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*Extractive Exploitation of cipó titica (Heteropsis flexuosa (H.B.K.)
Bunt., Araceae) in Acre: Management and Market Potential*

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Abstract

Richard Wallace (Tropical Conservation and Development Program, 319 Grinter Hall, University of Florida, Gainesville, Florida 32611) and Evandro Ferreira (Instituto Nacional de Pesquisas da Amazônia-INPA, Núcleo do Acre, Caixa Postal 73, 69.908-420 Rio Branco-AC, Brazil and Institute of Systematic Botany, The New York Botanical Garden, Bronx, N.Y. 10458-5126, USA). Extractive exploitation of *cipó titica* (Heteropsis flexuosa (H.B.K.) Bunt., Araceae) in Acre: management and market potential. Adv. Econ. Bot. x: xx-xx. xxxx — The extraction, processing, transport, and marketing of *cipó titica* (*H. flexuosa*) in Rio Branco, state of Acre, Brazil, is discussed here. *Cipó titica* is the principal fiber used by artisans in Rio Branco for the production of furniture, baskets, and other crafts. We conclude that despite often distant locations, rural inhabitants can successfully link into urban markets and value-added processing activities can help rural suppliers earn a greater share of final product value. In analyzing the urban artisan market we posit that despite reported failing sales the market for fiber-based products remains underdeveloped. Local and state support through credit, increased sponsorship of promotional fairs and markets, and business management training in marketing and management for informal sector artisans can strengthen commercial activities of locally produced fiber-based products.

Key words: Acre, *cipó titica*, extractive exploitation, market.

Introduction

In the Western Amazon State of Acre, Brazil, the extraction and marketing of non-timber forest resources is a logical strategy for rural inhabitants to pursue. Yet, little is known of the potential of these

resources for increasing forest household incomes or whether or not current extraction methods are predatory or sustainable. In this paper we describe and examine the ecological and marketing potential of the native fiber species *Heteropsis flexuosa*, commonly referred to as *cipó titica*. Current extraction, processing, and marketing methods are examined and constraints to expanding the market for *titica*-based products identified.

Study area

Data on extraction of *titica* was collected at the landholding of a former rubber tapper in the Riozinho Extractive Reserve (68° 30W; 9° 40S) located 80 kilometers northwest of the city of Rio Branco, the capital of Acre. Extractive reserves are defined by Allegretti (1990) as "public lands designated for the specific purpose of sustainable use of forest products...[with] property rights designated according to traditional patterns of land use rather than imported models of occupation." The Riozinho reserve has an area of 38,896 ha and was created in 1989 (IMAC, 1991). Rubber tappers living in the reserve were given 30 year usufruct rights to the forest resources on their landholdings. Access to the landholding is first by land, traveling approximately one hour westward on Highway BR364 until reaching the Antimari River, then by river, navigating by canoe upstream for approximately 1½ hours, followed by a 2½ hour trek along forest trails. Data on commercialization of *titica* was collected from the fiber extractor and his family and artisans in Rio Branco.

Methods

The study is based on field data collected in Acre from the period of October 1995 to September 1997. Information on extraction of *H. flexuosa* was obtained through an interview with family members involved in fiber collection and observation of extraction and initial on-site processing activities at the landholding of the principal supplier of this fiber to Rio Branco artisans. The formal interview was carried out to obtain information on fiber location, transport and the commercialization activities. A visit to a forest site was used to gather information on selection, extraction, and initial fiber processing. Labor time allocation for extraction and potential yield were quantified by marking off two 250 m² transects (10 x 25 meters), and noting the time required for extraction of all mature fiber by two collectors working together. Transect areas were identified by asking the landowner to direct us to two areas with a high concentration of *H. flexuosa* and the transects were plotted with the specific intention of obtaining the highest possible volume of mature, collectable fiber. The collected fiber was transported back to the landowners home where it was weighed both before and after initial processing -- the stripping of the cortex.

Data on artisan production and local marketing activities of products woven with *H. flexuosa* were collected through interviews with the four principal fiber artisans in the city of Rio Branco. Artisans were identified through initial interviews with the Acre Foundation for Social Well-Being (FUNBESA), a state supported organization which administers an artisan program for disadvantaged youth, and the Acre Company for Industrial and Social Development (CODISACRE), which coordinates the local Sunday evening artisan fair.

