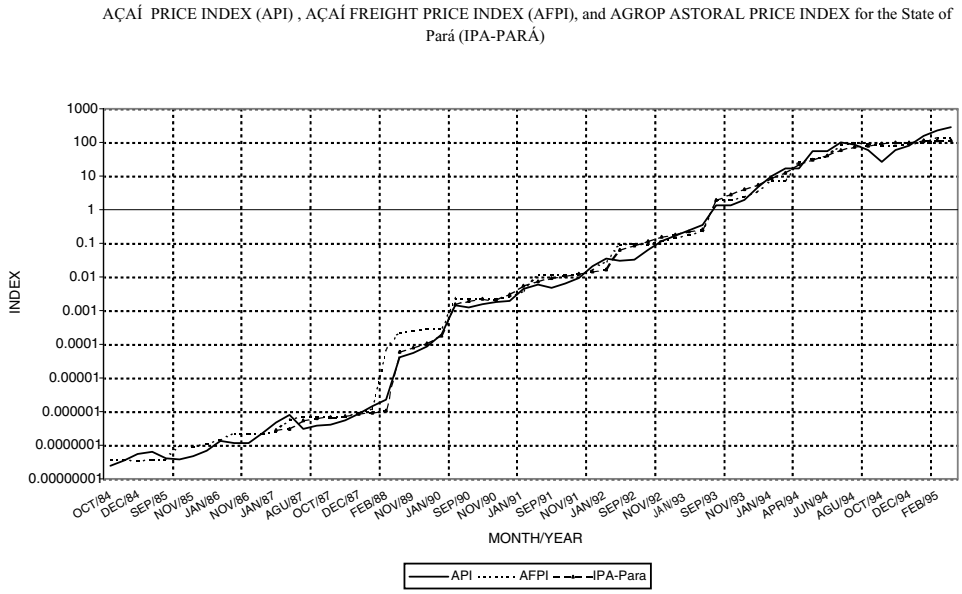

Figure 4. Açaí price index (API), Açaí freight price index (AFPI) [both from field data], and agropastoral price index for the State of Pará (IPA-Pará) [FGV data]: 1984–1995 (adapted from Brondízio, 1996).

regional urban market. This type of price control has been more common to products such as the heart of palm (from the same palm species), which can be regulated by canning industries. Also recently is the increase in competition from other production areas that are progressively offsetting seasonal variation in prices. In other words, up to 1995 açaí prices has followed supply and demand regulations of the regional urban market, a situation that is changing at a fast pace not always to the benefit of rural producers (Brondízio, in press).

In order to put açaí prices into perspective, one can compare them with other indices, such as the Agricultural and Husbandry Index for the state of Pará (IPA-PARA), both shown in figure 4. The figure shows a similar growth of both indices. This is an important parameter in the success of the açaí economy over the ten years period of the study. The açaí price index has followed and surpassed the inflation rates of the main rural products of the state; and based on the authors' experience, both seem to follow the general pattern of official inflation rates, measured by yet another index. More interesting is to focus on the seasonal gain of API over IPA-PARA. It shows that the season's second half is marked by a higher performance of açaí over IPA-PARA. This stresses the importance of the seasonal dynamic of açaí and the different market opportunities created by such a pattern. Control over harvesting period during the season is the main hedge of açaí producers against low prices and inflation.

Figure 5 shows the ratio between API and IPA-PARA, representing the performance of one index over the other (also shown is the ration between API and AFPI). Overall, açaí producers seem to have received a better price than the average price of all agricultural

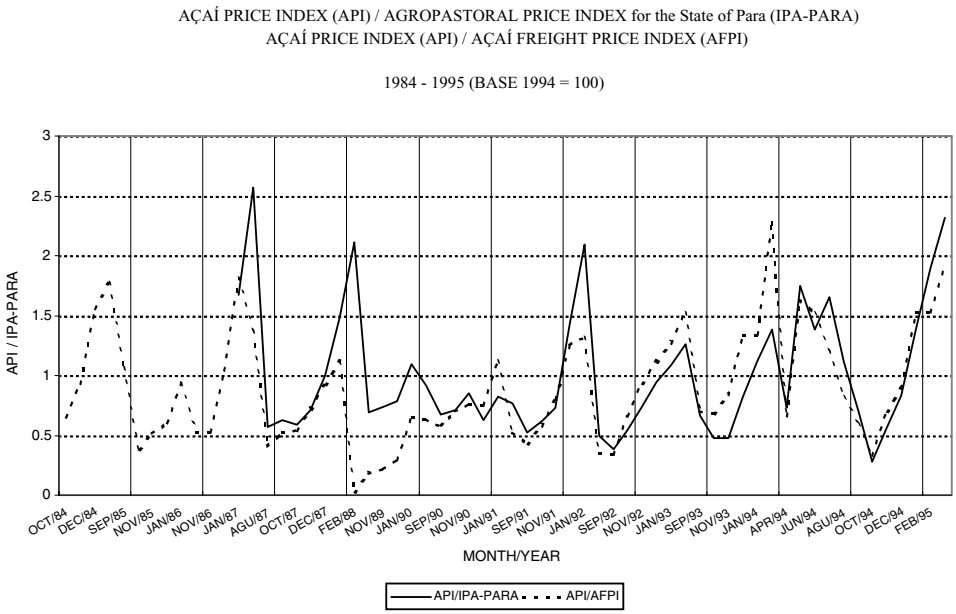

Figure 5. Açaí price index (API)/agropastoral price index for the State of Pará (IPA-Pará); and açaí price index (API)/açaí freight price index (AFPI). API and AFPI [derived from field data], IPA-Pará [FGV data]. (Adapted from Brondízio, 1996)

