Another Boom for Amazonia?

Examining the Socioeconomic and Environmental Implications of the New Camu Camu Industry in Peru

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ANOTHER BOOM FOR AMAZONIA? SOCIOECONOMIC
AND ENVIRONMENTAL IMPLICATIONS OF
THE NEW CAMU CAMU INDUSTRY IN PERU
By

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This study examines the socioeconomic and environmental implications of the new camu camu industry in Peru. Camu camu (*Myrciaria dubia*) is a small tree native to wetlands of the Amazon basin. It is especially abundant in Peruvian Amazonia. The high vitamin-C content of the fruit has generated interest in exporting camu camu products from Amazonia to more-developed countries. The government of Peru has been actively promoting this new extractive industry, as well as the planting of camu-camu in rural areas. Non-governmental development organizations and private industry are now actively involved with camu camu projects and enterprises. In Peru, enthusiasm for this native species is high, because camu camu is expected to provide a much-needed and sustainable economic boost for the region. However, many questions about the environmental implications and socioeconomic impacts of the camu camu export industry need to be answered in order to understand its ecological and economic viability, and its effects on business and in rural communities.

Findings indicate that camu camu has provided significantly more income to rural residents than is provided by the traditional boom and bust economies of Amazonia. Households who adopted camu camu as a new crop in their floodplain agroforestry

systems farmed significantly more floodplain land than non-adopters, and were especially adept at experimenting with new innovations. Lack of agricultural credit is a major constraint to adopting camu camu as a new crop in Peru. Geographic isolation and the location of processing facilities in relation to fruit harvests present major obstacles to the economic viability of the new industry. Camu camu was found to be cultivated with a higher diversity of annual crops than is typical in floodplain fields of the region. Extraction of camu camu fruits from the wild does not appear to have a negative environmental impact, at least in the initial years of the industry. This non-timber forest product in the process of domestication can support a viable industry in the Peruvian Amazon, if agricultural extension methods and marketing channels are improved.

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CHAPTER 1
INTRODUCTION

Camu Camu in Peru

This dissertation explores the patterns of development of an extracted non-timber forest resource undergoing domestication in Peru to supply foreign markets. This resource, commonly known as camu camu (*Myrciaria dubia* (H.B.K) McVaugh), is a small tree native to wetlands of the Amazon basin. It is an important component of riparian vegetation in Peru and Brazil; and is especially abundant in the Peruvian Amazon in blackwater environments (Peters and Hammond 1990). In northeastern Peru, camu camu fruit has traditionally been harvested from the wild and used to prepare beverages. The fruit is a round berry, about 2 to 3 centimeters in diameter (Figure 1-1). The high vitamin-C content of the fruit (Zapata and Dufour 1993) has generated interest in exporting the fruit pulp to be made into products such as beverage concentrate and vitamins (Whitman 1974, Calzada 1980, Clement and da Silva Filho 1994, Peters 1996, Paitán 1997).

Experimental projects with camu camu during the last three decades have now developed into an export industry in Peru's largest region of Loreto and neighboring region to the south, Ucayali (Villachica et al. 1998, Breuer 1999, Picón and Acosta 2000). As a result, demand for the fruit, viable seeds, and seedlings of camu camu has increased; and wild populations of this species are now intensively exploited. Along with Governmental agencies, non-governmental organizations (NGOs) and private industry have implemented many camu-camu projects (Salo and Torres1998, Vásquez 2000, IIAP

2001). Since 1994, a handful of private companies have exported up to 500 metric tons of camu camu pulp annually from Iquitos and Pucallpa via Lima, mainly to Japan (Picón and Acosta 2000). At the same time, domestic consumption of the fruit has increased. An array of candies, jams, powdered drink mixes, vitamin capsules, yogurts, ice creams, frozen preparations, and ready-to-drink beverages made with camu camu have been produced in Peru, promoted mostly for domestic consumption.

