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## **DEDICATION**

To the memory of Dr. Arnold R. Pilling.

## ACKNOWLEDGMENTS

I consider this dissertation the culmination of contributions from a great number of wonderful people without whom it would never have been completed. I would like to begin by acknowledging the orientation of my late advisor, Dr. Arnold R. Pilling whose attention to my academic development was exemplary. Unfortunately, Dr. Pilling is unable to see the product of our many long and profound discussions. I would also like to thank my current advisor, Dr. Barbara Aswad, for volunteering to step in with the passing of Dr. Pilling; her encouragement and advice have been invaluable.

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## PREFACE

This dissertation is the product of attempts to synthesize my ideas concerning the culture of consumption, global economic processes, and a desire to critique the concept of sustainable development. It began while I was investigating how subcultures form around the collection of particular classes of commodities, i.e. ornamental fish. Under the orientation of Dr. Arnold R. Pilling, during the spring of 1993, I conducted a directed study of the international trade of ornamental fishes, aimed at discovering the nature of the trade, identifying the sources of fish, and the nature of social relations of those involved in their capture.

While undertaking this study, I learned of the efforts of Dr. Ning Labbish Chao of the Universidade do Amazonas to study the ornamental fishery of the Rio Negro in the municipality of Barcelos, Amazonas, Brazil. Dr. Chao had established a research and extension project by the name of "Project Piaba," with funding from the Brazilian science foundation, Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), World Wildlife Fund, and the Dr. Herbert R. and Evelyn Axelrod Foundation, and his own NGO, Bio-Amazonia Conservation International. At the time Dr Chao was searching for someone to study the socioeconomy of the fishery in order to establish a community-based effort of preservation of ornamental fish and their habitats.

I wrote to Dr. Chao expressing my interest in the opportunity to conduct this research as I had finished preliminary research on the trade, and wished to understand the production and distribution of wild-caught ornamental fishes. He,

with the support of Universidade do Amazonas, and through the Departamento de Ciências Pesqueiras (DEPESCA) and the Faculdade de Ciências Agrárias, arranged for me to participate as co-investigator of Project Piaba as a Visiting Professor; a position I maintained during the period of July 1994 to October 1999.

This dissertation is my own original work, except where cited. I assume all responsibility for its content and scientific integrity. Portions of this dissertation were taken from Prang (1996a, 1996b, and 2001). All translations from Portuguese to English are mine unless stated in the citation.

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## CHAPTER 1

### INTRODUCTION

#### 1.1. OBJECTIVES AND RESEARCH SIGNIFICANCE

This dissertation has three main objectives. The first is to describe the socioeconomic organization of the ornamental fishery of the Rio Negro, Amazonas, Brazil and its articulation to the global aquarium trade; understood in historical context. The second is to provide ethnographic data which are comparable to those of other areas of Amazonia, and which demonstrate the lack of social and environmental uniformity in the region. The third is to examine the various myths of the social agents that have some social, economic, political or cultural association with wild caught ornamental fishes, in order to demonstrate the limits of the utility of theories of sustainable development of ornamental fish from the Rio Negro.

This study is the first of its kind on the international ornamental fish trade. While general contributions to the anthropological literature on fishing communities abound (Acheson 1981), and a number of studies have been produced concerning the Amazon basin (Chernela 1989 and 1993; Diegues 1989 and 1990; Furtado 1995; Gragson 1992; Harris 2000; Loureiro 1985; McGrath, *et. al.* 1993; Motta Maués 1990; Smith 1981), ornamental fishes<sup>1</sup> as extractive

resources have been largely ignored. Nugent (1993), Coomes (1992), Emperaire and Pinton (1993) and Hiraoka (1985) make brief mention of ornamental fish resources in their works on extractive economies in Amazonia, but only Chao (1993), Chao and Prang (1997), and Prang (1996a; 1996b; 2001) have produced more in-depth studies concerning the socioeconomy of an ornamental fishery.

The place of ornamental fish in the study of fishery economics and conservation, as well as fishing communities, is unique. Unlike food fish, ornamentals must be kept alive to have value, are generally collected for sale in foreign markets, and are sought and consumed for their symbolic rather than utilitarian value. Most studies of ornamental fishes are concerned with one or more of three main issues: economic process and importance, conservation and fish health, and labor exploitation.

The first issue, economic process and importance, has received the most treatment in the scientific literature. Chapman, *et al.* (1997), Conroy (1975), Fitzgerald (1987), Hemley (1984), the International Trade Centre (1979), and Watson (2000) have conducted research on the international trade in ornamental fish utilizing, primarily, secondary and anecdotal economic data. Welcomme, *et al.* (1978) examined the ornamental fish trade in Brazil, but are basically concerned with the export function. McGrath (1990) analyzed the trade in Brazilian wildlife, including ornamental fish, but primary data on the fishery is absent. Corrêa (1984), Eisenstadt (1992), Leite and Zuanon (1991) and Montenegro and Souza (1987) have made contributions to an understanding of the ornamental fish commerce in Amazonas, Brazil, but again, these works are

little more than reviews of statistical data from government agencies and supplemented by a few interviews with industry participants and government functionaries.

The second issue found in the scientific literature deals with the conservation of ornamental fish stocks. Although some researchers have proposed that some ornamental fish stocks are diminishing (Bayley and Petrere 1989; Andrews 1992; and McLarney 1988), they do not provide any concrete data.<sup>2</sup> Crampton (1999), who studied the effects of fishing of the (*Symphysodon aequifasciatus*) in the Rio Japurá and has empirical data, has argued that stocks have been reduced, but lacks any longitudinal data to confirm that overfishing of the species is the cause. Thomerson (1976), Junk (1984), and Chao (2001) have studied the impact of ornamental fisheries in South America, and assert that stock reduction is negligible for most species because of the short life-cycles of most fishes sought, although it may be that stocks of some species have been reduced in some local areas (Chao and Prado-Pedreiros 1995; Thomerson 1976). A related issue to conservation is that of mortality. Some studies (Conroy 1975:13; International Trade Centre 1979:6; and Welcomme 1978:38) indicate that mortality may be as high as 50 percent to 70 percent before fish taken from the wild arrive in foreign ports, while Thomerson (1976:58), estimates mortality at only 10-25 percent. The causes of fish mortality are said to originate at some point(s) at the production end of the trade (Thomerson, 1976:90; Leite and Zuanon 1991) and accounted for by the lack of appropriate technologies

(Eisenstadt 1992). Reduction of mortality represents an ethical issue to animal rights groups and a means by which less environmental stress could be ensured.

The last issue that appears in the literature relates to the relations of production in the Rio Negro ornamental fishery. This issue can be divided into two sub-issues: labor exploitation and arguments for the organization of cooperatives. Goulding, et al. (1996) and Oliveira, et al. (1994) allege the use of unfair labor practices, but they do not adequately place such practices into wider socioeconomic context. There is a further implication that the fishermen should organize cooperatives and eliminate the intermediary function (Eisenstadt 1992; Leite and Zuanon 1991). Although in theory this might be an attractive alternative, these authors do not base their recommendations on any concrete knowledge of the international commerce of ornamental fish, nor do they base them on the actual sociocultural forms encountered in the ornamental fisheries. I argue that the existing socioeconomic organization and external forces must be better understood before allegations of exploitation can be demonstrated and proposals of alternative forms of relations of production can be considered (i.e., extractive reserves, conservation units, cooperatives).

This study is concerned with the place of ornamental fish extraction in rural Amazonia. The peasants of rural Amazonia are often referred to as *caboclos*. Until recently, the only full-length ethnographies that treated caboclo societies were those of Wagley (1953) and Galvão (1976). During the last twenty years, various works (among them: Parker 1981; Loureiro 1985; Gow 1991; Ayres 1992; Coomes 1992a; Nugent 1993; Whitesell 1993; Chibnik 1994;

Furtado 1995; and Harris 2000) have made significant contributions to the ethnographic record of the historical Amazonian peasantry, particularly with regard to estuary and white water flood plain societies. It should be further noted that with the exception of Ayres (1992), Nugent (1993), Whitesell (1993), and Harris (2000), most studies of the rural Amazonian peasantry have focused on the regions near the urban centers of Belém, Manaus and Iquitos (see Hiraoka 1992). Yet within Amazonia, social space and natural space are not uniform (Nugent 1991; Ayres 1992; Whitesell 1993; Cleary 1993; Harris 1998). One would, therefore, expect to find different social histories and traditions, as well as various ecosystems, where “the impact of external forces is not universal or unidirectional” (Kottak 1999:26). This dissertation provides another ethnographic case study to enrich our understanding of the socioeconomic and environmental diversity found in Amazonia.

Very little attention has been given to the rural peasantry of the middle Rio Negro. Few ethnographic works exist for the middle Rio Negro: Emperaire and Pinton (1993), Lescure, *et al.* (1992), and Lescure and Pinton (1993) studied the extraction of piassaba (*Leopoldinia piassaba*) along the Rios Preto and Padauri, providing some socioeconomic details; and Galvão (1979a, 1979b & 1979c) has studied the process of acculturation in the basin. Only Oliveira (1975) has given a more complete ethnographic account of rural Amazonian peasant community in the middle Rio Negro. Additionally, most anthropological research conducted on the Rio Negro thus far has been concerned with the indigenous populations of the upper region of the basin above Santa Isabel: “there are few areas of the

Amazon where the [indigenous] population has a continuous territorial history as does the Rio Negro (Moran 1993:41).<sup>3</sup> There are various references to the rural peasants in the monographs of numerous ethnographers of the indigenous groups of the upper reaches of the Rio Negro, but generally in regard to the negative aspects associated with interethnic commerce (Meira 1993; Oliveira 1979; Oliveira, *et al.* 1994; Wright 1981).<sup>4</sup> Those interested in Amazonian anthropology should look integrate the study peasant and indigenous societies “in terms of the history and political economy of connections in particular areas” (Harris 1998:86). A better understanding of the peasantry of the middle Rio Negro and its link to the world system will contribute to a higher degree of integration in Amazonian anthropology.

## 1.2. THEORETICAL FRAMEWORK

The theoretical framework that I employ in this ethnographic inquiry is one that seeks to: (1) situate the anthropological discussion of the environment in relation to sustainable resource use in Amazonia; (2) clarify the local and global history in which Amazonian peasant cultural formation in the Rio Negro occurs; (3) demonstrate that the process that links these histories is mercantile capitalism; (4) highlight the place of petty commodity production within mercantile capitalism; (5) treat the issue of producer exploitation and autonomy; (6) demonstrate the implications of hierarchical social relations based on dependency for sustainable resource use in Amazonia.

### 1.2.a. Ecological Anthropology and Resource Management Strategies

The environment is a necessary variable in the understanding of culture formation. For many years anthropologists in Amazonia focused on the environmental limits to social and economic development in the form of poor soils (e.g. Meggers 1971) and protein capture (e.g. Gross 1975), emphasizing social forms peculiar to *várzea* (Amazonian floodplain) (e.g. Roosevelt 1980), or *terra firme* (upland forest) (e.g. Ross 1978a) environments. The ecological school of anthropology was interested in the formulation of general environmental models of Amazonian sociocultural evolution. Of the cultural ecology studies of Amazonian societies produced, very few deal with the rural peasantry. Of the few that do (Moran 1981; Bunker 1985) however, more interest is shown in the economic possibilities for peasant societies than the peasantries themselves (Nugent 1993:26). Moran (1974) and Ross (1978b) have classified caboclo culture as an adaptation to the Amazonian environment. Nugent (1993:106; see also Coomes 1992) has contested this classification: "Caboclos don't adapt to local conditions, they've been adapted for Amazonian conditions... Amazonian peasants are conditioned less by the environment than by external structures."

With the installation of the military dictatorship in Brazil, the consequences of the National Integration Policy (intensive deforestation and the encroachment of Indigenous territories) turned the anthropological gaze to an examination of the possibilities for "sustainable development."<sup>5</sup> Many researchers (see Browder 1989; Posey and Balée 1989; Anderson 1990; Goodman and Hall 1990; Goodman and Redclift 1991; Plotkin and Famolare 1992; Redford and Padoch

1992) began to reassess the utility of models of “ecological adaptation.” In order to prevent destruction of the Amazonian rainforest and ethnocide, emphasis was given to “resource management strategies” of indigenous and peasant societies and the prospect of “sustainable yield/harvest;” meaning, “the forest may be exploited in a non-damaging way and still result in profit for extractors” (Nugent 1991:147). The “management” contingent argued that theories based on ecological limiting factors (see Hames and Vickers 1982) fail to account for the role of human agency: Amazonian societies not only adapt to the environment, through their economic activities, they alter and manage it (Balée 1989).

Lescure and Pinton (1993:772) have found virtue in extractivism and found that it is “undeniably compatible with maintaining the humid tropical forest ecosystem. The argument that extractivism leads to rarefaction of resources does not seem to be justified for the large majority of species currently exploited.” They feel that the variety of extractive activities in the Rio Negro Basin “makes any kind of generalization about the future of extractivism or the implementation of improved production systems untenable, unless local contexts are considered” (Lescure and Pinton 1993:773). Whitesell (1993:3) asserts that the idea that extractivism “necessarily fosters sustainable resource use is clearly false.” Extractivism as a conservation and development paradigm fails to consider the fact that economic potential is inherently marginal to the economies of Amazonian states, nor does it assess the “changes in production systems that would likely accompany the expansion of such markets” (Whitesell 1993:109). Homma (1989) sees the decline of extractive production as inevitable, even

though its importance to the local economy may continue to have some importance, as rubber did until the decade of the 1980s. Homma has shown that as external demand for any particular extractive product increases, the more likely a replacement, through domestication and/or the fabrication of substitutes, will come to compete with it, thus leading to a drop in local demand for the product. This is not to say that the extractive resources will inevitably be exhausted as Bunker (1984 and 1985) has argued.

The “management” approach introduces the importance of history by demonstrating that indigenous and peasant societies are able to create, modify and augment natural resources, and, therefore, provide clues to sustainable resource use, yet there is little discussion of macro-level linkages to the Amazonian economy (Hiraoka 1992; Nugent 1993), the informal economy (Nugent 1991; Cleary 1993; Harris 1998) or the role of patron dependency (Whitesell (1993). In order to adequately assess the possibility of sustainable development, the relationship of local and global historical processes and in the formation of contemporary caboclo societies must first be understood.

### **1.2.b. Global and Local Histories**

Wolf (1982), Mintz (1985), and Roseberry (1983) have suggested that everywhere culture formation occurs in the context of global processes, and that the anthropological project is to identify in them the issues of power and domination. For these scholars, to describe any contemporary cultural formation as a totality with distinct boundaries is a futile exercise. Wolf (1982:19) has

suggested that in the wake of the expansion of European capitalism, “it becomes difficult to view any given culture as a bounded system or as a self-perpetuating ‘design for living.’” In order to understand our current world, “theoretically informed history and historically informed theory must be joined together to account for populations specifiable in time and space, both as outcomes of significant processes and as their carriers” (Wolf 1982:21). This approach allows Wolf to propose that the distinction between capitalist and pre-capitalist social relations made by the proponents of dependency theory is inadequate for understanding the complexity of the contemporary world.

Wallerstein (1974a; 1974b) and Frank (1969) have seen mercantile capitalism as transformative, responsible for the elimination of feudalism and the growth and development of the capitalist mode of production beginning in the sixteenth century. This transformation is seen as continuous, linear, and quantitative (Wolf 1982:85). Thus, one can envision the following stages: feudalism, mercantilism, and industrial/finance capitalism. Understood as such, the shift to capitalist production led to the “development of underdevelopment” (Frank 1969) where the “core” (Europe) extracted wealth from the “periphery” (colonies). For Wolf (1982), this notion is overly evolutionary, and assumes that all cultural formations can be classified as either pre-capitalist or capitalist. Further, it fails to explain local responses to their incorporation into the expansion of mercantile capitalism. He contends that the relationship between mercantile and tributary modes of production was strong until the end of the eighteenth

century. Nugent (1993) has employed Wolf's framework to argue that Amazonian caboclo society is a consequence of merchant capitalism.

### **1.2.c. Merchant Capitalism**

The importance of merchant capital in Amazonia has been noted in several studies (Murphy and Steward 1956; Miyazaki and Ono, 1958; Bakx 1988; Burkhalter and Murphy 1989; McGrath 1989; Ayres 1992), but it is Nugent who has best described its function:

Merchant capital's interest is in exportable tropical preciosities whose value can be realized in the external market. Merchant capital is interested in commodity production only to the degree that something is being produced which may be purchased and sold elsewhere. To the degree that merchant capital's interest has been discontinuous, rising and falling with changes in global demand for such tropical goods as rubber, skins, spices, nuts, tropical fish and so on, and because merchant capital's lack of direct investment excludes it from directly structuring emerging forms of commodity production, local peasantries' expansion of production forms constitutes a system-within-a-system. (Nugent 1993:217)

Merchant capitalism is an economic mode that serves to link commodity production (extractivism) in less developed regions of the world with those of the more developed regions. It refers to buying commodities cheap, and selling them dear. The wealth thus derived is invested in more commodities, increasing the net flow of commodities to the market. Mercantilism is both transformative and conservative. It is transformative in that it encourages the production of exchange values (wealth) and provides the access to markets by incorporation within global capitalist development. It is conservative in that it disciplines local production without entering directly into production, that is, labor is not alienated from means

of production. Mercantile capitalism accommodates, rather than altering existing relations of production from which surplus (not “use”) values are appropriated. For Nugent (1993), mercantile production does not necessarily lead to a capitalist mode of production; this has happened in core countries, but not in peripheral ones. Merchant capital does not create the backward linkages associated with capitalist development in the core, rather it subverts the local development of productive forces by fragmenting local social formations by means of environmental degradation and disorganized atomization of production units (Nugent 1993:229).

#### **1.2.d. Caboclo Identity/Formation**

For Nugent, “Amazonia has functioned as a reserve to be periodically reinserted into the national and global economy” (Nugent 1997:41) where caboclos are the “subjects of forms of domination which do not even acknowledge their agency” (Nugent 1997:42). The “historical” peasantries of Amazonia are better defined in terms of the external forces of mercantile capitalism, than by local cultural continuities: “The us/other dyad in Amazonia, in other words, consist not of ‘the West’/‘primordial other,’ but of ‘the West’/‘Western artefact’ and illustrates a dynamic which is perhaps characteristic only of this semi-periphery” (Nugent 1997:37).

Unlike other Latin American countries where there is a greater association between Indian ethnicity and class, caboclo culture/identity has no pre-capitalist antecedents (Nugent 1993; Ayres 1992; Harris 2000). Nugent (1993; 1997) and

Harris (1998; 2000) find the closest analogue for caboclo societies in the concept of the “reconstituted peasantries” identified by Mintz (1972) in the Caribbean. According to Mintz, the Africans or Native Americans who were forced to labor in the colonial plantation economy were initially not peasants. Upon the withdrawal of the European colonizers, they were compelled to find some new means of social reproduction, thus reconstituted peasants.

Caboclo culture cannot easily be defined as a social class (Ayres 1992:11). The notion of class implies the existence of explicit political interests that caboclos lack. Nor is there an exclusive, homogenous social category that could be referred to as Amazonian caboclo. Rather, there is a great variety of “types of caboclos” (Ayres 1992; Nugent 1993; Whitesell 1993; Harris 1998; Cleary 1993). These types can be classified according to ecological niche and economic activities. For Ayres (1992:157) “caboclos stand between the traditional Amerindian market-independent economy and the urban or rural proletariat.” In all cases however, contemporary caboclo culture/identity “represents a dynamic system which accommodates environmental features and the wreckage of the colonial system abandoned after the collapse of the rubber boom” (Nugent 1993:182). After the collapse, *caboclo* society expanded to a system of broad-based production that includes a variety of food and non-food crops and various forms of petty extractivism.

### **1.2.e. Petty Commodity Production**

Recognizing the difficulty of the term “peasants” for categorizing rural producers, Friedmann (1980) has identified two prototypes that can be placed on a continuum, differing in what she calls ‘degrees of commoditization,’ or differences in dependency on commodity for social reproduction. On one end is the category of “peasants” where “household reproduction involves important communal and/or class relations which limit the penetration of commodity relations into the productive process” (Friedmann 1980:162). On the other end is the category of “petty (simple) commodity producers” where household reproduction is integrated into the capitalist economy. Neither is separated from the means of production, but petty commodity producers lack the strong communal bonds of peasants, particularly in relation to land. Ayres (1992:12-13) has found that Amazonian caboclos are more like peasants than simple commodity producers, but argues that the level of commoditization among them is not uniform. In addition, there is significant variation in the level of commoditization over time for individual producers.

Following the rubber period in Amazonia, mercantile capitalism led to an explosion of forms of petty commodity production. The forms of commodities produced depend on the limits and opportunities presented by the mercantile system and the regional markets. Petty commodity production refers to the “production of commodities by owners of means of production, yet owners who must subsidize such production through increased self-exploitation in the subsistence agricultural sphere” (Nugent 1993:125, see also Kahn 1980; Turner

1986; Roseberry 1983). As such, the economy in Amazonia is based on two economic sectors: the merchant sector (capitalist, extractivist) shaped by the market, and the productive sector (subsistence, agricultural) shaped by kin-based units. According to Ayres (1992:131), the two sectors are linked by a complex set of commodity production forms and commercial relationships. In order to understand petty commodity production “it is necessary to distinguish between the nature of commodity relations as they mediate the ‘peasant economy’ and the larger economic sphere and the impact of commodity relations as they shape and are shaped by features of the domestic/household units” (Nugent 1993:177).

In combining the analyses of Ayres (1992:126-131) and Nugent (1993:176-179), a paradox of petty commodity production can be noted. Petty commodity producers’ articulation to the mercantile economy is constrained by the intensity of subsistence production, the vagaries of commodity markets, and competition among commodity producers (Kahn 1980, in Nugent 1993:177). Competition tends to lower price as production increases. As prices decrease, the more dependent producers become on subsistence production. The more emphasis placed on the subsistence sector, the less they are integrated into the capitalist sector. Thus, merchant capital disciplines commodity production by passing the burden of labor reproduction, in the form of subsistence production, to the producers themselves, reducing the cost of commodities (Kahn 1980:206, in Ayres 1992:130-131). The result is that exchange value flows from the production sector to the merchant sector. During the Amazonian rubber boom

period, the flow of exchange value was realized through the economic system known as *aviamento*.

### **1.2.f. Coercion or Autonomy**

*Aviamento* means supplies or provisions. It derives from the verb *aviar*, meaning to supply, provision, furnish, or outfit. Santos (1980: 155) defines *aviamento* as a socioeconomic arrangement that appears when the following conditions are present: (1) the base of natural resources as dispersed and scarce; (2) technology is simple; (3) economic exchange involves little or no money; (4) a local mercantile elite – native or foreign; (5) this local elite has ties to monetarized markets and underwrites credit; (6) an active external demand for one or more products in the geographical area in question. *Aviamento* is an economic mechanism through which surplus value is appropriated at the point of exchange (Miyazaki and Ono 1958; Santos 1980; Weinstein 1983b; McGrath 1989; Whitesell 1993). Weinstein (1983a and 1983b) claims it appeared as a means to control labor through coercion and contrived indebtedness, and to extract a surplus where capital was scarce, production seasonal, resources sparse and distant, and transportation slow. *Aviamento* is generally presented as extremely rigid, vertical, and exploitative, and therefore the cause of Amazonian underdevelopment (Ross 1978b).

The Amazonian extractivist economy is still associated with the *aviamento* system of the rubber boom: “Agricultural production is free, extraction is still based on *aviamento*” (Ayres 1992:119). While some observers of rural Amazonia

(Ross 1978b; Ennew 1981; Knight, 1988; Goulding, *et al.* 1996) believe that debt bondage<sup>6</sup> still prevails in the extractive economy, most have noted that Amazonian rural extractivist societies now enjoy more autonomy (Sizer 1993; Browder 1992; Romanoff 1992; Allegretti 1990; Schwartzman 1989; Bakx 1988; Wesche 1985; Weinstein 1983a, 1983b, 1985 and 1986).<sup>7</sup> The possibility of autonomous production is based on the notion that, traditionally, the patron's aim was to keep authority, avoid the loss of labor, and control as much of the rubber trade as possible, while the rubber tappers sought to increase subsistence production and diversify commodity production in the interest of security (Weinstein 1985). Additionally, there is a tendency to emphasize autonomy in terms of "breaking away" from the restrictions of, or as a form of resistance to, patronage. Whitesell (1993) has found claims of autonomous production to be based on a dubious distinction of "traditional" versus "autonomous" relations of production.<sup>8</sup> Subsistence production is not equivalent with "resistance;" it is a necessity! Further, explanations of the traditional/autonomous dichotomy also fail to adequately account for the role and dynamic nature of merchant capital and petty commodity production in extractive economies.

Autonomy is better explained in terms of Amazonia's marginalization following the rubber boom: "The viability of the local system is inversely proportional to the degree to which it is incorporated" (Nugent 1993:200-201). The marginality of caboclos, then, "allows for a freedom not possible were they more integrated" (Harris 2000:22) as they were during the rubber boom. The following passages from Whitesell and Nugent serve to emphasize this point:

Diversification of production is an economic necessity for everyone engaged in an economy in which the value of extractive products is marginal... Except for boom periods, it is not true that 'the patrons' interest is in maximizing rubber production' [Schwartzman 1991:400]. Just as the producer cannot make a living from rubber alone, neither can the merchant. All are under the same pressures to combine income-earning strategies... in order to survive in a marginal economy. (Whitesell 1993:130)

With the withdrawal of the apparatus of the rubber industry, tendencies toward centralization – typified in the hierarchical trading mechanism – were undercut, yet the lower reaches of the mercantile network remained intact. In terms of the possibilities for expanded peasant production, the trading network embracing direct producers and small-scale traders (*tabernas*<sup>[9]</sup> and *regatões*<sup>[10]</sup>) maintained both local markets and links with external ones (e.g. for tropical preciosities). The separation of direct producers and merchants, however, did not represent an unambiguous differentiation and there is considerable overlap, small-scale traders, for example, frequently being producers themselves as well as functioning as merchants. The living standards of such traders are in many respects equivalent to those of their debtors. (Nugent 1993:202-203)

Contemporary producer independence is also based on the ability to control 'unvalorized' natural resources and the increase of cash transactions. Unrestricted access to land and water resources, due mostly to the lack of legal restrictions (Nugent 1981:70; Nugent 1993:212; Cleary 1993), promotes economic diversity and flexibility, combining fishing, hunting, agriculture, husbandry, extraction and temporary wage labor. Unrestricted access has led to a system of communal property based on usufruct rights and a communal morality, organized mostly around notions of kinship and friendship (Nugent 1993; Harris 2000; Ayres 1992). Diversity of production has created a situation in which there is greater freedom to choose among available patrons (Ayres

1992:122), and probably means that patrons can be more selective as well. Many have noted that the use of money in economic transactions is now greater in the interior of Amazonia, allowing more freedom in trade and limiting the potential for coercion (Burkhalter and Murphy 1989; Ayres 1992; Romanoff 1992), while others claim that “patrons control the circulation of products and block the conversion of a barter economy to a monetarized economy” (Empeaire and Pinton 1993:786).

### **1.2.g. Patron Dependency**

In order to understand the notion of petty commodity producer autonomy, it is also necessary to recognize the importance of the sociocultural context of relations of patron dependency. Scott has defined the patron-client relationship as:

a special case of dyadic (two-person) ties involving a largely instrumental friendship in which an individual of higher socioeconomic status (patron) uses his own influence and resources to provide protection or benefits, or both, for a person of lower status (client) who, for his part, reciprocates by offering general support and assistance, including personal services, to the patron. (Scott 1972a:92)

Linger (see also Whitesell 1993:293-294; Scott 1972a:96) has demonstrated that patronage can be characterized as having a pyramid structure “within which power ramifies downward in a pattern of inverted-Vs. The nodes of the inverted Vs are patrons. All patrons (except for the hypothetical person at the apex of the pyramid are simultaneously clients” (Linger 1993:5). Patron-client relationships “both serve as a formula for bringing together individuals who are

not kinsmen and as building-blocks for elaborate chains of vertical integration” (Scott 1972b:8). Patron-client relationships are based on unequal exchange, and are “manystranded, dyadic, and vertical coalitions” that appear in a number of social contexts (Wolf 1966:86-87), require some degree of reciprocity to maintain legitimacy (Scott 1972a:92), and are more common where institutional and collective social security mechanisms are lacking (Scott 1972b:8-9). Further, exchange is governed by situational and personal considerations (Linger 1993:6); that is, patron-client relations are flexible and have a face-to-face character (Scott 1972a:93).

Whitesell (1993:292) has correctly argued that: (1) *aviamento* and patron/dependency relations are commonly and erroneously conflated; (2) dependency relations may continue in the absence of coercion or “traditional” patrons; (3) and that the elimination of the structural causes of dependency is necessary for the success of sustainable development initiatives in Amazonia.

Although both *aviamento* and patron-client relationships can be understood as hierarchical systems based on unequal exchange, they are different in that *aviamento* refers to an economic relationship, while patron-client relationships include both economic and non-economic features (Miyazaki and Ono 1958; Galjart 1964; Hutchinson 1966; Scott 1972a; Forman 1975; Burkhalter and Murphy 1989). “Since *aviamento* is an exchange network, it may be said to be constructed with the economic strands from the patron-client dyads that are found at all levels in the Amazonian political economy” (Whitesell 1993:295). Other “strands’ of the patron-client relations can be found throughout Brazil,

including Amazonia, operating within the social contexts of family, religion, work and politics (Hutchinson 1966; Foreman 1975; Linger 1993).

Linger (1993) has demonstrated that, in the logic of the Brazilian patronage structure, if traditional patrons fail to adequately provide for the well being of their clients, new, more effective patrons are sought. He provides an explanation as to why patron dependency in Brazil has not been rejected in favor of some alternative mode of political organization, and why other patrons are sought instead of renouncing the patronage system itself. Linger (1993:7) identifies a “common sense of power,” or embodied knowledge of personalized power, in the notion of the “double-faced” patron. On the one hand is the good patron who is loving, loyal, moral, and generous; on the other hand, is the bad patron who is abusive, exploitative, traitorous, corrupt, and selfish.

Hence the exercise of power seems (and in significant respects is) capricious and improvised rather than predictable and routine; although the treatment received depends in part on the specific relationship one has forged with the superior, such treatment always has an element of unreliability or arbitrariness... it signifies both a promise of benevolence and a threat of betrayal. The superior - parent, spirit, boss, patron - is therefore invested with hope and apprehension, with love and resentment... This general pattern of splitting and ambivalence facilitates a conceptual synesthesia, as perceptions and feelings specific to one social domain easily shift into another (Linger 1993:7)

In addition to the general ubiquity of dependency relations in Brazil, and thus Brazilian Amazonia, the fact that patron-client ties are rooted in reciprocal negotiations implies a lack of absolute power (Scott 1972a:93). Thus, theories of patron dependency in which coercion is opposed to autonomy become

untenable. Such theories also assume that autonomous extractivists desire to find or construct alternatives to the patron-dependent relationship that will guarantee economic security and social mobility (Whitesell 1993:299-300; 302).