and husbandry products of Pará. Analyzing the evolution of this ratio, we can see that açaí producers had an incentive to grow açaí, as its prices have followed those of other products, and during the end of the harvesting seasons, even surpassed them. We can, roughly speaking, assess the different opportunities Caboclos face, and whether the choice of intensifying açaí production has an economic basis reflecting trends in regional markets. However, the index reinforces seasonal characteristics of açaí production and price. A close look at the last two seasons gives a clear idea of the monthly variation in açaí prices as compared to IPA-PARA. Despite the average higher performance of açaí over other agro-pastoral products, one can see a clear disadvantage during the first three months of harvesting and a recovery after the second half of November. Again, one has to bear in mind that the IPA-PARA is an average of different prices, what causes the series to "flattens out", given the different seasons for the products used in its calculation. Understanding the seasonal variation of açaí price gives a different perspective to the economic evaluation of a producer's performance. In order to evaluate the revenue/receipt producers receive with açaí, one needs to distribute their gain over the percentage of harvesting each month. In order to calculate the income of açaí producers, the average price must be weighed balanced by a factor of monthly production. In other words, the producer's income depends on the percentage of total production one can put into marketing at different periods of the season, and as we are going to argue later on, this depends on one's land tenure structure.

A second basis for comparison is the performance of API over the cost of transportation of açaí, that is, AFPI, as show in figure 5. Similar to IPA-PARA, AFPI and API have shown similar price dynamics on the last ten years. Generally, API exceeds AFPI during the second half of the harvesting season. Freight costs tend to represent between 5 and 25% of the gross return of açaí according to the period of the season. In addition to the close association of freight price with açaí price, freight is also adjusted with other prices, such as fuel. Although açaí seems to have enjoyed some price advantage over other products (e.g., IPA-PARA), it has not been able to overcome its own freight price inflation during the peak of the season when fruit price is lower. This is shown in figure 5 that illustrates the ratio between API and IPA, and, API and AFPI. During this ten year period, açaí prices seem to have evolved below average freight prices. This is an infra-structural indicator of the açaí economy. There is a great dependency on transportation, which is reflected by the exchange terms between API and AFPI. Açaí producers are subjected to different types of relationships to middlemen depending on distance to the market and type of land tenure. Distance has also to do with the characteristics of the fruit since it spoils a short time after harvesting depending on weather and storage during transportation (from 1 to 3 days). This is an indicator that middlemen are still the main link between riverine producers and their markets, however filling a gap on the lack of infra-structural support for açaí producers.

In this sense, middlemen play a paradoxal role in the estuarine economy (and in the Amazon in general). While capturing expanding revenue to their control of transportation and possibly seasonal buying and personal credit (establishing different levels of dependency and social-economic control), they also fulfill an important gap in linking riverine producers to different types of markets and exchange systems. As discussed later, riverine producers have as one of their preferred investments the purchase of motorboats, which allow some of them to bypass middlemen. Actually, during the off-season of açaí fruit many producers and young adults choose to work as middlemen covering even further distances to include other products such as fish and game meat (e.g., from lake Arari in central Marajó Island), manioc flour, fruits (e.g., mango, pineapple, watermelon), ceramics, and virtually all sorts of other products. Sometimes they use their trading trips to expand their wife's network to sell Avon products (on a side note, Avon has an incredibly commercial network of individual sellers that link urban distribution centers to the furthers corner of rural areas). Becoming a trader and middlemen is a goal of many sharecroppers as well as small owners' kids who see limited possibilities in their own farming activities.

Land tenure, market relation and distribution of harvesting

Figure 6 presents the distribution of the percentage of harvesting during each month of the season for each of the experimental sites and shows the respective revenue/site/month. The season stretched from September to February considering all experiments, although clear variations existed between areas. The main difference is related to land tenure. The small owners spread harvesting out over the whole season, and thus have the chance to wait for higher prices. The sharecropper producer was ordered to harvest completely his production area, including the areas in which both experiments were set, mostly during