Much publicity has been given to this new industry, which many researchers and institutions consider to be an important and long-sought-after economic boost for the region and Peru's fruit export sector (Mejia 1994, Peters 1996, Paitán 1997, Salo and Torres 1998, Breuer 1999, Vásquez 2000). A small "gold-rush" mentality to obtain camu camu has developed because of the limited supplies and short fruiting season of this species. Many rural communities located near wild camu camu stands are now involved in these intense harvests. Governmental institutions and NGOs have promoted the planting of camu camu in the last decade, but almost all of the fruit is still harvested from wild stands, a source of worry for planners who are all too familiar with the damage caused by extractive economies in the Peruvian Amazon (see Peters 1990, Rojas et al. 1998, Vásquez 2000). Rural people living in floodplain environments are expected to be the main participants in planting projects, while they struggle to manage the increased exploitation of wild camu camu from their traditional resource base.

Statement of Problem

The purpose of this dissertation is to explore the environmental and socioeconomic impacts of a non-timber forest resource that is being exploited for a new industry in the Peruvian Amazon: the camu camu industry. Can specific patterns of exploitation be

identified at different scales (i.e., local forests, household, community, and region); and if so, how did they emerge and what determines them? Why are some camu camu forests more damaged by recent harvests than others? Why do some rural households choose to cultivate camu camu, while others appear to have no interest in this species? What is the nature of this extraction and domestication of camu camu, and how does it differ among rural communities and throughout the region? Reports from Peru on the progress of camu camu projects beg such questions, but offer little guidance as to specific patterns of variation or the importance of social and environmental factors that shape how rural people have responded to the new industry.

The lack of information available on these matters presents a problem for planning agencies, NGOs, and research institutions that seek to better understand this resource exploitation and development. My work explores the participation of rural people in the camu camu industry through studies in six different areas of the Peruvian Amazon. Insights gained from one study area serve to inform the others and provide a standard by which our understanding in each can be assessed. The regional focus of the study is an area extending from the Putumayo river basin on the Peru-Colombia border in the north; to the Ucayali river basin in the south, near Pucallpa, Peru. The nature of the regional case study is described later in this chapter.

Research Questions

At issue here are the implications of this new industry for economic development and conservation in the Peruvian Amazon. Will cultivating camu-camu reduce harvest pressure in the wild? The rapid spread of commercial resource extraction in várzea has had a major impact on the people and plants of the Amazon floodplain. At the same time,

our knowledge of floodplain conservation and environmental degradation is very limited (Goulding et al. 1996, Padoch et al. 1999). In Peru, there is already reason for concern about increased harvests of camu camu in the wild. For example, fish feed on camu camu fruits (Calzada 1980, Villachica 1996, Paitán 1997), including valuable fish species such as the gamitana (*Colossoma macrocarpum*). Rural people in Peru suggest that fewer fruits falling into the water have resulted in smaller catches (Penn 1994).

Locals are concerned about the current state of fisheries, and about their access to natural camu-camu stands in the future. Meanwhile, the government has promoted the planting of camu camu on the floodplain as the best way for rural people to benefit from the industry, and for the camu camu industry to sustain itself. Addressing these issues raises the following question: What are the environmental and socioeconomic implications associated with this non-timber forest resource (NTFR) that is being promoted as a new industry in the Peruvian Amazon?

To answer this broad question, a subset of questions was used to identify early trends and patterns that may exist in extraction and cultivation activities. The research questions also examine whether planners and planters are selecting locations that will facilitate the domestication and marketing of camu camu.

- How have rural communities responded to this new industry, where are they located, and what explains the nature of their responses?
- How have the planting programs changed the landscape, and what explains these changes?
- How is camu camu being cultivated in Peru, and what explains the differences in these recently adopted practices?
- What environmental impacts from this industry can be observed in camu camu stands, and what explains the nature of these impacts?

- What initial patterns and trends does the new industry exhibit across the vast area of the lowland Peruvian Amazon, and how does it compare to other attempts to domesticate non-timber forest products in Amazonia?