Whitesell concludes that

although contemporary extractive producers can not be uniformly portrayed as virtual slaves or debt peons, there is imbalance in the distribution of power to determine the allocation and use of extractive resources which may not be overcome without structural change in the political economy of Amazonian extractivism (Whitesell 1993:119-120).

#### **1.2.h. Summary of Theoretical Framework**

For Wolf (1982), the interface of global and local histories must be understood to describe and interpret any sociocultural case study. For the Brazilian Amazon, Nugent (1993 and 1997) has forcefully argued that mercantile capitalism defines the socioeconomic context in which the rural peasantry has emerged. Both Nugent (1993) and Ayres (1992) demonstrate how mercantile capitalism is able to extract a surplus from producers via petty commodity production, but Ayres provides more specific implications for the organization of kinship and households. Although the analyses of Nugent (1993) and Ayres (1992) contribute greatly to our understanding of peasant societies in Amazonia, the role of *aviamento* and patron dependency is given greater attention by Whitesell (1993). Whitesell has shown that, even in the absence of coercion and debt bondage, patron dependency remains a formidable obstacle to any project of sustainable development. In order to determine the possibility of sustainable

development of ornamental fish resources from the Rio Negro Basin, it must be understood that mercantile capitalism mediates the global and local histories, and at the local level petty commodity production and patron dependency are the relevant socioeconomic variables.

### **1.3. METHODOLOGY AND FIELDWORK**

In this section I present a characterization of the ethnographic field, elaborate the basic research questions for this study, detail the data collection techniques employed, and describe the data analysis process.

#### **1.3.a. Characterization of the Field**

The ornamental fish industry is a small social and economic microcosm in the capitalist world system. It is a microcosm in which a mercantile relic of the system, the society of the middle Rio Negro is dependant on the externally generated demand for aquarium fishes, where social and economic relations bear little resemblance to the final consumer. In order to highlight this fact, in this study I employed a “multi-sited” mode of ethnographic research to facilitate the description of the nature of the world system and the place of the participants, proponents and critics of the ornamental fish industry in it. According to Marcus (1995:95), a multi-sited ethnography

moves out from the single sites and local situations of conventional ethnographic research designs to examine the circulation of cultural

meanings, objects, and identities in diffuse time-space. This mode defines for itself an object of study that cannot be accounted for ethnographically by remaining focused on a single site of intensive investigation. It develops instead a strategy or design of research that acknowledges macrotheoretical concepts and narratives of the world system but does not rely on them for the contextual architecture framing a set of subjects.

By studying the various links in the circulation of ornamental fishes, the field for this study is actually many. The focal point from which this work is organized, however, is the socioeconomy of the Rio Negro fishery in the municipality of Barcelos in Amazonas, Brazil. Barcelos is located 420 km from Manaus, the capitol of the state of Amazonas (see Figure 1). The municipality is one of the largest in the world with a total area of 122,572.7 km<sup>2</sup>. It was founded in 1728 as a Carmelite mission and served as the first capitol of the Capitânia de São José do Rio Negro (today the state of Amazonas) from 1758-1791 and 1798-1803. Barcelos has always been of economic importance in the regional economy of the Rio Negro. During the early colonial period (1700-1758), it was an important transshipment point for the Indian slave trade and the export of extracted forest products. These forest products, collectively known as *drogas do sertão* (backland drugs), included annatto, cacao, vanilla, puxuri and sarsaparilla. Under the Directorate system (1758-1799), agricultural production was emphasized in the region. Economic production during this period resulted from crops of manioc, coffee, indigo, cotton, cacao and tobacco. After the transfer of the capitol to Manaus, the region experienced a long period of economic stagnation in which the economy was based on the extraction of a

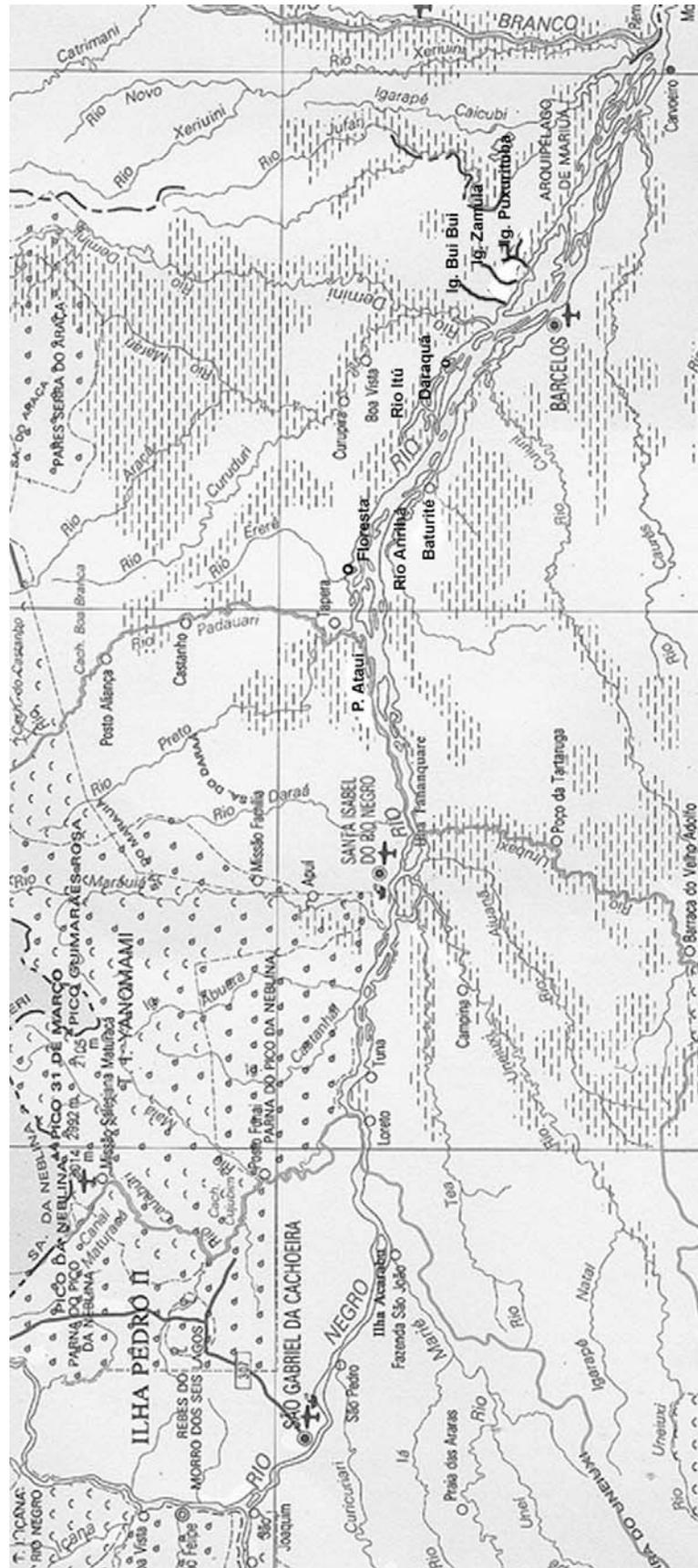


FIGURE 1. THE RIO NEGRO BASIN

variety of forest products. It was not until the rubber boom that the Rio Negro would pass through another period of economic growth. Although the international demand for rubber subsided in about 1910, rubber tapping continued to have some importance until the mid-1980s, particularly during WWII.

Barcelos experienced two other short-lived extractivist booms with *balata* (*Mandilkara bindenata* and *M. huberi*) from 1923-1930 and *sorva* (*Couma* sp.) from 1970-1983. Balata is white latex that has a non-slip quality useful for machine beltings. Sorva is white latex used for making chewing gum and glue. Piassaba (*Leopoldinia piassaba*), a palm fiber, has always been an important resource in the Barcelos economy. It was a favored material in the fabrication of rope for the maritime industry during the colonial period; today, it is used in the manufacture of brooms and crafts. Since the commercialization of the cardinal tetra in about 1960, Barcelos has become the self-proclaimed world capitol of ornamental fishes.

The capture of ornamental (or tropical aquarium) fishes in the municipalities of Barcelos (pop. 24,121, IBGE 2000) and Santa Isabel do Rio Negro (pop. 10,547, IBGE 2000), Amazonas, Brazil, is now the principle economic activity, accounting for at least sixty percent of municipal revenue in Barcelos alone (Personal comm., Amazonas State Revenue Service in Barcelos, 1996). The remaining forty percent is derived from the extraction of piassaba palm fibers, Brazil nuts (*Bertholletia excelsa*), food fishes and petty food production for local markets, mining, and other local commercial activities. There

is a palm heart plant in the east part of town, but little activity. It is the property of the Sharp Electronics group that is well established in the Free Trade Zone of Manaus. There are approximately forty people employed there. Sharp is now planting palm trees to eliminate their extraction on the many islands of the Rio Negro. One of the other largest employers is the municipal government who, at the time of fieldwork, employed approximately 400 people, depending on state and federal grants. There are now five tour operators in Barcelos who specialize in sport fishing for the peacock bass (*Cichla* sp.), employing about 150 people during the fishing season. Recently, the state and municipal governments have implemented an incentive program for planting palms for the export of palm hearts, and sugar cane for use by Coca-Cola in Manaus. There is almost a complete lack of family agricultural activities (except manioc for family consumption) or agro-forestry projects in the region.

Through the trade of ornamental fishes (*piabas*) and other extractive products, the inhabitants of this region are linked to the international economy. The international demand for aquarium fishes ensures a livelihood, albeit a precarious one, for many people in the state of Amazonas, particularly in the Rio Negro basin. Over the last two decades the prices paid for extractive products such as *balata*, rubber, Brazil nuts and *sorva* have dropped significantly. Although there is still some activity in the extraction of fibers from the piassaba palm ( $\pm$  20 percent of municipal revenues: Personal comm., Amazonas State Revenue Service in Barcelos, 1996), ornamental fishes are now the only truly viable extractive product in the region. Additionally, Brazilian census data indicate

that the population of the municipality has more than doubled in the last ten years, growing from 11,035 in 1991 to 24,121 in 2000 (IBGE). As such, many of the local inhabitants desire to fill the ranks of ornamental fishers (*piabeiros*). However, because the international demand constrains the quantity of fishes purchased by exporters, there are important socioeconomic consequences. Chao (2001) has shown that exports of ornamental fishes have remained stable at approximately 20 million fish per year for nearly twenty years. Thus, an increase in the number of fishers means that the total annual production must be divided into smaller portions, while total gains remain the same.

### **1.3.b Research Questions**

Kottak has suggested that in order to understand ecosystem management, it is necessary to employ a methodological approach that “emphasizes the embeddedness of communities in multiple systems of different scale” (Kottak 1999:31). He outlines what he calls “linkages methodology” where changes at the local level are linked to those in regional, national, and global systems (Kottak 1999:30). This approach is comparable with that proposed by DeWalt and Pelto (1985) in which the articulation of the relationship between relevant demographic, ecological, and socioeconomic factors and multiple levels of analysis ensures that observable social units are adequately defined.

I have adopted the linkage approach for this dissertation with the exception that specific levels of analysis are based more on the social and economic factors that are encountered by following the journey of the fishes

themselves, than on more generalized micro to macro level linkages. The research questions, then, relate to the following levels of analysis: ecological (habitat and reproductive biology of the fish); local (the fishermen, the intermediaries); regional (transporters, the exporters, trade associations, regulators, and law makers); national (regulators, and law makers, animal rights activists, environmentalists, and indigenous rights activists); global (international air carriers, importers, wholesalers, retailers, consumers, trade associations, regulators, and environmental and animal rights activists). The research questions developed for this dissertation reflect a desire to understand the possibility of economic and ecological sustainability of the ornamental fishery of the Rio Negro.

In terms of the ecological level of analysis, the following research questions were addressed: What are the key features of the landscape of the middle Rio Negro basin and patterns of resource exploitation? What role does the environment play in ornamental fish productivity? Is there evidence of over-fishing and local extinction in the ornamental fishery of the Rio Negro? What is the extent of fisherman knowledge regarding fish species and their habits and habitats, fishing methods, and handling practices? Do fishermen have some form of conservation ethic? The answers to these questions have implications for understanding the important environmental and social variables that contribute to preservation or depletion of habitats and species, and provide clues for appropriate conservation measures.

In terms of the local level of analysis, the following research questions were addressed: What socioeconomic changes have taken place in the research site since the region was first colonized, and what changes occurred as a result of the international demand for tropical ornamental fishes? What are the social relations of production in the ornamental fishery of the Rio Negro Fishery? How are fishing areas are staked out, defended, and shared? What are the means of exchange and contractual arrangements? Any attempts to impose notions of conservation or sustainability must take cognizance of existing social forms, many of long standing, to be accepted by the local people. Additionally, they provide data regarding local socioeconomic transformation in Amazonia confronted with external social and economic forces

In terms of the regional level of analysis, the following research questions were addressed: How is regional transportation structured? What is the nature of the operations of the exporters and the relations among them? What is the relationship between the intermediaries and exporters? What are the terms of payment? Do exporters provide intermediaries/fishermen with technical support? What are the principal logistical concerns of the exporters? What is the role of the state in the regulation and monitoring of the ornamental fish trade? The answers to these questions will allow for a description and analysis of structural links in the distribution of live caught ornamental fishes.

In terms of a national level of analysis, the following research questions were addressed: What is the role of the nation in the regulation and monitoring of the ornamental fish trade? Are administrative structures and human resources

adequate to effectively ensure that these laws and regulations are enforced? What are the record keeping practices of the relevant governmental agencies in relation to ornamental fishes? Is there public dissent with regard to the ornamental fish trade? Essentially, the object of this line of questioning is meant to determine the role of federal government and public discourse with respect to the trade.

In terms of a global level of analysis, the following research questions were addressed: Who are the principal exporting countries? What is the role of air carriers in the international trade in wild caught ornamental fishes? What is the structure and nature of the import market for wild caught ornamental fishes? What are the structural relationships between importers and wholesalers? What are the structural relationships between wholesalers and retailers? What is the impact of ornamental fish farming on the international trade in wild-caught ornamental fishes? What are the classes of ornamental fish hobbyists and what role do each play in the international trade of wild-caught ornamental fishes? What is the economic history of the international commerce of ornamental fish? In the analysis of the historical trajectory and structural analysis of the international commerce of ornamental fishes, I hoped to discover the significant continuities or discontinuities that would improve our understanding of this unique industry. An analysis at the global level provides important clues to understanding, in greater detail, the nature of external forces on socioeconomic change in a peripheral economy like that found in Amazonia.

### **1.3.c. Data Collection**

In order to learn about the relevant environmental factors of the ornamental fishery, various data collection techniques were employed. Due to my position at the Universidade do Amazonas, with its close proximity to the National Institute for Amazonian Research (INPA), and my participation in Project Piaba, scientific literature and permanent and visiting researchers were easily and continuously consulted. In order to assess the fishermen's knowledge of fish and the environment, as well as fishing and handling methods, participant observation and interviews with fish collectors was employed during numerous fishing excursions.

Various methods of data collection regarding the socioeconomic organization of the ornamental fishery were employed. With respect to Rio Negro history, a literature search of relevant data relating to demographic, social and land use patterns was performed, and interviews with local historians were conducted, and oral histories were collected in Barcelos and Manaus. During the course of my fieldwork I visited numerous communities and fish collecting sites for various lengths of time (one day to three weeks). The sites were chosen reflect fish habitat and diversity, and intensity of involvement on the part of the community members. In the sites visited, the following data collection techniques were employed: a census (when and where possible), unstructured and semi-structured interviews, oral histories, and direct and participant observation.

As much or more time was spent in the town of Barcelos itself where most fishermen/intermediaries arrive at the end of the week to deliver their product. In

addition to participant observation, structured, semi-structured and unstructured interviews were conducted with relevant government employees, fish collectors and other inhabitants while in town. Over a period of five years of fieldwork, I became acquainted with several key informants (I might say friends) who proved invaluable in gaining insights into the socioeconomic organization of the fishery. In addition, life histories of certain fish collectors that represent varying seniority in the economic activity was sought and collected. Finally, through my participation in Project Piaba, I was able acquire a significant amount of knowledge about the local social and economic situation via project employees and their fiends and family, plus the many visitors that we received.

In order to understand the regional linkages between Barcelos and Manaus in the context of the trade, I collected trade data available from state and federal commercial and environmental agencies for as many years as possible, and collected newspaper clippings during the major portion of my stay in Manaus. Participant observation was employed during the transport of fish to Manaus. Interviews were conducted with intermediaries, exporters, state and federal agents, regional boat owners and transportation sector employees. An historical survey of exporter participation in the trade was also carried out through a literature search and oral histories with trade participants. The role of airfreight carriers was understood through interviews with freight agents, customhouse brokers and exporters.

In order to examine the role of national governmental agencies in the regulation of the ornamental fish trade within Brazil, interviews with exporters and

pertinent authorities at Brazilian Institute of the Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, IBAMA) were conducted, and official documentary resources were reviewed. Additionally, colleagues at INPA and the Universidade do Amazonas were able to tutor me in the finer points of Brazilian bureaucratic nuances (*jeitinho*).

In the research pertaining to the international level of the ornamental fish trade, a number of methodologies were employed. A search of the relevant literature pertaining to the history of the hobby and trade was sought and noted. Import data provided by the U.S. Department of Commerce, the World Wildlife Federation, and other documentary sources was collected and analyzed. Interviews were conducted with importers, wholesalers, retailers and hobbyists. Key informants were utilized when and where possible. In addition, life histories of certain hobbyists and industry participants were sought and collected.

#### **1.3.d. Data Analysis**

Data analysis was inductive and qualitative. All scholarly and pertinent literature, as well as other official and unofficial documentary sources, field notes, interviews, observations and oral histories were de-contextualized through the development of coding schemes of my design. These codes were then re-contextualized through a process of sorting the codes into groups associated with the levels of analysis outlined above. This analysis required a continuous process of revision of the coding schemes and, not infrequently, a re-

conceptualization of the research problem(s) addressed. In this way, the data collection informed the analysis, and analysis informed further data collection in a “rhetoric of inquiry,” rather than a “method of inquiry” (Rorty 1979).

#### **1.4. ORGANIZATION OF THE CHAPTERS**

Chapter 2 describes the history of ornamental fish keeping and the economic development of the ornamental fish industry. It outlines the transformations in commercial structure, science, technology, and consumer preferences related to fish keeping. It begins with a discussion of historical antecedents of fish keeping as a hobby and its growth in Victorian England, where scientific innovation, public aquariums, aquarium societies, and the introduction of exotic or tropical fish transformed the hobby and industry. In a description of the growth of “tropical” fish keeping in the US, the increasingly global nature of the industry is highlighted, as well as efforts to concentrate the organization of production and distribution, the importance of specialized publications, and the role of technological and scientific innovation. The final sections demonstrate the continuing rationalization and concentration of all economic aspects of the ornamental fish industry, and a summary of the current global trade. This chapter lays the foundation for demonstrating the articulation of the historical trajectory of a global industry with that of the local historical trajectory of the middle Rio Negro basin.

In Chapters 3 and 4, I examine the local historical trajectory of socioeconomic relationships in the middle Rio Negro basin, encompassing the region that includes the modern day municipalities of Barcelos and Santa Isabel. These chapters outline the historical process in the middle Rio Negro basin, providing the context for understanding the socioeconomic conditions that made the extraction of ornamental fish possible. Chapter 3 describes the Portuguese expansion in the Rio Negro basin, and is divided into two periods characterized by state sponsored labor control and the growth of an informal economy: the mission system and slave/forest product trade (1690 –1750), and the Directorate (1751 – 1799). It will be demonstrated that the indigenous societies of the middle Rio Negro were reduced to an undifferentiated mass of detribalized Amerindians and mestizos, forming the social base of a system of mercantile exchange rooted in relations of dependency.

In Chapter 4, I analyze three phases of *aviamento* and petty commodity trade in the Rio Negro basin: prior to the rubber boom, during the rubber boom, and after the rubber boom. In this chapter I analyze the historical process of *aviamento* and petty commodity trade from the end of the Directorate period to the beginning of WWII. It will be demonstrated that *aviamento* continued to be the principle means for extracting a surplus following Brazilian independence, but on an exclusively informal basis. *Aviamento* would be consolidated into a vertical trading system during the rubber boom, only to be decentralized during the post boom period, while the forms of petty commodity production increased and diversified. Particular attention is paid to the variety of petty commodity traders,

patron – client relations, and the role of debt bondage and coercion in the relations of production.

Chapter 5 demonstrates how the global historical trajectory of the ornamental fish industry and the local historical trajectory of the middle Rio Negro socioeconomy become unified. The chapter is divided into three sections: the confusion related to the so-called “discovery” of the cardinal tetra, the process of organizing the production ornamental fish and the socioeconomic transformation associated with it, and a historical summary of political and economic change in the middle Rio Negro since 1960. Emphasis is given to the changing nature of the debt contract in petty commodity production, state intervention, and the impact of technological innovation. This chapter also provides the basis for understanding the gulf that separates the knowledge concerning commodity production, distribution, and consumption between the social agents that participate in the ornamental fish industry.

In Chapter 6 I provide a multi-sited ethnography of the ornamental fishery of the Rio Negro basin. The chapter is organized by following the journey of the cardinal tetra, beginning with a description the physical environment, and followed by analysis of the social, political, and economic context of each phase of the commercial process. Emphasis is placed on the relations of production however, in order to highlight the nature of mercantile capitalism, petty commodity production, and patron dependency.

In Chapter 7 I conclude by summarizing the findings in terms of the possibility for sustainable development of ornamental fish resources on the Rio Negro, and dispelling some of the commonly held myths about the Rio Negro fishery.

### 1.5. NOTES

<sup>1</sup> For the English speaker, the term ornamental fish refers to fish that are kept for personal and public display. They are variously known as aquarium fish, tropical fish and exotic fish.

<sup>2</sup> Their warnings may be based on knowledge of the fact that, in 1988, fishers in the regions of the Rio Jufarís in Barcelos and Rio Téa of Santa Isabel do Rio Negro solicited the Brazilian environmental protection agency (SUDEPE, now IBAMA) to prohibit the fishing of discus in those localities for one year due to a decline in discus (*Symphysodon* sp.) populations. Additionally, in 1989, the president of the ornamental fish exporters association in Manaus (ACEPOAM), Sebastião Corrêa, proposed closing down the rivers Jufarís, Cuarés, and Aiuanã for two years to preserve the stocks of cardinal tetras (see Anonymous, 1989); this never happened. He did succeed in prohibiting the fishing of cardinals between May and July, and their exportation in June and July.

<sup>3</sup> In his book entitled *Through Amazonian Eyes: The Human Ecology of Amazonian Populations*, Moran (1993:31) “presents native approaches to dealing with the diverse resources and habitat characteristics of Amazonian environments.” Yet, his definition of “native” obviously does not include the traditional peasantry, as he makes clear in the chapter, “Blackwater Ecosystems.” Moran (1993:37) presents a map of the Rio Negro in which the tributaries and population centers between Manaus and the mouths of the Rios Uaupés and Içana, with the exception of the Rio Branco, do not appear; nor is there any reference to the “historical” peasantry below the São Gabriel da Cachoeira. Nugent (1993) has forcefully argued that rural Amazonian peasants have been invisible to those interested in developing or preserving Amazonia, including anthropologists. For Moran then, it would seem that the peasants of the Rio Negro have been blind too.

<sup>4</sup> According to Nugent (1997:39-40): “the anthropological emphasis on the study of Amerindian societies has had a political trajectory which has formally placed caboclo societies on the side of the state in as much as caboclos are widely

identified as intruders, while non-Indian Amazonians have largely been used as evidence of the untoward effects of further 'integration.'" Also see Ramos (1991).

<sup>5</sup> "The entry of the caboclo...into anthropological discourse has been made possible by the ascendant legitimacy of ecological/environmentalist discourse. To the degree that caboclo society is implicated in questions of resource use and management in a highly fetishized Amazonia, the anthropological culture industry has gained entry, not because caboclo society is any more interesting/intact/coherent than it was before the rise of ecologism, but because the anthropological culture industry is responding to global socio-economic transformations" (Nugent 1997:46).

<sup>6</sup> Debt bondage refers to relations of production involving "the receipt of an advance payment (or loan) together with a prohibition on working for other employers (or labor contractors) so long as the debt remains outstanding" (Brass 1986:51-52).

<sup>7</sup> Weinstein (1983a, 1983b, 1985 and 1986) and Barham and Coomes (1994a and 1994b; see also Coomes and Barham 1994) have argued that autonomy was possible even during the rubber boom years.

<sup>8</sup> Allegretti (1990:256), for example, defines "traditional" relations as occurring distant from commercial centers, in which "captive" tappers (clients) are forced to pay rent to the seringalista and are maintained under conditions of debt peonage, no money is exchanged, and industrial goods advanced to tappers are overvalued; "autonomous" relations are "now winning out," there is no influence of patron (merchant) control, and in more accessible areas, the producers have been "freed."

<sup>9</sup> Taverns.

<sup>10</sup> Itinerant traders.

## CHAPTER 2

### A BREIF HISTORY OF THE ORNAMENTAL FISH INDUSTRY

Aquarium-keeping is a pursuit (called by its followers a “hobby”) calculated to subvert any designs Satan may have upon idle hands, and to draw its devotees closer to the heart of the world of water life, so different from our own, yet urged and governed by such similar impulses - a pursuit in which familiarity breeds no contempt. Little fishes and the gods still are mentioned in the same breath. (Mellen 1931:306)

In this chapter I outline a brief history of the development of the global ornamental fish industry during the past two hundred years.<sup>1</sup> Of particular interest are the transformations in commercial structure, science, technology, and consumer preferences. My definition of the ornamental fish industry resembles what Appadurai (1986:27) refers to as a “commodity ecumene,” that is a “transcultural network of relationships linking producers, distributors, and consumers of a particular commodity or set of commodities.” The ornamental fish industry, as I refer to it here, is the totality of producers, commercial agents, scientists, publishers, and enthusiasts whose interests, economic or aesthetic, depend on the maintenance of live fish in captivity.

## 2.1. EARLY DEVELOPMENTS IN FISH KEEPING

Fishing has been an important economic activity for the human species since the Paleolithic period, but “it was not until the development of more leisured societies that the non-alimentary aspects assumed importance in their own right” (Banister 1977:9). The Chinese were the first to cultivate both food and ornamental fishes. They had domesticated the common carp by the beginning of the Christian era (Atz and Faulkner 1971:11),<sup>2</sup> and goldfish were kept beginning in the middle of the fourth century. During the T’ang Dynasty (618-907 C.E.), goldfish were associated with important political and ritual symbolism (Banister 1977:25). Goldfish were being bred, and considered home items, by at least the eleventh century of the Sung Dynasty (960-1279 C.E.) (Banister 1977:9).<sup>3</sup>

Romans, during the second century B.C., also appreciated the aesthetic characteristics of fish; pools of marine fish were an “extravagant Roman fashion” (Atz and Faulkner 1971:12). There is no evidence, however, that they ever actually cultivated fish for aesthetic purposes. With the collapse of the Roman Empire, Europe would wait another thousand years before fish keeping would become a popular pastime once again.

The earliest evidence in Europe for the maintenance of fish in glass containers is found in the sixteenth and seventeenth centuries. In 1554, Guillaume Rondolet, a professor of medicine at Montpellier University published one of the first books dedicated solely to fish (Banister 1977:15; Atz and Faulkner 1971:14). In this book he notes that he and his wife kept a fish alive in a glass

container for three years. In 1665, Samuel Pepys wrote in his diary that he had visited the home of a friend and was shown fishes kept in glasses of water that were extremely hardy, of unfamiliar shape and color, and “finely marked” (Banister 1977:15; Atz and Faulkner 1971:14).<sup>4</sup>

In 1730 a book published in Hungary described how weatherloaches (*Misgurnus anguillicaudatus*) were kept in containers to predict storms (Atz and Faulkner 1971:14). The weatherloach, which is able to consume air from the water surface, is supposed to become restless when the barometric pressure falls. The maintenance of fish in glass containers was noteworthy enough in England by 1746 to warrant the publication of William Arderon’s letter on the “keeping of small fish in glass jars” in the *Philosophical Transaction* of the Royal Society (Atz and Faulkner 1971:13).

The keeping of fishes as pets did not become a popular pastime in the western world until after the goldfish was introduced into England from China early in the eighteenth century. They were first kept in the ponds of wealthy landowners. The goldfish bowl became a popular household item in England between 1775 and 1784 (Atz and Faulkner 1971:14). Goldfish were later introduced into several other European countries from England and the Orient. In 1791, the Russian Prince Potemkin gave a banquet for Catherine II, at which bowls of goldfish were used for decorations.

The fish keeping hobby became most popular in England: “In no other country did so many people have the leisure to pursue such a hobby, nor was any other industrial establishment sufficiently advanced to supply the tanks and

other necessary apparatus at reasonable prices” (Atz and Faulkner 1971:15). For many eighteenth century fish keeping enthusiasts, viewing fish in a glass container offered “an opportunity of observing the activities and propensities of those beings with whom we can be little acquainted in their natural state” (Gilbert White 1782, in Atz and Faulkner 1971:14). Fish keeping in England would later grow sufficiently to attract the attention of Charles Dickens. In the first installments of his *Pickwick Papers* (1836), he wrote his “Theory of Tittlebats” in which he made fun of the little groups of amateur aquatic naturalists that had sprung up (Atz and Faulkner 1971:14-15). The tittlebat, or stickleback fish, was one of the native fishes commonly kept by fish keepers in England.

## **2.2. THE BIRTH OF THE MODERN AQUARIUM**

Ornamental fish keeping developed in Europe and the US in the nineteenth century with the introduction of the “modern glass aquarium.” During the nascent years of the hobby, the purpose of keeping glass aquariums was to maintain a “community of animals and plants in such concentrations as to reflect as nearly as possible the conditions of the wild” (Banister 1977:15). There seems to be no one person responsible for the introduction of the modern aquarium. More likely, various individuals experimented in fish keeping and there was a subsequent sharing of experiences. Eventually aquarium designs and maintenance techniques would be improved and refined through such interchange. The first

individuals to popularize the aquarium hobby appear to have been devoted horticulturalists who raised aquatic plants.

### **2.2.a. The Stable Aquarium**

Early nineteenth century interest in aquaria was a consequence of the early scientific research concerning the exchange of oxygen and carbon dioxide between plants and animals (Banister 1977:15; Klee 1987:1-7). In 1830, M. de Moulins of Bordeaux found that fish and mollusks kept together with plants were healthier (Banister 1977:15). In 1833, Dr. Danbery showed that aquatic plants emitted oxygen and absorbed carbon dioxide under the influence of light (Banister 1977:15). Later, in 1842, Dr. Ward proved that plants and animals could be placed in airtight containers with an equilibrated exchange of oxygen and carbon dioxide (Banister 1977:15; Klee 1987:3). It was Robert Warrington, however, who is credited with giving the aquarium its practical form (Hibberd 1856, in Klee 1987:7). In 1850, he placed two goldfish and aquatic plants (*Vallisneria spiralis*) in a glass bowl of fresh water, but soon realized that the decay of plant leaves created turbidity, and unwanted algae appeared. He then added snails to eat the algae on the sides of the glass and decaying plant leaves. In this way he was able to create a “complete compensating process” (Hibberd 1856, in Klee 1987:7). English zoologist Philip Henry Gosse would then popularize Warrington’s discovery. His writings on the subject were widely read and aquaria became features of the Victorian parlor, or library ornaments.