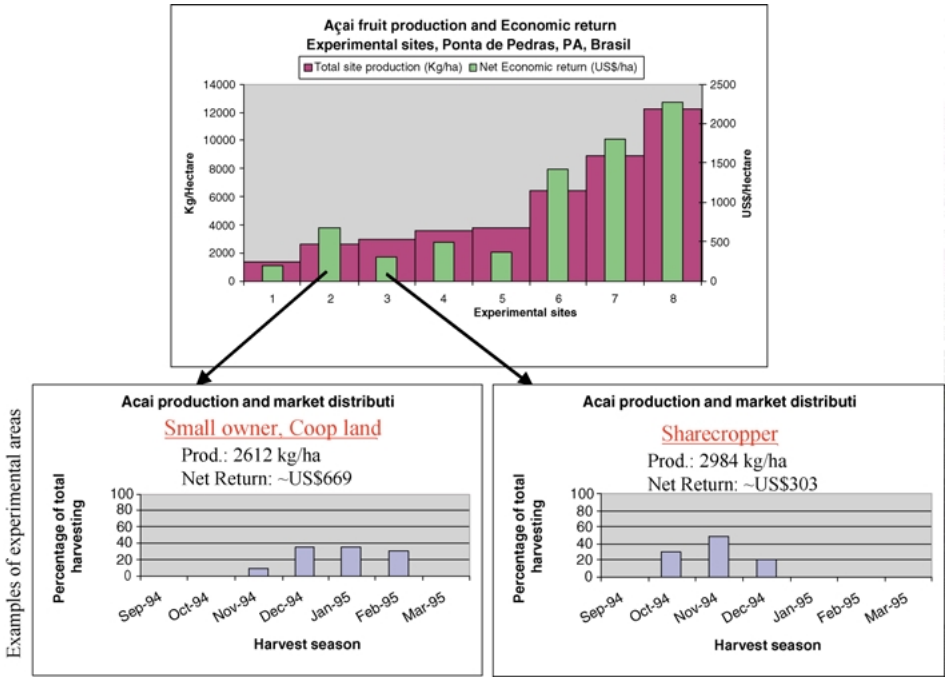

Figure 6. Economic return in experimental production sites (production season 1995/1995).

November and December. During this period, açaí attains its lowest market price. These differences accounted for large variations in revenue. In addition to low prices during the months of October and November, the cost of transportation during this period was higher in comparison to fruit prices.

The resulting revenue is more related to harvesting period than to total area of production, as one can observe in figure 6. Areas with lower production (e.g., site 5) provided better revenue than areas of higher production, such as sites 7 and 8, due to the producer's ability to harvest later in the season. "Net revenue" per hectare varied from US$ 203.60/ha/year (unmanaged site) to US$ 2,272.70/ha/year at the most productive site. However, within the same group (total yield of fruit), for instance sites 5, 8, 2, and 7 (production between 2612 kg/ha to 3,568 kg/ha) revenue varied from US$ 303.70/ha/yr to US$ 669.80/ha/yr as a function of harvesting and selling period, closely related to land tenure.

This data is compared to most of the figures presented in the literature. Jardim and Anderson (1987) calculated average revenues (discounting cost of management) between US$ 235.20 to US$ 371.50/ha/yr for areas producing about 1,158.8 to 1,854.8 kg/ha/yr. These figures are comparable to those for the unmanaged site. For an area producing around 2,437.6 kg/ha/yr, they estimate revenue of US$ 504.60/ha/yr, a figure comparable to those for sites 5, 8, 2, and 7. Hiraoka's estimate of gross revenue corresponds to US$ 946/ha/yr. Ours is a satisfactory estimate, since it is intended to be an average return, thus placing it in between intermediate and intensively managed sites.

Urban demand, price variations, and the economic return for producers: The role of markets negotiations, fruit seasonality, and land tenure

The evolution of açaí prices during the last decade has shown a respectable performance, even when compared to all major crops and husbandry products in the state. Another important point is the consistent market for the product during the last decade, which shows signs of a well-structured production system. Production has increased significantly five to six-fold during the past 15 years based on management and planting, rather than extraction from untapped sources. The increase in production and price maintenance have been followed by the emergence of a socioeconomic organization around production, distribution, marketing, and processing, introducing a regional class of producers and workers emerging from a history of extractivist economies but now functioning as a category of agricultural producers. More recently, along with the expansion of the açaí fruit as a fashion food in other parts of Brazil and abroad other urban entrepreneurs have entered the economy, such as industrial processors and commercial brokers.

Caboclos are generally regarded as insensitive to market opportunities and are frequently questioned about the "rationality" of their economic behavior. Interestingly, new participants in the açaí fruit economy usually place themselves—for new groups of consumers outside the region—as the ones "discovering" the açaí fruit economy and bringing entrepreneurship to the system, thus reinforcing the stereotyped views of rural producers' economic rationality (Brondizio, in press). A close look at the açaí fruit economy and marketing shows signs to the contrary. During the last ten years the price of açaí fruit seems to have surpassed, on average, regional agricultural inflation. This performance supports the efforts Caboclos are putting into açaí agroforestry as their main economic activity while providing the backbone of the most significant agricultural economy of the Amazon estuary. Market demand and price changes have been the main motivation for the Caboclos' decision to implement açaí agroforestry as their main agricultural activity. Caboclos' decision for agricultural intensification is strongly connected to market opportunities and prices, as well as to their technological ability to implement such a decision. However, several factors mediate interaction between urban markets and farmer's land use decisions, including factors affecting price, such as seasonality and fruit supply/demand in the main market, and factors affecting the economic return of production such as land tenure, access to transportation. More recently, control of stocks, such as in the form of frozen pulp, has started to play a significant role and in the long-run will tend to offset seasonal strong variations in price.