Conceptual Approach

The conceptual approach taken here emphasizes the evolution of non-timber forest resources from wild, extracted forest resources to domesticated, cultivated species for export markets. This concept recognizes that many patterns and processes of exploitation coexist as cultivation techniques for these resources develop. The relevance of the abundance and proximity of this species to centers of human population in the extraction, cultivation, and marketing processes will help guide the inquiry. To illustrate the dynamic nature of relationships among people, extracted resources, and markets, the domestication of other non-timber forest resources in Amazonia was considered in both the past and present. At the same time this approach recognizes that the camu camu industry has yet to establish itself and is therefore different from non-timber forest resources that supported significant markets for decades or centuries. Furthermore, the presence of plant diseases and pests is a recurring theme in the history of non-timber forest products that have undergone domestication, and camu camu cultivation may encounter similar problems. Thus, the tenuous nature of this emerging industry is especially relevant to the research questions.

Regional Case Study

A regional case study was undertaken that focused on six areas of the Peruvian Amazon with significant camu camu extraction and cultivation activities[1]. I visited 39 villages and 6 towns located in these areas during 2000-2003. My research also involved

[1] Camu camu is extracted and cultivated in other area, such as in the Río Tigre, Rio Tapiche, Río Curaray, and the Río Napo.

considerable fieldwork in other communities, and on boats traveling along rivers and lakes. Time was also spent in the cities of Iquitos, Pucallpa, and Lima, Peru. In Colombia, I visited 4 villages, and the town of Leticia. In Brazil, I visited the city of Manaus, along with visits to the frontier town of Tabatinga.

I chose this approach because my years of work in this area of the world have shown me that the regions of the Amazon exhibit internal differences. For example, even neighboring communities may exhibit considerable variability in their occupations or land use practices. In the case of camu camu, preliminary examination of the literature suggested that the fruit varied significantly in importance to the people of the Peruvian Amazon. For example, Vásquez and Gentry (1989) listed camu camu as one of the ten most frequently consumed fruits of the Iquitos area. However, in a survey near Iquitos, Pinedo et al. (1992) compiled a list of the most important wild tree species exploited by people of the floodplain. More than 30 trees were on the list, but camu camu was not on that list. Chibnik (1994) conducted a regional study focused on the livelihoods of floodplain communities, but there was no mention of camu camu. This shows how focusing on just one area or a limited number of communities may give a misleading picture of the region as a whole.

This approach was also necessary to test assumptions and hypotheses about geographic location and the local people's involvement with the new camu camu industry. It was also necessary to examine wild stands of camu camu in several areas, not only to determine the effects of extractive activities, but to observe this species in different environments in order to gain an understanding about variations in the size of stands and the morphology of camu camu. Water levels can differ greatly during the year

and between years, requiring me to frequently change the location of my research during the study. Peters and Hammond (1990) also noted how the ever-changing water levels make it a challenge to study these oligarchic, riverine forests.

Besides needing to adequately address the socioeconomic diversity and contend with environmental adversity, early findings demonstrated the simplistic extension method of this tree-planting project and the necessity to visit an extensive and diverse group of rural communities that participated and did *not* participate in the PNCC. A total of 16 months of field research was conducted from December 2000 to January 2003.

Study Areas

Regional Geography

The regional focus of the study was spread over an area extending from the Putumayo river basin in the north; to the Ucayali river basin in the south, near the city of Pucallpa (Figure 1-2). Within this vast area of Amazonia, field research was conducted in six main study areas. This consisted of two areas of the Putumayo River, the immediate vicinity of the city of Iquitos, the Tahuayo River basin, the Jenaro-Hererra area, and the immediate vicinity of Pucallpa. These areas were selected because they were located at varying distances from camu camu processing plants and urban markets for the fruit. I found that they were home to a diverse sample of ribereño, colonist, and native peoples engaged in a multitude of economic and subsistence activities.

Most of the study was conducted in floodplain landscapes. Much of the land used for agriculture in the floodplain consists of old river levee fragments of alluvial soil called “restingas,” which may or may not flood on an annual basis. Annual precipitation is 2400-2800 mm at Iquitos; and mean monthly temperatures are 26-28°C (SENAMHI

1997). Oxbow lakes are numerous along the floodplain, as are backswamps (tahuampas).Agriculture is geared toward subsistence, but it is also the most important economic activity in the region (Hiraoka 1986, 1989, Padoch and de Jong 1989, Chibnik 1994, Coomes 1995).