Exploitation of *cipó titica*: A legitimate case of sustainable extraction?

The common name, *titica*, or *cipó titica*, is used by inhabitants of the interior regions of the Brazilian Amazon to identify a few epiphyte Araceae species belonging to the genus *Heteropsis*. The genus has approximately 13 species distributed in the tropical Americas (Mayo et al., 1997), and 8 occur in Brazil. In Acre 5 species can be found: *H. flexuosa*, *H. integrifolia*, *H. integerrima*, *H. oblongifolia* and *H. logispatacea*. A common characteristic of all species is their elongated and aerial feeder roots. These are

adventitious, hard and fibrous roots that grow toward the soil from the tree branch in which the plant is located. These are the roots commonly referred by the extractors as *cipó* or fibers.

1505 | The species exploited commercially in Acre is *H. flexuosa* (Fig. 1a). The feeder roots in this species can reach several meters in length, according to the height of the supporting tree branch. Processed fibers are used in the fabrication of baskets, furniture, storing and ornamental objects. In rural areas, fibers are often used in construction of homes and other infrastructure to secure support beams, wallboards and other building materials as substitutes for nails.

Discussion

Extraction

The extractor advised that on his landholding *titica* prefers high ground to low lying areas but has no preference for growing on a particular tree species. The quality of the fiber is consistent across different tree species on which it grows. In addition to extraction on his landholding, the extractor occasionally explores *titica* from a neighboring ranch. The rancher advises him in advance when planning to deforest an area for conversion to pasture and allows the extractor to collect fibers in this area before cutting and burning takes place.

Extraction of fibers is made upon request from buyers. The extraction is a male dominated activity. When large quantities are required -- often 80-100 kg -- a group of six or more teenage boys and men set out together. This group is broken down into teams of two individuals who work together to extract and prepare fibers for transport back to the household, or in some cases, directly to the city.

Fiber selection is based on color and length. Thickness of the roots is not a factor in selection. Mature roots ready for harvest are identified by their whitish-grey color. Green root, often moist to the touch, are not cut down but left behind for future extraction. Mature roots are quickly examined to assess whether they are of sufficient quality for extraction by the presence of few knots. From their ground view, extractors estimate whether there is a minimum of one meter of knot-free root. This is the minimum length generally accepted by buyers in Rio Branco because smaller lengths may not be sufficient for production of all products. Preference is also given to roots that fall straight down from above branches rather than twisted around the trunk of the tree (Fig. 1b). Straight roots are easier to extract and easier to use for craft production. During the extraction process, dead roots are pulled from trees to allow room for new growth. Although the extractor stated that he saw no visible change in the forest areas from which vines were extracted, no ecological studies have yet been conducted to assess this.

The method of extraction is a relatively simple process. Extractors secure the roots with both hands, one above the other, just above chest height (fig. 1c). The root is given a hard tug to release it from the tree branch. If it does not release, increasing weight is placed by leaning backward and through successive firmer pulls until the root snaps loose. Climbing is not necessary as the root releases after consecutive pulls. This method rarely result in the removal of the epiphyte body from its supporting tree. The root knots are cut out on the forest floor (Fig. 1d). This can be done quickly, reduces transport weight and the shorter root lengths are easier to transport through the forest. Teamwork in knot removal expedites this process. One member cuts out the knots while the other bundles together the roots to prepare them for transport. While bunching the roots, one end is aligned to make them easier to transport (Fig. 2a). When all roots from an area are extracted, they are tied together with a strip of bark fiber pared from a nearby tree.

Transport is usually by animal, especially when large quantities of fiber have been extracted. This extractor uses an oxen which can haul up to 100-120 kg of fiber. The principal problem in transporting fibers is vine length. While one end of the vines are aligned and tied firmly to the animal's back, the longest vines drag behind the animals and can easily become snagged in brush along narrow and sometimes overgrown forest trails.

Although we cannot comment on the long-term sustainability of extraction practices, the extraction methods do not appear to be destructive in the sense that collectors avoid cutting down immature plants or intentionally damaging the forest areas where they work.