According to Banister (1977:15), “That simple, stable aquarium started the ‘great aquarium rush’ of Victorian England,” and fish keeping became a status symbol.”

The first “home aquarium craze” occurred in England and Scotland during the years 1854-1862. According to Atz and Faulkner (1971:15), “the intriguing notion of setting up a self-sustaining microcosm in one’s parlor seems to have played almost as important a part in generating the fad’s contagious enthusiasm as did the successful aquaria themselves.” By 1864, there were significant developments in the hobby that would contribute to successful fish keeping in the US. Robert West, an editorialist, began warning hobbyists about the dangers related to overstocking. He advised hobbyists to regulate the size and number of fishes stocked in aquaria to maintain a reasonable level of oxygen (Klee 1987:13). Klee (1987:10) believes that West may have “exerted perhaps more influence than any other individual in advancing the hobby in the American appreciation.”

The hobby was now growing in the northeastern US, and fishes and tanks were finding their way by rail to Midwest cities. In the early 1860s, the typical tank was 24” x 18” x14”. The base and ends were often made of slate and held together by torsion bars. The first aeration devices were also now being invented and patented. By the 1870s, many iron and zinc works had gone into the manufacture of ornate fish tanks.

### **2.2.b. Public Aquariums**

Another significant event in the growing popularity in fish keeping was the opening in London of a Fish House in Regent's Park Zoo during the spring of 1853. This was also the site of the first photograph of a fish in an aquarium. The tremendous success of the new exhibit "in turn made parlor aquaria and collecting trips to the seashore all the rage" (Atz and Faulkner 1971:15). Within a few years, most major European cities had public aquariums.<sup>5</sup>

By 1854 the "new fad" spread to America. The aquarium hobby was popularized in America by English authors and aquarists, and was championed by a handful of Americans. P.T. Barnum first introduced the American public to the amusement of aquariums (Klee 1987:8). In 1856, Barnum established the first public aquarium in the US at the American (Barnum's) Museum, and was it named "Aquarial Hall." The aquarium displayed a number of tanks filled with sea anemones and other sea animals. Barnum's aquarium played an important role in stimulating interest in the aquarium hobby in the US. Of Barnum's Aquarial Hall, "the first [American] amateur aquarist authority," William Emerson Damon, wrote:

From fish to fish I traveled, and from those fishes I never stirred for the whole day; and, when finally dragged away from the place by my companion, my first thought was, "I must have an aquarium!" At first I wanted one as big as the Central Park, where could be kept every kind of fish I had ever heard of; then, successively, I felt obliged to reduce the size to that of Union Square and of the Everett House; and thought I was very moderate when I had compressed my imagination to the limits of two city lots, and mentally flooded them for the purpose of fish culture! But, finally, on reflection, it became apparent to my sobered thought that in so large an aquarium as I had been imagining I should not be able to see my fish, any more than if I should drop them into the ocean. So away went my dreams, and, in sad sobriety, I at last concluded to

content myself with a tank of the largest size! (Damon 1879, in Klee 1987:8)

In 1861, Barnum organized fish collecting exhibitions to Honduras and the Gulf of Mexico to obtain tropical fishes for the American Museum (Klee 1987:8). Damon and a student of Louis Agassiz, Albert S. Bickmore, led the expedition and returned with more than 600 live tropical marine fishes. The Aquarial Hall eventually burned down in 1865, only to be rebuilt and burned down again a few years later.

In 1876, W.C. Coup established the New York Aquarium, which, like Barnum's Aquarial Hall, served to further American interest in fish keeping (Klee 1987:15). Coup enlisted the services of rare animal importers, Charles Reiche and Brothers, to procure stock. It was Coup's desire that the Aquarium be a truly scientific institution, although run as a business. He hired some of the best-known authorities of the day, establishing a "Free Scientific Library and Reading Room," a fish hatching department and a "Naturalist's Workshop," or laboratory (Klee 1987:16). Additionally, the Aquarium published the first, albeit short lived, aquarium magazine in the world, the *New York Aquarium Journal*.

### 2.2c. The Introduction of Exotic or Tropical Fish

Most of the novice aquarists in later 19<sup>th</sup> century, however, were ill prepared to maintain an aquarium; especially the most commonly maintained of the day, which were stocked with marine fish, taken on excursions to the sea. The popularity of fish keeping in England began to decline by 1867. According to the Reverend J.G. Wood (in Banister 1977:21): “In the due course of time, nine out of every ten aquaria were abandoned; many of the shops were given up, because there was no longer any custom; and to all appearances the aquarium fever had run its course...” The decline in popularity was blamed on the disastrous consequences of aquarium breakage, water pollution due to failure to remove dead animals, the loss of novelty, and the burden of constant maintenance.

Interest in aquarium keeping was revitalized with the introduction of tropical, or exotic, freshwater fish (Banister 1977:21). A French army officer by the name of Carboneir would become responsible for stimulating the demand for tropical fishes in Europe after shipping a few pairs of paradise fish (*Macropodus opercularis*) to France in 1869 (Coates 1933:62). He had observed the species making its bubble nest in rice field ditches of China. Given the shipping technologies of the time, this species stood reasonable chances of survival because of its tolerance to low water temperature and oxygen levels.<sup>6</sup> The paradise fish was available in the US by 1876 (Klee 1987:15). Adolphus Busch, during one of his frequent business trips to Germany, saw the fish and became

fascinated with them. He obtained several individuals that had been imported from France that same year, and brought them home to the US.

In 1893, almost every major city in the eastern US had at least one prime dealer in aquarium supplies (Klee 1987:45). Although there is no evidence for the use of heaters or thermostats in the 1890s, both were in use by 1913 (Banister 1977:23). The development of technology for maintaining water temperature improved the hobbyist's ability to successfully keep tropical freshwater fishes that were more desirable than the freshwater fishes from temperate climates. Demand for tropical fishes would grow further as enthusiasts became more aware of the many colorful and interestingly shaped varieties. The first tropical fishes to be imported were ones that could stand the long sea voyages. Two of the most famous examples of these early tropical imports into Europe and the US are rasboras (*Rasbora heteromorpha*) from Malaysia, Thailand and Sumatra, and mollies (*Poecilia* sp.) found along the Atlantic coast from Virginia to La Plata.

#### **2.2.d. Aquarium Societies**

In 1893, the first American aquarium society was founded (Klee 1987:44). It began when five persons, who had by chance become acquainted, formed it in New York City. It was named "Triton", and its president was a German immigrant named Baron von Schlichting. Later the same year, a second aquarium society in New York City was organized. Its name was "Salamander", and its president was Dr. A. von Duereng. These societies followed the German custom of naming aquarium societies after fish, other aquatic animals, and mythical creatures

associated with the sea. These clubs had no real impact on the hobby and were clannish, with meetings often conducted in German. By 1896, neither existed.

In 1896, the “Aquarium Society”, later the “New York Aquarium Society,” was formed (Klee 1987:51). This society was to have a tremendous effect upon the aquarium hobby in the US. According to its by-laws, dealers could also become members. They were not, however, allowed to use their membership as a means of advertising, nor consider other members as privileged parties to “reasonable concessions” (Klee 1987:52). In 1898 the “Aquarium Society of Philadelphia” was formed. The mission of the Society was “the scientific management of the aquarium and the amateur breeding of fish” (Klee 1987:53). In March of 1900, the Aquarium Society of Philadelphia hosted the first competitive aquarium exhibition in the US.

By 1912, the US had 8 aquarium societies, while Europe was home to many: Switzerland had 7; Holland had 5; Russia had 3; Belgium, Denmark, Hungary, and Sweden had one apiece. But in Austria and Germany, there were 149 aquarium societies: 22 and 127 respectively. The importance of the German societies in the aquarium hobby is reflected in the numerous imports of aquarium fishes from there during the period of 1900-1910 (Klee 1987:84). The most important factor in the consideration of these societies was, and continues until this day, the intersocietal exchange of breeding stock and information regarding all aspects of the hobby: aquarium maintenance, fish behavior and breeding.<sup>7</sup> Additionally, these early societies were composed of unique membership roles

that included simple enthusiasts, scientists, publishers and suppliers, all interested in the promotion of the hobby and trade.

## **2.3. THE GROWTH OF “TROPICAL” FISH KEEPING IN THE US**

### **2.3.a. The First Suppliers of Wild Caught Tropical Fish**

The German amateur aquarists, like the British, were stimulated by the idea of the balanced aquarium, but their interest “seems to have been less precipitous and more sustained” (Atz and Faulkner 1971:16). By the turn of the twentieth century they became the preeminent group of aquarists in the world, a position they sustained until World War II. It was German sailors who did the part-time collecting that provided most of the original exotics to the hobby. German ichthyologists organized the first expeditions to find new exotic pet fishes; and it was German firms that organized the first collecting stations in South America, Africa, and Asia from which most tropical fishes were shipped. In 1930, about 200 hundred species of tropical fish were available. By 1940, “largely as a result of the increased importations, the number of available species [had] doubled” (Chute 1934:95).

Although a few fishes were being sent from Germany to individual hobbyists in the US, the growing American interest in tropical fish, ultimately, can be credited to sea faring folk. Most of the first suppliers of wild caught tropical fish were merchant sailors working on the various steamship lines. At the turn of the twentieth century, it was they who accounted for nearly all new imports of exotic

fishes (Socolof 1996:7; Stoye 1936:137). As a means of augmenting their incomes, they would purchase freshwater fishes caught near the major seaports of South America, Africa, Europe, and the Far East. They would care for the fishes until they were able to sell them to the larger ornamental fish wholesalers at major ports of the world. A brief biography of the German immigrant Richard Dorn (Klee 1987:61) will demonstrate the role of sailors in the growing interest in tropical fish. Dorn, a New York Customs House Officer, came to the US in the early 1900s. From his privileged situation he was able to obtain many of the fishes that the merchant sailors were bringing into New York.<sup>8</sup> Although Dorn was not involved commercially, he is credited with popularizing many tropical ornamental fishes by breeding some and giving others to expert breeders.

The earliest organized attempts at importing exotic fish occurred during the early twentieth century. In 1907 Herman Rabenau of Brooklyn became the first dealer to import tropical fish into the US for commercial purposes (Klee 1987:66). In 1913, J.J. Halterbeck<sup>9</sup> sent a collecting party to the Amazon basin in search of angelfish. Up until that time, the only angelfish that had arrived in the US had been imported from Germany (Klee 1987:67).<sup>10</sup> In 1917 Bernhard Berkitz began to deal in aquarium fishes and supplies, founding the Aquarium Stock Company in New York City; it would become one of the largest retailers of ornamental fishes in New York by the 1930s (Klee 1987:179; Socolof 1996:191). He had, in succession two assistants who would become significant figures in the introduction of exotic fish stock into the US: Marius Kramer and Richard Buettner.

### 2.3.b. The Role of Publications in the Growing Interest in Tropical Fish

Klee (1987:71) argues that the second decade of the 1900s signaled the “beginning of the modern phase of the aquarium hobby in America.” By 1915 the hobby had spread out to the entire US (Klee 1987:96). A good part of the reason for the growth of the aquarium hobby during this decade, and beyond, is due to pioneering efforts of some aquarium societies and particular individuals in the publication of material devoted to aquariums and ornamental fish.

On January 21, 1912, the Aquarium Society of Philadelphia and the Brooklyn Aquarium Society decided to jointly publish a magazine: *The Aquarium* (Klee 1987:75). The editor would be William Innes, who would become one of the most important writers dealing with issues concerning the aquarium hobby. The first issue of *The Aquarium* promoted a lecture “Varieties of tropical aquarium fish,” by Isaac Buchanan. Klee (1987:76-77) believes this lecture “was probably the most significant ever delivered in the aquarium hobby. It was a milestone as it marked the beginning of the *tropical* fish hobby in Philadelphia” [emphasis mine]. Consequently, the interest in the US moved away from goldfish and native American fishes, and turned toward the keeping of tropical fishes, increasing their demand, and opening up more economic opportunities to meet that demand. In June 1932, Edward K. Innes, the brother of William Innes secured the distribution of *The Aquarium* magazine by the American News Company, ensuring its place in most news kiosks in the US. This was a major innovation for the publishers of aquarium periodicals, and exposed tropical fish and fish keeping to thousands of potential hobbyists (Klee 1987:139).

The first publication of *Aquatic World* in October 1917 also demonstrates the growing importance of tropical fish. According to the editors of the magazine, their goals were to: (1) describe new tropical fishes; (2) arouse interest in the tropical fish; and (3) because of the large US market, publish a magazine “devoted to the newcomer in the fish fancy” (Klee 1987:108). They also suggested that their readers send brief descriptions of their fish, and share their experiences or exchange ideas so as to contribute to the improvement of fish keeping practices (Klee 1987:109). However, “The concept of a magazine devoted to beginners did not meet with success” (Klee 1987:110).

It was around this same time that William Innes determined that more material dedicated to tropical fishes was needed (Klee 1987:110).<sup>11</sup> Most American publications at the time did not list very many species. There was a need for a book that would be useful in the identification of the new fishes that were arriving from Germany (Klee 1987:126). In 1917, Innes published *Goldfish Varieties and Tropical Aquarium Fishes: a Complete Guide to Aquaria and Related Subjects* (Philadelphia: Innes) so that more attention could be given to tropical varieties of fish.

### **2.3.c. The German Connection: Intensification of Commercial Organization**

The decade of 1930 would be an extremely important period in the development of the tropical fish trade. The international trade in ornamental fish was becoming an increasingly attractive business opportunity, despite the fact that commercial air transportation was still unavailable (Socolof 1996:176).

Tropical fish had “reached the peak of enthusiasm and success in Europe and America” (Mellen 1931:287). Tank raised tropical fish coming from Germany and local breeders, mostly of German descent, were easily available in the US (Mellen 1931:301; Socolof 1996:7), and the fish farming industry was of steadily growing importance in both hemispheres (Mellen 1931:306, Socolof 1996).<sup>12</sup>

During the early 1930s, Germany was clearly the “center of the tropical fish business” (Socolof 1996:117) and many German aquarists immigrated to the US and became important commercial agents: “This closely knit group of Germans were a major force in the aquarium hobby during the decade of the 1930s” (Klee 1987:154). There were four ornamental fish dealers during this decade that had a profound impact on the industry and hobby: Aquarium Hamburg, Paramount Aquarium, Empire Tropical Fish Co., and Amazonica, Inc. The efforts of these dealers would greatly increase the popularity of tropical fishes from the Americas and Caribbean, and provide pioneering fish farmers with breeding stock of potential “winners.” The individuals involved were considered adventurous in their day, but more interested in organizing production, than capture. Their enterprise was lucrative, but risky. One observer of the period describes their commerce in the following way:

[Dealers] have to organize a force of collectors,<sup>[13]</sup> arrange for regular shipments from an irregular supply, face terrific losses in transportation and handling and then hope that their fish, when they do arrive, will meet with public fancy. Sometimes they do not, and the unfortunate tradesman is

burdened with a consignment of unsalable fish which must be carried in stock and fed (Coates 1933:19).

Production was organized in rather haphazard fashion during first half of the 1930s if Coates is correct about the means of exchange between the collector and fisherman: “In places where a regular commerce has sprung up the natives know what fish will be worth a few coins or a pack of chewing gum or cigarettes to the collector. In a new territory the collector frequently has a mob of children at his heels who will bring him all the little fish he wants” (Coates 1933:19). Prior to 1930, tropical fish from Asia were being transshipped from Holland and Germany before arriving in the US.

Hugo Schnelle and Walther Griem founded Aquarium Hamburg in Hamburg, Germany during the early 1920s. It was the only “global tropical fish operation” at that time (Socolof 1996:176). Schnelle and Griem developed many contacts throughout the world to ensure that a variety of wild fish could be offered to consumers. They trained runners (collectors) to transport fish from the Far East. Aquarium Hamburg maintained a regular service of fish runners, purchasing rooms especially fitted with aerators, pumps, and shelves for the cans of fish (Coates 1933:19). During the mid 1930s, there was still a lack of temperature control and fish were not fed (Chute 1934:93); shipments from Singapore took eighteen days and reached five hundred “German shipping cans”<sup>14</sup> (Socolof 1996:176). Most of the fish sold by Schnelle and Griem, however, were tank-raised: fish they produced themselves and fish they purchased from many small German hatcheries (Socolof 1996:179).

Empire Tropical Fish Co. was one of the most influential importing firms in the aquarium hobby. Richard Buettner and Carl Mertens founded the company in 1929 (Klee 1987:114). Located in Manhattan, Empire sold quality fishes, and “built its reputation on the most wonderful display of the very rarest fish for sale anywhere” (Socolof 1996:191).<sup>15</sup>

Ferdinand (Fred) Cochu had experience in freight forwarding and had worked part time for his brother-in-law, Hugo Schnelle, at Aquarium Hamburg. He established Paramount Aquarium in 1933 in Ardsley, New York, and would maintain close ties to Aquarium Hamburg for many years after. Initially, Cochu was selling imported fish from Aquarium Hamburg and domestically produced fish from Florida (Socolof 1996:175). He later made many expeditions in search of aquarium fishes, and animals as well, and has a number of species named after him (Klee 1987:154). Cochu “wanted to bring back fishes that could be sold to pet shops, then to aquarists, and then commercially bred by fish breeders” (Dow 1995:173). Cochu developed close working relationships with the public aquarium directors such as Christopher W. Coates of the New York Public Aquarium and Walter H. Chute of the Shedd Aquarium. He also developed close links to publishers like William T. Innes, of *The Aquarium*. These relationships allowed him to establish valuable contacts during the early years of Paramount.

Although Amazonica, Inc. was a short-lived venture; it would make a major contribution to the popularity of tropical ornamental fishes in the trade. The history of Amazonica, Inc. begins in 1932, but the firm was not founded until 1934 (Socolof 1996:178). The founders were Walther Griem, of Aquarium

Hamburg, and his brother Karl. The firm was originally called H. & K. Griem and was based in Rio de Janeiro. South America was then known to possess the most sought after varieties of ornamental fishes. In 1933, The brothers made a collecting trip up the Amazon to Santarém, Pará, hoping to take advantage of the growing American demand for these fishes.

They kept twelve adult specimens of each variety of fish they captured for the trip to New York. Many of the fish they collected have become the mainstays of the ornamental fish hobby.<sup>16</sup> The discus, or pompadour fish (*Symphysodon aequifasciatus*), however, was the most significant find. It was probably the first time the fish would be seen alive in the US (Socolof 1996:177). The Griems sold eight of the discus fish to the Empire Tropical Fish Company in New York in 1933 for \$150.00 each: “this when a normal job paid ten dollars a week” (Socolof 1996:177). *The Aquarium* featured the discus on the cover of the April 1933 issue. By 1934, the discus had been successfully bred in captivity by Gustav Armbruster in Philadelphia (Socolof 1996:177).

The sale of discus to Empire Tropical Fish Company also provided the opportunity for the Griems to become acquainted with Carl Mertens. They made arrangements with Mertens to sell the new Brazilian fish since he already understood the American ornamental fish market, and thus began Amazonica, Inc. (Socolof 1996:177-178). The Griems also named Marius Kramer, a former assistant of Bernhard Berkitz during the late 1910s, Vice President of the firm (Klee 1987:154). Amazonica, Inc. operated for three years and then Karl Griem's ill health forced him to close the business (Klee 1987:154; Socolof 1996:178)<sup>17</sup>.

In 1937 he sold the firm to Cochu. Marius Kramer joined Paramount (Klee 1987:154), and Mertens returned to Germany (Socolof 1996:178).

By 1935, tropical fish had replaced the goldfish in popularity. The “tropicals” were preferred over goldfish, despite their higher cost, because of their color, “finnage,” breeding habits, activeness; and because they required less maintenance than goldfish (Mellen 1931:287; Coates 1933:18). The Characin family of fish now dominated the market for tropical fish, though they had been popular since their introduction in the early 1900s. An increase in both the number of individuals available and the number of new species was attributed to direct American importations from Central and South America (Chute 1934:96; Coates 1933:18).

#### **2.3.d. Other Factors Related to the Growing Popularity of “Tropical” Fish in the 1930s**

During the 1930s, the links between dealers, breeders, hobbyists, publishers, and scientists and public aquariums were intensified. Collecting expeditions by ichthyologists began to provide new introductions to the hobby. In 1932, Dr. Myron Gordon of the American Museum of Natural History made an expedition to Mexico.<sup>18</sup> Gordon was doing research on melanoma with viviparous (live bearing) platies (*Xiphophorus maculatus* and *Xiphophorus variatus*) and swordtails (*Xiphophorus helleri*). Socolof (1996:41) contends “the pet industry benefited enormously as the residue of his research included the fixing of wonderful new red and wagtail strains of platies and swordtails.” Many such collecting expeditions were initiated and often, at least in part, financed by

aquarium societies and dealers of tropical fishes (Klee 1987:136). The public aquariums also contributed to the growth of direct importations into the US (Chute 1934:95), seeking stock for their exhibits.

During the late 1920s, two important technologies were introduced to American aquarists that would contribute to the popularity of tropical fish keeping. In 1927 the concept of pH, “its significance to fish keeping, and its measurement,” would lead to better water quality (Klee 1987:120). Stainless steel tanks were also introduced, leading to fewer problems of leakage (Klee 1987:127). In 1930, “the novelty market” in the commerce was born when Chase Novelty Mfg. Co. of Chicago began marketing a metal diver bending over a treasure chest to adorn the aquarium bottom (Klee 1987:128). In 1932, the Empire Tropical Fish Import Co. began offering German manufactured “inside box” type filters (Klee 1987:128).

Amazingly, despite the worldwide depression, the aquarium fish industry continued to grow and prosper unencumbered. The number of aquarium societies in the US grew from 25 in 1930 to 42 in 1935 (Chute 1934:92). Writers on the history of the ornamental fish industry emphasize the dynamism of the hobby during the years of the depression. Klee (1987:127) noted: “As economic indicators dropped, tropical fish keeping rose to heights that seemed dizzy to the old timers.” Another observer of the ornamental fish industry, and a baker, “always tried to figure out why, during the depression, people had money to spend on fish, but not on pretzels” (Socolof 1996:116). And Coates (1933:62) wrote: “Even the financial upheavals of recent years seem powerless to affect the

new infant industry. Stores devoted to the sale of tropical fish are opening weekly and aquatic journals are popping up like mushrooms.” The introduction of the neon tetra (*Hyphessobrycon innesi*) to the tropical fish commerce would result in even greater popularization of the aquarium hobby during the second half of the 1930s.

### **2.3.e. The Neon Bonanza**

Early reports of the discovery of the neon aroused a keen interest in the public, describing the fish as “the most beautiful ever discovered” (Innes 1936:135) and “undescribly beautiful” (Stoye 1936:137). German ichthyologist Werner Ladiges maintains that the sight of the neon “erased all other impressions of colored fish” (Ladiges 1978:4). According to Ladiges (1978:6):

[The] neon Tetra brought a great change to the aquarium hobby. Up to that time there were some people who looked on hobbyists with a pitiful smile and regarded the hobby more or less as a pastime for harmless fools: housewives in particular did not show much empathy. This jewel of a fish brought about a completely new image. It was recognized even by women as an attractive decoration in the home and it won their full affection. It was through this fish that the genuine “home aquarium” actually first came into existence.

The introduction of the neon also caused fish keepers to become more interested in the chemical composition of aquarium water (Ladiges 1978:5). Shortly after its introduction an infectious disease struck the neon, the “neon tetra disease” caused by a protozoan, *Plistophora hyphessobryconis*. This problem stimulated “early research and findings in this area” (Ladiges 1978:5). The

knowledge thus gained would later facilitate the large scale breeding of the neon in the Southeast Asia.

Frenchman Auguste Rabaut is credited with the “commercial” discovery of the neon.<sup>19</sup> Before venturing into the ornamental fish business, Rabaut had tried his hand at many economic endeavors: mineral prospecting, caiman hunting and butterfly collecting.<sup>20</sup> There are two explanations as to how Rabaut first discovered the fish. The first proposes that one of Rabaut’s butterfly collectors told him “he could show him tiny fish with the same reflective blue color as morphos butterflies.” (Socolof 1996:179). Ladiges (1979:21) claims: “One day an Indian woman brought him an earthenware pot, containing the first neon tetras to be seen by a white man.” Regardless of how the fish was “discovered,” the result was that in 1935 Rabaut left Brazil for Paris taking the first small shipment of neons (Socolof 1996:179). The fishes were stored in boxes of mahogany and cedar, lined with pitch (Stoye 1936:138).

Rabaut delivered the fish to J.S. Neel of M. Lepant in Paris (Innes 1936:135; Socolof 1996:180). Neel offered some of these first neon Tetras to Walther Griem of Aquarium Hamburg.<sup>21</sup> Cochu was in Hamburg buying fish when the Neons arrived. Griem asked Cochu to take six living neons back to the US for Dr. Walter Chute of the Shedd Aquarium in Chicago and Dr. William Innes of *The Aquarium* magazine (Socolof 1996:180). Cochu would become the first person ever to make an international air shipment of live ornamental fish. He hand-carried<sup>22</sup> the fishes from Hamburg to the US, traveling by zeppelin.<sup>23</sup> Only one

fish survived. The surviving fish was the subject of a lot of publicity: a reporter named it “Lonely Lindy” in honor of Charles Lindbergh (Socolof 1996:180).

Rabaut returned to Brazil to collect Neons commercially. He brought the next shipment of 4,000 neons to New York in the spring of 1936 (Innes 1936; Géry 1994; Socolof 1996; Stoye 1936). Rabaut had previously contacted Dr. William Innes to find a buyer for the neons. Innes recommended Fred Cochu of Paramount Aquarium. Both Dr. Innes and Fred Stoye, an editor of *The Aquarium*, accompanied Cochu.

Cochu bought 4,000 neons for one dollar each. He told Rabaut that he needed a week to make the payment<sup>24</sup> and asked that Rabaut sell him the entire shipment exclusively. Rabaut agreed. Cochu thought he had bought all of the fish. He later learned of the kind of intrigue that would, in the future, frequently visit the commercial agents involved in the international trade of ornamental fish.<sup>25</sup> “Cochu had no difficulty in paying Rabaut the \$4,000.00 before the week was out. The average wholesale price for these neons was \$4.00/fish and the retail price was \$10.00/fish (Socolof 1996:182). Stoye (1936:137) remarked: “Offers of more than 100 dollars were made for a pair.” Rabaut would later become an employee of Paramount Aquarium until a few years after WWII (Socolof 1996:182).

With the commercial success of the neon,<sup>26</sup> Cochu concentrated his attention on South America. In spite of the good relationship between Paramount Aquarium and Aquarium Hamburg, there existed a lack of communication in the first years of the “Neon Bonanza” (Géry 1994; Socolof 1996). Both Géry

(1994:83) and Socolof (1996:183) tell the story of how early in 1937 Aquarium Hamburg sent collectors Hans Pietch and Wm. Praetorius to Brazil. The authors are in agreement over the basic details of the events up to a point and then diverge. The basic story is that Cochu was unaware of the Aquarium Hamburg collecting expedition, and Aquarium Hamburg was unaware that Rabaut had been hired by Cochu to collect neons for Paramount in Brazil. Early one evening in Manaus, on the way down river from Benjamin Constant/Tabatinga with the first large shipment of neons for Europe, the boat on which Pietch and Praetorius traveled tied up alongside the boat Rabaut traveled on. The same local company owned both boats. From this point the stories of Socolof and Géry diverge. Géry (1994:83) claims that Pietch and Praetorius “saw the empty [German] fish cans – the only containers available for transporting fishes at that time – and had them all dumped overboard. The next morning Rabaut found himself minus his entire load of collecting cans.” Socolof (1996:183-184) claims that Pietch and Praetorius: “made inquiries, and discovered that some one (Rabaut) was coming from the collecting grounds at Benjamin Constant. They paid a man to dump the entire load of full fish cans overboard. This was timed to happen just before dawn, and just moments after their boat departed for Benjamin Constant. When Rabaut awoke the next morning his entire load had disappeared.”<sup>27</sup>

### **2.3.f. 20 Years Of Market Domination For Paramount Aquarium**

Prior to WWII, Paramount was the largest importer and distributor in the US. According to Klee (1987:154), in the years leading up to the war, “a terrific trade

war developed among the importers in the US, wrecking prices and demoralizing the fish business in general.” Paramount was one of the survivors and in 1941 Cochu took control of Empire Aquarium from Buettner. Cochu and Paramount would dominate the ornamental fish market for the next twenty years (Socolof 1996:178).

In 1937, Cochu made the first of 204 round trips down to South America (Dow 1995:173). In order to protect his supply of neons, he and Aquarium Hamburg pooled their resources to obtain the only two permits ever granted by the Brazilian Government for exclusive marketing rights of Brazil’s tropical fish (Socolof 1996:182).<sup>28</sup> Cochu rented a new, state of the art fish hatchery from the Brazilian government in Belém, Pará.<sup>29</sup> The hatchery would serve him and his associates as a holding compound for ornamental fish. From Belém, Cochu was able to establish collecting stations, train local riverine people to collect fishes for him, and receive and condition fishes before shipping them by sea to the US (Socolof 1996:183). Paramount used the hatchery until the end of WWII. Cochu finally gave up this exclusive right due to “bureaucratic red tape and local political corruption” (Dow 1995:173-4). Under this arrangement, however, Paramount Aquarium and Aquarium Hamburg were able to enjoy a virtual monopoly on Brazilian ornamental fish exports.

In 1941, Hugo Schnelle came to the US to visit Cochu and decided to stay when the war broke out. Schnelle settled with his business partner, Walther Griem. He ran Paramount Aquarium for Cochu, setting up a fish breeding program during the war (Socolof 1996:125).

During WWII, Cochu was deferred from US military service so that he could provide electric eels to the US government (Dow 1995:173). He had an exclusive license for their importation into the US. Many institutions were now experimenting with these eels as part of the wartime effort. No one was allowed to bring tropical fishes into the US at that time, but Cochu managed to bring a few containers back for the trade. Cochu took advantage of the opportunity to “smuggle” tropical fish into the US in buckets labeled “eel food” in order to “keep interest alive” (Dow 1995:173).<sup>30</sup>

On his way to Belém the fall of 1937, Cochu spent a few days with Art Reinbrecht in Trinidad, and the “Trinidad Tropical Fish Industry” was born. Cochu arranged for Reinbrecht to ship fishes to him in New York, and “by the early 1950s there were almost fifty dealers in Trinidad” (Socolof 1996:185). *Plecostomus* and *Corydoras aneus* were being collected there (Socolof 1996:21). Some fishes sold from Trinidad were transshipped from British Guiana (Socolof 1996:17). By 1965, Trinidad, the usual source for *Corydoras aneus* and plecostomus, was almost fished out (Axelrod 1980:65; Socolof 1996:185). The Trinidadian government imposed embargos and quotas on shipping fishes every other season in an effort to prevent their extinction (Socolof 1996:66). Today, there is no ornamental fish industry in Trinidad.