Except for the Pucallpa area, roads are quite rare in this region of Peru. Most people travel in small, 13 to 20 meter river taxis (colectivos), or larger diesel-powered river boats that carry 50 to 120 tons of cargo and passengers. Communities are mostly small villages (caserios) of less than 400 people scattered along the floodplain and where it meets non-flooding uplands.

Upper Putumayo River

This was the most remote of the study areas. I visited two large native communities where The Instituto Nacional de Desarrollo (INADE) had development projects, including camu camu. The villages are officially designated as native, but the people are a mixture of Quechua/Quichua and Huitoto Indians, along with mestizo inhabitants. These communities are located near the infamous Colombian town of El Encanto, once the scene of atrocities committed by rubber barons, and now a large military base (Figure 1-3). Scheduled river boats arrive only twice a year to this area, to drop off and pick up school teachers. The people must find rides with infrequent logging tugs, or development agency boats to take them to the town of El Estrecho downriver. Otherwise, a canoe trip to El Estrecho takes 3 to 4 days.

Middle Putumayo River

This study area centers around the small Peruvian town and district capital of El Estrecho. Of the three communities studied, two were on the Colombian side of the river.

One of these communities was native Murui. Two lakes, one on each side of the river, are important sources of camu camu (Figure 1-4). El Estrecho has a military base and an airstrip; and has become a processing center for camu camu. Flights to and from Iquitos in small planes (civilian and military) usually operate from 3 to 4 times a week, but the cost is prohibitive for most people. Occasional boats come up the river from Colombia or Brazil, and take passengers (who can eventually find their way to Iquitos by boat, a process that takes around 12 days).

Iquitos Vicinity

This study area centers around the largest city in the Peruvian Amazon, Iquitos (Figure 1-2), with more than 325,000 inhabitants (Soregui 2001). Just outside the city, there is extraction of wild camu camu, along with a very limited amount of cultivated fruit. The vicinity of Iquitos has been, and still is, the main center for camu camu research, development, processing, and consumption of the fruit in Peru. Iquitos is the main market for a vast area of lowland Peruvian Amazonia, but is only connected by road to Nauta, a small town of minor importance. Boats take people from several ports in the city to outlying settlements. Pucallpa is a 5 to 6-day trip upriver by boat from Iquitos, while Leticia in Colombia is a 3-day trip downriver. Plane service from Iquitos takes people to these cities, as well as Lima and Tarapoto.

Tahuayo River – Muyuy Islands

This area is home to more than 20 villages participating in camu camu cultivation, and also contains an important area of extraction on the upper Tahuayo River

(Figure 1-5). This is the area of the large CASPI extension project managed by CARE-Peru. All villagers in this area can reach the city of Iquitos by river taxi within 1 day. I studied 22 villages in this area.

Jenaro-Herrera and Supay-Sahua Cocha

This area includes the district capital of Jenaro-Herrera, and several villages that extract camu camu from nearby lakes located across the Ucayali River. Supay and Sahua Cocha are two adjoining lakes (referred to hereafter as Supay-Sahua Cocha) that at first supplied most of the camu camu for the new export industry. Processing barges have visited the lakes for several years to buy camu camu, and the locals in this area also cultivate camu camu (Figure 1-6). Residents travel to Iquitos by large river boats, a journey of approximately 24 hours. Boats are available about 3 days a week. I studied 5 villages and the town of Jenaro-Herrera in this area.