Processing

The fiber processing is a two stage activity. The first is the cutting away of knots in the forest extraction area. The second is the stripping away of the greyish-white cortex, carried out on the landholding house when a buyer orders fiber without this cortex. Stripping away the cortex is a simple process. Starting with one end of a single fiber, the cortex is first carefully pried loose from the core root either using one's finger nails, a small knife blade or machete (Fig. 2b). The cortex pried loss is stripped back by hand revealing a whitish-tan and moist fibrous core. Often a long length of cortex will peel away from the moist center without further loosening. However, if the cortex does not strip away easily the processor must then manipulate the vine to loosen it. He does this by gripping the fiber with both hands, approximately six inches between them, then in rapid motion, he pulls his hands apart bending the stiff root at a 90 degree angle at both fists (Fig. 2c) then returns the roots to its original straight position. The processor repeats this motion two or three times, which is usually sufficient to loosen the cortex. This is repeated as he works his way down the length of the root. Processed fibers are bunched and tied up before being transported to the market (Fig. 2d). Although the processing in our study was carried out by the young teenage men who extracted the roots, this activity is not gender specific and women also participate when a large quantity of fiber is collected.

Labor allocation and production potential

Table 1 presents data collected from the 2 transects. It includes production data from the transects as well as labor allocation for extracting and processing the fiber collected from these areas. We have noted the selling price of both unprocessed raw material (with knots removed) at US\$ 0.91 per kg and processed fiber at US\$ 1.82 per kg to make an initial analysis of the extractor's pricing scheme.

In transect one, the two extractors worked 17 minutes to extract and de-knot 4 kg of raw fiber material. This equals an extraction rate of 7.05 kg per hour for one worker. The 4 kg of raw fiber were processed (i.e. the cortex stripped away) by one person in 27 minutes resulting in 1.6 kg of processed fiber, a 60 % reduction in total weight. Total extraction and processing time (not including walking to the extraction area) was 61 minutes per worker.

In transect two the same two extractors worked 15 minutes, a total of 30 minutes labor, to extract and de-knot 5.3 kg of *titica*, an extraction rate of 10.6 kg per hour per worker. Processing time was 33 minutes with two individuals working, or 66 minutes for one worker. The final weight after processing fell to 2.2 kg, a 58.5 % weight loss, almost identical to that of the fiber weight loss in transect one. Total extraction and processing time was considerably higher at 96 minutes, due mainly to increased processing time.

One can immediately see a problem with the pricing scheme of the extractor. In the first transect, if the raw fiber is sold immediately, before it begins to dry, it has a value of US\$ 3.64. However, after nearly

one-half hour of processing, the fiber value falls to US\$ 2.91, even at the higher per US\$ price of US\$ 1.81. The sharp reduction in total weight due to processing more than offset the doubling of the price per US\$ for processing titica. In this case, what would appear to be a "value-added" activity actually decreased the final product value.

Converting our findings to an eight hour day allows us to compare the return for *titica* fiber against the potential returns from other regional extractive activities such as the tapping of *Hevea* rubber (*Hevea brasiliensis*) and the collection of Brazil nuts (*Bertholletia excelsa*). Data for production of tapping *Hevea* rubber and collecting and shelling of Brazil nuts was noted through the authors' conversations with rubber tappers in the Chico Mendes Extractive Reserve. We do this not to suggest that extraction of fibers should or can replace traditional extractive activities, but it does provide insight to the potential return of extractive alternatives and the role they might play in diversifying incomes. Table 2 shows us the return from these three activities. Using the results from our first transect, moderately less productive than transect two, one worker extracting for eight hours would collect approximately 56.4 kg of raw material. Valued at US\$ 0.91 per US\$, the extraction of *titica* compares favorably with rubber tapping and collecting and shelling Brazil nuts.

Transport

Getting goods to market can pose a major challenge to successful marketing ventures in tropical forest areas, particularly for perishables (Padoch 1989). Access to transport and transport costs are two important factors. Although fibers are not perishable, their value does begin to decline after extraction -- processed or not processed. Fiber price is based on weight and when they are extracted their water content begins to evaporate. An experiment conducted with an artisan in Rio Branco demonstrates how quickly vine weight can fall; 4.2 kg of processed fiber weighed immediately after the cortex was stripped away fell in weight to 2.05 kg after five days, over a 50% drop. Extractors have a great incentive to deliver fibers to buyers as soon after extraction as possible. As a result, this particular extractor often transports fibers the same day they are collected.

Transport systems and transport costs will obviously vary with location of the extractor. We describe here the transport system and costs associated with the fiber supplier living in the Riozinho Reserve. Although many rural families may face more difficult circumstances, this case demonstrates how it is possible to link into often distant urban markets.