The role of seasonality

In order to understand the dynamics of açaí marketing one needs to consider the strong seasonal variation in fruit production. Açaí production is divided into two main seasons: summer (*safra de verão*) and winter (*safra de inverno*). Açaí fruit takes around six months between flowering and fruit maturation. However, little attention (in terms of research) has been paid to phenological aspects of açaí palm. Jardim's (1991) study on the reproductive biology of natural populations of açaí in the estuary is one of the most detailed work

on the subject, which is also discussed in Jardim and Anderson (1987) and Jardim and Kageyama (1994). Additional information can be found in Bovi *et al.* (1986) for planted populations.

There is a general agreement regarding the açaí production season. Jardim (1991), Jardim and Anderson (1987), and Jardim and Kageyama (1994) point out that based on controlled experiments in the estuary the peak of flowering occurs between February and May (with maximum peak from February to April), whereas peak of fruit production ranges from June to December (with maximum peak from September to October). This information concurs with other reports such as those of Hiraoka (1994), Murrieta *et al.* (1989), and Siqueira *et al.* (1993). Calzavara (1972) agrees with the previous periods and stresses the incidence of a winter season from January to June.

However, if the supply of açaí fruit to the Belém market is taken into account, one realizes that the main harvesting season continues through February. The winter season, therefore, begins only in March and goes until June. During February, when fruit production decreases, there is a strong change in market supply, clearly marking the end of the main season (i.e., summer season). In general, market and price patterns reflect this seasonality. Prices increase progressively from August to February, but have the tendency to increase exponentially during the winter season from March to June.

One of the reasons for the continuous supply of fruit to urban markets between August and February is related to the increasing number of regions supplying the main market in Belém. For instance, in 1994 the first two month of the main season were mainly supplied by the regions of Abaetetuba and the islands, whereas Ponta de Pedras and other areas in Marajó increased their market participation in October with a peak supply in November and December. New participants in the açaí fruit economy are producers from the state of Maranhão. They overload Belém's market in December, creating a surplus not advantageous to estuarine producers. Açaí from Maranhão lacks quality in relation to estuarine açaí, and can be sold at much lower prices. As the açaí market grows outside the estuary, Amapá producers are increasing their participation in the winter season when fruit in the state are still abundant.

The off-season is a hard time for producers since it coincides with the lack of other agricultural products (due to continuous rainy months). Most producers rely on their savings from the main açaí fruit season. Search for alternative labor is common including itinerant trading (as previously discussed), construction, and other types of wage and sporadic labor. Many producers become middlemen of açaí fruit by traveling long distances in search of available fruits.

Daily price dynamics in the market

Market price for açaí fruit in urban areas is regulated by a combination of quantity and quality factors. Quantity regulates general daily and seasonal price fluctuation. On the other hand, quality and precedence of the fruit regulates the variation of prices among different brokers. There is no fixed price until the unloading of boats, although quite a good estimate can be made based on the previous day. The average price starts to develop near the first hours of the day, but each broker decides upon a price based on the quality of açaí on hand.

Numerous quality factors are considered when a broker is determining prices. The origin of the fruit is an important one. Since açaí is highly perishable, fruit originating from the islands around Belém, as well as fruit from Ponta de Pedras are known to be of higher quality when compared to other areas. At the other extreme is fruit from Maranhão. Besides the greater chance it will spoil, it arrives on trucks, which mix bad and good fruit without proper selection. Maranhão's açaí has the lowest price on the market. The arrival of large quantities of açaí from Maranhão is likely to depress the price of local açaí. Other quality factors taken into account are the size of the fruit, its pulp, its color (ripeness), and its taste. These characteristics are observed by the processors, especially by the more traditional ones, who sell to consumers that require good quality and taste.

Açaí producers know that quality is an important attribute in determining price. For this reason, they allocate a considerable amount of time to the selection of fruit and careful preparation of each basket. Dry and rotten fruits are discarded, as well as twigs and leaves. There is also a careful selection of "perfect" fruits for the top layer of each basket. One important requirement is the preparation of each basket as homogeneous as possible (fruit of the same ripeness), so the quality of the beverage will be enhanced. Some processors are committed to selling açaí only from Marajó due to its fame, while others sell any mixture of açaí at lower prices. Following a dissimilar price value is the "açaí branco" (white açaí). This type of açaí appears in very small quantities at the market and is sold at double the usual prices. It goes to very selective customers that only enjoy this kind of açaí, which is widely believed to be lighter and more digestible.