Pucallpa Vicinity

This study area centers around Pucallpa, the second largest city in the Peruvian Amazon. Pucallpa has over 200,000 inhabitants (CTAR-Ucayali 2000), is linked to Lima by road (a 12-hour trip under good conditions), and has infrequent flights to Lima and Iquitos. The city is home to several industries, including a brewery that processes camu camu fruit into several non-alcoholic products such as powdered drink mixes, juices, and hard candy. Since there is no wild *M. dubia* in this area, most of the fruit must come from nearby farms, or very distant sources of wild fruit located in the province of Loreto. Unlike Loreto, the area experiences a pronounced dry season between May and September, when only 50 – 70 mm of rain per month falls, and average annual precipitation is 1400 - 1700 mm (Gentry and Lopez-Parodi 1980, Riva and Gonzales

1997). Outside of the city, many farmers cultivate camu camu (Figure 1-7). After Iquitos, the Pucallpa vicinity is the second most important center for camu camu research, development, processing and consumption of the fruit in Peru. I studied five communities in this area.

The People of the Region

Population

About 880,000 people live in the department (state) of Loreto, which covers almost the entire northeastern Peruvian Amazon (INEI-Loreto 2000). Slightly over half of the population lives in the urban center of Iquitos, with the remainder inhabiting small towns, villages, and single homesteads in rural areas. Bordering Loreto on the south, the somewhat smaller department of Ucayali has about 425,000 inhabitants, with 65% living in the urban center of Pucallpa (CTAR-Ucayali 2000). Precise figures are difficult are to come by, as populations are calculated by district, not individual cities or towns, and the last complete national census figures are from 1993. What has been documented in the last two decades is the accelerating migration of people from the rural areas to the two main urban centers (Iquitos and Pucallpa), as well as rapid population growth in many small towns such as Requena, Nauta, Tamshiyacu, and El Estrecho (Hiraoka 1985, INEI-Loreto 2000, Soregui 2001).

Ethnicity and Identity

Eight-five percent of rural inhabitants of Loreto (Egoavil 1992) and 81% in Ucayali (CTAR-Ucayali 2000) are referred to as ribereños, a quasi-ethnic group of mestizo people of mixed Amerindian and European descent who live along water courses

(Chibnik 1991). Ribereños, like Amazonian Indians, have a great knowledge of forest plants, agroforestry techniques, and hunting and fishing methods. Much has been written about the swidden-fallow agroforestry systems of ribereños in Loreto, with emphasis on the native and market influences (Hiraoka 1985, 1986; Padoch and de Jong 1987; Denevan and Padoch 1988; Padoch and de Jong 1989; Coomes 1995; de Jong 1996; Coomes and Burt 1997). Padoch (1988a) showed that ribereños contribute greatly to the economy of the region, and are also responsible for most of the extraction of natural resources.

Despite the persistent use of the term in the literature, these rural inhabitants do not actually call themselves "ribereños." They most often refer to themselves in occupational or class terms such as pescador (fisherman) or chacarero, as chacra is the common name for the plots of land they farm. The advent of the camu camu industry has brought the term camu-camero(a) (individuals who are most dedicated to working with this fruit).

Researchers point to the Cocama-Cocamilla origins of many of these people (Padoch 1988a; Chibnik 1991, 1994), but ribereños have diverse origins, and it is not advisable to make generalizations about their ethnicity. The origin and ethnicity of the Kokama[2] Indians themselves are still poorly understood (Cabral 1995). Unfortunately, discrimination and repression have caused many of the ribereño people to ignore or deny their true ethnicity. To be called or classified as nativo or indio is still an insult to most people in Peru. Moreover, the processes of urbanization, especially the migration of young people from rural to urban areas, make it increasingly difficult for these families to preserve their understanding of natural resources such as camu camu.

[2] Phonetic spelling (Cabral 1995).