This extractor requires three legs of transport to deliver fibers to the capital: animal, canoe and truck. The first leg, from the landholding to the Antimarí River, is by animal. The extractor uses a family owned oxen for this task, with travel time approximately 2 to 2½ hours one way. The ox can haul up to 120 kg, with a maximum of two trips per day. Sales are generally 80-100 kg but larger transactions, up to 256 kg, have taken place. When weight is greater, the fiber is often hauled on two different days to allow the animal to rest.

Once the fiber arrives at the rivers' edge, a wooden canoe, again family owned, is used to transport the product to where the Antimarí River passes under Highway BR364. This leg of the journey generally takes 1½ to 2 hours one way using a nine horsepower motor and requires approximately 15 liters of fuel to make the round-trip. At a cost of US\$ 0.73 per liter the actual cash outlay to make this trip is US\$ 10.91.

The shortest but most expensive leg is the final one hour truck ride on Highway BR364 into the city of Rio Branco. Although the extractor does not own a vehicle, this stretch of highway generally offers reliable transport due to passenger travel between the cities of Rio Branco and Sena Madureira.

Passenger transport is provided several times each day by four wheel drive pick-up trucks with specially outfitted cargo bins which include wooden benches and a nylon tarp overhead to keep passengers out of the sun and rain. The extractor knows a number of drivers on this route and he pays them US\$ 10.18 to transport him and the fiber direct to the point of sale in Rio Branco. As his fiber sales are on credit, he has a special arrangement with specific transporters to pay them when he receives payment from his buyers.

Transport from the extractor's landholding to Rio Branco is time consuming but not prohibitively costly. The extractor maintains a cargo animal and canoe to transport goods. Without either, selling *titica* in Rio Branco would be extremely difficult: fibers are bulky to carry, even in small amounts, and the river is not heavily traveled and arranging a ride is difficult. The extractor's ability to arrange highway transport to Rio Branco on credit, with a flexible payment schedule facilitates the marketing process.

Return to labor

Table 3 brings together the labor time and transport costs associated with extraction, processing and transport of 120 kg of both raw and processed *titica* to calculate an average return on labor. We have used the 120 kg as a comparative figure as this is the maximum weight an animal can haul in one trip to the Antimarí River. It is slightly over the average sale figure of 80-100 kg. An average figure for labor time allocation for extracting and processing activities was calculated by using the data gathered from our two transects. Although the total return for 120 kg of processed *titica* is greater than for unprocessed fiber, the real return per hour of labor, including travel time, is higher for unprocessed fiber. At current prices, the extractor would be better off allocating time toward extraction and sale of raw fiber rather than processing the fibers. However, artisans in Rio Branco indicated that they are moving toward a preference for processed over raw fibers, suggesting that the extractor could possibly implement a price increase for unprocessed fiber.

Marketing

Identifying new or under-served markets is an important element to successful marketing. The extractor's experience in establishing himself as the main supplier of *titica* in Rio Branco is worth noting. His key selling point was guaranteeing his buyers a quality product. The Rio Branco market had long been served by a sole supplier who provided poor quality vines, ridden with knots. This supplier also falsely increased the weight, and subsequently the selling price, of bundled fibers by placing wooden sticks and dirt in the roped up vines. The current supplier, although he had never supplied fibers to the market, was told of this problem by one of the artisans and offered to become his supplier, guaranteeing a quality product which would be delivered on short notice and with flexible payment terms. After an initial trial, he was guaranteed all the artisan's business and soon he was the exclusive supplier to the other three artisans and FUNBESA. Fiber sales, which did not exist three years ago, are now his chief source of income. They are impressive: from July 1996 to July 1997, he sold approximately 1,499 kg of unprocessed raw fiber and 639 kg of processed fiber for total sales of US\$ 2,434.54.

Fiber artisans in Rio Branco

One family spearheaded the development of the non-indigenous artisan market for fiber-based products in Rio Branco. This began in 1969 when a colonist farmer from the city of Brasília moved to Rio Branco and opened a small artisan business, making fiber-based furniture, baskets and ornamental articles. In 1980 he approached FUNBESA to ask if they would support his work by providing him a storage and workspace. They agreed, and additionally enlisted him to teach poor children for a small

salary. Together with his two brothers, who followed him into trade, they account for the training of the three other principal fiber artisans currently operating in Rio Branco.