Based on the description above, four basic patterns can be described that relate price and broker-producer relation. The most common price policy can be called "average pricing," which can be described as the average price calculated from the beginning to the end of the market day. This situation occurs when supply is greater than demand, a condition presented during the middle of the main season. On this basis, the price agreement between producer and broker can follow two terms: (1) a straight average of the initial and final daily price, and (2) the final daily price. This logic of marketing was developed by brokers to adjust and decrease the risk posed by price fluctuations between the beginning and end of the market season. Prices can shift up to ten times during the same day depending on the amount of açaí arriving on the market. Under this condition, brokers only pay producers and middlemen at the end of the market, so the risk of buying at a high price and selling cheaper is smaller.

A third pricing system can be called the "hourly price," which can be described as the price paid according to the offer made the moment the açaí reaches the market. This pattern is implemented when demand exceeds supply, generally at the very beginning or end of the main season and during most of the winter season. Producers and middlemen can select their brokers based on the price they offer, which is paid right at the time of delivery. When açaí is scarce, processors are willing to pay exorbitant prices to maintain their supply, also at a higher profit margin, since they can sell it for consumers at higher prices, too. A fourth pricing system can be called "contracted price." In this pattern, there is an agreement between producer and broker that regulates the price during different periods of the season. For instance, brokers and producers agree to maintain a specific price from September to November when the market is saturated.

Land tenure and management

Although performed by owners and sharecroppers alike, the level of açaí agroforestry management and planting on one side, and commercialization on the other, is directly related to the degree of autonomy a producer has over the resource, which is given by land tenure relations. Land tenure creates a line that distinguishes decision-making among small owners, large/medium owners, cooperative affiliated, and sharecroppers. Small owners are characterized by land holdings ranging from 1 to 50 hectares that are exclusively used by family/kinship for subsistence and market production. Medium owners are characterized by properties ranging in size from 50 to 200 hectares, while large owners' properties are bigger than that. Despite the differences in property size, medium and large owners are both dependent on sharecropping for production.

Management can take a variety of pathways in relation to intensification of production depending on the level of input associated with it. Whereas small owners are independent in resource management, and can decide which level and means of intensification to proceed with, sharecroppers are bound by the landowner's decision regarding pace and degree of intensification. The possibility of creating legal ties to a piece of land and thus acquiring right of ownership is a frequent threat to absent landlords. For this reason, the categorization of açaí fruit as an extractivist resource rather than as a production system is seen by the owners as an advantage. Since açaí management maintains forest vegetation, it is not recognized as a "benefit" to the land under legal terms.

Although sharecroppers are attached to an insecure production system, the benefits of the system need to be considered. Landless by origin or life history circumstance, sharecroppers find in açaí a highly profitable production system as compared to other types of cultures. First, it gives access to land already at some level of production, thus providing immediate return regardless of labor input to management. Second, the floodplain environment provides access to a number of resources such as fruits, raw materials, fuel, and fish and shrimp, among others, thus supplying basic subsistence needs. Third, sharecroppers usually take advantage of management sub-products such as lumber and heart of palm under the same conditions they do of açaí fruit. In some cases, however, they do not share half of the profits generated by management but are paid on the basis of contracted labor. Finally, in a prosperous economy, such as the case of açaí, there can be enough surpluses for savings to be invested in other activities, goods, and even property. One of the main economic strategies used by sharecroppers in the region of Ponta de Pedras is the investment in houses located on urban peripheries (in either the municipality of Ponta de Pedras or in Belém). Investment in motorboats is another widespread strategy among sharecroppers. Boat ownership represents the possibility of autonomous enterprises that can indeed be very profitable. One major example is the engagement in off-season commercialization of açaí from other areas of the estuary, when the fruit reaches inflated prices in the Belém market. These two investments are examples of socioeconomic adaptation to insecurity. Whereas houses serve both to provide a place where sharecropper's children can live while pursuing studies in town, they are also secure residences in case of expulsion; motorboats may provide means of economic independence for sharecroppers. However, the chances of buying a piece of land of their own are scant, since few rural areas, especially small and medium ones, are for sale.

Small owners, on the other hand, are generally engaged in more than one means of management, which includes management of natural stands, house gardens, and planted agroforestry (*roçado de várzea*). Management of natural stands can also be intensified at a significant pace. Some important reasons behind management are the possibility of quick expansion of the basis of production, the increase in property value, the increase in income in the medium and long term, and the possibility of quick capitalization resulting from exploitation of timber and heart of palm. Most of the time, small owners have access to less area than sharecroppers. However, their ability to decide on the use of the land in the long term, as well as to whom and when they want to sell their production clearly differentiate them from sharecroppers. In addition to that, since sharecropping implies half of the production, they need twice as much productive area to offset their income with a small owner.

Leasing is a familiar category in the heart of palm economy but relatively new among açaí fruit producers. It has become profitable to both owner and leaser to exploit new tracts of land under this condition. Land leasing generally runs for 5 to 10 years under a variety of conditions established between the parties. Usually, it begins with the exploitation of heart of palm, followed by açaí fruit, although in some cases lumber may be involved. Leasers' contracts may be established under a fixed price (rent) or in relation to a percentage of the total production outcome. As the açaí market has remained promising, there have been cases where landowners only renew leasing if they receive a percentage of production.