During the 1930s, Cochu and Aquarium Hamburg were buying fish in Guiana, knowing one day that it would supply the hobby with many fishes when air routes between Guiana and the US were established. “Nothing much happened [in Guiana] until ten years after World War Two when Leonard Rafferty

and Louis Chung both started shipping fish by air” (Socolof 1996:179).<sup>31</sup> They supplied Fred Cochu at Paramount exclusively (Socolof 1996:20). Paramount became a partner with Louis Chung to establish a collecting compound on the Demerarra River, near the only large airport in Guiana (Socolof 1996:192). Louis and Winnie Chung were the principal fish dealers in British Guiana for many years. Cochu was bringing the fish to the US using his own plane. “It was not until commercial airlines could transport fish to Miami and New York City (1954) that Paramount’s control of the Guianese fish supply was breached” (Socolof 1996:192). By 1955, Pan Am started direct flights from Georgetown to New York and other small dealers emerged in British Guiana such as Sam Persaud, Art Reinbrecht,<sup>32</sup> Murray Director and Ross Socolof.

#### **2.4. POST WWII CHANGES IN THE TROPICAL FISH INDUSTRY**

Following WWII, several new technological innovations contributed to greater supply and demand of tropical fish. Shipping improvements ensured an increased selection of fishes available to tropical fish keepers. Plastic bags were in use starting in 1948.<sup>33</sup> By the mid 1950s, plastic bags were being filled with oxygen (Socolof 1996:58), and shipped in corrugated containers (Socolof 1996:125). Beginning in 1960, Styrofoam boxes became available, permitting better temperature regulation (Socolof 1996:104).

During the 1950s, the commercial airlines were noting that the transport of tropical fish was profitable, and by the early 1960s, “tropical fish had become the

single largest airfreight item out of Florida” (Socolof 1996:128). New air routes in the early 1950s opened up more opportunities to conduct business, travel, and do science in the Amazon (Smith 1999:56). Competition among fish dealers grew as more flights became available out of Colombia, Peru, Brazil, and the Guianas. Later, in the 1960s, when commercial airlines began providing regular jet airplane services, the “business boomed” as freight costs were considerably reduced, travel time was reduced, and logistics were simplified (Socolof 1996:152).<sup>34</sup>

Demand was stimulated by innovations in basic fish-keeping equipment. The “all-glass” aquarium became available in 1948.<sup>35</sup> Its manufacture depended on a newly developed product by Dow Corning, called “Silastic.”<sup>36</sup> “Gro-Lux” lighting was developed which promoted healthier aquatic plants. The use of filtration devices also became universal during the post-war years (Klee 1987:129).

With the supply steady and organized, and hobbyists more appropriately equipped and knowledgeable, the industry was poised for the introduction of more new and spectacular species. This would take place during the first years of the 1950s; the era of the “neon tetra” would end, and the “cardinal tetra” (*Paracheirodon axelrodi*) era would begin. The introduction of the cardinal tetra into the aquarium hobby was accompanied by controversy and confusion in terms of its discovery, its scientific description, and its type locality. I will deal with this subject in greater detail in Chapter 5.

#### **2.4.a. The Rationalization Of The Tropical Fish Industry**

The ornamental fish trade would undergo a major transformation during the coming decades as it became increasingly rationalized.<sup>37</sup> The tropical fish industry, in terms of aquarium accessories and publications, pharmaceuticals and rations, and livestock, became increasingly subordinate to the larger pet industry, and investment would become progressively more centralized. This transformation is exemplified by the growth of Southeast Asian fish farming, and the corporate histories of the Hartz Mountain Company, Tetra Werke and Tropical Fish Hobbyist.

By 1980, wild caught fish would make up only a small percentage of international tropical fish shipments, with captive bred fish would account for nearly ninety percent of all the fish shipped. Although Hong Kong had been a tropical fish exporting center since the early 1930s, Singapore was deeply involved by the 1950s. In the early 1960s, Hong Kong's fish volume grew considerably when it started producing large quantities of small egg layers at very low prices. German breeders traditionally supplied this type of fish for years. They were unable to compete, however, despite the advantage of lower airfreight costs to the United States; the German trade was soon obsolete. During the 1960s, entrepreneurs in Hong Kong and Singapore would begin to invest heavily in the excavation of fishponds. Jet transport and lower labor costs would soon allow them to compete with the Florida fish farms for many other varieties of fish (Socolof 1996:170-171). Taiwan, Thailand and Indonesia would soon enter the fish breeding business as well.

Singapore is currently the world's largest producer and exporter of ornamental fish, offering about 300 varieties of about 30 species, including species indigenous to the Amazon, Mexico, and other Southeast Asian countries (Fernando and Phang 1994:6).<sup>38</sup> The Singapore ornamental fish farming industry grew from S\$0.78 million to S\$72 million between 1962 and 1992 (Fernando and Phang 1994:6). This tremendous growth is attributed to Singapore's climate, access to major air networks, and its experienced aquaculturists. After WWII, many food fish farmers immigrated to Singapore from China. They modified their aquaculture practices for ornamental fish (Fernando and Phang 1994:8). Today, all ornamental fish farms in Singapore are family businesses, descendants of first and second-generation fish farming families (Fernando and Phang 1994:9). A few small farmers are also brokers and freight consolidators for ornamental fish exporters. Singapore also is a key transshipping point for ornamental fish from South and Southeast Asia.

Beginning in about 1956, a very subtle change in production and quality occurred in the growing Florida fish farming industry (Socolof 1996:129). Many new farms were digging highly productive ponds. Although the demand for captive bred fish was great, there were soon more farmers producing more fish than the market could absorb; prices fell (Socolof 1996:215). This unhappy state of affairs led Jim Woolf, owner the largest fish farming operation of that time, to accept an offer to sell his facility in 1963 to Leonard Stern, son of Max Stern, founder of the Hartz Mountain pet empire (Socolof 1996:128).<sup>39</sup>

During the mid 1960s, Hartz Mountain introduced the concept of the “complete pet supply department into more than thirty thousand supermarkets and mass merchandisers” (<http://www.hartzmountain.com/history/>).<sup>40</sup> Large “discount stores”<sup>41</sup> began housing large retail pet departments which they generally rented to supposedly experienced individuals. The price of fish and aquarium accessories dropped steadily, as did quality. Fish that Hartz itself was not supplying to the discounter were obtained at low cost from the ever-growing fish farming industry in Southeast Asia.

Southeast Asian bred fish were becoming more available due to the efforts of the newly emerging tropical fish trans-shipping industry in California. Transshippers were able to order enough fish to reduce the freight rate. They reconditioned the fish, broke down the orders, and sent the shipments to the buyer. Retailers were able to buy a minimum of four boxes, often buying more than was needed of the low cost fishes (Socolof 1996:212-213). According to Socolof (1996:213): “Live stock, when it managed to get [to the retailer] alive, was sold as fast as possible (before it died). Sick, small, and diseased fish were the rule not the exception. The magic word was ‘cheap.’ New hobbyists were attracted at a phenomenal rate as things were discounted heavily.”

Fish quality was poor because Hartz was never able to institute an adequate aquarium maintenance program for its customers, and only the hardiest varieties of fish could be sold (Socolof 1996:136). The fish quality problem would prove disastrous for the hobby: “The poor quality quickly made more ex-hobbyists with unhappy memories” (Socolof 1996:214-215).<sup>42</sup> With time,

most of the retail chains dropped out of the live fish business: “one of the best things that ever happened to the tropical fish hobby” (Socolof 1996:136-137).

During the last twenty years more restructuring of the retail sector of the pet industry has occurred. Hartz Mountain would later become part of more rationalization efforts. In December 2000, Hartz Mountain was sold to an equity investment firm, “specializing in leveraged buyouts and recapitalizations of middle-market growth companies in partnership with company management” (<http://www.hartzmountain.com/history/>). The “complete pet supply department” introduced by Leonard Stern of Hartz Mountain has found new life in the “complete pet superstore” chains. Like the discounters of the 1960s, price is a prime motivator and wild caught fish are rarely stocked. The most familiar of these “pet superstores” are Petco and PETsMART. Petco Animal Supplies, Inc. was founded in Delaware in 1965. With backing from a private merchant banking firm, and a private investment partnership, it now operates 530 specialty retail stores in the US. PETsMART, Inc., founded in 1987 in Phoenix, Arizona, operates more than 525 pet stores in the United States and Canada.

Around 1950, Dr. Ulrich Baensch founded Tetra Werke in Melle, Germany. He was a pioneer in the development of flake foods for aquarium fish. Tetra would eventually become a major producer of many other aquarium accessories, chemicals, pharmaceuticals, as well as hobbyist literature. In 1974, Baensch sold Tetra Werke to Warner-Lambert, Inc. By 1978, subsidiaries were established in many countries under the name of Tetra Sales. In June 2000, Pfizer, Inc.

acquired Warner Lambert. Tetra is now a subsidiary of the world's second largest pharmaceutical corporation.

In 1947, Dr. Herbert R. Axelrod began his career in the aquarium industry as a laboratory assistant to Dr. Myron Gordon at the American Museum of Natural History. One of his tasks was to maintain 1,000 aquaria (Axelrod 1997a:96). In 1948, in order to prepare other laboratory assistants for aquarium maintenance, Dr. Gordon requested that Axelrod write a protocol: "The Hobbiology of Aquarium Keeping." An editor from McGraw-Hill learned of the manuscript from Gordon and published Axelrod's book in 1950 as "Tropical Fish as a Hobby." McGraw-Hill also published Axelrod's second book in 1951, called "The Handbook of Tropical Aquarium Fishes". Ichthyologist Leonard P. Schultz of the Smithsonian Institution, at the behest of the publisher, edited Axelrod's second book and was made co-author.<sup>43</sup> In 1952, Axelrod began publishing the Tropical Fish Hobbyist magazine, whose current circulation reaches nearly 60,000. Axelrod (1997e:155) credits the success of his magazine, at least in part, to the photos of fishes he and others "collected in the jungles;" absent in the magazines of his competitors. TFH, Inc. would become the largest publisher of pet literature in the world, offering more than 1,000 titles. Central Garden and Pet Co., a large producer of consumer garden and pet products, acquired TFH in 1997.

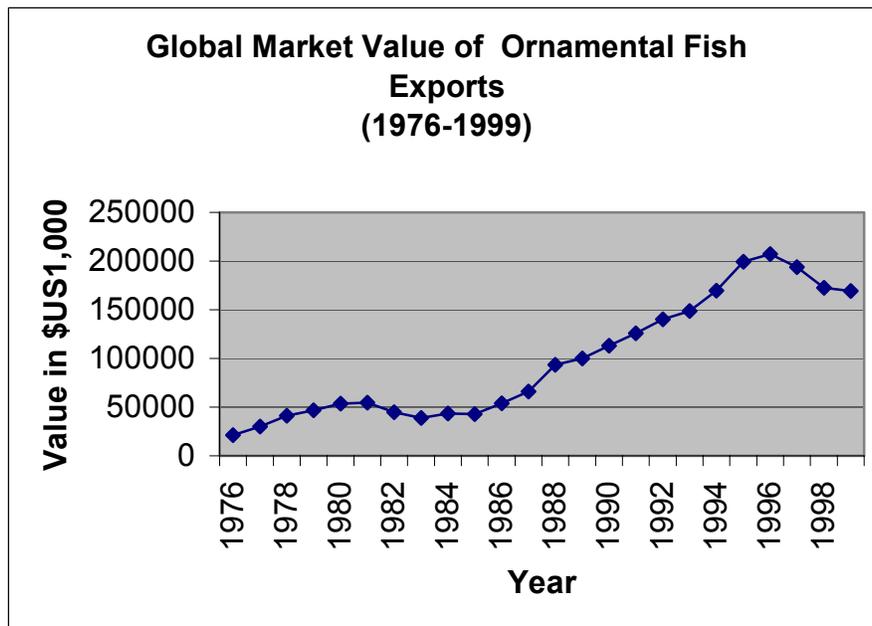
#### **2.4.b. The Current State of the Global Trade of Ornamental Fish**

There are many sources of live ornamental fishes captured in the wild. In South America, Colombia is the largest supplier to the world market; followed by Brazil and Peru respectively -- although these figures vary from year to year. In Africa, Nigeria, Zaire, and Great Rift Lakes are the principal sources. In Asia, wild caught ornamental fishes originate in Sri Lanka, Malaysia, Indonesia, and the Philippines. Additionally, a few of the Caribbean Islands are exporters of ornamental fishes. According to Andrews (1990:55) only 10% of total exports of ornamental fishes are wild caught. Most ornamental fishes are captive bred on fish farms in Singapore, Malaysia, Japan, Israel Thailand, Hong Kong and the US. McLarney (1988:50) asserts that 30% of US demand is supplied by US fish farms. In 1985, Florida provided 10 million fishes, representing 125 species worth \$75 million. Ornamental fish make up more than 50% of the total volume of airfreight out of Florida. Singapore, however, is by far the largest exporter of farm raised ornamental fishes.

Statistical data on the world trade of ornamental fish is often scant or contradictory.<sup>44</sup> The total world market for aquarium fishes, equipment and accessories was estimated at US\$ 4 billion 1971, going up to US\$ 7.2 billion in 1986 (Andrews 1992:25). In 1988, Conniff (1989:92) claimed it was only US\$1 billion and had grown by 25% per year in 1987 and 1988. Dawes (2000:110) estimated the entire industry to be worth about US\$15 billion. The fish themselves represent only a fraction of the overall industry, maybe as little as three percent (Watson 2000:7). The value of ornamental fish exports rose by

more than 300 percent between 1985 and 1996, but has fallen by about eighteen percent during the period 1996-1999 (Figure 2). The Food and Agricultural Organization (FAO Fishstat plus 2001) reports that in 1999 the world import value of ornamental fish was US\$242,470,000, while export value was US\$169,430,000. The explanation for this discrepancy must be attributed to the idiosyncrasies of recording practices in various countries.

**FIGURE 2**



Source: FAO

Although it is not possible to calculate the quantity of fishes traded annually with any accuracy due to reporting discontinuities, Fitzgerald (1989:259) estimated that 350 million fishes are sold annually; valued at \$600 million. Andrews (1992:25) estimated that only 150 million ornamental fishes were sold in the world market. However, Andrews' estimate seems to be quite dubious as

Fitzgerald (1989:259) claims that Singapore alone exports 150 million fishes annually. Further, if Hemley (1984:1) is correct to estimate that 124 million fishes are imported into the U.S. alone, then Andrews' estimate is of no use at all. The number of ornamental fish in home aquariums exceeds 200 million specimens (PIJAC 1998:1). This total includes between 2,000 (McLarney 1988:49) and 3,000 different species (PIJAC 1998:1).

## 2.5. NOTES

1 I do not claim that this history is complete, not having had the opportunity to examine relevant literature from other countries, particularly Germany. It should also be noted that many important details concerning the commercial history and structure of Africa and South and Southeast Asia are omitted, requiring further research.

2 Food fish culture in China may be as old as 4,000 years (Banister 1977:25).

3 The goldfish has been kept as an ornamental for longer than any other species of fish, and "its contribution to the hobby has been far and away the most important of any fish" (Atz and Faulkner 1971:13). The principle reason for its preference, aside from color, is due to its hardiness, withstanding a wide range of water conditions. The first recorded importation of goldfish to England was in 1691. Goldfish were introduced into the US during the eighteenth century.

4 Bannister (1977:15) contends that this fish was probably a paradise fish (*Macraaopodus opercularis*) from Southeast Asia.

5 Public aquariums were constructed in Paris in 1860, Hamburg in 1864, and Berlin in 1869.

6 The paradise fish is an anabantid that has an air breathing apparatus that allows it to extract oxygen directly from the air above the water's surface.

7 The exchange of live stock, and breeding and care tips, has also been an important social fact for tropical fish dealers and fish farmers as well (see Socolof 1996).

8 Some examples of the fish Dorn introduced into the hobby from Asia, Africa, and Central America are barbs, *Danio* spp., various catfishes, many tetras, most of livebearers now on the market, many cichlids, rasboras, most of gouramies now on the market, killifishes, butterfly fish, and the scat; from South America, examples include the hatchetfish, *Corydoras paleatus*, *Cichlasoma severum*, *Cichlasoma insignis*, *Hyphessobrycon heterorhabdus*, *Geophagus brasiliensis*, *Geophagus gymnogenys*, *Pterophyllum* spp. (Klee 1987:61).

9 Halterbeck was a manufacturer and the patent holder for the "Peerless" aquarium, a one-piece aluminum tank.

10 Angelfish were priced at \$200.00 a pair in 1913 (Socolof 1987:82). In 1915, the angelfish was first bred in the US (Klee 1987:97). By 1922, they were selling for \$15.00 each in Chicago." (Socolof 1987:82).

11 "As time went on, Innes clearly saw the need for a revision of [Herman T.] Wolf's book, *Goldfish Breeds and Other Aquarium Fishes*, which was published in 1908... but Wolf, the old goldfish man that he was, would not agree to coauthorship of a revised edition of his book. Therefore, Innes bought the rights from Wolf, paying for the copyright plus agreeing to a royalty" (Klee 1987:110).

12 Fish farming began in Louisiana and Florida during the late 1920s, but would not become a significant economic force until the 1950s (Socolof 1996)

13 Coates defines collector as the individual who actually, for himself or a pet dealer, travels to the tropics and ships the product to Europe or the US.

14 "German shipping cans" are soldered, shortened cans generic to the coal and oil industry. They were 15-18 inches in diameter, with a perforated, 5 inch opening at the top. Containing 3-4 gallons of water, they could hold around 200 guppies (Axelrod 1997c:148). Their name arose as a consequence of the fact that the cans were developed in the US by Hugo Mulertt, a German immigrant; and not because of some development in Germany (Klee 1987:26). The "German shipping can" was used throughout the aquarium hobby until the invention of the plastic bag.

15 "A fairyland where I could see, even if I could not afford to buy, all the wonderful fish that were illustrated in Dr. Innes's book 'Exotic Aquarium Fishes'" (Socolof 1996:191).

16 Fish collected include headstanders, silver dollars, oscars, leaf fish, pencil fish, hatchet fish, *Corydoras* sp., plecostomus, many types of catfish, *Chalceus*, *Abramites*, *Anostomus*, *Leporinus fasciatus*, *Hemiodus*, and *Prochilodus* spp. (Socolof 1996:177).

17 In early 1937 Fred Cochu, on a collecting trip to Brazil, found Karl Griem suffering from typhoid fever in Belém. He took Griem back to Germany where he eventually recovered (Socolof 1996:178).

18 Chute (1934:93) wrote, “[ichthyologists] have learned something of the life histories of their catch, so that the facts gleaned and the methods evolved by the aquarist in the pursuit of the hobby have aided science in its eternal search for knowledge.”

19 Neon tetras inhabit the streams along the Amazon River between the middle Ucayali in Peru and São Paulo de Olivença in Brazil (Géry 1994:83). This range is also the home of the Tukuna Indians. The first Neons were found on the Igarapé Preto, near the village of Belém, Tabatinga, Amazonas, Brazil, about 60 km from the border region of Peru, Colombia and Brazil (Géry 1965:31).

20 There are various reports on Rabaut’s earlier exploits: he was prospecting for emeralds and hunting caiman for skins (Stoye 1936:137); he was collecting the livers of caiman and blue morphos butterflies (Géry 1994:82; Socolof 1996:179); he was searching for diamonds in Venezuela, hunting crocodiles for their skins, and collecting butterflies (Ladiges 1979:21).

21 It is unclear whether Griem received all or a portion of the fish. Socolof (1996:179) states that Walther Griem “went to Paris and bought all of the fish that were there,” which was less than fifty. Socolof gives one the impression that the fishes that made the trip with Cochu were of the same stock that Griem received from Neel. According to Innes (1936:135), “a few of the fish sent to Paris found their way to Hamburg,” and were bred. The six Neons that were to make the long journey were the offspring of the fish that Griem had obtained from Neel. Innes (1936:135) and Stoye (1936:137), further claim that the first Neons received from J.S. Neel was during the year of 1936. It must be assumed that these fish were from Rabaut’s original importation to Paris. Innes sent these on to ichthyologist Dr. George Myers for identification. In July of 1936 Myers published the scientific description of the neon (Myers 1936), giving it the scientific name of *Hyphessobrycon innesi* in honor of Innes. In his description of the neon tetra, Myers (1936:97) stated that the original holotype he had to work with was “received by Mr. Innes directly from the importer in Paris for identification.” Thus, corroborating the claim of Innes. According to Weitzman & Fink (1983:388) the holotypes of Myers were “taken in March and/or April 1936 during a trip by canoe traveling up the Rio Putumayo into the State of Amazonas, Colombia.” If Weitzman and Fink are correct, then the fish Myers identified was not from the first shipment, and therefore Innes’ facts about how he received his first neons are not clear if Neel originally received the fish in 1935. It may be that Griem acted as an agent for Neel in having Cochu deliver a portion of the neons to Innes, Socolof noted the wrong year, or Neel did not give Griem all of the fish.

22 “Smuggled” (Dow 1995:172).

23 Socolof (1996:180) reports that Cochu traveled on the “Graf Spey.” Dow (1995:172), Innes (1936:135), and Géry (1994:83) report that Cochu traveled on the zeppelin Hindenberg.

24 Cochu told Socolof “he did not have the four thousand dollars then, but would have had a real problem finding four hundred dollars” (Socolof 1996:180-181).

25 Socolof (1996:181) gives the following account: “The biggest center for the sale of tropical fish in New York City was on Nassau Street in Manhattan. There were three stores there almost side by side. They fought constantly. They berated each other in the newspaper advertisements... They fought rudely and insultingly in their weekly newspaper advertisements which every hobbyist read. They all did a big business. The tropical fish buyers in New York loved it. Prices on Nassau Street were always lower than any other place... A man named Al Goldman owned all three stores. His managers would meet several times a week, in secret with Goldman, after each store closed... Goldman was Paramount’s very best customer. [Cochu’s] first phone call was to Goldman to sell him the neon tetra that he had exclusively... Goldman had laughed and said, ‘come on down and see yourself.’ The mystery unfolded after he saw an aquarium full of neons at the Nassau Pet Shop.

Rabaut had employed one of the sailors on the ship from Brazil as a helper. The helper was to be paid when the ship docked, and Rabaut and the sailor had different ideas as to what his service was worth. He stole a can from Rabaut to pay himself properly. He had then sold his can of Neons to Goldman. Al Goldman generously let Cochu have the fish at a more than reasonable price.”

26 By November 1936, the wholesale price dropped to as low as \$2.00 each and went down to seventy-five cents each by 1952 (Socolof 1996:182). Socolof also points out that collectors in Leticia, Colombia were being paid only one third of a cent each as late as the 1950s; as such, the importation of Neons was quite profitable.

27 Apparently a little concerned because of this incident, on his next to trip to Leticia, Rabaut encountered two French convicts that had escaped from Devil’s Island in French Guiana. “Rabaut hired them, and they helped protect his and Paramount’s interests for years” (Socolof 1996:184).

28 According to Axelrod (1980:12): “This exclusive license was given to Cochu because of his extraordinary courage and skill in discovering many new fishes deep in the jungle, with training local natives how to collect and ship them to a central point, and for his fearless journeys into the wild, uncharted jungle where many white men simply disappeared.”

29 The Brazilian Government had built the hatchery to raise tucunaré (*Chichla ocellaris*). The effort failed. By the end of the first year, in 1936, the government discontinued funding, and the project was abandoned. The hatchery was part of the Museu Goeldi and located near the Amazon River. The rent paid contributed to the maintenance of museum's zoological gardens.

30 Dow (1995:173) noted, "Customs inspectors seldom stuck their hands into the eel containers."

31 Axelrod (1997c:149) believes the year that Chung started was 1952.

32 From the Trinidad Tropical Fish Industry, mentioned above.

33 Merrill Cohen began the development of plastic bags to transport fish in about 1948 (Socolof 1996:18). His father-in-law was in the packaging business, and a good customer of the Bemis Bag Company. They suggested he try a new process electronic sealing through water, and "the old German fish can was dead and gone by 1953" (Socolof 1996:19).

34 "Freight costs become the deciding factor when buying or selling fish" (Socolof 1996:186).

35 Merrill Cohen is also given credit for manufacturing and marketing the first all-glass aquariums (Socolof 1996:19).

36 Dow was impressed by the unforeseen use of their product. They would join Cohen in promoting "Silastic" at a National Association of the Pet Industry trade show, even demonstrating its utility in decorating aquariums with ceramics, wood, and rocks.

37 Klee (1987:158) laments: "The rise of the hobby to a point where its commercial side represents 'Big' business, is undoubtedly the most significant of all developments [in the ornamental fish commerce], prewar or postwar."

38 Viviparous species represent 30% of ornamental fish exported (Fernando and Phang 1994:37).

39 In 1926, Max Stern emigrated from Germany with five thousand singing canaries. By 1932, he was the largest importer of livestock in America and decided to expand into packaged bird foods under the Hartz Mountain brand. During the next decades his customers would include R.H. Macy, Sears Roebuck, F.W. Woolworth, W.T. Grant, S.S. Kresge. In 1959, the Stern and his son, Leonard, were expanding their business to include dog and cat supplies, as well as gold fish, tropical fish and aquarium supplies.

40 By the beginning of the 1980s Hartz Mountain products were sold in more than 40,000 retail outlets (<http://www.hartzmountain.com/history/>).

41 In addition to the retailers mentioned in footnote 39, other examples include Arlans, Korvette, Spartan, Ames, Kings, and Robert Hall.

42 By the late 1960s, “basements and attics across the United States were stocked with empty aquariums and equipment” (Socolof 1996:213).

43 According to Axelrod: “Dr. Schultz made my reputation, and I was able to support myself writing fish books and starting Tropical Fish Hobbyist magazine in 1952” (Axelrod 1997a:104).

<sup>44</sup> Conroy (1975:2) warns that there are several problems in obtaining accurate statistical data: there is no uniform nomenclature for reporting import and export statistics; there are no real standard units of volume for reporting imports and exports; and the various reports available are rarely converted to commonly accepted monetary units.

### CHAPTER 3

#### COLONIAL SOCIAL TRANSFORMATION IN THE MIDDLE RIO NEGRO

This Chapter is divided into two sections, corresponding to two periods of Portuguese colonial expansion in Amazonia: the slave and forest product trade (1690 – 1750), and the Directorate (1751 – 1799). The first section delineates the socioeconomic context in which colonization of the Rio Negro became a necessity for the Portuguese. It highlights the constant labor shortage in Grão-Pará, which led to war with the Manao and the substitution of a vast indigenous trading system. The first section also shows how official and unofficial agents of state expansion, Carmelites missionaries and *sertanistas* (trans-frontiersmen), together brought the Rio Negro into the global mercantile exchange network. The second section describes the Portuguese Crown's attempts to resolve the labor shortage by employing a secular government and increase agricultural productivity in the colony. It provides some details of the legislation, why the expectations of this legislation were unrealistic, and the consequences for social formation in the Rio Negro basin. This chapter establishes the basis for social formation based on mercantile exchange, informal economic arrangements, and relations of dependency.

### 3.1. THE SLAVE AND FOREST PRODUCT TRADE (1690 – 1750)

#### 3.1.a. Labor Shortage in Grão-Pará

In the latter quarter of the seventeenth century, the Portuguese empire was experiencing an economic crisis due to a diminishing supply of spices from India (Goulart 1967:87), falling prices of its principal exports of Brazilian sugar and tobacco, and rising prices for imports of corn, cloth, and other essential items from Northern Europe (Boxer 1969:25). The discovery of spices in Amazonia, generically known as *drogas do sertão* (backland drugs), led the Portuguese Crown to order *sertanistas* (trans-frontiersmen) to intensify the extraction of cacao and substitutes for clove, cinnamon, and vanilla at the expense of gold prospecting (Goulart 1967:87). The discoveries also brought a great increase in commerce to the port city of Belém at the mouth of the Amazon River. The decline in world sugar prices, however, had led many Lisbon merchants to insist on cash transactions rather than in kind, which created a serious financial crisis in Brazil (Boxer 1969:26).<sup>1</sup> The shortage of currency in the colony led to a thriving contraband trade, which deprived the Crown of important revenues during a period of economic decline in its colonies (Boxer 1969:27).

Labor was a problem since the beginning of settlement in the region. The European population in the state of Maranhão and Grão Pará was small, about 1,000 in the middle part of the seventeenth century, growing to only about 2,000 people by the beginning of the eighteenth century (Boxer 1969:275). The settlers depended on Amerindian labor as hunters, fishermen, rowers, field hands for

domestic and export crops, household servants, and collectors of drogas do sertão. Labor was generally obtained through the process of *descimentos*, or descents of Amerindians down the river to settlements and missions, in which they were cajoled or forced into service for the crown. More often than not, the settlers were unable to obtain what they deemed the necessary compliment of indigenous laborers for their economic endeavors.

Labor shortages in the region were the consequences of smallpox epidemics and the distribution of indigenous slave labor that favored missionaries, government officials and wealthier settlers. In the second half of the seventeenth century, the Jesuits, with the support of the Portuguese Crown, controlled labor in the region, administering several dozen missions on the lower Amazon and several plantations in the area of Belém. Poorer settlers increasingly complained the Jesuits were monopolizing the indigenous labor force, and were thus responsible for settler poverty.<sup>2</sup> Smallpox epidemics (1622, 1644, 1663, and 1695) exacerbated the labor problem with each occurrence (Sweet 1974). A consequence was that official, as well as private, slave raiding of Amerindians intensified with each epidemic in order to replenish the labor force of Pará.

Depopulation on the lower Amazon forced the Crown to prohibit slavery in 1680, but to no avail. In 1686, in an attempt to regulate slaving expeditions, the Crown instituted the *Regimento das Missões* (Mission Regiment) in which Jesuits and Franciscans were granted complete spiritual, political, and temporal power of *aldeias* (villages) and missions (MacLachlan 1973; Sweet 1974:135-143).<sup>3</sup> The

new regulations included provisions for *tropas de resgate* (rescue troops)<sup>4</sup> to be sent annually into the *sertão* (backlands) by the Royal treasury. The tropas were manned by a Portuguese soldier (*cabo*), Amerindian crewmen in the Royal forces, and a Jesuit chaplain charged with the responsibility of verifying that slaves were legally taken; meaning the slaves were to be prisoners of interethnic wars.<sup>5</sup> The tropas de resgate “were expected to maintain the labor force of the colony, while satisfying administrative and ecclesiastical scruples about the ‘justice’ of enslavement and at the same time providing much-needed revenues” (Sweet 1974:525-26).