This study focuses on these four main artisans; two operate in the more prosperous neighborhoods of Experimental and Bosque, the other two in the poorer neighborhoods of João Eduardo and St. Inês. Two operate from their homes, one rents a small garage adjacent to his home for US\$ 46.30 per month and another works out of a FUNBESA-owned workshop where he does not pay rent. They range in business experience in Rio Branco from 2-27 years. Two rely only on artisan trade for family income. A third earns a monthly salary of US\$ 250.00 as a teacher at a local elementary school; he would like to dedicate all his time to artisan trade but is not yet ready to give up his guaranteed teaching income. The fourth, the pioneer artisan discussed above, receives a monthly retirement income of US\$ 271.84 from the state for his years as a teacher at FUNBESA.

Family labor is generally used for fiber processing and crafting products, although one artisan has hired two women who receive 50 % of the selling price of the products they produce; they are paid only after the article is sold. One of these women indicated that her monthly income fluctuates dramatically but is on average around US\$ 194.17 per month. Two other artisans indicated a desire to hire labor but cannot afford it: one has only enough business to keep himself busy, the other, while maintaining a backlog of business, cannot absorb the initial raw material losses due to poor craftsmanship while the assistant would be learning the trade. His son, still in school, currently assists him.

Fiber processing at the artisans shop

Preparation of *titica* and the weaving of products is also similar among artisans. Initial processing, the stripping of the cortex, is done manually, identical to the method described in detail above. With the cortex removed, the fiber is cut, split, and shaved into the length and thickness required for a particular product. Larger objects often require thicker fibers to make them more sturdy, while small baskets require thinner fibers. Cutting of the fiber to a desired length is done with a small paring knife. To obtain the desired thickness, first the artisan splits the fiber lengthwise by making a small incision in one end of the fiber and then pulling the two ends apart until the fiber is separated into two thinner lengths. This process continues, splitting each smaller section until the desired thickness is achieved. If the fiber is dry, as can be the case when a large supply is purchased, the artisan soaks the fiber briefly in water just before processing to make it more flexible.

To hone thickness and smooth and round edges, the fiber is then passed through a *raspadeira*, a metal plate punched with small holes of various diameters (Fig. 3a). The different sized holes accommodate fibers of diverse thickness (Fig. 3b). A fiber is often run through one or more punched holes numerous times to hone it to the desired thickness and smoothness. All fibers required to produce an article are usually prepared before the weaving process begins.

Products

Artisans working with *titica* produce a range of products. Often products are created or designed in response to specific requests by customers who bring basic ideas for baskets, clothes chests, chairs, wall hangings and other items. They range from utilitarian breadbaskets, cake platters with covers and storage chests to more decorative items such as large clothesbaskets, flower holders and wine bottle holders (Fig. 3c). The more typical products are rectangular and oval-shaped bread baskets, small circular and heart-shaped baskets -- often used as favors at birthday parties -- and small sandwich size baskets, used by local *luncheonettes*, or lunch stands, to serve sandwiches or *salgados*, deep-fried or baked meat, chicken and cheese filled pasty items, a common mid-morning and afternoon snack

throughout Brazil. For basket-like products, a pressed board product, locally referred to as duratex, is used for the basket bottom (Fig. 3d). Nearly all products are painted with lacquer to preserve the fibers. One artisan sometimes dyes a few fibers to weave a simple color pattern into his products.

Table 4 provides a list of the diverse products, labor allocation required for processing raw material and crafting each product, and product selling price for one artisan in Rio Branco. Other artisans make similar products but the diversity of items is considerably less. This artisan produces specialized articles such as a wine bottle holder, flower holder or decorative wall fan that others do not sell.

The table reveals a number of interesting points. First, the majority of labor required for fabricating articles is in the weaving of the fibers rather than preparation, which includes stripping the fiber of its cortex, and splitting, cutting, shaving and in some cases rounding the fibers to desired thickness and length. For each product, time to prepare fibers for weaving is 50 % or less of the total time; for many it is significantly less. A growing preference for fiber stripped out of its cortex is likely the result of a recognition of poor pricing by the supplier and the desire of artisans to eliminate labor required for this procedure. A more just price might change this preference.