Associated with leasers are "opportunistic" sharecroppers called *apanhadores* (harvesters). This category of production is increasing in the region. For large owners, who have large tracts of unexplored (unmanaged) floodplain, *apanhadores* provide both labor and production while posing no threat to land tenure. They are not involved in management nor do they have a fixed residence for more than one harvest season. Usually they establish small shelters called *tapiri*, which are abandoned when the açaí season ends, leaving no visible trace of human settlement after a few months. *Tapiris* are occupied for a period of 3 to 6 months depending on the kind of exploitation taking place. In the case of açaí fruit, *apanhadores* are generally allotted 30–50% of the total production. Such a category is said to offer less risk of land conflict and fewer problems with landowners, since they have no family and residence ties with the land being exploited.

Land tenure and marketing

Land tenure explains the main differences between the marketing strategies of small owners, large owners, and sharecroppers and most often expresses the structure of social relations among the estuarine population. Two main factors are responsible. First, is the decision about the timing and frequency of harvesting, and second the decision about to whom to sell the production. Decision on harvesting period is directly related to market fluctuations and household needs. Since market supply is concentrated during the middle of the main harvesting season, it is likely that better prices can be demanded at the beginning or at the end of the season. Whereas owners have the autonomy of deciding on the risks of waiting for better prices, sharecroppers need to follow the owners' schedule and decisions. Thus, sharecroppers may be subjected to selling all their production when the lowest prices are to

be had. The second factor, market choice, has far more complex arrangements associated with it.

Large owners, mostly of urban residency, usually act as middlemen in relation to "their own" sharecroppers. Small owners have a higher degree of autonomy, based on the price offered and on their relationship with different middlemen. The frequent dependency on middlemen and the "dream of autonomy" are the key motivations behind the frequent investment of savings in motorboats, for instance, but also helps to improve one's position in the regional social ladder.

On the other hand, middlemen are important components of the estuarine açaí economy. Four main kinds can be distinguished. First is the "local middleman," who acts as an intermediary between local producers and a larger middleman. Local middlemen, if prepared to take risks, can also act as brokers in the central market. They usually set up agreements with neighboring producers to transport and sell their production on the market or to another middleman. A second type of middleman can be characterized as the "itinerant middleman." They are larger dealers compared to local middlemen; they cover a large supplying region, and are provided with larger and more reliable means of transportation. A third type of middleman is the "transporter." They provide freight to the market, charging producers in relation to quantity transported. Finally, a fourth type of middleman can be distinguished, the "opportunistic middleman" that travels off-season to isolated areas of the island to buy açaí fruit. As mentioned before, they are usually small owners and sharecroppers that travel along with family members to *arriscar a sorte* (take a chance) in the off-season açaí market. One frequently hears about the successes and failures of such business trips, since they do not know what price they will find when they reach the market. If they reach the market on a day when açaí is scarce, it is very likely that there will be astonishing profits. For instance, there are opportunities when the price of a few baskets of açaí (e.g., 5 *paneiros*) can exceed the minimum wage, whereas on other days sale of the whole load does not even pay the gas used for the trip. (See figure 3 for illustrative description of Producers-Market mediators.)

Owner-sharecropper relationships during the harvesting season are typified by a number of informal and formal rules in relation to harvesting periodicity and schedule, price, and transportation costs. It has become more frequent for owners to organize a general meeting with the sharecroppers to decide on these issues. Owners usually decide on a starting date for harvesting that coincides with that of different sharecroppers working on the same property. Three types of price policies can be established. The most common is to set up prices based on daily figures paid by itinerant middlemen. A second common type is to pay the sharecroppers based on the average market price on the day of commercialization. Although advantageous at the end of the season, it is risky during the peak of the season when the market is saturated. A third type also common nowadays is the establishment of season-long contracts that set up a fixed price despite market fluctuations. Some sharecroppers prefer to accept this policy, since it guarantees a known income during the season. This strategy has proven valuable especially for sharecroppers whose area production peak is reached during the months of September to November when market prices are usually lower. There are also mixed strategies during different periods of the season. For instance, one can agree upon a supply/price contract for the first three months of the season, but prefer to "negotiate" better

prices at the end of the season. Supply/price contracts are also common between small owners and middleman, or small owners and market brokers. This is especially true for more isolated and "unmotorized" small owners that depend on middlemen for marketing. Sharecroppers normally pay their portion of the transportation cost, despite the fact that large owners usually have their own boats in which to transport açaí. Transportation costs are then split between owner and sharecropper. In rare cases, owners do not charge for transportation.

Between sharecropper and owner, as well as between small owner and middlemen or broker, there are different types of obligations, including forms of debt servitude (*aviamento*). This is especially the case for families living in areas that are more isolated further away from urban markets. During different times of the year, including the harvesting season, owners provide sharecroppers with basic products such as flour, coffee, liquor, soap, toothpaste, deodorants, and so forth. In some cases, the middleman/owner buys groceries and deducts their price from sales. In addition to the product cost, middlemen usually charge for transportation costs when they bring products from Belém, such as 60 kg bags of manioc flour. In other cases, middleman/owners provide their own products, which in general are available at a much higher cost.