The tropas fell out of favor with the governors in Belém who, without control over the distribution of the rescued slaves, were more interested in profiting from the collection of *drogas do sertão*. Sweet (1974:467) claims that most preferred to send as many Amerindian crewmen as possible, “under whatever pretext,” to collect forest products (and slaves) on private account. Thus, those with sufficient financial resources to outfit expeditions - governors, other officials, and wealthier settlers - underwrote most slave raiding. These wealthier settlers did not undertake these expeditions themselves, but rather they employed the services of *mamelucos* (progeny of European fathers and Amerindian mothers) or African members of their households to lead crews of Amerindian slaves. “The total number of slaves taken in any expedition were kept secret insofar as possible, to keep taxes at a minimum and to leave the slavers leeway for the distribution of their captives through private rather than public channels” (Sweet 1974:484, see also Boxer 1969:284). Thus, the result of this

informal economic system was that the Royal Treasury and the poorer settlers both suffered.

In 1695, the *Nova Repartição das Missões* (New partition of Missions) called for the geographical division of mission activities to various religious orders. Temporal authority was given to the Jesuits in the area to the south of the Amazon River, the area to the north was divided among Franciscan and Mercedarian orders, and the rivers Solimões and Negro to the Carmelites (Hoornaert 1982:161). This Repartition was part of the Crown's desire to promote the conversion of Amerindians to increase the production of drogas do sertão, satisfying both the settler's demands for labor, and the Crown's need to refill the royal coffers and establish its presence in areas of geopolitical importance (Hoornaert 1982:165).

### **3.1.b. The Manao Indigenous Trading System**

During the last quarter of the seventeenth century, the largest reserves of manpower then remaining in the Amazon valley were then found in the river basins of the Solimões and Japurá, and the Rio Negro and Rio Branco.<sup>6</sup> It is at this time in which the middle Rio Negro became incorporated into the world economic system. Standing in the way of Portuguese attempts to establish formal boundaries with the Spanish and the need to resolve the settler's labor problem, were the Manao.

Prior to Lusitanian expansion on the Rio Negro, the Arawak-speaking Manao were the dominant group from the mouth of the Rio Branco to the Isle of

Timoní, near the mouth of the Rio Tea (Ferreira 1984), an area now occupied by the municipalities of Barcelos and Santa Isabel do Rio Negro. They and other Arawak-speaking groups, who occupied most of the Rio Negro basin at the beginning of the colonial period, most likely migrated from the middle Rio Amazonas about 3,000 – 6,000 years ago (Zucchi 1987).<sup>7</sup> The earliest knowledge of the Manao was associated with the fabled “El Dorado,” which was said to be located in the region inhabited by them.<sup>8</sup> Although El Dorado turned out to be a myth, the rumors of it indicate a significant interethnic trading system in which the Manao figured prominently. In terms of substantive information concerning Manao trading, the first comes from Acuña (1859). He learned in 1639 that the Manao traded for gold from a tribe from which they “get a great quantity, so that by heating it they make plates, which they hang to their ears and noses” (Acuña 1859:102, in Hemming 1978:440).<sup>9</sup>

In 1689, Jesuit missionary Samuel Fritz (1922:42) wrote that the Manao were itinerant traders who traded with more sedentary tribes over a large area to the north and south of the Rio Negro. There they traded small plates of gold, vermilion, manioc graters, hammocks, and various kinds of clubs and shields (Fritz 1922:62-63). During each flood season the Manao visited the Rio Solimões near the mouths of the Rios Japurá and Juruá to trade.<sup>10</sup>

By the 1690s, the Manao economy was changing from a trade in artisan goods to a trade in slaves. Fritz (1922:93) provides evidence of a three-way trade conducted by a branch of the Manao, the Cavauri or Caburicena, who lived near the mouth of the Rio Caurés, more or less opposite the mouth of the Rio Branco.

They were known to have traded for shell necklaces from the Solimões for slaves on the Negro, which were then exchanged for manufactured Dutch goods obtained from Carib speaking groups of the Rio Branco. Trading the Dutch manufactures for shells on the Solimões completed the cycle. By inserting themselves into the Dutch slave trade to obtain European manufactured goods, the Manao would control the slave traffic in the region from the 1690s to the 1720s. By the 1720s, the Manao were attempting to circumvent the Carib intermediaries to deal directly with the Dutch.

Portuguese attempts to curtail this trade led to the construction of a fort at the mouth of the Rio Negro, and are reflected in the establishment of Carmelite missions in the same region. By 1700, the colonists had established relations with the Manao.<sup>11</sup> As it turns out, the Dutch goods were of superior quality to those of Portuguese manufacture, and both the Portuguese settlers and the Carmelite missionaries were actively involved in the trade for these goods (Sweet 1974:269-270). When the trade in Dutch goods finally ceased,

it was because of the settlement of that region by Paraense trans-frontiersmen who bribed and bludgeoned their way into the indigenous commercial world of the Northwest, set up their own systems of regular trade and communication with their relatives down the river, and carried off most of the inhabitants of the region (middlemen iron-goods traders among them) into slavery in Pará. (Sweet 1974:272)

### **3.1.c. Carmelites and Sertanistas**

By 1710, the tropas de resgate had ceased to operate in Northwest Amazonia. During the next decade, private slavers delivered most slaves brought down to Belém, complementing the trade of forest products. The Carmelite missionaries and trans-frontiersmen had by now become key elements of the northwest Amazonian social landscape, forming the backbone of an extractive economy based on faunal, floral, and human resources (Sweet 1974:664-671). At the time at the Repartição, the number and influence of the Carmelites was minimal in Amazonia.<sup>12</sup> Sweet (1974:655) has argued that the most salient quality of the Carmelite missions on the Rio Negro was the “independent character of each mission as a business enterprise.” Undertaken with little Royal financial or military support, Carmelite activity was concomitant with the violent process of depopulation on the Rio Negro, and resulted in the acculturation of numerous indigenous populations, and the formation of a Catholic religious consciousness (Hoornaert 1982:170). The Carmelites’ role in the cultural formation of the Rio Negro was a consequence of their obligations to set up and maintain a stable labor force for their mission villages and the Carmelite convents and estates in Pará and Maranhão, as well as to provide crewmen for collecting/slaving expeditions (Sweet 1974:663).

The Carmelites were much less educated than the Jesuits. Most were sons of the less affluent Portuguese settlers in Pará who sought the “guarantee of a comfortable living for anyone who might complete the modest course of theological training and gain admission to the Order” (Sweet 1974:633). Carmelite training did not emphasize hard work and sacrifice like the Jesuits, but

rather withdrawal from worldly affairs. Most had no experience with life in the Amazonian interior and were accustomed to lives of relative comfort.<sup>13</sup>

The Carmelites were “more interested in making money than in saving souls” (Sweet 1974:641). In terms of conversion of Amerindian societies, the Carmelites were “content with an adherence to outward forms and an acceptance of fervent Marianism and penitence” (Sweet 1974:647). Ferreira (1984:155) notes that most Carmelite friars were so involved in the slave trade, that they had little time for catechism; once they had assisted in the descimentos of one group, they moved on immediately to another. Unlike the Jesuits, they were not in conflict with the settlers over labor, “and were in fact, as the operators of small slave-worked estates, participants in the settler demand for unrestricted access to Indian manpower” (Sweet 194:635).

Trans-frontiersmen (*sertanistas*) were generally mamelucos who were raised speaking the *lingua geral*, and trained from early childhood to organize an Amerindian work force. According to Sweet (1974:664-65): “Freed of the laws and the class system of Pará, they contributed more than any other outsiders to accelerating the pace and patterning the process of social change in the region – to building the curious society without government of the Negro and Solimões valleys.” The trans-frontiersmen were rugged, unruly, and generally illiterate. Many were military deserters from Pará and the river forts, escaped prisoners from Pará, or lone adventurers. They maintained friendly relations with a number of Amerindian tribes, acting as intermediaries and counselors in the European customs of war and trade. They earned the nickname of *cunhamena* (squaw-

men) because of their tendency of fraternizing with the daughters of the chiefs with whom they traded. They would lead expeditions with the assistance of Amerindian auxiliaries “as alien and as warlike and far from home as themselves” (Sweet 1974:466). The Amerindians, for their part, preferred serving the trans-frontiersmen to life as a plantation slave, as “it did not involve removal from familiar environments” (Sweet 1974:671).

The trans-frontiersmen survived in Amazonia as individuals, based on their ability to adapt, rather than impose (Sweet 1974:466). Among these trans-frontiersmen, we find the figure of the *regatão*, or itinerant trader, operating in the backlands as part of the *tropas de resgate* or independently (Goulart 1967:83). Goulart (1967:84) has suggested that the *regatão* arrived at the same time as the founding of the fort at Pará in 1627. The term *regatão* derives from the verb *resgatar*, alluding to the rescue or purchase of Amerindians, “in which the first of these itinerant traders naturally played a part” (Veríssimo n.d.:468, in Goulart 1967:106).<sup>14</sup>

Although a nemesis for the Jesuit, the trans-frontiersmen were valued collaborators of the Carmelite missionaries (Sweet 1974:648). They would set up temporary residence in the various *aldeias*, where they would drink heavily, abuse the women, and prepare for the next expedition into the backlands. “The Carmelite missionaries relied on them heavily, cooperated in their undertakings, and in fact seem in most ways to have lived and worked like trans-frontiersmen themselves” (Sweet 1974:648). The trans-frontiersmen served the missionaries as defenders of the missions, as the organizers of descimentos of Amerindians

and the collection of forest products, and as foremen of Amerindian work crews. The missionaries frequently provided the trans-frontiersmen safe haven from the occasional government recruiters, “and in general allowed them to incorporate themselves into the life and work of the missions” (Sweet 1974:667).

### **3.1.d. Just War and its Aftermath**

In 1721 and 1722, the crown again employed the tropas at the behest of the Jesuits and others. The Jesuits had related charges of anarchy and corruption in the administration of the slave trade, including indiscriminate licensing of private slavers by bribed officials and a “blatant disregard of the legal requirements of priestly ‘examination’ and registration for tax purposes” (Sweet 1974:526). The socioeconomic conditions that made the tropas possible were what might be considered relations of merchant dependency. Indigenous societies, by now familiar with the brutal habits of the colonizers, were prepared to trade slaves for manufactured goods (Sweet 1974:578). The more adaptable and warlike began to specialize in slave raiding, dispersing potential and real enemies into more remote locales. The colonial trading system had the effect of making such societies more and more dependent on the colonizers for iron goods, cloth, alcohol, etc. The basic operation was conducted by going up the river and establishing an *arraial*,<sup>15</sup> or base of operations where stockades were built and gardens planted. These bases were located on high ground near the edge of rivers, generally in areas of abundant game and aquatic resources. Many of these bases would eventually serve as the sites for Rio Negro missions.

Tropas would visit the Rio Negro basin regularly from 1723 to 1750. In 1727, private citizens, and thus sertanistas, were authorized to participate in the tropas, allowing them to trade for slaves on their own account.<sup>16</sup>

The first official tropa to reach the Rio Negro in 1723 was attacked by the Manao, under the leadership of Ajuricaba, killing a soldier and an allied Amerindian principal. News of the attacks prompted the governor, with persuasion by the settlers, to mount a “just war” (*guerra justa*) in retaliation (Leite 1943:378). However, there remained a desperate need for slaves by the settlers, exacerbated by smallpox epidemics in and around Belém in 1724 and 1725, which contributed to the justification of the war. Although the King was informed that the war was necessary because Ajuricaba and his allies represented a threat to the colonial economy,<sup>17</sup> the real reason for the war was not because the Manao were “aggressors,” but because “they stood in the way of aggression” (Sweet 1974:537).<sup>18</sup> With the removal of the Manao from the middle Rio Negro, the Portuguese could get to the populous slaving grounds of the upper Rio Negro, eliminate the Amerindian-Dutch trade, and replenish the labor force of the lower Amazon valley. The “just war” against the Manao, however, “in its terrible way... laid the ground for the development of the ‘society without government’ in the northwestern trans-frontier” (Sweet 1974:559).

Between 1723 and 1728, at least 3,370 captives, most the product of the war with the Manao, were brought down to Belém (Sweet 1974:495).<sup>19</sup> The war and tropas sent to pacify the Manao ended up being a financial disaster. They did not supply the necessary number of slaves to compensate for their costs, and

limited the amount spent in future recruitment (Farage 1991:67-68). There were political costs as well. One tropa de guerra sent to the Rio Negro caused numerous complaints by the Jesuits (Azevedo 1901:216). In 1729, and again in 1730, they condemned the brutal acts committed in the Amerindian aldeias by settlers of the tropa led by Belchior Mendes de Moraes, a mameluco cabo.<sup>20</sup>

During the war (1728), Carmelite friar Matias São Boaventura founded the mission of Santo Eliseu de Mariuá (later Nossa Senhora da Conceição de Mariuá), modern Barcelos. By 1740, Mariuá was the Carmelite mission headquarters and largest settlement on the Rio Negro, with a population of about 2,000, although the mission of Bararoá had the largest number of Manao (Sampaio 1825). By the mid-1730s, the indigenous populations and their interethnic trading system were eliminated, at least as far west as modern-day Santa Isabel do Rio Negro. Those who were not killed were sent into slavery in Pará, dispersed deep into the forests, or living in the growing number of Carmelite missions.<sup>21</sup> In addition to the indigenous population allocated to the missions through the recruitment processes of descimento and tropa de resgate, many of the surviving Manao sought out the protection of the missionaries, establishing the roots of dependency relations in the religious sphere of local life. In this respect, Sweet (1974:595) writes:

Before 1740, great numbers of [Manao] had attached themselves to the Carmelite mission settlements on the Negro. They fished, farmed and gathered forest products under missionary supervision; and when there was a chance they went forth willingly to serve as crewmen, guides and military auxiliaries for the Portuguese slaving expeditions. This accommodation provided opportunities for a few especially pragmatic (or opportunistic) chiefs of the Manao to

prosper and become leading figures in the evolving mestiço society of the Negro.

### 3.2. THE DIRECTORATE (1751 – 1799)

#### 3.2.a. The Intellectuals behind the Plan

By 1755, the King of Portugal, Dom José I, assumed that the cause of the economic woes in Amazonia was the “avarice of individuals,” whether settlers or missionaries, and could only be remedied with the strengthening of the Portuguese colonial state (Hornaert 1982:171). Sebastião José Carvalho e Mello, the King’s secretary of international commerce and war from 1750, was given the task. Due to his increasing power, he was named the Marquis of Pombal in 1755, a title that he held until the King’s death in 1777 (Hemming 1987:2). Given the lack of colonists in Brazil, Pombal was convinced that the natives should become loyal vassals of the Crown in a *união da sociedade civil* (union of civil society), following the pattern of the Roman Empire (Hemming 1987:6-7). Such a union would lend itself toward the goals of militarization, and the occupation and consolidation of territory for Portugal.

In 1751, the brother of the Marquis of Pombal, Francisco Xavier de Mendonça Furtado, was named Governor of the state of Grão Pará and Maranhão. In 1752 he was named the boundary commissioner, and assigned to fix the boundaries between Portuguese and Spanish America as called for in the Treaty of Madrid of 1750 (Loureiro 1978:108). Mendonça Furtado left for the Rio Negro in 1754 to establish the new Capitania de São José do Rio Negro (March

3, 1755) in the mission village of Mariuá. He directed the construction of a palace, barracks, artisan shops, and bridges, and filled in the swamp behind the village. His mission was to meet with Spanish boundary commissioners who would arrive via the Cassiquiari canal, which links the Negro and the Orinoco rivers.

Both brothers were convinced that the missionaries had been gaining “economic benefits to the detriment of the state and the settlers” (MacLachlan 1973:209). Pombal decided that what was needed was a revision in the mission philosophy of conserving the indigenous labor force until they were properly indoctrinated properly into Christianity (MacLachlan 1973:209). He opted for a philosophy that would incorporate the Amerindian into Portuguese culture, resolve geopolitical issues, institute a secular legal system, and promote increased production in agriculture and industry. This philosophy resulted in the creation of the *Directorio* (Directorate), established on May 3, 1757 (MacLachlan 1972:360). The legislation was both a civilization plan for indigenous societies, and a colonization program (Almeida 1997:14), “a model for the complete transformation of the Amerindian into a European peasant” (Ayres 1992:73).

### **3.2.b. The Directorate in Theory**

On June 7, 1755, the temporal authority of the missionaries was revoked.<sup>22</sup> Mendonça Furtado realized, however, that without the missionaries, a political vacuum had been created that would have to be filled by the government (MacLachlan 1972:360). In 1757, temporal power was transferred to secular

administrators (Directors) and Amerindian principals, who were under the direct authority of the governor. On the Rio Negro, the affability of the thriving Carmelites, in contrast to the hostility of the Jesuits, impressed Mendonça Furtado (Hemming 1987:10). The missionaries were allowed to remain in the capacity of priests (Ferreira 1984:61), but only eight remained by 1765 (Hemming 1987:58). The Directorate also called for the abolition of Amerindian slavery. In return for his freedom, the Amerindian was to learn to “assume normal responsibility and acquire an appreciation of the material benefits of labor” (MacLachlan 1973:209). The Crown hoped the natives “would be automatically absorbed into the economy” (MacLachlan 1973:209).

Under the new system, villages were to function in the Portuguese pattern of government, with Amerindians and settlers subject to the same civil laws, fiscal and judicial representation, and municipal assemblies (Almeida 1997:14). Villages too small for such an arrangement were to be governed by their own principals. In order to facilitate integration into Portuguese society, a project of social engineering was devised. Portuguese would substitute *lingua geral* so that communication between the settlers and Amerindians could be facilitated. The names given to mission villages were substituted with the names of those located in Portugal.<sup>23</sup> Schools were to be provided for catechism, basic instruction, and domestic arts. European clothing was encouraged, indigenous societies were restructured into nuclear units, and communal houses were replaced by European-style cottages. The basic symbols of Portuguese political and judicial authority, municipal buildings and a jail, were also erected in each village.

The Directorate reversed the policy that isolated the Amerindians from the settlers “and their vices” (MacLachlan 1972:362). By allowing the settlers to integrate themselves into the former mission villages, it was hoped that the Amerindians would emulate the European cultural ways, be convinced of the dignity of manual labor, and be encouraged to intermarry. There were also prohibitions against the distribution of alcohol to the Amerindians.

The Directorate legislation called for the division of available Amerindian labor into two equal parts (MacLachlan 1972:366). Half were to remain in the village to perform agricultural labor or participate in government activities, and other half was divided among the settlers. Salaries were fixed for different categories of indigenous labor (common laborers, canoe men, skilled craftsmen), and deposited in advance with the director. The director had to consent and supervise any transactions with Amerindians under his responsibility. He was not paid a salary, but a 16 percent commission of the value of the production of his village. The Amerindian officials assigned to the supervision of collecting activities received 20 percent of the profits from each expedition. Regulations also permitted Amerindian officials to participate in regular collecting expeditions on their account. Further, village officials, both European and Amerindian, did not have to deposit salaries in advance, but assumed debt contracts.

One of the main goals of the Directorate was to increase production in agriculture and industry. In an attempt to de-emphasize extractivism, Mendonça Furtado pushed the cultivation of exportable perennial crops: coffee and cacao, indigo, and cotton. In terms of industry, Governors João Pereira Caldas (1779-

88) and Manuel da Gama Lobo d'Almada (1788-1799), maintained profitable cotton and brick factories, and stimulated the production of hammocks, ceramics, palm frond hats, and canoes.<sup>24</sup> In 1787, Governor Caldas introduced cattle onto the savannas of the Rio Branco valley (Reis 1944:43; Loureiro 1978:138).

### **3.2.c. The Directorate in Practice**

For the task of indigenous cultural transformation, Mendonça Furtado sought directors who were good patrons: “wise, firm but benevolent, and self sacrificing” (MacLachlan 1972:369). Such individuals were hard to find in the interior of Amazonia.<sup>25</sup> At the time of the establishment of the Directorate, many of the soldiers and sertanistas involved in the tropas, wars, and forest product trading remained in the region of the Rio Negro.<sup>26</sup> It was from this group of individuals that many of the Directorate administrators in the region were chosen (Reis 1989:84).<sup>27</sup>

In terms of the desired cultural objectives of the Directorate, there are several observations. Portuguese ended up replacing the lingua geral, but “more by default than by design” (MacLachlan 1972:370). The directors had no incentive to learn the native languages, and the number of settlers in the villages increased contact with Portuguese speakers. The education of Amerindian children could not be accomplished either, as there were no qualified teachers; certainly not the directors. MacLachlan (1972:371) argues that cultural absorption worked the other way around; that is, the settlers learned to live in the Amazonian cultural and natural environment.

By 1785, Barcelos was one of the largest producers of coffee in the captaincy, although it did not grow as well as in other areas of Amazonia (Reis 1944:31). There were also a number of plantations of cacao and indigo along the Rio Negro (Ferreira 1984). However, indigo never produced meaningful harvests, and cacao plantations were not maintained as they required a large labor force and a substantial period of time before a return on investment could be expected. Although agricultural efforts failed, in part, due to regional environmental conditions (flood cycle, insects and other agricultural plagues, and poor soils (Reis 1944:33; Ferreira 1984:62-64)), their failure was due more to the unreal expectations of the Directorate initiative in general.

Military expeditions to the frontier continuously required Amerindian laborers for paddling, portage and the construction of forts, removing them from the labor force available for agricultural activities. The rate of death and desertion in these expeditions was exceedingly high (MacLachlan 1973:216-17; Wright 1981:173). Ferreira (1984:63-64) attributes the desertions of Amerindians to the violence committed against them, and the unfulfilled promises made to them. In any event, the government demand for labor, as well as numerous epidemics of smallpox, measles, and yellow fever, contributed to the general shortage in the basin, and the necessity of more descents of natives.<sup>28</sup>

The collecting industry continued to dominate the economy of the Rio Negro (see Appendix B for a summary of extractive resources and the localities). Because they were paid commissions and agriculture required a great investment of labor power and time, the directors preferred the more profitable

extractivist industry (MacLachlan 1973:213-215). Additionally, the Amerindian Treasury financed collecting expeditions, advancing credit and deducting the amount financed from the product delivered. The average collecting expedition required about sixty men for three to six months, spread out in one or another geographical area, most likely defined in terms of river basins. The treasury provided a large quantity of *farinha* (manioc flour), an Amazonian staple, powder and shot, containers, metal tools, *cachaça* (cane alcohol), assorted remedies, pepper, and salt for processing dried fish (MacLachlan 1972:373). The credit system was very similar to the *aviamento* system (see Chapter 1, 1.2.f.), differing in the fact that credit was formal and provided by the state, rather than informal and provided by private merchants. Labor was frequently controlled by means of coercion, indicated by the high degree of desertion, but there is little in the literature regarding contrived indebtedness, although it too must have been present. The system does, however, resemble *aviamento* in the sense that surplus was extracted where capital was scarce, production seasonal, resources sparse and distant, and transportation slow (Weinstein 1983a and 1983b).

As had happened in the past, the settlers were priced out of the indigenous labor market, and wealth continued to concentrate in the Amazonian elite (MacLachlan 1973:210-211). Settlers could not afford to pay the salaries or expenses up front, and wealthier settlers -- perhaps the directors themselves-- were bidding up the price of labor. Since labor was not available for the settler to profit from agriculture, and thus accumulate capital, subsistence production,<sup>29</sup> extraction and illegal trading were the only other suitable economic alternatives.

It would seem that the sellers, as well as their native counterparts, were experiencing the paradox of petty commodity production (see Chapter 1, 1.2.e.). As competition for resources increased, price decreased, leading to more emphasis on subsistence production, or as in the case of the natives, desertion (a constant theme in the correspondence of colonial observers). Therefore, cultivation beyond subsistence was minimal (Ferreira 1984).

The informal economy of Amazonia, nascent in the slave-raiding period, continued unabated during the years of the Directorate. In 1755, *regatões*, or *comisarios volantes* (itinerant traders), were banned from Portuguese America (MacLachlan 1972:376). Competition for labor and salary requirements however, made the informal economy attractive, as it required little investment: a canoe and a supply of *cachaça*. Ferreira (1984:365) claimed that whatever persons, commodities, and novelties the director may have wanted could circulate on the river without any control by the state. Ferreira (1984:375) also considered the settlers to be traders, rather than cultivators. Despite its prohibition, *cachaça* became the medium of exchange in the informal trading network involving itinerant traders, and the directors themselves. The abuse of alcohol was widespread, and had the directors enforced the prohibition of alcohol, “they would have undoubtedly lost their share of the illegal trade to the peddlers” (MacLachlan 1972:372). The directors were in a privileged position in the Amazonian commercial milieu since regulations prohibited any trading with Amerindians without their prior consent. As it was their job to see that fair prices were paid the Amerindians for their goods, and that the price of their purchases

was reasonable, there was plenty of room for informal negotiations with itinerant traders and desperate settlers on the part of the director.

The degree to which the informal trade flourished is reflected in the views of many colonial observers. In 1786, Ferreira (1984:366-367) suggested that the capitol of the captaincy be moved to the confluence of the Solimões and Negro to stave off the illegal trading. In 1788, Governor Martinho de Sousa Albuquerque tried to control the illegal trade by requiring licenses for all canoes leaving Belém; anyone found to be without the license would be considered an itinerant trader and punished accordingly (MacLachlan 1972:377). With regard to the informal economy and its contribution to the objectives of the Directorate, MacLachlan (1972:377) writes:

Although the government failed to maintain its control over the village production, the intent of the directorate to integrate the Indian into the colonial economy obviously succeeded. While the crown hardly approved of the illegal nature of much of the trade it could not deny that Indians had been fully exposed to the demands of commerce.

It would seem that there could be little doubt that the directors were the “patrons” of their villages. Ferreira (1984:93) likened the directors to feudal lords, which suggests that some cultural level of patron dependency existed by this time. If one considers that the average director was a soldier, or Luso-Brazilian commoner or *sertanista*, generally accustomed to low social status, it becomes possible to imagine the satisfaction he must have experienced from the complete authority he enjoyed over people less knowledgeable of the larger world than he. During the period of the Directorate, the Amerindians suffered terribly at the

hands of the directors, as well as from the many epidemics. Besides the obvious trauma of being removed from their native territories, often separated from kin, Amerindians were removed from their traditional way of life (Parker 1985:34; Chernela 1998:320). They were stripped of their traditional means of subsistence, as well as their economic system based on egalitarianism and reciprocity, in order to satisfy the demands of commerce. Women were excluded from their customary duties of gardening and forest collection, in favor of artisan work. Instead of liberating the Amerindians, they increasingly became dependent on the director or the itinerant trader for many essential domestic items, even manioc. The Amerindians also suffered from overwork, whether on the military expeditions, forest collecting or agricultural duties (Sampaio 1825; Ferreira 1984; MacLachlan 1972; Hemming 1987). Ferreira (1984:76) felt that the Amerindians fared better under a system of slavery, than under the supervision of many of the directors, who showed little concern for the well being of their charges. As for the Amerindian officials, "rather than responding to 'benevolent guidance,' became accomplices or at worst victims of oppressive directors" (MacLachlan 1972:370).

The Manao, who until the mid-1750s had been the dominant element in the ethnic mix, and whose language served as the lingua franca of the Rio Negro missions, resisted the changes of the 1750s (Sweet 1974:596-97). In 1757, Manao principals in the former Carmelite missions of Dari (Lamalonga) and Bararoá (Thomar) led a rebellion in which the churches were burned or sacked, religious adornments were destroyed and a Carmelite friar, chief Caboquena, and others, was assassinated (Sampaio 1825:106-108; Ferreira 1984:55-57).

Although Meira (1997:133) argues that the rebellion was a revolt against the missionaries, Sweet (1974:597) considers it a final effort to expel the Portuguese from Northwest Amazonia. For some time into the future, the Manao descendants would maintain a messianic belief that Ajuricaba was still alive, and would one day return to liberate them from the colonists. For Sweet (1974:597): “The myth was a defense, not of Manao society, but of the hybrid Indian-Carmelite-slave raider society which replaced it in the second quarter of the century, and which the Manao survivors had helped to build.”<sup>30</sup> The Rio Negro had witnessed the evolution of the detribalized Amerindian into the mixed-breed caboclo (Parker 1985; Ayres 1992).<sup>31</sup> In the place of the Manao there existed a growing class of subordinated and marginalized citizens (“domesticated” or “civilized” Amerindians, mestizos, and freed African slaves) who would come to depend on an irregular and informal trading system for their subsistence necessities.

### **3.2.d. The End of the Directorate and its Wake**

Because the promise of agricultural production on the Rio Negro never materialized, and its indigenous population was decimated, by 1779 the economic focus was beginning to shift to the Solimões basin (Reis 1944:37). The removal of the capitol from Barcelos to Lugar da Barra by Lobo d’Almada in 1790 would signal the end of the short-lived economic importance of the Rio Negro. Many Amerindians were attracted by the economic opportunities in Manaus (and Belém), causing depopulation along the Rio Negro, and the abandonment of

many of the former mission villages. During the years of the Directorate, the population of Barcelos varied, but dropped considerably during the final years: 1,000 in 1755;<sup>32</sup> 460 in 1780;<sup>33</sup> 1,152 in 1786;<sup>34</sup> 680 in 1790;<sup>35</sup> by 1795, only a few hundred remained.<sup>36</sup> In 1787, the population of Lugar da Barra (Manaus) had only a few hundred, but by 1795, it had around 3,000 (Reis 1989).

In 1798, Governor Francisco de Souza Coutinho decided to abolish the Directorate in order to relieve the labor shortage, and because he thought the Amerindians and mestizos had reached a point of cultural development, “where they could be successfully integrated into society” (MacLachlan 1973:223). New legislation was created that intended to treat Amerindians as equal to all other subjects of the Crown, although as “legal minors” (Hemming 1987:60). It also provided for any Amerindian without a house or fixed occupation to be compelled to work for the government or private settlers.<sup>37</sup> Despite the abolition of the Directorate then, Amerindians “had neither the freedom to withhold their labour nor access to economic and social benefits” (Ayres 1992:88). State sponsored and private slaving continued right up to the rubber boom period. Governor José Joaquim Vitória da Costa, for example, encouraged “terrible and infamous raiding parties to enslave the heathen and creole Indians of the Rio Negro” (Hemming 1987:215).

The cultural and social transformations of the colonial period introduced new patterns of consumption, which resulted in the development of petty trade and the fixation of the *regatão* on the Rio Negro (see Ayres 1992:101). Since there was no substantial internal market, an economic system was beginning to

emerge in which barter based on monetary values was the main form of exchange. According to the legislation of 1798 and 1799, itinerant traders were permitted to trade with Amerindians as long as they did not supply them with weapons. Hemming (1987:61) claims that this was the beginning a century of dubious dealings and debt-bondage by itinerant traders, “who easily exploited Indians’ ignorance and gullibility.” The *regatão* has always been a target of the Amazonian elite (and not infrequently anthropologists and historians). In providing necessary goods to the rural population, the *regatão* offered them an economic alternative, and thus effectively competed with the elite class for scarce labor.