Most interesting is the relationship between total labor time and selling price, in particular the inconsistency among products. For example, the most expensive item, a clothes basket, requires approximately 7 hours of labor and sells for between US\$ 38.46 and US\$ 48.08. This contrasts with a cake platter with domed cover which requires approximately 9 hours of labor and sells for US\$ 24.04. While the clothes basket requires more raw material, this would not account for the price disparity -- it would have to use a minimum 7.5 kg of additional fiber, or US\$ 14.42 worth of processed fiber to compensate for this price differential.

Other products reflect this same incongruity between labor allocation and selling price. For example, wall fans are labor intensive items, requiring 13 hours to produce. Yet, they sell for only US\$ 14.42. On the other hand, breadbaskets require only 45 minutes to make and sell for US\$ 14.42. This labor/price disparity may reflect the desire of the artisan to sell a diverse range of products, despite the fact that some are less profitable than others. Business operations focus on increasing sales in general rather than calculating profit per piece and focusing on the most profitable items in terms of labor allocation and material cost. It would be interesting to observe the effect that lowering prices might have on demand.

Marketing of artisan products

Artisans generally market products directly from their work place. None of the artisans maintains a permanent retail selling outlet. One artisan has placed baskets on consignment with a retail store that sold a variety of regional products, although sales were minimal. This could be due to the poor location of the shop, which closed approximately a year after it opened. This same artisan maintained a display of his products in the exhibition room of a popular local restaurant but sales were slow despite the wide range of products displayed. Without a centrally located selling outlet, word of mouth is the artisans' principal marketing tool. Sales are mostly the result of neighborhood residents or other interested buyers approaching the artisans with special orders. Holidays such as Easter, Mother's Day, and Christmas usually provide a sales boost. One artisan estimated that he makes approximately 200-300 baskets at Easter. Providing party favors, such as small baskets to "Sweet 15" parties for young girls has also been a source of sales.

Despite occasional multiple basket orders, three artisans indicated that since the implementation of the

Brazilian Government's macro-economic stabilization plan, termed the Real Plan, in June, 1994, sales have fallen dramatically. The most well known of the artisans has also experienced lower sales, but has been able to stay ahead of his competitors because of his ability to meet large orders in a timely manner. For example, a large supermarket in Rio Branco requested the delivery of six large baskets to display breads and fruits and he was able to supply all six within one week. As a result of his high quality and quick delivery, he received a follow-up order for six more. Each of these baskets sold for US\$ 46.29. With two well trained women working for him he is able to produce quality products with only a few days notice.

Contrary to the situation of these three artisans, one artisan in the poor neighborhood of João Eduardo claims a backlog of orders from neighborhood families. We will discuss below why we believe he has been successful.

Selling in local markets and fairs

Participation in local fairs and markets is another strategy artisans have pursued to increase sales. One is the weekly Sunday evening *feirinha*, or craft fair, which takes place in the city center during the dry season months from May through October. However, two artisans who have participated in this fair stated that the introduction of the Brazilian economic reform -- the Real Plan -- had reduced sales considerably. Although the cost of maintaining a booth at this is minimal at US\$ 18.87 per year, only one artisan displays products regularly. He is the only artisan who carries an inventory of diverse products to display. Another artisan stopped participating due to slow sales and problems in transporting a small stock of baskets to the market: round-trip cab fare was expensive and transporting baskets by bus was difficult.

The central municipal market is another potential selling place. This market, the largest fresh vegetable and fruit market in Rio Branco, is thriving with commercial activity on weekend mornings and attracts buyers of all socio-economic classes. One artisan attempted to sell products there but was ushered away by market officials who advised that only rural farmers were permitted to sell there. He has recently been allowed to operate there and advised that sales fluctuate but sometimes reach US\$ 25.64 or more per weekend.

Another potential market outlets are the *mercados livres*, or open markets, which operate on scheduled days each week in outlying neighborhoods where no permanent market structure exists. Although established primarily to channel fresh fruit and vegetables to consumers in underserved areas, one artisan has had some success in marketing baskets and other articles at these markets.

Another outlet is the FLORA fair, a three day fair established in 1994 to promote interest and awareness in diverse regional products. Products ranging from fruits and nuts and their processed derivatives such as ice cream and jams, to jewelry crafted from seeds and nuts, to baskets woven from regional fibers are displayed and sold. Only one of the four artisans has participated in the annual FLORA event. Although sales were strong in the initial FLORA, sales in subsequent years, including the FLORA IV in 1997, have fallen. Nonetheless, he noted that in 1996 at FLORA III he had sales of US\$ 380.00, not a small sum for three days work.