The main conflict between owners and sharecroppers is the frequent allegation of stealing from both sides. Since owners are not able to "take care" of large tracts of forested land, some sharecroppers are accused of hiding açaí baskets in the forest to sell later to other middleman at higher prices, and without the need of splitting the profits. Such allegations are common; they are one of the most frequent reasons for sharecropper expulsion. On the other hand, sharecroppers frequently complain about the division of profits by the owners. Owners are said to take advantage of illiterate sharecroppers "robbing" from them by cheating on quantity and prices. Anyone living in the region knows that both types of conflicts are real and frequent, and some preventive strategies have been adopted. Older sharecroppers ask literate members of the family to keep tabs on production on a daily basis, as well as to keep abreast of market price fluctuations. Owners have developed more intensive monitoring of their production area, so they can estimate and better control the possible production outcome of each sharecropper. Another strategy is to designate a "watchman" over the area, controlling, for instance, boat traffic in their area.

The data and ethnographic observations derived from the harvesting experiments presented here highlight the variation in economic return for açaí production across the range of producers in the region (figure 6). Areas with lower production (e.g., site 5) provided better economic return than areas of higher production, such as sites 7 and 8, due to the producer's ability to harvest later in the season. These are significant variations in return for a local household. Besides inability to decide on harvesting schedule based on price signals and the sharecropper's half split (50%) situation, when comparing his two production areas to other of equivalent output he received 4.4 and 2.6 less return when compared respectively to two small owners.

It is important to note that any producer (owner or sharecropper) is aware of the daily detail price variation. Urban-rural distances in the Amazon estuary, independent of scale and type of media, are no match for the widespread flow of information, particularly for a product as important as the açaí fruit. Price and other information (e.g., level of market

supply) "move as water" in the Amazon estuary where rivers are busy avenues of boats and people, lines of phone posts connect capital and interior, weekly inter-community soccer games are social events, and friends and relatives are constantly visiting. It is not access to information, but autonomy upon harvesting, transportation, and other production decision-making that limits the best returns for açaí fruit producers, particularly small owners and sharecroppers.

Concluding remarks

The açaí economy in the Amazon estuary has been directly affected by regional urban growth, as well as by consumption trends in national urban centers. Caboclos' rural producers response to urban market demand has created a mosaic of land use systems combining different economic strategies, but centered on the intensification of açaí agroforestry in the floodplains. Intensive and extensive land use types co-exist in the Amazon estuary reflecting coping strategies that respond to changes in the regional political economy, local conditions of land tenure, and livelihood needs.

Whereas market growth has created new opportunities for local farmers, it reproduces, to some extent, historical inequalities against local Caboclo producers. At one level, regional market demand creates differential opportunities for producers according to their land tenure condition, access to resources, distance and access to markets. At another level, the lack of access to transformation industries is taking away the most substantial portion of revenue created by the emergence of a national and international fashion food market around açaí fruit. There are, however, some localized initiatives to support local Caboclo producers in participating more fully the açaí boom. On a small scale, one can find examples of development projects from the state of Amapá aimed at improving processing and increasing the aggregated value of açaí and other regional products (Poullet, 1998). Similarly, a few initiatives in the state of Pará are emerging, such as the "Bolsa Amazônica" (a type of stock market for regional products) and the location of processing plants in the interior (Bolsa Amazonica, 2002).

Caboclos are generally regarded as marginal actors of the regional market economy and are frequently questioned about the "rationality" of their economic behavior as backward and unfit to contemporary urban economic demands. A close look on the last ten years of the açaí fruit economy and marketing shows signs to the contrary. Market demand and price changes have been the main motivation for the Caboclos' decision to implement açaí agroforestry as their main agricultural activity. Caboclos' decision for agricultural intensification is strongly connected to urban market opportunities and prices, as well as to their own technological ability to implement such a decision. During the last ten years, the price of açaí fruit have surpassed, on average, the regional agricultural inflation. This performance supports the efforts Caboclos are putting into açaí agroforestry as a wise medium term economic decision. However, land tenure—often reproducing forms of urban population control over rural areas—is a major force determining the relationship between Caboclo producers and the market as well as the economic return of agroforestry activities.

Urban and rural are continuous socio-cultural, demographic, and economic spaces in the estuary (and in the Amazon in general), in some instances creating opportunities while

in others reproducing social relations of dependency and control of people and resources. The açaí agroforestry case helps us to re-think land use intensification in Amazonia from a market and socio-cultural perspective. Caboclo's ability to participate on the açaí economy emerges from their aptitude to respond to urban demand by increasing production from an existing set of management techniques, instead of adopting an exogenous system. It suggests that agricultural development in Amazônia can be successfully built from existing rural knowledge and technology, but it is constrained by the hierarchy of social relationships historically developed in the context of extractivist economies. Caboclo rural producers have coped with these conditions with a progressive and flexible market insertion, which incurs fewer risks by combining subsistence and market activities. However, whereas açaí production occurs across all property systems, the economic return of a producer is constrained by ones ability to decide when to best place one's yield on the market, a limited condition to sharecroppers in general and to small owners depending on middlemen. Thus, the açaí fruit case reported here suggests that intensification of agricultural production does not necessarily translate into improved economic return, but rather it depends on one's ability to take advantage of price fluctuations in urban markets. Urban markets for regional products help to create new opportunities to small-scale estuarine producers; in this context, urban consumers and entrepreneurs may play an important role in helping local producers to overcome, instead of re-enforcing the historical inequalities and forms of urban-rural relationships that characterize the regional scenario.