Camu camu in the Study Area

There are approximately 65 species of *Myrciaria* in the lowlands of northwest South America (Gentry 1993). Camu camu refers to several species of *Myrciaria.* The most well known of these is *Myrciaria dubia*,[3] which is a small tree 6 to 8 meters in height, characterized by profuse basal sprouting and thin, pendant branches which give the plant a sprawling appearance (Peters and Hammond 1990). It forms extensive oligarchic and monotypic forests along water courses in Peru. These wild stands of *M. dubia* produce a prodigious amount of fruit (to be discussed in Chapter 2). The fruit is a round berry about 2 to 3 cm in diameter (Peters 1990). *Myrciaria dubia* is often referred to as a bush (camu camu arbusto), or as the small species of camu camu (camu camu pequeño). The other species of camu camu are larger trees with straight trunks, rather than the bush-like *M. dubia*. In Peru, these species of *Myrciaria* are still in the process of identification, and often referred to simply as camu camu de árbol (the tree form of camu camu) (Villachica 1996, Villachica et al. 1998, Vásquez 2000). Researchers in Peru are also uncertain if *M. dubia* is in fact the only species of the smaller, bushy camu camu[4].

At least three species of camu camu were found in this study. All might be called simply "camu camu" by the locals, but three distinct species were identified. The first was *M. dubia,* the topic of this dissertation, which has already been described. The largest stands of *M. dubia* observed during the study were located in lakes in Colombia along the Putumayo River, such as Tinta Cocha (Figure 1-4)

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[3] *Myrciaria paraensis* is a synonym of *M. dubia* (Villachica et al.1998, Vásquez 2000). Rogers McVaugh (1981) has also stated that it is synonym of Psidium dubium.
[4] Mario Pinedo, IIAP, personal communication 2001.

The second species observed was usually called shahuinto or camu camu de árbol, and grows into very large trees. I observed specimens with trunks larger than 60 cm DBH, and at least 20 meters in height. The fruits vary in size, but are thicker-skinned than *M. dubia*, and less round in shape, with stem-end necks. The fruits usually have 2 or 3 seeds, compared to 3 or 4 seeds for *M. dubia* fruits of the same size. The seeds are slightly smaller and more oval-shaped than the nearly flat seeds of *M. dubia* (Figure 1-8). The fruit is red when ripe, and quite acidic; more so than *M. dubia*, which explains why many locals called it camu camu ácido, or shahuinto ácido. The trees were usually dispersed along floodplain lakes and are also spontaneous in gardens. This species was most common in the upper Tahuayo River. Fruiting usually occurs at the same time as *M. dubia,* (December-February in the Tahuayo); but the tree may go 1 or 2 years without fruiting. When it fruits, production can be abundant or next to nothing.

The third species of camu camu was a tree from 8 to 12 meters in height, having a sweet fruit with a slight vanilla flavor (often called shahuinto dulce). These fruits varied in size, from that of *M. dubia* to very small specimens of 0.5 cm in diameter (Figure 1-9). The fruits formed small bunches, almost like grapes, and turned dark violet when ripe. The seeds were similar in shape to coffee beans, usually one or two in each fruit. The pericarp of the fruit is thicker than that of the other two species, and has a leathery texture. The fruits begin to form in November, but ripen unevenly, often taking three or four months to fully ripen. As with the other tree species of *Myrciaria* found in the study area, fruit production can be abundant or next to nothing. These latter 2 tree species of *Myrciaria* were found mostly as individuals scattered along the floodplain, or in groups of a few trees, but never in large stands like *M. dubia.*

Field Work Methods

Multiple methods were used to gather information in this study, from formal household and market surveys to in-depth interviews and participatory observation. It was also necessary to have extensive informal conversations with my many informants, especially with those who were involved in the often sensitive business aspects of the camu camu industry. Surveys were conducted in fields planted with *M. dubia* (accompanied by their owners, in order to assess the condition of the trees, as well as the patterns of land use associated with this species). Damage censuses of wild camu camu stands were conducted in five areas. Low water levels were required to facilitate this work. These levels are often low during the months of August-September and December-January, but this was not true for much of 2002. Timing of field research was also conducted during months of extraction from wild stands (usually December-January), and of camu camu cultivation work in gardens (usually April-September). I also worked alongside the local people, helping them to harvest, sort, and transport camu camu fruits. In their fields, I helped in the planting and weeding of this species. These work experiences allowed me to gain important insights and obtain information that was not obtained by other methods. Research methods are given in detail as the different aspects of the research are presented in the upcoming chapters.

Figure 1-1. *Myrciaria dubia* fruits.