Market constraints

Artisans must confront a number of problems that limit their ability to market their products locally, all

of which have their roots in a lack of capital. Without capital, artisans are unable to purchase raw material which limits their ability to stock an inventory of products to meet large orders or market their goods at fairs. This also inhibits their ability to pursue other marketing activities such as displaying their crafts in local hotels or selling them on consignment through retail stores. Lack of capital restricts their ability to hire extra labor to meet interim periods of high demand or to finance the training of other workers. A lack of capital also limits their ability to establish a central retail outlet, although this does not seem like an optimal marketing al

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Conclusions

Heteropsis flexuosa is the principal fiber used by non-indigenous artisans in Rio Branco for the production of furniture, baskets and other crafts. Extraction methods employed by the sole supplier to the major artisans appear to be non-predatory but further study is needed to better understand the affects of extraction methods on the species population and longer-term sustainability. The extractor

interviewed for this study has supplied fiber to the market for only three years and could not provide an indication of the time period for the re-growth of mature vines. Transect data indicate that there is not an extremely high concentration of fibers and extractors may be required to cover considerable territory to extract large quantities. The team-work employed by one extracting family would support this conclusion.

Transporting fibers to urban centers from remote forest landholdings can be a great challenge. Access to transport is critical. Although vine species are not perishable, they are sold on a per-US\$ basis and delay in transport will reduce extractor income as the fibers begin to dry. The real challenge of transport appears to be one of logistics rather than time and distance. This study reveals that rural inhabitants may be willing to travel great distances if transport is reliable, costs are reasonable and there is flexibility in payment.

Fiber must pass through various stages of processing before ready for weaving. Rural extractors may be able to gain a greater share of product value by undertaking one or more value-added processing activities. In the case of *H. flexuosa*, providing suppliers with a fiber stripped of its cortex could provide higher return. However, our study reveals that price making can be a difficult task, especially for extractors who have historically been price takers and have little if any experience as price makers. In this case, the extractor actually lost value because of poor pricing. Notwithstanding the pricing problem, it is noteworthy how this extractor successfully identified and obtained a market niche which has substantially increased his family income.

The market for *titica*-based furniture, baskets and other craft items in Rio Branco has taken a downturn in recent years. Sales in special fairs and markets have fallen and subsequently some artisans have stopped participating in them. Tourism in Acre has been slow to develop also limiting growth of the artisan market. Slow sales have led one artisan to fail to meet scheduled payments to the fiber supplier, jeopardizing his ability to buy fiber on credit. One artisan, however, has indicated a backlog of orders. It is particularly interesting that nearly all of this backlog of business is neighbors and others living in this low-income neighborhood, far from the urban center. Neighborhoods less served by commercial furniture and other retail establishments may provide an opportunity for artisans. Artisans can provide reasonable credit terms not available from formal sector commercial outlets to make their product and services attractive to low income families. At the same time the poor may prefer investing in a high quality hand-woven product made by a neighbor who could quickly repair or replace a broken fiber over purchasing a low quality industrial item from a far-off retail outlet to which they have little recourse should it break soon after purchase.

The economic potential of *H. flexuosa* remains untapped in Rio Branco. While potential supply is unknown, it does not appear to be constrained -- the sole extractor has indicated he could easily supply a greater quantity. Current market limitations lie in the urban center. Artisans suffer from a lack of capital which affects their ability to invest in inventory to quickly meet demand, participate in exhibitions or place articles on consignment, or hire and train assistants. Bank's are unwilling to lend to these informal businesses even if they have a guaranteed income, however small.

The local, state and federal government can play an important role in stimulating artisan production and sales. In many cases artisans are unaware of services offered by government organizations such as SEBRAE, the federal small and micro-enterprise development agency which operates in Acre. Small investments by local, state and federal governments to promote regional products, make credit available on affordable terms, expand regional product markets and fairs, and provide marketing training and business and financial management advice at subsidized costs or free or charge to informal sector artisans would have a healthy affect on the local economy. Promoting regional tourism from other states might also increase demand for products made from native fibers.

For a detailed discussion of extractive reserves see Allegretti 1990, Anderson 1992, Daly 19xx, Fearnside 1989 or Schwartzman 1989. Browder 1992 questions the

²We have not included the time to walk to the extraction area in the calculation of the return on labor as this time would be amortized over an entire days' labor production rather than the small amount of fiber extracted for this study.