Acknowledgments

This study was made possible by the contribution of several grants including a NASA—Global Change Fellowship Program in 1994 to the project "Land use Change in the Amazon Estuary: Agriculture, Secondary Succession and Agroforestry of Native Populations" (PI: E. Brondizio, NASA 3708-GC94-0096), and an equipment grant from the Midwestern Center of the National Institute for Global Environmental change. From 1992–1994, research in the area was supported by the National Science Foundation (grant 91-00526) from the Geography and Regional Science and the Program on the Human Dimensions of Global Environmental Change (P.I. Emilio Moran). More recently, this project has been supported by Indiana University's COAS faculty start-up grant (to E. Brondizio). Earlier field studies in the study area, and informing this study, were made with support from the Wenner-Gren Foundation for Anthropological Research to E. Moran, and grants from the Brazilian National Research Council and the Museu Goeldi in Brazil (P.I. Walter Neves, CNPq 403534/90-9; 150043/90-2). Recent work in the region has been supported by the NASA LBA-Ecology Program (LC-09, PI E, Moran, co-PIs E. Brondizio, P. Mausel, F. Ponzoni. D. Valeriano, J.C. Randolph). An earlier version of this paper was originally presented at the section "Re-visioning Amazon Peasantry: Ecology, conflict and beyond" held at the 95th Annual Meeting of the American Anthropological Association, San Francisco, CA, 20–25 of November, 1996.

The authors are thankful for comments provided by reviewers and the editor. The authors specially acknowledge the assistance and friendship of the açaí producers that collaborated with the production experiments, price notes, and have taught us largely about floodplain

agriculture and management. We are thankful for the continuous collaboration and support of Emilio F. Moran, Walter A. Neves, and Rui S.S. Murrieta and Oriana Almeida for her suggestions on the management of price data. The authors acknowledge the assistance of Lucival Rodrigues Marinho (in memory) and Jair da Costa Freitas for their work with plant taxonomy and field research. We are in debt with the local support of our friends Valois Delcastagne and Joana Socorro V. Ribeiro, and the people of Praia Grande, Marajo-açu, Paricatuba, and Ponta de Pedras as a whole. Finally, we are thankful for the continuous support of ACT and CIPEC staff personnel and colleagues. Responsibility for the views expressed in this paper are the sole responsibility of the authors and do not reflect the views of the funding sources or collaborators.

Notes

1. For more information on palm species see Balick *et al*. (1987), Balick (1988), Pio Correa (1926), and Pinheiro and Balick (1987) (a volume dedicated to Brazilian palms compiled from Pio Correa's plant dictionary).
2. We concentrate our analysis on the forested areas of the estuary. It is important to point out those cattle ranching industry on Marajó's grasslands is of major significance, as well as fishery industry in the esturary.
3. Anderson and colleagues (1993) estimate that *Virola surinamensis* industry generates an economy of US$ 50 Mi/year. A government publication, *Pará Rico por Natureza* (1993) estimates that exportation of heart of palm in the state of Pará is responsible for an economy of US$ 30 Mi. However, taking into account all the sectors of the heart of the palm industry, Pollack *et al.* (1994) estimated that the heart of palm industry alone contributes approximately US$ 300 Mi/year to the estuarine economy.
4. The term *açaização* was used by Hiraoka (1994) to express the expansion of açaí agroforestry areas in the region.
5. The accuracy of açaí fruit data provided by FIBGE is limited. Among the problems is the lack of systematic data collection in Belém an in other parts of the estuary. To our knowledge, there are no systematic daily or seasonal surveys of açaí market and production fluctuations. Another problem is the "informality" of the sector, which makes it barely quantifiable by traditional statistical methods. However, FIBGE data can be of practical use in understanding the growth pattern associated with the açaí economy, and the overall figures of açaí production in the region. Data on heart of palm is expected to be more precise, since this product is highly controlled by industries and distributors, and it is an important export product for the state of Pará.
6. Ponta de Pedras contributes to about 30 percent of the total national açaí fruit production.
7. Currency changes from 1984 to 1995 in Brazil:

Before 28, 1986	—	Cruzeiro (Cr$)
February 28, 1986	—	Cruzado (Cz$)
January 16, 1989	—	Cruzado Novo (NCz$)
March 16, 1990	—	Cruzeiro (Cr$)
August 01, 1993	—	Cruzeiro Real (CR$)
July 01, 1994	—	Real (R$)

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