The Rio Negro had entered what Amazonian historians call a period of decay. The Manaus were then nearly absorbed into the mestizo society. With the end of colonial rule in 1822, the extreme poverty, discrimination and oppression in which the emerging *caboclo* society in Amazonia found itself, culminated in a civil war known as *Cabanagem* from 1835 to 1839, originating in Belém. One of heroes in putting down the rebellion was a citizen of Thomar, Ambrósio Aires. The *cabanos*, as they were called, attacked Moura, Barcelos and Thomar. Although the events related to the revolt on the Rio Negro are incomplete, Jobim (1957) claims that the rebellion took many lives from Manaus to Santa Isabel. After the revolt, the Indian work force dispersed. It is unclear whether *cabano* forces that came from the lower Amazonas had some type of collaboration from the *tapuios* (decultured Indians) of the Rio Negro.

The colonial period of slave raiding, forest collection, and war, resulted in the death of many Amerindians and their societies or their transformation into a 'mass' of undifferentiated *tapuios* (detrribalized Amerindians) or *caboclos*, and the formation of a catholic religious consciousness (Hoornaert 1982; Ayres 1992). The period also saw the development of the Amazonian informal economy in which the *regatão* came to play a significant role, and a hierarchical system of trade that linked the urban center of Belém with the hinterland. The developments of this period served as the basis for the subsequent social and economic formation in the basin.

### 3.3. NOTES

<sup>1</sup> The normal means of exchange had been cotton, sugar, tobacco, cocoa, and various backland drugs. "Money was virtually unknown before the year 1749, when gold, silver, and copper coins were first minted at Lisbon for circulation in the colony" (Boxer 1969:26).

<sup>2</sup> The missionaries were granted two-thirds of the Amerindian laborers, divided into three groups (MacLachlan 1973:201-02). One group remained in the village to attend to agricultural work. The second group assigned the task of bringing other Amerindians from the interior to designated mission villages. The third group was to be made available to government service and for distribution among the Portuguese settlers. The government had priority over settlers. The remaining slaves, 20 percent of the total Amerindian labor force, could then be distributed to settler for a period of two months at a time. Settlers' labor needs could not be met from such a reduced labor force. Further, "the two-month time limit made little sense in an area where a collecting expedition required a minimum of six months. As a result, settlers resorted to deceptions in an effort to retain a labor force" (MacLachlan 1973:202).

<sup>3</sup> Under the new system, twenty-five Amerindians were reserved for missionaries over thirty leagues from Belém. The remaining Amerindians would be located in the villages near Belém, and were divided into two groups. One group was assigned to work in the village, while the other was to be available as a labor

reserve for the settlers. The length of time settlers could depend on indigenous labor was increased from two to six months (MacLachlan 1973:202). However, settlers were forced to pay fifty percent of the Amerindians salary up front, and the rest at the completion of the service (MacLachlan 1973:205). The settlers continued to be unable to meet their labor needs and in 1689 the Crown began to allow settlers to obtain labor at their own expense, an option few settlers could afford. MacLachlan (1973:206) argues that the Amazonian economy was influenced by the method of distributing Amerindian laborers and the uncertainty of supply. The result was that with few Amerindian laborers at the disposal of settlers, there was an overemphasis of forest collecting and, thus, overexploitation.

<sup>4</sup> Based on the elimination of cultural practices encountered among Tupi ethnic groups along the Brazilian coastal regions, tropas de resgate were intended to negotiate for slaves taken in interethnic wars. Since the Tupi were anthropophagus, the Portuguese rationalized that life as a perpetual slave would be preferable to the fate the subject would otherwise encounter.

<sup>5</sup> “No one ever saw the practices which were alleged” (Wright 1981:132).

<sup>6</sup> The first official Portuguese entrance onto the Rio Negro, however, actually occurred in 1657 (Leite 1943:370). Bento Maciel Parente, and Jesuits Francisco Veloso and Manuel Pires, founded a mission at the mouth of the Rio Tatumã, near the confluence of the rivers Solimões and Negro, and returned to Belém with 600 Tatumãs captured as slaves (Loureiro 1978:74).

<sup>7</sup> Zucchi (1987) believes that Proto-Arawaks from the middle Rio Amazonas divided into four groups, three of which migrated to the Rio Negro: the Proto-Curripaco (Rio Içana and Rio Uaupés), Proto-Baré (middle and upper Rio Negro and Cassiquiari), and Proto-Manao (middle Rio Negro and its tributaries).

<sup>8</sup> “El Dorado” was thought to lie, roughly, within the region between the Rio Solimões, the Rio Ucayari (Uaupés), and the upper tributaries of the Rio Parima (Branco). According to Edmundson (1906:231), “The fact that the name of Manoa is so widely associated with this imaginary city filled with rich treasures of gold may be taken to indicate that within the limits of the three localities named lay the sphere within which the Manoas traded.”

<sup>9</sup> Hemming (1978:440) believes that the tribe mentioned by Acuña may have been the Chibcha or Quimbaya of Colombia, as they are known to work gold in this fashion. He also finds that it would have been possible for the Manao to reach these tribes by moving up the Japurá-Caqueta. It is just as plausible that they may have obtained these gold items from others on the Uaupés, who may, in turn, have gotten them from some other group (see Fritz 1922:62-63).

<sup>10</sup> They were able to trade on the Solimões by ascending the right hand tributaries of the Rio Negro, principally the Rio Urubaxi, crossing the short portage in the region of Maraã, and descending the tributaries of the Japurá.

<sup>11</sup> The first contact may have been made by a Sergeant Guilherme Valente, who was stationed at the Portuguese fort at Barra do Rio Negro (Manaus). He went up to the region of the Rio Caurés (Cabucirenas Cavauris or Caburis), where he married the daughter of a Manao principal and settled with her at the mouth of the river Caurés (Sampaio 1825:90) “It is altogether reasonable to assume that Valente’s business, perhaps conducted with the cooperation of his Manao relations, was trading for slaves to be sold to Pará – or at least corralling people for a *descimento* to be resettled at the service village of the Rio Negro fort” (Sweet 1974:522-23).

<sup>12</sup> In 1715, there were only 400 Carmelite friars in all of Brazil (Sweet 1974:633). By 1744, they possessed more than 500 extensive estates and well-appointed convents.

<sup>13</sup> Many were also accused of concubinage. Whether or not the accusation was true, according to Sweet (1974:647), “it was the normal thing for men living or traveling in the Amazon country to be accompanied by groups of servants including women to do the cooking and cleaning, and for men to make sexual use of whatever women were available when they could.”

<sup>14</sup> As Populações Indígenas e Mestiças da Amazônia. in *Rev. Do Instituto Histórico e Geográfico Brasileiro*, tomo 2.<sup>o</sup>, pág. 468.

<sup>15</sup> Arraial can be translated as Royal air, or air of the King (Almeida 1997:155). It referred to either military encampments or troops in campaign.

<sup>16</sup> “This was the beginning of a new system of slave-trading in which all interested parties joined together in a systematic effort to remove as nearly as possible the entire population of whatever territory they chose to visit” (Sweet 1974:486).

<sup>17</sup> “[Ajuricaba’s] principal achievement appears to have been the formation of a kind of confederation of Manao sub-groups, or even of neighboring tribes, in which temporarily and for military purposes the warriors of many villages subjected themselves to his leadership to prevent the Portuguese from passing beyond the rapids of the middle Negro, and thereby by passing the Manao as middlemen in the slave trade” (Sweet 1974:535).

<sup>18</sup> “The Manao, having given some evidence of a willingness to collaborate with the first Portuguese visitors in a slave trade of modest proportions, were unwilling simply to leave the way open when the foreigners revealed their determination to

go with tropas de resgate... to the rich slaving grounds of the upper Negro valley. The Manao depended for their iron tools and other trade goods on their function as a link in a trading chain, and they had developed an alternative market for their human wares on the upper Branco and Essequibo. Their slaving was of finite proportions, and was only possible in the context of carefully maintained friendly relations with other tribes, both as buyers and as suppliers. It was no part of their purpose and would presumably have been beyond their capabilities simply to depopulate the Negro valley and transport its people wholesale to some other region” (Sweet 1974:537-38).

<sup>19</sup> Ajuricaba was also captured, but according to local legend and the reports of witnesses he created some rebellion near modern day Manaus, and rather than submit to a life of slavery, heroically jumped into his beloved Rio Negro in shackles, disappearing in the depths. An alternative explanation, and one to which I subscribe, is that he was probably thrown overboard to avoid the trial in Lisbon that would be required under the regulations of a just war. Had he gone to trial, the illegalities of the slave trade and the underlying fallacies of the just war might be revealed; causing trouble for the colonial administration and slave trade participants (Machado 2000:29).

<sup>20</sup> In 1733, Governor José de Serra tried to persuade Belchior Mendes de Moraes, and other native-born, mameluco Paraenses to return from the interior. He, like many administrators before him, considered mamelucos to be the cause social disruption and violence, demonstrating a widely believed “myth of a racially determined propensity for barbarousness in the miscegenated Paraenses” (Sweet 1974:665-66). The solution to the problem was simple: the governor would appoint gentlemen as cabos de tropa” (Sweet 1974:598). Late in the 1740s, the King asked that missions be established in more remote places to reduce the abuses of the sertanistas. “From the settlers’ point of view, it was a singularly bad time for such a determination. The last half of the decade of the 1740’s was precisely the period of highest death rate from epidemic disease (smallpox, followed close on by the measles) in the history of the colony” (Sweet 1974:611).

<sup>21</sup> Although the war was directly contrary to the expressed purposes of the missions, it was supported by the Carmelite missionaries out of fear of the Manao (Sweet 1974)

<sup>22</sup> Pombal waged a campaign against the Jesuits, culminating in the law of September 3, 1759, which expelled them from Portugal and all of its dominions (Hemming 1987:17).

<sup>23</sup> Along the Rio Negro, the mission village names changed from Santa Rita de Cássia de Itarendua to Moura; Santo Alberto de Aracari to Carvoeira; Santo

Angelo do Cumarú to Poiaras; Mariuá to Barcelos; Cabuquena to Moreira; Baroaó to Thomar; Dari to Lamalonga; Tapurucuara to Santa Isabel.

<sup>24</sup> The most prosperous period of the Captaincy occurred under the administrations of Caldas and Lobo d'Almada (Reis 1944:36).

<sup>25</sup> "Individuals capable of accepting the philosophical tenets of the Directorate were not to be found in the Amazon jungles, nor for that matter in Portugal or elsewhere... The directorate unrealistically demanded a type of secular saint willing to sacrifice himself when in reality, the majority of settlers in Pará were desperate men locked in a struggle for survival and economic gain. Wealthy or educated individuals could hardly be expected to move to distant Indian villages" (MacLachlan 1972:369).

<sup>26</sup> "Savage groups passed from the theocratic regime to the military – the captain replaced the religious, the soldier substituted the catechist" (Azevedo 1901, in Hemming 1987:60)

<sup>27</sup> In May of 1758, Mendonça Furtado named Francisco Xavier de Moraes, a veteran slave raider and the brother of Belchior Mendes de Moraes, the famed Indian killer, to the municipal assembly of the newly named village of Barcelos; and Captain Francisco Xavier d'Andrade, also a veteran slaver, as Prefect (Ferreira 1984:326).

<sup>28</sup> The labor shortage continued even after Governor Pereira Caldas imported the largest number of African slaves into the captaincy during the colonial period.

<sup>29</sup> Sources of food were scarce in Barcelos during the period of the Directorate. In order to feed the commission personnel, Ferreira (1984:292) claimed that the Lago de El-Rei (King's Lake) on the Rio Demini was heavily fished for manatee. At the time of his visit in 1786, the captaincy maintained one canoe that brought turtles from the Solimões and the dried fish from the Amazonas and Branco (Ferreira 1984:366). Depredation of turtles on the Branco became so intense that preservationist legislation was passed 1786 to regulate their collection (Reis 1944:33-34).

<sup>30</sup> According to Sweet (1974:619): "By the end of the colonial period, Manao survivors were virtually indistinguishable from the rest of the population of the Rio Negro settlements." Many of the mestizo descendents of the Manao (and of the Baré and Baniwa from the upper Rio Negro) became members of the traditional society of the Rio Negro, but it is also probable that as many or more didn't.

<sup>31</sup> At this time, the offspring of white and Amerindian unions was still called *mameluco*; the mixture of African and white, *mulatto*; Amerindian and African, *cafuzo* or *curiboca*. "Caboclo still referred to the civilized Amerindian, a synonym for *tapuio*" (Ayres 1992:82). Ayres proposes that "until the rubber boom period,

the definition of caboclo was based on ethnic criteria, from then on it was based mainly on economic criteria" (Ayres 1992:59).

<sup>32</sup> Reis (1989:111).

<sup>33</sup> Baena (1969:389).

<sup>34</sup> Ferreira (1983:461).

<sup>35</sup> Loureiro (1978:184).

<sup>36</sup> Wright (1981:173).

<sup>37</sup> The Governor re-emphasized this provision in 1799, requiring the outgoing directors to make lists of all Amerindians who were available for public and private employment (Hemming 1987:61). These individuals were to be relocated from the villages to the major Amazonian towns.

## **CHAPTER 4**

### **AVIAMENTO AND PETTY TRADE IN THE RIO NEGRO (1800 – 1940)**

In this chapter I analyze the evolution of aviamento and petty commodity trade from the end of the Directorate period to the beginning of WWII. Particular attention is paid to the variety of petty commodity traders, patron – client relations, and the role of debt bondage and coercion in the relations of production. The chapter begins by describing the continuing labor shortage and the proliferation of petty commodity trade during the years following Brazilian independence. I then move on to an analysis of the consolidation of aviamento during the rubber boom, and the range of socioeconomic relations that characterized the Rio Negro basin. An analysis of post-boom period will demonstrate that aviamento was decentralized, the number and kinds of traders increased, and the extractive base was diversified. The chapter concludes with a comparison of the socioeconomic context of other regions of the Brazilian Amazon.

#### **4.1. THE CONTINUING LABOR PROBLEM**

Throughout the nineteenth century, Amerindian labor recruitment continued on the upper Rio Negro and headwaters of left-hand tributaries of the

middle Rio Negro. Amerindian labor was sought for extractivist activities along the middle and lower Rio Negro, for public service in Manaus, and for defense projects along the frontier. Despite its prohibition, unofficial slave raids, known as *pegas* (grabs), were the principle means of labor recruitment throughout the nineteenth century.<sup>1</sup> With Brazilian independence in 1822, the official means of labor recruitment was the *Corpo de Trabalhadores* (Workers Corps) and the *Regimento das Missões* (Mission Regiment). The *Corpo de Trabalhadores*, created in 1838 in response to the Cabanagem rebellion, was established to discipline the labor of detribalized Indians, mestizos and free Africans who were not allowed to enlist in the National Guard (Loureiro 1989:111). Along the Rio Negro, companies were established in Moura, Thomar, and São Gabriel.

In 1840, the President of Pará, João Antônio de Miranda, recognized the declining population in the region as a threat to the undefended Brazilian frontier. In 1845, the *Regimento das Missões* was implemented, reestablishing missions on the upper Rio Negro (Ugarte 1997:176). Under this system, the Brazilian Emperor appointed a *Diretor Geral de Índios* (General Director of Indians) for the Province. The president of the province named a *Diretor de Índios* (Director of Indians), along with *Encarregados do Índios* (charge of Indians)<sup>2</sup> and at least one missionary, to be assigned to one of the key villages in the province. These directors worked with the collaboration of military personnel in the forts of the upper Rio Negro, and had authority over the clerics. Troops were present on the Rio Negro throughout the mid-century. Descimentos were again the method of recruitment; systematized under orders of the Governors of the newly created

Província do Amazonas (1850). Dias (1943:385) wrote that in 1861, the director of Barcelos, Vitorino Antônio Estrela, did not “have any settled Indians yet, but they should be brought down [to Barcelos] this summer from the Rios Aracá and Deminí.” Loureiro (1989:64) demonstrates that Estrela would eventually bring 530 Xirianas and Bapianás to be settled in Barcelos, or elsewhere.

With the creation of the Província, several government officials were sent to explore the region to provide social and economic data necessary for its governance. The famous English naturalists Alfred Wallace (1850-1852) and Richard Spruce (1851-1855) also explored the Rio Negro following the establishment of the Província. All of these visitors to the Rio Negro mention the deplorable conditions encountered in the settlements: misery, desolation, desertion and despair.<sup>3</sup> From the end of the Directorate, to the founding of the Amazonas Province, the population of the basin had been reduced by twenty percent (Loureiro 1978:184).<sup>4</sup> By this time, nearly all of the residents and inhabitants of the settlements of the Rio Negro were Amerindians and caboclos.

The principal extractive resources of the Rio Negro during the nineteenth century were: sarsaparilla, piassaba, *breu* (a tar-like substance used for waterproofing canoes), *estopa* (a cotton-like substance also used in waterproofing canoes), cacao, *puxiri*, and vanilla.<sup>5</sup> There was also a small, but significant trade in turtle oil. Manatee, *pirarucu* (*Arapaima gigas*), manioc flour, and probably turtles,<sup>6</sup> were the principle subsistence items (Spix and von Martius 1981:268). The extraction of these products depended on market quotations, available labor, and seasonal variables.

## 4.2. AVIAMENTO AND PETTY TRADE PRIOR TO THE RUBBER BOOM

The cultural and social transformations of the colonial period introduced new patterns of consumption on the Rio Negro, resulting in the development of petty commodity trade during the first half of the nineteenth century (Ayres 1992:100). Santos (1980:171) has argued that because there was no substantial internal market, *aviamento* served as a substitute. Barter, based on monetary values, was the main form of exchange (Santos 1980:157-159). The *aviamento* system operated as during the mission period, but differed to the extent that smaller traders could operate on a regional basis, financed by larger local merchants along the Rio Negro. *Aviamento* during this period also differed from that of the Directorate in that no formal credit arrangement was available (see Chapter 3, 3.2.c.). Wallace provides a colorful description of *aviamento* in nineteenth century Amazonia:

There is, I should think, no country where such a universal and insecure system of credit prevails as here. There is hardly a trader, great or small, in the country, that can be said to have any capital of his own. And at every step of this credit there is not the slightest security; and robbery, waste, and a profuse squandering away of the property of others, is of constant occurrence. To cover all these chances of loss, the profits are proportionably great at every step, and the consumer often has to pay two shillings a yard for calico worth two pence, and everything else in like proportion. (Wallace 1889:263)

#### 4.2.a. Atravessadores and Regatões

The regatão has been seen as the key figure in this inefficient system, but another commercial figure, the *atravessador*, was also active in the economy. *Atravessador* refers to one who goes across, as well as commodity monopolist. Reis (1944:48) noted that by the end of the Directorate period, the number of *atravessadores* in Amazonia had increased. McGrath (1989) has shown that itinerant traders could not monopolize extractive production, and as such, it seems unlikely that they were included in the social category of *atravessador*. Similar to the regatão, the *atravessador* is also involved in relations of unequal exchange, and dealing in the same commodities and merchandise, he is generally the intermediary for a larger merchant, and is not itinerant. Given the socioeconomic structure of the colonial period, the *atravessador* was likely the offspring of Luso-Brazilian directors and settlers who occupied a higher position in the social hierarchy of the interior, accustomed to organizing economic activities. Along the Rio Negro, they would have lived in one of the former mission/Directorate settlements on the right margin, roaming the various river basins of the region in search of extractive resources, attempting to monopolize production. This local merchant class, in constant contact, and most likely in collusion, with representatives of the Workers Corps and military detachments, was in a much better position to exploit labor by coercion and debt-bondage, than were the *regatões* (plural form of regatão).

McGrath (1989:21) found itinerant traders to be less committed to debt-based relations. Loureiro (1989:11) states that until rubber production intensified,

the regatão did not deal in credit, but in specie. The regatão would not be able to thrive if he depended on tactics of coercion and contrived debt that the atravessadores engaged in, although debt was surely a possibility. On the Rio Negro, extractive products, and the labor necessary for their extraction, were highly dispersed and scarce, and did not represent the market potential that rubber would in later years. The regatões were thus opportunists unable to control labor; given the presence of the Workers Corps, the military, and larger traders, it would be a difficult achievement. Additionally, by this time the tribal groups had become dependent on steel tools for their subsistence activities, and the emerging reconstituted peasantry, unable to make the long trip to urban centers for basic necessities, welcomed the visits of the regatão (Bastos 1975:352- 353). Until the advent of regular commercial navigation (see below, section 4.3.), the regatão remained one of the few sources of manufactured goods, news, etc. in the interior, and extractive products for the local markets of Belém and Manaus (Monteiro 1958:28).

#### **4.2.b. The Bad Reputation of the Regatão**

The regatão has always been a nemesis of the Amazonian elite (Goulart 1967; Monteiro 1958; Reis 1944). Three reasons are attributed to their bad reputation: severe exploitation of their clients, bad taste, and failure to pay taxes. The regatão was known to keep his scales rigged to his advantage, and unscrupulously underpaid for products received, while overcharging for merchandise delivered. Given the lack of knowledge of markets, the Amerindian

and caboclo clients were thought to be at the mercy of the regatão. Additionally, critics of the regatão expressed displeasure with the fact that novelties, trinkets, and alcohol were traded to the riverine folk, rather than more useful or tasteful items. The distribution of cachaça to Amerindians, as during the Directorate, was particularly criticized for its consequences on productivity.

With the creation of the new province of Amazonas in 1850, the treasury was in need of revenues. Taxes for the state and municipalities were levied on everything from Amerindian objects to turtle butter, and at various times legislation was proposed or instituted to tax the elusive regatão (Goulart 1967; Monteiro 1958). In 1853, the municipal chamber of Barcelos brought the issue of tax evasion to the attention of the Governor (Monteiro 1958:100).<sup>7</sup> Rather than reduce evasion however, taxes encouraged contraband (Loureiro 1989:93).

According to McGrath, itinerant traders:

have little or no access to state power, and therefore are not in a position to use the state regulatory framework to their advantage. As a result, they have little to gain from operating within the regulatory framework of the state, and instead find it more advantageous to operate outside that framework. By doing so they avoid the taxes and regulations which reduce flexibility and profits. They are also better positioned to participate in contraband activities which frequently offer greater opportunities for profit. (McGrath 1989:16-17)

The complaints by the local mercantile elite were based on economic, rather than ideological reasoning; there was a certain double moral standard.

The informal economy was appropriate for the elites when they were in need of domestic servants for example (see note 1 above), but not for marginal itinerant

traders. In this respect, Wallace (1889:216) observed: “Nothing is easier on the Rio Negro, than for any person possessed of friends or money, to defeat the ends of justice.” It is probably realistic, however, to assume that many regatões took advantage of client ignorance and lack of bargaining power, but there is no reason to believe that the local merchants or atravessadores were any more altruistic with their clients. The reason for the complaints levied against the regatão then, seem to lie in his provision of indispensable goods to the rural population. The regatão offered them an economic alternative, and thus effectively competed with the elite class for scarce labor (Ayres 1992:102).

#### **4.3. THE RUBBER BOOM IN THE RIO NEGRO BASIN**

The international economy was in a period of expansion in the mid-nineteenth century, and Brazil was experiencing a boom in coffee exports. The Amazon region benefited from this growth as well. The increasing international demand for rubber brought an unprecedented period of economic growth to Amazonia. Exports from Amazonas grew by nearly 600 percent between 1853 and 1883 (Loureiro 1989:257). On March 25, 1874, the first European sailing ship docked at Manaus (Loureiro 1989:155). Between 1880 and 1883, 68 transatlantic vessels landed in Manaus (Reis 1944:81). Agricultural products such as tobacco and coffee, whose production was initiated on the Rio Negro during the Directorate, became insignificant or nonexistent as imports became less expensive (Loureiro 1989:257-281). At the same time, the demand for other

extractive products such as cacao and piassaba grew as transatlantic transportation made their exportation less costly. It is also within this context that ornamental fish would eventually find their way into European, and later American hobbyist markets (see Chapter 2, 2.3.a.).

The contribution of the Rio Negro region to this growing Amazonian economy was not immediate however:

Even during the decade of 1880, years of heightened economic expansion, the portion of exports from the Rio Negro had reached no more than 2 percent of total Amazonian export value. This changed with the surge in world demand for Amazonian rubber. The drive for rubber reached the Upper Rio Negro in the early 1870s, and by the close of the century rubber traders had penetrated into the farthest reaches of the Uaupés basin. (Chernela 1998:322)

The penetration of the rubber economy into the Rio Negro was facilitated with the introduction of steamship navigation. By 1879, three steamship lines were operating on the Rio Negro.<sup>8</sup> Steamship navigation brought new economic life to the Rio Negro, and between 1870 and 1880, Thomar, Barcelos and Sao Gabriel became the major trading posts (Wright 1981:322). The steamship service to the Rio Negro, however, represented an insignificant portion relative to other regions of Amazonas. In 1883, the number of passengers traveling on the Rio Negro with the Amazon Steamship Navigation Company, Ltd. represented only seven percent of the total for the state of Amazonas (Loureiro 1989:159).<sup>9</sup>

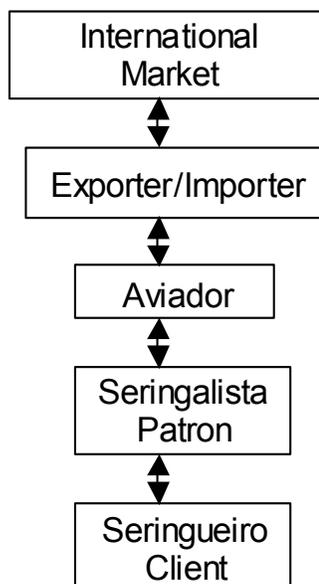
#### 4.3.a. The Consolidation of Aviamento and the Rubber Boom

During the rubber boom, aviamento was consolidated into a hierarchical chain of economic exchange (see Figure 3). The *aviador* (outfitter, trading house or post) was connected to the foreign market (mostly) by monetary exchange, generally by selling his product to exporters in regional market centers like Manaus and Belém. British, German, and to a lesser extent, American merchant banks frequently financed the aviadores. The aviador then advanced money or goods to the *seringalistas* (rubber stand owners, nominal or actual), who employed *seringueiros* (tappers).

For Ayres (1992:98), the consolidation of aviamento served to eliminate the political forms of forced labor of the colonial period, introducing dyadic relations of production where all parties have vested interests in the relationship. Relations of production were now based on dependence, exchange of services, and obligations between all (Reis 1997b:174). Although caboclos voluntarily participated in the new economy,

the patron's use of violence and debt-bondage reveals that the level of market integration was only partial... The only means of imposing labour control was through the monopoly of the supply of essential manufactured goods, and indeed this was made a core function of aviamento. (Ayres 1992:98)

**FIGURE 3**  
**THE AVIAMENTO SYSTEM DURING THE RUBBER BOOM**



Contrived debt was an already established practice on the Rio Negro at the time of the rubber boom,<sup>10</sup> and depended on the individual personality of the patron (Ayres 1992:114). Since the seringueiros were mostly illiterate and the patrons often took advantage of them. Collier (1968:48) wrote: “Few [tappers] had any clear idea of what rate of pay was due to them... And fewer still could fathom why [the patron] wanted the rubber, for none had ever seen a bicycle, let alone an automobile.” Balances were often forged causing the seringueiro to work more to pay off the debt; frequently they were expected to accept overpriced merchandise, thereby being forced into debt (Reis1997b:176). The average markup on advanced merchandise was sixty percent, and as high as 240 percent (Ayres 1992:106). According to Collier (1968:47): “Few men in the ensuing 3 months could collect enough rubber to cancel their debts - and by then

they needed fresh supplies... Rarely did any man repay what he owed; few, as long as they lived, saw hard cash for their labors.”

As a form of mercantile capitalism, *aviamento* was able to discipline production at the point of exchange, and produced few backward linkages. Towns in the interior were little developed (Ayres 1992:109). Production was not specialized, products were scattered, precluding the establishment of permanent settlements (Ayres 1992:111). *Aviadores* (plural of *aviador*) were not interested in innovation (Reis1997b:157). Since productivity could not be increased technologically, an increased number of tappers were sought (Dean 1987). The great demand for labor and the steadily rising quotations for rubber kept producers from agricultural activities:

As a consequence, during the rubber era Amazonia experienced agricultural devolution. The transformation of traditional livelihood was not effected through a direct encounter of new industry and 'traditional' livelihood, but indirectly via shifting internal demand for labour and external demand for rubber. (Nugent 1997:42)

#### **4.3.b. The Emperor of Amazonas**

In 1878, José Gonçalves de Araújo Rozas and his brother Joaquim Gonçalves de Araújo ran a general store in Manaus, Araújo Rozas & Irmão. Their business grew tremendously from the period of 1879 to 1886. Their commerce was initially based in Manaus where trade in the interior was a consequence of individual requests for merchandise and personal favors and services (Ugarte 1992:55-56). Personal bonds, intertwined with economic

aspects, characterized the relationship between the *casa aviador* (trading house) Araújo Rozas & Irmão and its clients. The firm received letters from kin, *compadres* (co-parents, based on the Catholic ritual of baptism; see Chapter 6, 6.4.c.), friends, and individuals recommended by them. Clients addressed their requests individually to one of the owners, asking them to care for the education or health of their kin, pass along letters, make travel arrangements for someone, etc. Generally, the clients were individuals of the military, governmental administrators, and small merchants. The former two utilized the services of the brothers as personal financial agents, who received their government paychecks and paid outstanding debts on their behalf.

Until 1879, client debts were not settled with deliveries of extractive products (Ugarte 1992:56). Araújo Rozas & Irmão then became interested in the growing demand for rubber, requesting exploratory research on the rubber stands in the regions of Barcelos and Thomar (Ugarte 1992:57). By 1881, nearly all of the firm's clients were shipping rubber and other extractive products to pay their debts and continue their credit with the *casa aviador*. However, Araújo Rozas & Irmão did not set the prices, nor did they retain the right to obtain the extractive products exclusively, rather, it acted as intermediary for their clients. Upon receipt of their clients' products, they would find the highest bidders, and then adjust the current account with the proceeds. Accounts were rarely positive however.

The process of *aviamento*, while an economic relation of extractivism, relied on patron - client relations, kinship, *compadrio* (Catholic system of god

parenthood, see Chapter 6, 6.4.c) and simple friendship (Ugarte 1992:59).<sup>11</sup> By building on existing social custom, *aviamento* masked its underlying economic basis of merchant capitalism. In spite of the familiar social relations however, there were conflicts: excessive markups; shipments of food, medicines, and other consumer goods that were damaged, falsified, altered, or of poor quality; and the creation of phantom debts (Ugarte 1992:60).