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Table 1. Time allocation incurred costs for extraction, processing and transport activities. (US\$).

Activity	Transect No. 1	Transect No.2
Time to extract (2 persons)	17 min. x 2 = 34 min.	15 min. x 2 = 30 min.
Weight of extracted cipo with bark	4.0 kg	5.3 kg
Extraction rate	7.05 kg per hour	10.6 kg per hour
Time to strip bark from fiber	27 min. x 1 person = 27 min.	33 min. x 2 persons = 66 min.
Rate of processing	8.9 kg per hour	
Weight of cipo after stripping bark	1.6 kg	2.2 kg
Weight loss	60 %	58.5 %
Value before stripping bark (US\$ 0.96 per kg)	US\$3.64	US\$4.82
Value after stripping bark (US\$ 1.92 per kg)	US\$2.91	US\$4.00

Table 2. Return from three extractive activities (US\$).

Activity	Kg collected in one day	Value
Extraction of cipo titica	56.4 kg	US\$51.27
Tapping of <i>Hevea</i> rubber	6-12 kg	US\$4.36-US\$8.72
Breaking of Brazil nuts	10 latas (140 kg)	US\$20.00

Table 3. Return to labor based on extraction, processing and travel time and associated costs.(US\$).

	Unprocessed Fiber	Processed Fiber

Activity		
Extraction	13.6 hours	34 hours ¹
Processing	-	19.2 hours
Transport (time is roundtrip)		
	5 hours	5 hours
Landholding to River		
River to highway - time	3 hours	3 hours
River to highway - fuel (15 liters @ .80/liter)	US\$ 10.91	US\$ 10.91
Highway to Rio Branco - time	2 hours	2 hours
Highway to Rio Branco - freight	US\$ 18.18	US\$ 18.18
Total labor hours	23.6 hours	63.2 hours
Total cash costs	US\$ 29.09	US\$ 29.09
Total return	US\$ 109.09	US\$ 218.18
Return per labor hour after cash outlay	US\$ 3.39/hour	US\$ 2.99/hour

¹ Based on an approximate 60% reduction in weight after processing, 300 kg of raw material would need to be extracted to produce 120 kg of processed cipo titica.

Table 4. Titica- based artisan products , labor and sale value. (US\$).

Product	Size (cm)	Labor Time (hours)			Value
		Prepare Fiber	Make Product	Total Time	
CakePlatter w/ Cover	14 (h) x 33 (d)	1	8	9 hours	US\$ 24.04
Clothes Basket	60 (h) x 31 (d)	3	4	7 hours	US\$ 38.46- US\$ 48.08

Baby Hamper	40 (h) x 29 (d)	1 hour 30 min.	8	9 hours 30 min.	US\$ 28.85
Heart-shaped Basket	11 (h) x 32 (l) x 38 (w)	20 min.	50 min.	1 hour 10 min.	US\$ 14.42
Heart-shaped Basket	12(h) x 43 (l) x 52 (w)	15 min	1	1 hour 15 min	US\$ 28.85
Chest	12 (h) x 40 (l) x 30 (w)	2	8	10 hours	US\$ 38.46
Bread Basket	10 (h) x 34.5 (l) x 21 (w)	15 min.	30 min.	45 min.	US\$ 14.42
Flower Holder	56 (h) x 12 (d)	1	16	17 hours	US\$ 33.65
Wall Fan	55 (l) x 32 (w)	1	12	13 hours	US\$ 14.42
Wine Bottle Holder	10 (h) x 25 (l) x 17 (w)	15 min	30 min	45 min	US\$ 9.62
Small Circular Basket	6 (h) x 16 (d)	5 min	25 min	30 min	US\$ 3.85
Magazine Rack	12 (h) x 40 (l) x 36 (w)	15 min	1	1 hour 15 min	US\$ 19.23
Fruit bin	22 (h) x 120 (l) x 50 (w)	2 hours ¹	6 hours	8 hours ²	US\$ 48.08
Tray	55 x 20 x 30	15 min	30 min	45 min	US\$ 9.62

¹ Time for preparation of the fiber does not include stripping the cortex fiber but only for cutting and thinning the fiber for weaving.

² Total Time does not include time for stripping the cortex from the fiber.