In 1904, José Gonçalves de Araújo Rozas left the firm and his brother Joaquim Gonçalves (J.G.) de Araújo assumed control. MacCreagh (1985:217) characterized him as a great trader

who held all Amazonas in the hollow of his hand. The Emperor of Amazonas, he was called. But this Jotta Jae [J.G.] was a ruthless man... a robber baron who desired no strangers butting in on the fell secrets of his doings; and rumor had it that his hired bravos had recently [1923] quietly done away with two or three parties who had ventured in upon his forbidden territory. This official warning by the consul in his role of advisor to American citizens was by all means not to go up-river, and to steer very carefully clear of this mediaeval despot.

J.G. established affiliates along the Solimões and Negro rivers, permitting greater control of production and exchange of extractive products. Along the Rio Negro, affiliates were established in Santa Isabel and São Gabriel. From these affiliates, J.G. was able to directly supply the *seringalistas*. Portuguese immigrants, frequently arriving through personal channels of J.G., became representatives of the *casas aviadores*, *seringalistas*, managers, and bookkeepers (Reis1997b:256). During the boom period, Portuguese artisans constructed houses of masonry and mansions along the Rio Negro.<sup>12</sup>

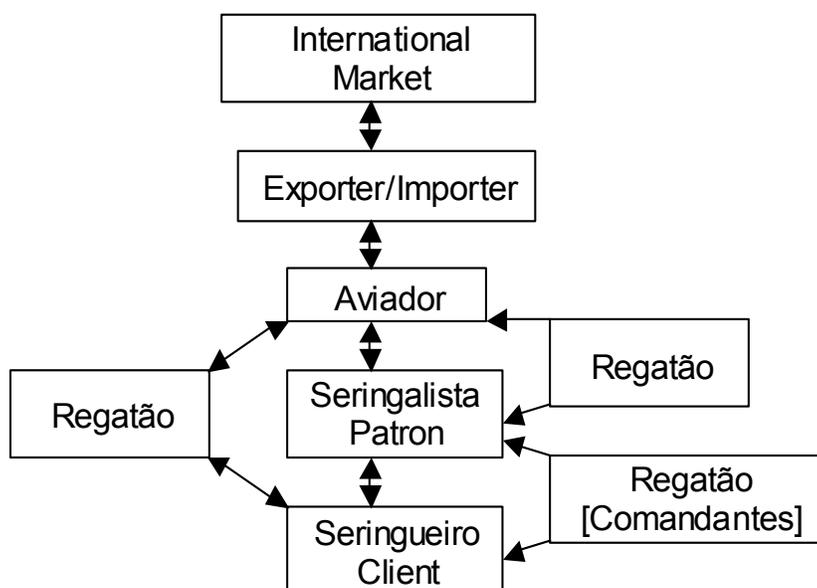
### 4.3.c. The Regatão During the Rubber Boom

With the rubber boom, the *sítio* was replaced by the *seringal* (rubber stand). The *sítio* is a rural location occupied by a family and *agregados*, or those that belong to the household, i.e. Amerindians, servants, etc. (Galvão 1979b: 122). The *sítio*'s former, open nature was rendered clandestine by the newly formed web of *aviamento*. McGrath (1989: 110) posited that *regatões* were “both part of the *aviamento* system and distant from it.” They would get provisions from the *aviadores*, then sell or trade them to rural patrons, and/or to producers. They might even obtain provisions from patrons and trade with producers (Figure 4). Thus, as an economic category, *regatões* support the thesis that the rubber production was not monopolized.

The *Regatões* again became a controversial, but significant, if small, segment of the socioeconomy of rubber. During the boom however, foreigners (Portuguese, Syrians, Jews, and Lebanese) began to enter the ranks of the Amazonian *regatões* (Reis1997b:246). Syrians, Lebanese and Jews, known collectively as “Turcos” as their countries of origin were under the Ottoman Empire at the time of immigration to Brazil, composed the largest contingent of *regatões* (Reis1997b:256). The *regatão* was once again viewed as a threat to control over labor, but this time complaints were also manifest in terms of ethnicity. Anti-Semitism, as well as anti-Arab sentiments, was part of “widespread xenophobia in the Amazon during the early 20th century, which manifested in periodic explosive violence directed against Jewish *regatões* and Jewish-owned *aviamento* houses” (Raffles 1999:351).

The regatão was accused of cheating the seringueiro by all ways and means. The regatão supplied trinkets and novelties of the day: gramophones, cheap medicines, weapons, canned meats, “the thousand objects, that constituted the sensation of the moment in the [plazas of Manaus and Belém]” (Reis1997b:247). The seringueiros held no illusions about the deception of which they were victims, but held no animosity against the regatão, who they embraced as a source of their necessities, not always duly supplied by the seringalista or casas aviadores (Reis1997b:247). Itinerant trading was a profitable business, and many of the recently arrived immigrants accumulated capital, some eventually forming casa aviadores or other commercial establishments (Benchimol 1994 and 1998; Antonaccio 1996).

**FIGURE 4.**  
**THE ROLE OF THE REGATÃO IN THE AVIAMENTO SYSTEM**  
**(MCGRATH 1989: 97)**



#### 4.3.d. Local Organization of Production

Along the Rio Negro, local patrons assumed control of tributaries by squatter rights. The *sítio* was what most characterized the occupation of the Rio Negro. As a rule the *sítio* was located on an island where the *seringal* was located, but usually the owner has another locale on the river edge (Galvão 1979c:122).<sup>13</sup> According to Galvão (1979a:137), the dispersion of resources in the Rio Negro basin obligated the population to distribute itself over a large area, preventing the formation of denser nuclei and more intimate arrangements. Rubber was collected during low water season (October-March), Brazil nuts and piassaba in the rainy season (April-September).

A shortage of manpower would again become an issue on the Rio Negro. During the rubber boom, the Rio Negro suffered more from this problem than other regions with more easy access to emigrants, i.e. *Nordestinos* or Northeastern Brazilians (Galvão 1979a:140).<sup>14</sup> The response to this problem was to recruit workers from the upper Rio Negro, bring them down river, and get them into debt (Galvão 1979c:121). Thus, unlike the rivers of the right margin of the rivers Amazonas and Solimões where many *Nordestinos* and *caboclos* composed the labor force, the patron of the Rio Negro depended on the Amerindians of the Upper Rio Negro. Recruitment would be more intense when the price for extractive products was higher. During the rainy season many local patrons (*seringalistas*) would send out their representatives (*comandantes*) to buy *farinha* (manioc flour) and contract laborers for the upcoming rubber harvest.

Tenreiro Aranha (1907:63-64) gives a number of other ways in which Indians would go to work in the *seringais* (rubber stands). One of which was the *regatão* who “imposed” merchandise and *cachaça* to buy labor to sell to the *seringalistas*. Another was the *caboclo seringueiro*, who would exchange merchandise for the promise of future wealth, and get the Indians drunk on *cachaça*. After the *feira* (party) the men were taken to the *seringais* of the districts of Santa Isabel do Rio Negro, São Joaquim (Lamalanga), Thomar, Moreira, Barcelos and Carvoeiro. The Amerindians were settled in riverbank settlements and on the islands of the archipelago Mariuá, as well as the flood plain (*igapós*) of the middle and lower Rio Negro.

The Amerindians planned to work a few months, but were often not allowed to leave until their debts were paid.<sup>15</sup> In fact, very few families returned to the upper Rio Negro leaving a significant presence in the lower and middle Rio Negro (Meira 1997:138). Up until the second or third generation of working in the extractive economy, Indians were identified with their tribal affiliation, and maintained their language and traditional habits (Galvão 1979c:122). Nevertheless, they were forced to assimilate the *língua geral* or Portuguese, and reorganize their lives in a similar mold to that of the *caboclo*. Thus, Amerindian recruitment led to a process of enculturation that would serve as the basis of the current *caboclo* society encountered today on the middle Rio Negro.

The Rio Negro is the habitat of two species of rubber tree, *Hevea microphylla*,<sup>16</sup> and *Hevea benthamiana*. Neither is as productive as the *Hevea brasiliensis* that occurs in the right margin tributaries of the Amazon basin and

produces the highest quality latex. According to Galvão (1979a:155), a *seringueiro* (tapper) on the Rio Negro could only hope to tap a maximum of 400kg/season, less the *tara* (anticipated water weight loss) of twenty percent. Whitesell (1993:207) working on the highly productive Juruá, found that tappers on that river collect an average of 512kg /tapper/season with a *tara* of only fifteen percent. Thus, the Rio Negro tapper was at a disadvantage compared to his counterpart on the right margin tributaries of the Rio Amazonas/Solimões.

#### **4.3.e. Good Patrons and Bad Patrons**

Low productivity, together with the lack of manpower, in the Rio Negro basin contributed to relations of production characterized by coercion and contrived debt. But there existed more cultural forms of labor control as well. During the rubber boom, there existed two principle patrons of the upper Rio Negro who serve to exemplify two kinds of relations of production: one in which paternalistic patron dependency is emphasized, and the other violence. Tenreiro Aranha (1907:63) accused both of them, clients of J.G., of serious abuse of the Amerindians of the upper Rio Negro; both have descendants living along the Rio Negro or in Manaus

The first was known as the “King of the Içana.” His name was Dom Germano Garrido. He was from an upper class family from northern Spain. Garrido, with his “multitudinous Indian relatives” (MacCreagh 1985:261), controlled the Rio Içana from the 1870s through the 1920s. He and several sons lived in the village of São Felipe and operated a trading post there. He

maintained the Indians “in a kind of debt-servitude” (see Köch-Grunberg 1967:33). According to Wright (1981:324) “[he] was no doubt the most powerful and influential merchant in the region.” However:

[he] was not the kind of patrão...who made fame and fortune by bludgeoning and mercilessly exploiting Indians; rather he gave the impression of a benevolent patriarch who sought to become a part of extensive social networks which he used to his own advantage. One way was through the system of *compadrazgo* [*compadrio* in Portuguese], which went hand-in-hand with the patron-client relationship of the rubber extraction business. (Wright 1981:325)

The other was the “King of the Uaupés,” Manduca Albuquerque.

Albuquerque lived on the Island of the Crocodile (Ilha do Jacaré), he being the crocodile (MacCreagh 1985:267). He was a “Negro-Indian-Portuguese and a scoundrel as black of heart as he [was] of complexion, and is an Indian killer besides” (MacCreagh 1985:263). He was a “shrewd villain” and known as the “Man Who Makes the Water Bloody,” *Ohkohthiurunga* (MacCreagh 1985:263).

According to MacCreagh (1985:267):

in order to provide himself with a certain official standing under which to cover his nefarious dealings with the Indians he had applied to the Government in [Manaus] for appointment as local Indian agent. That was in the old rubber days; and he had found no difficulty in getting the necessary affidavits from fellow-crooks among the rubber-gatherers, and so was duly appointed. (MacCreagh 1985:263)

#### 4.4. THE POST-RUBBER BOOM IN THE MIDDLE RIO NEGRO

The end of the rubber boom in 1910 caused a reorganization of socioeconomic relations. Aviamento remained in the Rio Negro basin, linking the interior with Manaus, but the potential for coercion weakened. The larger seringalistas power diminished as the population dispersed among the many small sítios. By 1922, over half the settlements along the rivers were abandoned as former rubber workers withdrew to Manaus (Tavera-Acosta 1927:59). Many of the seringalistas moved to Barcelos and São Gabriel (Hanson 1933:591). Sousa (1959:13-14), who explored the Rio Negro during 1928-1929 found the region in decay, finding Barcelos with a population of only two hundred and nineteen houses.

By 1914, J.G. Araújo became the largest aviador in Manaus, and in 1916, with rubber collapse and the subsequent withdrawal of German and English importer/exporters, he entered the export business (Benchimol 1994:10). Until 1910, he controlled ten percent of the rubber market, and by 1920, twenty percent. With the withdrawal of competitors, his structure in the interior, and with his navigation and outfitting empire, the interior market was captive to his organization. J.G. Araújo decentralized the firm and diversified his established affiliates at locations along the major rivers of the state of Amazonas, and expanded the number of extractive products of his commercial portfolio.

#### 4.4.a. Decentralization of Aviamento on the Rio Negro

Oral histories indicate that the former seringalistas headed the post-boom diversification of extraction, continuing their relation with J.G., although by 1930 two other competing firms were operating on the Rio Negro as well.<sup>17</sup> In the post-boom Rio Negro, there were several of the more successful clients/seringalistas of J.G. who were then based in the urban centers of Barcelos, Santa Isabel, and São Gabriel, while many of the others, or their descendants, remained in the sítios after the rubber boom.<sup>18</sup> By 1930, the patron class began to be linked by marriage ties, transforming the basis of regional politics, becoming more significant during the period of “*colonelismo*” beginning at the time of WWII (Leal 1975; Benchimol 1994:137).

The system of usufruct rights continued intact, but depended on market prices for extractive products, and the size of the labor force that could be assembled to exploit them. In general though, the products and locations exploited depended on the location of the patron’s sítio. Just as during the Directorate period, for example, the patrons located near, or across from, the mouth of the Rio Preto dealt in piassaba. Piassaba stands on the Rio Preto and Rio Padauri were numerous, thus divided among a number of smaller and larger patrons, depending on the labor force. Usufruct rights would be lost at the moment labor was insufficient to exploit an area. It was in this fashion that smaller, opportunistic traders would eventually begin to replace the larger patrons following WWII. The figure of the patron and patron dependency became

generalized at that time, creating a number of socioeconomic forms that would form the basis of mercantile exchange in subsequent periods.

#### **4.4.b. The Proliferation of Petty Commodity Traders**

Meira (1997), Oliveira (1975), and Galvão (1979c) have argued that the *regatões* dealt directly with *sítio* owners, *caboclos* and Amerindians, serving as financiers of the harvests. For Meira (1997:138), the presence of the *regatão* grew and indigenous labor became generalized during post-rubber period. For Galvão (1979c:124), the *regatões* served as a “substitute for the *patrão* or *seringalista* of other regions of Amazonas.” Galvão (1979c:124) argues further that the *regatão* was based in Manaus, rather than in the *barracão*, or trading post, associated with *aviamento* of the boom period. Oliveira (1975:12) distinguishes two types of *regatão* (in reality four): those who work for themselves; and those who are subordinate to a larger *regatão*, a larger patron, or a *casa aviador* in Manaus.

While it is true that the *regatão* became an important figure in the development of patron dependency, he has been overemphasized, or at least, ill defined. These authors however, correctly indicate the extent to which intermediaries or “middlemen,” representing merchant capitalism, were agents of social and economic change in the basin. The fact that many of the residents of Barcelos are the offspring of Amerindians from the upper Rio Negro serves as adequate proof in this regard. Further, the fact that most traders did not reside in the indigenous areas of the upper Rio Negro where they frequently went to seek

labor and extractive resources, has created a dichotomy of non-capitalist and capitalist relations in which the *regatão* represents the link. Overemphasizing the *regatão* then, most likely reflects a perspective of advocacy of indigenous societies. For those who study indigenous societies, any representative of merchant capital represents a threat to their research subjects in the form of acculturation and exploitation. In addition to the *regatão* however, just about anybody who had a boat to transport extractive products to the points where the riverboats landed could have functioned as an intermediary of merchant capital. What is true is that there were a number of intermediaries whose function was to discipline petty commodity production, via economic exchange, for the benefit of the large commercial establishments in Manaus.

By referring to Figure 4 above, the mercantile connections of various commodity traders can be understood. Within the patron class there was the *comandante* (commander), who represented the patrons located in the *sítios* along the river or in the urban centers, including Manaus. The *comandante* was a type of foreman. He oversaw the *empresa* (extractive activity), delivering the extractivists' *rancho* (subsistence merchandise) and returning with the product for his patron. There was also the *atravessador* (see 4.2.a.), who competed with the traditional patron class. The *atravessador* generally dealt in particular extractive products from one of the urban centers of the interior and was tied to some *casa aviador* or exporter. They recruited whatever labor was available, and had more intensive relations with the indigenous societies of the upper Rio Negro. In Figure 4 above, the *atravessador* would be located at the same level as the *seringalista*.

According to informants, a *regatão* was an itinerant trader, based in an urban center like Manaus and Belém, who makes periodic voyages to trade for a variety of products. Informants explain that they have not appeared on the Rio Negro since 1990 or so.

#### **4.4.c. Diversification of the Economy**

With the decline in the rubber prices the number of extractive products exported from the Rio Negro also grew. J.G. Araújo expanded his commercial portfolio. By diversifying the number of extractive products, J.G. Araújo and his clients were able to hedge against the vagaries of the extractive product market (Dias 1992:19-20).<sup>19</sup> The need to diversify the number of extractive products was greatly enhanced by two great fires that occurred in the middle Rio Negro (Carvalho 1952:16). Within Barcelos, enormous regions of *igapó* (flooded forests) and *campo* (savanna) along both banks were destroyed from the Rio Preto to the Rio Branco, rendering the *igapó* rubber stands unproductive. The first occurred during the very dry summer of 1912. It burned for more than a month, producing such a quantity of smoke that navigation on the Rio Negro was seriously impaired. Thousands of rubber trees died, further depressing the economy of the region. The second occurred in 1926, the year of one of the strongest recorded El Niño - Southern Oscillation events (see Richey, *et al.* 1989:101). The fire was larger than the first, completing the destruction of the first fire.

According to Carvalho (1952:13), commercial activity in the region was declining each year. Despite the falling prices and the two fires, rubber (*Hevea*

*benthamiana*) remained the principal extractive product in the region until 1950 (Carvalho 1952:13), largely because transportation was subsidized (Hanson 1938:289). Along the Rio Negro, the seasons create a yearly rotation of labor effort, and stimulated socioeconomic relations characterized by geographic mobility. In addition to rubber, during the dry season (August to March) there existed a small trade in salted pirarucu, *tartarugas* (*Podocnemis expansa*), (Carvalho 1952:14), and egret feathers.<sup>20</sup> In 1924, W.R. Grace asked permission to import caiman skins as prices in the U.S. rose. (Loureiro1995:58). The trade in caiman skins was promoted as highly lucrative, and a means of eliminating a constant danger to domesticated animals and humans: turn pests into profit! A variety of products were also harvested when water levels were high (April to July): piassaba, Brazil nuts,<sup>21</sup> *puxuri*, *balata* (*Mimusops globosa* and *Manilkara bidentata*), and *ucuquirana* (*Ecclinusa balata*). All of these resources are located on the terra firme where the high water shortens the distance to the resources, and facilitates fluvial transport downstream. By the 1930s, cattle were raised on the savannas of the Rio Jufarís (Holdridge 1933:384), largely due to the efforts of J.G. The diversification of extractive resources did not assist much in the development of the region however. By the time Holdridge visited the Rio Negro in 1932, the social conditions remained precarious: “Since the collapse of the rubber market and the Brazil nut and piassava industries, the people of the region have lived on the verge of starvation” (Holdridge 1933:384).

The diversification of extractive resources was facilitated by a short-lived boom of *balata* (1923 – 1930), and the continuing, if diminished, demand for

piassaba. An examination of the extraction of these two products also serves to exemplify the range of socioeconomic possibilities in the region. In the two following sections, I discuss the socioeconomic aspects associated with these two products, and offer a comparison to other regions of Amazonia.

#### **4.4.d. The Balata Boom (1923 - 1930)**

Balata is white latex that has a non-slip quality useful for pulleys; it was also used in the manufacture of golf balls. The principal regions where the extraction occurred were the Rio Branco basin and the upper Uaupés. Balata was also to be found in the far north of the Rio Negro basin, in Yanomamo territory, but it was considered a very dangerous place to work (Galvão 1979a:155). There were two ways to collect the latex: fell the tree and collect the latex, or tap it.<sup>22</sup> The number of balata trees had been drastically reduced by the end of 1930 (Holdridge 1933). Many of the Rio Negro patrons entered the balata trade given the fall in prices for rubber. Dom Garrido and Manduca Albuquerque both entered the balata trade. Garrido informed MacCreagh in 1923 (1985:261), however, that he would not begin production of balata until J.G. sent a specialist to inform him how to correctly exploit the resource without destroying it. Albuquerque had different plans. He had a small following of not more than fifty of the immediate relatives of his wives, “a hard-bitten gang who went armed to the teeth for fear of reprisals” (MacCreagh 1985:267). Albuquerque told MacCreagh that he hadn’t seen a piece of money for ten years, that is, since the rubber boom (MacCreagh 1985:265). MacCreagh asked how the “King of the

Uaupés” would enter in the balata business. The “King” replied: “he who has the most men gets most of the balata” (MacCreagh 1985:272). He added, “[had] I guns for all of [my men], I would get all of the balata in those jungles” (MacCreagh 1985:272.). When first discoverers of balata passed down “his” river from the upper Uaupés on their way to Manaus, Albuquerque didn’t know what they had,

leaving it to be inferred that had he known, they would never have passed... About a dozen boats had come up, a dozen out of the couple hundred that had started so crazily from [Manaus], and he let them pass. Why not? Would they not, those who survived the strenuous and dangerous work in the jungles, have to come back through his territory and past his very front door? So must a robber baron have spoken from his stronghold on the Rhine. (MacCreagh 1985:272)

After some time visiting a group of Tukano up the Rio Tiquiú, MacCreagh returned to the Island of the Crocodile only to find the verandah “stacked high with great slabs of white balata” (MacCreagh 1985:332).

#### **4.4.e. Piassaba Extraction**

Piassaba has been an important extractive product in the region since the eighteenth century. As rubber and balata lost their economic importance, piassaba began to have a more significant importance, and continues to do so even today. Relations of production in the extraction of piassaba have long had a reputation for exploitation (see Meira 1993). Carvalho (1952:23) noted during his passage of the middle Rio Negro that certain whites held Indians in “true slavery.” Galvão (1979a:156) found: “The control exercised by the patrons that

monopolize the exploration [of piassaba on the Rio Preto] is extremely rigorous and the whip is still a good argument for recalcitrant clients.” I have been able to collect a several oral histories as well as conduct a number of interviews concerning the period between the rubber boom and the advent of ornamental fish collection. In the paragraphs that follow I provide two cases of patrons involved in the piassaba trade.

Shortly after the collapse of the rubber market, a Portuguese named Albino Pereira da Silva arrived from Portugal to make a living in the Amazon rain forest. In a short time he became the owner (rightful or not) of one of the largest tracts of land in the largest municipality in the world ( $\pm 122,000 \text{ km}^2$ ). The Deminí and Aracá rivers were “owned” by him. In 1932, when Holdridge visited the region, Albino had nearly two hundred clients on the Deminí (Holdridge 1933:379). Sr. Albino was known as the “*colonel da piaçaba*”. According to many of the older residents of Barcelos, not too much happened in Barcelos without his approval. He had several relatives assisting in the management of his entrepreneurial endeavors. His son took over responsibilities during the decades of the sixties and seventies. Eventually his family members moved to Manaus and Rio de Janeiro, where they and their descendents have professional careers.

From his sítio on the island of Piloto, upstream from Barcelos and opposite the mouth of the Rio Deminí, Sr. Albino grew fruits and vegetables, raised livestock and traded extractive products such as *sorva* (*Couma* sp.), Brazil nuts, rubber and piassaba. He traded frequently with Yanomamo Amerindians (see Avila and Campos 1959:260). In Manaus, he often employed them in his

piassaba warehouse, providing lodging for them in apartments he built adjacent to his house.<sup>23</sup> According to naturalist Margaret Mee (1988:149) Sr. Albino “had a reputation for being a slave-driver and maltreating his workers... The Indians up these rivers were working for Albino, who supplied them with necessities at a cost far above normal... Debt slaves for life” (Mee 1988:150). However, speaking with those who worked closely with him, I was reminded, not just once, that the difficulties in obtaining basic food items far from Manaus made the debt-contract equally attractive for the client as for the patron. I was told that the “*colone*” was actually serving the “*povo*” (people), who would otherwise do without items necessary for survival in the middle of the jungle.

In this case, the nature of the extractive activity plays an important role. The extraction of piassaba is undertaken on the *terra firme* near the headwaters, far from the municipal seat of Barcelos. It is a labor-intensive activity and requires a lot of provisioning. Contemporary patrons claim that clients are specialists in abusing them, the costs of running a piassaba trading operation are high, prices relatively low, and natural hazards numerous. They feel they are doing a favor for the people in the interior. For the patron, the high price of merchandise reflects the inherent risks of the trade. Clients were only allowed to change patrons when their debts were paid in full. Other patrons, large and small, honored these moral and economic contracts, either paying off the debts for the prospective clients, or refusing employment.

It is likely that producer autonomy was more common for those already residing along the middle stretches of the Rio Negro than in the upper reaches.

In the upper Rio Negro Amerindians continued to be a valued source of labor in the extractive economy (Nimuendaju 1950). Nimuendaju, and other observers, noted that many merchants acted as if they owned the Amerindian villages; taking whatever liberties they desired among the inhabitants, particularly the women. Such behavior was probably not so widespread among the more affluent patrons, but most likely among the *regatões*, *comandantes* and *atravessadores* roaming the upper Rio Negro.

There were also patrons like Sargento Guilherme. He was an ex-military commander at Cucuí; informants called him an *atravessador*. During the 1930s and 1940s, Guilherme was known to bring Indians down from the upper Rio Negro to the *piassaba* stands of the Rio Padauri,<sup>24</sup> not allowing them to return to their homes, claiming that their production was insufficient to pay off the goods advanced them. Meira (1993:84-92) relates the use of force, terror and violence by the former commander and other ex-military men, together with other *caboclo* and European patrons. Meira (1993:85) notes that patrons like Guilherme imposed a system of “patron time” on the Amerindians of the upper Rio Negro. According to Meira’s idea of “patron time,” the individual and family life histories of Amerindian, as well as *caboclo* extractivists, had distinct phases, punctuated sequentially by the patrons with whom they were associated, and which coincided with the production of extractive products in certain regions determined by the patron (see also Oliveira 1975 and 1979). This system remains in effect today, but is mostly associated with particular products such as *piassaba* or ornamental fish.

#### 4.4.f. Additional Forces of Social Change

With the collapse of the rubber boom two forces of social change were introduced: Salesian missions and *Serviço de Socorro e Localização dos sem Trabalho* (Unemployment Assistance and Localization Service). The Salesians were encouraged by the Brazilian government to establish missions along the Rio Negro. Chernela forcefully argues:

In granting the missions access to remote Indian populations for the purposes of religious conversion and social and national integration, the state ensured its own ends of border surveillance, and the mobilization and organization of Indian labor. Landscape and individuals were simultaneously 'converted' and 'domesticated.' (Chernela 1998:329)

The Salesians were well known for their commitment to vocational training in an industrializing Europe (Chernela 1998:323). Missions were established at São Gabriel, Taraquá, Iauaretê, Santa Isabel and Barcelos. In 1926, the mission at Barcelos was officially founded. The Salesians built a large school, hospital and shops of industrial arts. In 1923, there were already 225 students housed in Barcelos (Reis 1997a:164). The missionaries became an important part of the social relations of dependency on the Rio Negro, providing “a reliable source of trade, medicines, goods, and protection” (Chernela 1998:326). Chernela (1998:324) likens the Salesian mission economy to that of the colonial period, based on *aviamento*: “The mission maintained a trading store where the missionaries sold Indians finished goods on credit and collected payment in the form of products or labor.” What the Carmelites had not achieved in terms of cultural integration of the Rio Negro, the Salesians resolved.

In 1934, the Serviço de Socorro e Localização dos sem Trabalho (Unemployment Assistance and Localization Service) was introduced in Barcelos to redirect production toward agriculture (Loureiro1995:66). It would be operational until 1944. Hanson, who visited the Rio Negro during 1931-1932, gives some indication of the outcome of the effort to introduce agriculture on the Rio Negro in the details of a conversation he had with an agronomist in Barcelos. He was informed, “the wealth of these forests is their biggest curse” because it creates conditions of geographic mobility that prevents a greater investment in cultivation (Hanson 1938:319). The agronomist was trying to form an agricultural cooperative. When asked how it was coming along, the agronomist answered: “Terribly. They’re all in debt to the traders who threaten to foreclose if they do things to help themselves. I have to get government money into it. But the traders complain to the government in Manaus that I’m interfering with business” (Hanson 1938:325).

#### 4.5. A COMPARISON WITH OTHER REGIONS OF AMAZONIA

The post-boom socioeconomic conditions of the Rio Negro differed in some respects from those found in other regions of Amazonia. Harris (2000:41) and Ayres (1992:113) have shown that patron ties were looser in areas in which the ecological conditions were characterized by the *várzea* (Amazon floodplain). In the *várzeas*, where the annual floods replenish the soil with nutrient rich sediment originating in the Andes, agricultural production heightened producer independence. In regions such as Acre (Bakx 1988), the Juruá (Whitesell 1993) and the Rio Negro where extractivism dominated, coercion frequently continued to typify relations of production. In Acre, as well as along the Juruá, where rubber production is among the highest in Amazonia, rubber continued to have economic importance after the boom (Bakx 1988:150). In the Rio Negro basin, agriculture has never been as productive as it is in the *várzeas* of the Amazon and Solimões rivers. The consequence in the Rio Negro has been a greater emphasis of extractive forest products such as rubber, Brazil nuts, and piassaba. It is more appropriate to consider the environment in terms of its provision of valuable extractive products in the interest of merchant capital, rather than in terms of adaptations to *várzea* or terra firme ecosystems.

The Rio Negro also differed from other regions of Amazonia to the extent that state intervention was greater. Harris (2000:41) notes there was little state intervention or capital investment in the region of Óbidos on the lower Amazon floodplain. Although subsidized transportation and unemployment services also

represent a measure of state intervention, the establishment of Salesian missions represents significant state intervention and capital investment. The arrival of the Salesian religious order was premised on the state's desire for integration of the Amerindians into the national society, and to secure the Brazilian border. The missions were built with imported material and human resources, representing a huge capital investment. After the rubber boom, *prelacias* (prelacies) were established in the municipal seats of the interior throughout the State of Amazonas. From the parish in each seat, the Padres also served the various communities of the municipality. These prelacias were concerned more with the administration of religious rites of Catholicism. In the Rio Negro basin, the Salesian missions aimed at political, economic, and cultural integration into the national society.

#### 4.6. NOTES

<sup>1</sup> According to Spruce (1907:354): "The Brazilian Government has promulgated [edicts] against the seizing of the native inhabitants and reducing them to slavery, yet the practice still exists and is carried out. Since I came up the Rio Negro two such expeditions have been sent up a tributary of the Uaupés, called the Rio Papuris to make *pegas* among the Carapaná." Wallace (1889:207) relates the following anecdote: "The [commercial agents] and authorities in Barra [Manaus] and Pará, ask the traders among the Indians to procure a boy or a girl for them, well knowing the only manner in which they can be obtained; in fact, the Government in some degree authorizes the practice.... Senhor L. [an itinerant trader] had been requested by two parties at Barra – one the Delegarde de Polícia – to furnish them each with an Indian girl... as this man was an old hand at the business."

<sup>2</sup> In the absence of an appointed director, a layperson was charged with the responsibility of directing the labor at assigned village.

<sup>3</sup> In 1854, Hirlário Maximiliano Antunes Gurjão, named by President of the Província do Amazonas, Herculano Ferreira Penna to establish the site for a fort in Cucui, reported of the “deplorable decline” of settlements along the Rio Negro (Loureiro 1989:84). In 1861, Dias (1943:386) found “misery and destruction,” and travel companion, Leovegildo de Souza Coelho (1987) noted the “deplorable state” of the settlements, and lack of education and religion. In 1865, Bastos (1975) studied the possibility of steam navigation on the Rio Negro. Wallace (1889:136) found Barcelos depopulated and almost deserted. According to Spruce (1908:268): “The Rio Negro might be called the Dead River - I never saw such a deserted region.”

<sup>4</sup> In 1845, João Henrique de Wilkens de Mattos reported that the population in the village of Barcelos was 72 persons (Loureiro 1978:184). The population of Barcelos was 200 in 1854, living in eighteen houses (Jobim 1965:140). In 1856, Barcelos had a population of 949; Carvoeiro, 310; Moura, 476; and Thomar, 1,017 (Loureiro 1989:35). In 1859, the population of Barcelos had dropped to 512; Moura’s had grown to 938; and Thomar’s fell to 413 (Loureiro 1989:36). In 1861, the population of Barcelos had gone up to 602, living 109 houses (Coelho 1987:100). In 1865, the population of Barcelos was 646; Moura, 707; Thomar, 824 (Bastos 1975:127). Variation in census figures may be explained by the epidemics experienced in 1854, 1856, and 1857; idiosyncrasies in census taking, possibly due to seasonal production; and the intensity of descimentos by the Directors of Indians to replenish the labor force on the middle Rio Negro.

<sup>5</sup> Sarsaparilla (*Petroselinum saturum*) was collected on the Rio Padauri; piassaba (*Leopoldinia piassaba*) on the Rios Aracá, Deminí, Padauri, Preto, Xiê; breu and estopa were collected on tributaries of the upper Rio Negro, above Barcelos; cacao (*Theobroma cacao*), puxiri (*Aerodictidium puchury*), and vanilla were collected on the right margin tributaries of the Rio Negro (see Spix and von Martius 1981:262; Herndon 1854:275; Loureiro 1989:86).

<sup>6</sup> Rio Arirahá and Rio Itú are well known for *irapucas* (*Podocnemis erythrocephala*), *cabeçudos* (*Peltocephalus dumerilianus*) are found throughout the middle Rio Negro, *tartarugas* (*Podocnemis expansa*) are caught in the Rio Branco, and *tracajá* (*Podocnemis unifilis*) are more common below the Rio Deminí. Just as they are today, the beaches where *irapuca*, *tracajá*, and *tartarugas* came to deposit their eggs must have always been common knowledge to the local residents. Turtles, in the form of eggs and meat, have probably formed an important component of the subsistence diet of residents of the middle Rio Negro since the Manaos inhabited the region. Many older residents lament that the number of *irapucas*, *tracajás*, and *tartarugas* has been greatly reduced in the last 50 years. The cabeçudo is the only species not over harvested. It deposits its eggs in forested areas, making them more difficult to find than the eggs of *irapucas*, *tracajás*, and *tartarugas*. Although there is some illegal trade in Manaus, turtles should be considered subsistence products.

<sup>7</sup> Wallace discovered firsthand the new measures to increase the revenues of the treasury of Amazonas: “I reached Barcelos, and here I was annoyed by having to give an account of what I had in my canoes, and pay duty, the new government of Barra not allowing anything to escape without contributing its share” (Wallace 1889:258).

<sup>8</sup> The state operated Companhia de Comércio e Navegação do Amazonas began regular monthly steamship service to Santa Isabel on January 15, 1855, which took twenty one days; reduced to eight by the third trip (Loureiro 1989:151). With the expansion of internal commerce, the Companhia Fluvial do Alto Amazonas began service to Santa Isabel in January 1871 (Loureiro 1989:153-4). By 1879, a third steamship line, Amazon Steamship Navigation Company, Ltd., was making bi-monthly voyages up the Rio Negro (Loureiro 1989:157).

<sup>9</sup> 766 passengers were transported up the Rio Negro, while 3,421 were transported up the Rio Purus, 2,754 on the Madeira, 1,917 on the Solimões, and 1,962 on the Juruá (Loureiro 1989:165).

<sup>10</sup> Spruce (1907:377), in a letter to a friend, complained of his difficulty in having a canoe built for his expedition, gives an indication of how debt functioned in the mid-nineteenth century: “No work can be done in this country without paying for it before-hand. The Indian carpenters are all in debt to some racional or other, and if a person needs one for the slightest job he must first pay the debt of some carpenter, and then the latter will not put hand to work without a further advance of goods.”

<sup>11</sup> *Compadrio* has probably been a social and cultural element in the extractive economy since the Carmelites were established in northwest Amazonia. Herndon (1854: 274) wrote: “The Indians... can generally persuade some good-natured white man to stand as godfather, which secures the payment of the church fee (a cruzado), a bottle of spirit to the father, and a yard or two of cotton cloth to the mother. Antonio tells me he is compadre with half the tribe.”

<sup>12</sup> One of these Portuguese masters, Albino Pereira da Silva, would stay on to achieve some notoriety in Barcelos.

<sup>13</sup> Most communities and sítios in the municipality of Barcelos are located on the right margin of the Rio Negro where the river bank is above the high water level.

<sup>14</sup> Between 1877 and 1878, 827 Nordestinos migrated to Amazonas, with 137 settling in Moura, 122 in Carvoeira, 50 in Moreira, 60 in Thomar, and 9 in São Gabriel (Loureiro 1989:40).

<sup>15</sup> Oswald Cruz (1913:106) said the Rio Negro more than other any other area gave the “exact impression of slavery.”

<sup>16</sup> Davis (1997:387) relates that this specie of rubber tree is “the most unusual of all the species of rubber... [It] is a slender, sparsely crowned tree, often found growing in dense colonies along creek margins or around the shores of islands on land subject to extreme flooding.”

<sup>17</sup> Higson & Fall were operating on the Rio Negro in 1918, Higson Jones & Co. in 1926-28, and J.S. Amorim in 1928 (Loureiro1995:94). In 1933, J.G. Araújo, Higson & Companhia, and J.S. Amorim were all operating on the Rio Negro (Loureiro1995:136).

<sup>18</sup> Sousa (1959), who was on the Rio Negro in 1928-1929, provides detailed information regarding the principal patrons and their locations on both sides of the middle Rio Negro, from Moura to São Gabriel.

<sup>19</sup> In 1921, J.G. Araújo also began manufacturing rubber products (Dias 1992:19).

<sup>20</sup> Egret hunters have operated on the Rio Negro since, at least, 1914 (Carvalho 1952: 18). The birds were killed while guarding their nests during the low water season, when their plumage reached its finest form (January to April). The feather hunters were able to kill between 20-30 egrets/day.

<sup>21</sup> The Brazil nut stands in the interfluvial region of the Ereré and Aracá, as well as the Rios Arirahá and Jufarís were some of the most productive on the Rio Negro (Sousa 1959:221-222; Carvalho 1952:16). Many of them were discovered following the fire of 1926 (Carvalho 1952:16). Brazil nut collection also occurred on Jurubaxi and Uneiuxi (Sousa 1959:17) and Cuiuni.

<sup>22</sup> According to MacCreagh (1985: 262), there were two ways to extract the latex from the tree:

One, the idiotic popular one, is to fell the tree, gash it all over with a machete, and leave the juice run out upon a bed of banana leaves. After a week or so the balatero comes back on his round and—if some other balatero hasn't stolen it—gathers up the coagulated mess, leaves and all, and takes it to his base camp. Here he puts it into big tin pans and boils it and strains it and boils it and strains it again. Four times in all; though six times is better. The final straining is poured into square molds and there hardens into a white non-elastic brick known as 'first-grade white'.

Within a month or so the balatero has cut down all the trees in a circle around the camp as far as he and his crew can comfortably travel. So he packs up and moves to a new center where the trees are not too widely separated to be profitable. Perhaps his circle overlaps that of another balatero. Then the rule seems to be that

the one who has the straighter-shooting crew wins. We hear stirring tales, up here, of the jungle battles that for sheer savage ruthlessness leave nothing to our wildest scrambles off 'forty-nine.'

But, whoever wins, presently there are no more balata-trees. That is what happened to the Rio Branco balata. That is why, when a rumor of a new balata-strike comes, there is such a crazy scramble to get on the ground first.

The second one, according to MacCreagh, "[was] to tap the tree."

<sup>23</sup> Relations with the Yanomamo were not always friendly however. Holdridge (1933:379-80) relates the following account that surely involved Sr. Albino, or at least his *freguesia* (clientele): "The civilized settlements of the Aracá were the scene of a spirited attack on September 24, 1931, by Indians of an unidentified tribe. The settlements comprised nearly a hundred persons; but they were greatly outnumbered by their assailants, and, though seven Indians were killed, two women and a child were carried off."

<sup>24</sup> The Rio Padauri was known as the "*celeiro da morte*" (cellar of death) of the inhabitants of the upper Rio Negro, where many died of dysentery and yellow fever (Sousa 1959:222).

**CHAPTER 5**  
**THE “CARDINAL TETRA RUSH” AND SOCIOECONOMIC CHANGE ON THE**  
**MIDDLE RIO NEGRO**

In this Chapter I establish the linkage that joins the global history of the ornamental fish industry to the local history of the middle Rio Negro. In the first section I will unravel some of the mystery surrounding the first efforts to commercialize the cardinal tetra, and highlight some of “the interesting associations that develop between colleagues” in the tropical fish industry (Axelrod 1980:9). In the second section, I outline the process of organizing the collection (extraction) of ornamental fish in the middle Rio Negro, and the changes to the local social and economic formations. In the final section, I highlight the significant political, social, and economic changes in the region since origin of the ornamental fishery.

## 5.1. THE MYSTERY SURROUNDING THE “DISCOVERY” OF THE CARDINAL TETRA

### 5.1.a. Debate Over the True Discovery of the Cardinal Tetra

As early as 1950, there were rumors circulating that “alleged the existence of a ‘new neon’ somewhere in the Amazon basin” (Géry 1994:83). The first empirical evidence for the existence of the cardinal tetra is found in a letter dated 3-16-1953 from Dr. Harald Sioli, the famous limnologist at the Instituto Agronômico do Norte, Belém do Pará, to Dr. Werner Ladiges of the Hamburg Zoological Museum (Ladiges 1956; Weitzman 1956; Weitzman & Fink 1983:389; Geisler and Annibal 1986:7-8; Géry 1994:83).<sup>1</sup> The following is a translation of a portion of Sioli’s letter by Weitzman & Fink (1983:389):

In the fall of 1952 I made a trip to the upper Rio Negro together with some colleagues of the Instituto Agronômico do Norte, Belém and Prof. Theodosius Dobzhansky. On September 24, 1952 near Sítio Caburis,<sup>[2]</sup> I looked into a very small forest pond, less than one meter wide and deep, and among the dead leaves on the bottom I suddenly saw in the brown water some silvery double-points [eyes] with silvery pigment over their dorsal surface. I quickly dipped my net into the water and caught some beautiful-coloured fishes, red and blue, which I, as a non-ichthyologist, thought to be the neon tetra, *Hyphessobrycon innesi*.

Sioli noted that he mentioned the discovery to Dietrich Horie of Belém, who organized the fish collecting expeditions for Paramount Aquarium, Inc. (Weitzman & Fink 1983:389). Géry (1994:83) writes that Sioli also “told a fish enthusiast, the pilot of Panair do Brasil (Brazil’s only commercial airline at that time) with whom he flew on several occasions, about them.” His name was

Capitão Mauro.<sup>3</sup> He piloted a Catalina aircraft on a weekly flight to Taraquá in São Gabriel da Cachoeira, Amazonas from Belém, Pará, with stops along the Rio Negro. He is said to have searched for the cardinal tetra and on “one occasion during 1952 he met some Amerindians who collected the first *cardinalis* alive for him” (Géry 1994:83). The cardinal then became popular among enthusiasts in São Paulo. In the years that followed, Capitão Mauro would occasionally organize the collection of cardinal tetras for sale in São Paulo and Rio de Janeiro. It seems likely that Capitão Mauro was collecting as late as 1957. During that year, German adventurers Georg and Thea Seitz claim to have met a “tall, fair young man” in Taraquá: “He turned out to be a Panair pilot who spent his holidays here. His hobby was catching tropical fish. He proudly showed us his catch: about ten thousand gaily colored little fish merrily swimming about in some forty tins. It seemed to be a quite lucrative hobby, every fish - if it survives the journey - fetching up to fourteen schillings [or US\$ 2.00]” (Seitz 1963:67).

At the end of 1953, Amanda Bleher<sup>4</sup> saw these “red neons” in São Paulo during an expedition she made to South America in search of the discus (Géry 1994:83). She was told that Capitão Mauro was the source of these fishes. In March 1954, she would become the first person to attempt to export cardinals, traveling from São Paulo to Frankfurt, Germany. All of the fishes arrived dead.<sup>5</sup> Eventually, people in Europe and the US “became aware of this jewel through the subsequent publications mentioning the mysterious new neon” (Géry 1994:83).

At the beginning of 1956, the first living examples reached the US. There exists some debate as to who exactly is responsible for the commercial introduction of the cardinal tetra, Fred Cochu of Paramount Aquarium or Herbert R. Axelrod. On the one hand, there are those who believe that Cochu introduced the cardinal tetra to the US ornamental fish market in early 1956 (Socolof 1996:58; Dow 1995:172).<sup>6</sup> Axelrod (1976; 1980; 1994; 1997a; 1997b), on the other hand, claims it was he.<sup>7</sup>

Axelrod, however, did not initially take credit for the discovery of the fish at the time of the debate related to its original scientific description. Axelrod (1956:16) wrote: “on February 10<sup>th</sup> or 11<sup>th</sup> the beautiful Scarlet Characins were brought to my attention by several of my friends. Sol Kessler, a fish dealer in a nearby New Jersey town, was kind enough to give Bill Vorderwinkler a few specimens” (Axelrod 1956:16). This statement makes it difficult to believe that Axelrod actually traveled to Brazil at that time. In fact, in much of the rest of the same article he attempts to explain how he discovered the eventually-proven-to-be erroneous locality of the new fish he received from Kessler. Consider the following quote: “I knew that Fred Cochu and his father-in-law, Herr Schnelle of Paramount Aquarium, were probably the only two white men to know the exact locale [of the cardinal tetra] and I further knew that they wouldn’t be fools enough to tell me or anyone else” (Axelrod 1956:17)!

### **5.1.b. Debate over the Original Description of the Cardinal Tetra**

At the beginning of 1956, specimens reached prominent American ichthyologists, George S. Myers and Leonard Schultz. The cardinal tetra was described simultaneously, but independently in different journals in February 1956. Leonard Schultz from Smithsonian Institution published his description of the *Cheirodon axelrodi*, or the “scarlet characin,” in the *Tropical Fish Hobbyist*. George S. Myers and Stanley Weitzman of Stanford University published their description of the *Hyphessobrycon cardinalis*, or “cardinal tetra,” in the *Stanford Ichthyological Bulletin*. After some debate concerning who would be given the ultimate credit for the description (Hoedemann 1956), the International Commission on Zoological Nomenclature, on June 24, 1957, decided in favor of the name *Cheirodon axelrodi*, Schultz.<sup>8</sup> Much of the debate revolved around the timing of the publication,<sup>9</sup> type locality of the holotypes, and the fact that the *Stanford Ichthyological Bulletin* was a professional journal, rather than a popular magazine like the *Tropical Fish Hobbyist*. Apparently, Schultz and Myers were quite surprised at the coincidence, and shared no ill will as a consequence. Since the original description, Géry (1960) reworked the systematic position of the neon and cardinal tetras. Weitzman and Fink (1983) later placed both species in the genus *Paracheirodon*.

### **5.1.c. Debate over the Locality Data of the Cardinal Tetra**

The locality of the cardinal tetra was a kept secret for some time (Géry 1994:84). Later, it became well known that they were caught in the tributaries of the Rio Negro, above the Rio Branco. The first two descriptions of the cardinal

tetra included different type localities. Schultz (1956:42) reported the type locality of his two specimens as being somewhere near Porto Velho on the Rio Madeira. His locality data came from Axelrod (1980:17). Axelrod thought that Cochu and his brother-in-law Schnelle would not easily give up the locality of the cardinal tetra:

This fish was worth thousands of dollars and when others found out where they were getting the Neons from, the market was killed.... They didn't want the same thing to happen to this fish.... I asked a very good friend of mine, Mr. Mervin Roberts, to ask Schnelle where the fish comes from. Schnelle and Roberts are close associates. Roberts could not get a specific locale from Schnelle. Then I remembered a man who used to collect fish in that region. I told him the story... he told me where the fish come from (north of Porto Velho on the Rio Madeira). He knew the exact area... [he] even told me how to get there by plane. Take a four engine plane to Manaus, then a small seaplane to Porto Velho (Axelrod 1956:17).

Meyers & Weitzman (1956) gave the type locality as the Rio Negro. The precise locality of the holotype was withheld from publication at the request of Paramount Aquarium (Weitzman & Fink 1983:389). The type locality was actually recorded as Thomar, Rio Negro (0°25'S, 63°55'W; lying within the municipality of Barcelos on the right margin of the Rio Negro<sup>10</sup>) and the date of collection was given as winter of 1955-56.

More confusion was introduced into the debate over the cardinal locality when Axelrod wrote that Schnelle of Paramount Aquarium gave Myers information that indicated that the cardinal tetra was "collected around Manaus (near the mouth of the Rio Negro)" (Axelrod 1956:17). Axelrod thought Meyers' was naïve to think that Paramount would provide locality data that would allow

other importers to find and collect the fish that it was then exporting exclusively. Weitzman (1956:257-58), however, claims that Meyers knew that the fish was found on the Rio Negro, but never said it was found near Manaus.

The mystery surrounding the locality of the cardinal tetra would be sustained for some years. German anthropologist Harald Schultz (1959:5), for example, would write about “the discovery a short time ago of the Cardinal Tetra, *Cheirodon axelrodi* in the upper reaches of the Rio Negro and near Porto Velho.” Mystery would also surround the discovery of a third species of neon, the *Paracheirodon simulans* described by Géry (1963). The holotypes of *P. simulans* were recorded as having been collected by H. W. Schwartz from the Rio Purus during November 1962. Géry (1966c:231), “corrected this locality to the Rio Jufarís, which empties into the Rio Negro near the mouth of the Rio Branco. The correction was supplied to Géry by the collector, H. W. Schwartz” (Weitzman & Fink 1983:389-390).

## 5.2. THE ORGANIZATION OF THE CARDINAL TETRA COLLECTION

Based on my fieldwork and a review of the literature, the following chronology of the development of cardinal tetra production emerges. The limnologist Harald Sioli discovered the existence of the cardinal tetra in 1952. Others, interested in its commercialization, subsequently learned of its existence. Initially, the first fortune seekers would explore the areas closest to the location of the cardinal’s original sighting by Sioli. By 1955, it appears that several people

were collecting cardinals on the upper Rio Negro, at least above Santa Isabel. In this phase of commercialization of the cardinal tetra it is likely that collectors worked alone as they tried to cash in on the limited supply in the market, selling what they could carry from the region. It would take the until the end of the decade before those interested in its organized production would realize that the cardinal's natural range extended east to the Rio Branco, and could be found in much greater quantity in the tributaries of the middle Rio Negro.

Capitão Mauro (Comandante Malmer) may have sold some of the cardinals to an exporter in Belém by the name of Takase. Takase shipped Amazonian fishes to the Chung's in Georgetown. Sometime during the mid 1950s, Madame Chung visited Takase in Belém. Takase showed her cardinal tetras he had in his facility. One former exporter told me that Ms. Chung informed him that she "was crazy for any quantity" of the finely colored fish. Takase would later send his son to Tapurucuara (Santa Isabel) to organize the collection of cardinals to sell to the Chungs. I was unable to determine if this ever, in fact, occurred. Because of the regular air service of Pan Am in Georgetown, the Chungs and Harry Jardin would eventually become the principle shippers in the export of cardinal tetras, chartering DC3s to pick up fish from Manaus. New air routes were eventually introduced, and Boeing 707s began service to Manaus in 1962.<sup>11</sup> Non-stop flights to the US would begin at that time; direct flights from Manaus to Europe, first to Paris, would begin in 1976 (Adolfo Schwartz, personal communication). The exportation of cardinal tetras thus greatly facilitated, transshipment from Georgetown became unprofitable.<sup>12</sup>

In 1958, Axelrod traveled to Manaus to meet Harald Schultz<sup>13</sup> after learning of him from industry insiders. Harald Schultz would introduce him to Hans Willy Schwartz.<sup>14</sup> During that first meeting, Axelrod convinced Schwartz to enter the ornamental fish business; a prodding that would have profound influence on the socioeconomic future of the middle Rio Negro basin. Schwartz soon started an ornamental fish export business called *Aquário Rio Negro*, and he and Axelrod became business associates for some years.<sup>15</sup>

Schwartz began shipping fish from Tabatinga between 1958-1960. Schwartz shipped some product to Manaus by plane, and the rest were shipped in a large canoe tied up to a 15hp boat, changing water regularly during the trip. He hired Gentil Rocha to set up a collection operation. Gentil Rocha was experienced in ornamental fish collection, working out of Benjamin Constant/Letícia by at least 1951. Rocha had worked for Cochu, but because he was discovered collaborating with a competing exporter called Companhia Asa, he was released.<sup>16</sup> Rocha began buying on the Rio Negro on his own in about 1964, competing with Schwartz.

### **5.2.a. The Birth of the Piabeiro (Ornamental Fisherman)**

The commercialization of the cardinal tetra occurred at a significant historical moment on the Rio Negro. With the postwar decline in the demand for rubber, economic activity along the Rio Negro slowed. The population of Barcelos and the rest of the Rio Negro basin had been greatly reduced in the years that followed the rubber boom. Many Amerindians returned to the upper

Rio Negro or settled along the riverbanks, while much of the rest of the population moved to Manaus. In 1960, the population of Barcelos, including Carvoeiro and Moura, was 12,060 (IBGE 1960), with only twenty percent residing in the municipal seat (Galvão 1979b:264). At that time, specialist laborers and local industry had left the region, and except for the small fixed group of merchants and civil servants, the rest of the population who remained moved according to seasonal extractive activities. The few Portuguese and *caboclo* patrons who remained had diversified or begun to operate their extractive endeavors from Manaus. Despite the reduction in population, there still remained a surplus of labor given the lack of viable economic alternatives, a situation that had not been the case since the colonial period.

At the end of WWII, debt peonage began to fade throughout the Amazon basin. Improvements in the means of communication and transport, state intervention, and the increasing use of money, began to allow more freedom in trading arrangements (Miyazaki and Ono 1958; Galvão 1979a and 1979c; Bakx 1988; Burkhalter and Murphy 1989; Ayres 1992; Cleary 1993; Harris 2000). Falling prices for extractive products reduced the patron's capability to finance his clients' subsistence, allowing for an increase in the number of petty commodity traders (Ayres 1992:117; Galvão 1979a:136). Producers now had more freedom to choose between the growing numbers of patrons. These new socioeconomic condition also meant that patrons could be more selective as well.

Cash payments began to replace barter where clients were able to pay off the

their debts. Due to competition for clients by patrons, the patron had no choice but to pay credit balances in cash. The use of cash also increased the importance of the rural towns as rural producers began searching for lower prices than offered by the river traders. Many individuals from the interior elite began to shift from the role of patrons of extractivism to urban-based merchandisers.

Wage labor in and around the larger urban areas grew steadily (Cleary 1993:337), and would become one of a number of income earning options for the independent rural producer (Ayres 1992:122). The result of these changes in the rural Amazonian socioeconomy led to a growing importance of the rural towns and established the conditions for geographic mobility among the petty commodity producers (see Bakx 1988:152).

After WWII, the empire created by J.G. Araújo would begin to crumble as the war effort brought attempts at rationalizing the production of rubber (Benchimol 1994:14).<sup>17</sup> In 1942, the U.S. government monopolized the purchase and sale of rubber and finance in the Brazilian Amazon. By instituting the *Banco da Borracha*, they hoped to eliminate the role of traditional exporters and aviadores. The U.S. operated Rubber Development Corporation also began to supply the “*soldados da borracha*” (rubber soldiers) with provisions. In addition, Benchimol (1994:14) posits that J.G.’s descendants lacked the interest, dynamism and capacity to adjust and adapt the *casa aviadora* to the necessities and transformations of post-WWII Amazonia. By 1941, Araújo’s Rio Negro Empire was being replaced with a variety of competitors.<sup>18</sup> By 1949, there were four firms navigating on the Rio Negro as far as Tapurucuara (Santa Isabel): SNAPP; J. G.

Araújo; HIRAN, operated by the State of Amazonas; Higson & Cia. (Carvalho 1952:12-13).

The increase in competition for shipping revenues increased internal communication within the Rio Negro basin. Additionally, battery powered radios were by then able to pick up stations located in Manaus (Carvalho 1952:88). From at least 1952, Panair, a Brazilian subsidiary of Pan Am airlines, operated weekly flights from Belém to Taraquá on the Rio Uaupés, stopping at the municipal seats along the journey. These flights facilitated travel for the larger merchants, state and federal civil servants, and local politicians, as well as improving the postal service in the region. Local merchants were also able to utilize outboard motors and aluminum canoes to increase communication between the towns and sítios, and the locations of resource extraction (see Davis 1997:387).

The SPI became more active in the region as well. In 1954, the Brazilian Indian Protection Service (SPI) established a post on the upper Deminí in order to pacify the Yanomamo (Ferguson 1995:156). The Salesian mission had by now also become an established force in the social and religious life of Barcelos.

The collection and sale of ornamental fish offered a degree of debt relief and freedom from the rigid patron/client relations to which petty commodity producers had become accustomed. In the first few years of the trade however, those who owed their traditional patron were allowed to enter the fish commerce only when the debts were paid off. The piaba pioneers relate that “traditional” patrons, dealing in such products as rubber and piassaba, did not care much for

the piabeiro since they “did not belong to them; they didn’t like the seringueiros either, for that matter.” Nor was the client class very optimistic about the prospects of ornamental fish collecting. Many had no faith in fish collecting and joked a lot with the original piabeiros, poking fun at their fishery: “that’s not work, work is Brazil nuts and *fantasia*” (pelts and skins);<sup>19</sup> “that’s work for fools and lazy men.”

Many extractive producers would find *pegando piaba* (catching fish) much easier and tolerable. Producers and their families were accustomed to “patron time,” moving to various localities to extract forest resources or plant gardens. They might stay in one *paragem* (stop), or a series of *paragens* (stops), depending on the season, product abundance, and logistical constraints; it was also possible to stay in the same place for several years. When the possibility of ornamental fishing became an option, there were a number of willing recruits. According to one fisherman:

The opportunity to fish was at least better than being stuck in the jungle. At that time, nobody had ever been to Manaus before. By fishing we would be called upon once and a while by Schwartz to come to Manaus on his boat. One could now go to Manaus to visit and receive money that could be used to buy products that were much less expensive than those sold by patrons in the interior.

### **5.2.b. The First Years of Ornamental Fish Collection on the Rio Negro**

In 1959, an individual named Dr. Roosevelt owned a building near Schwartz on the Rua Miranda Leão, where he sold piassaba and caiman skins. It seems probable that Schwartz, eager to learn of potential sources of cardinal tetras, asked his neighbor to undertake some exploratory research for him. At that time, Louro Fontes, a petty commodity producer from Barcelos, was obtaining caiman skins for Dr. Roosevelt on Rio Curuduri, near the mouth of the Rio Aracá. Roosevelt asked Fontes to locate and collect a sample of cardinal tetras on the Curuduri. Louro Fontes and his son, Silas, would become the first full-time piabeiros on the Rio Negro.

The first ornamental fishery in the Rio Negro was established on the Rio Itú, on the left margin, just above the Rio Deminí. In 1960, Padre Estevão, of the Salesian Mission in Barcelos, showed up at the mouth of the Igarapé Aduiá, on the Rio Itú, looking for samples of cardinal tetras. He learned of the existence of the cardinal tetra from João Viana. He took two thousand cardinal tetras and sent them to Willy Schwartz (João recalls that the Padre and Schwartz were kin; Schwartz was Jewish). According to informants, Schwartz traveled together with the priest throughout the region. In that same year, Schwartz would lead an expedition to the Igarapé Aduiá (Schwartz 1961). There, he and nine workers met up with João and four others from the area. Informants say they fished there for the first two years, collecting only cardinal tetras; Schwartz did not leave material to store fish during those years. He would bring his own fishermen and a number of 20-liter kerosene cans for transporting the fishes. At the fishing

camps, fish were stored in plastic lined baskets, woven by family members of the fish collectors. The baskets were covered with leaves of inajá (*Maximiliana regia*) to shade the stock from the sun. The fishermen would spend three to four days fishing, and Schwartz' personnel would return to Manaus. One of Schwartz' boats would stop at the Aduiá every 15 days during the first fishing season, taking 2.000 - 3.000 cans of fish. The piabeiros were paid 20 centavos/1,000 in the early years. After two to three years, dirty, rusty cans were utilized in the collection sites as well. Schwartz would later stop sending non-locals to the Itú.

During the next few years, Schwartz continued to establish teams of fish collectors (*freguesia* or *cliente*), most likely with the help of Padre Estevão. The second source of fish to be exploited was the Rio Jufaris basin, followed by the Rio Cuiuni, Paraná Atauí near the mouth of the Rio Preto, the igarapés on the left margin of the Rio Negro facing Barcelos, and the tributaries of the Rio Negro near Santa Isabel. Schwartz outfitted the collecting groups well, including money: "whatever we needed. At the time everything was easy, nothing was lacking. We were paid on delivery; he paid little, but he paid. We never lacked money; we never went hungry under the power of Schwartz." During the first years, Schwartz followed the economic pattern of *aviamento*, exchanging clothing, radios and other merchandise, and maybe small amounts of currency. Although the relations of production between Schwartz and his clients followed the pattern of *aviamento*, they differed in the fact that Schwartz did not charge a premium on the goods he sent to his fishermen. Money as a means of payment, however,

only became more common as the fishermen personally transported the fish to Manaus.

After the first year, Schwartz began buying boats and sending them to fishing areas. He would send employees to take merchandise from Manaus to the fish collectors, and bring the fish down to Manaus, leaving the fishermen to fish. When the collectors had a large number of fishes collected, they would send notice to Schwartz who would then dispatch one of the boats to pick them up. After the second year, fishermen from the various areas transported their own fish directly to Manaus. Shelves were often constructed within the interior of the boats to transport more fish. An individual in each group of fish collectors was provided a boat. For some time, however, Schwartz continued to send employees to the more remote Santa Isabel to pick up fish. In this way, he rationalized the transportation function of his operation, passing the responsibility to his client fishermen for organizing shipment downstream to Manaus. In many respects, Schwartz created a small group of patrons in that he selected who would get a boat to work with. The privileged few chosen would then have the responsibility of organizing the actual collection process, which generally meant employing the services of close family and kin. Unlike the conventional *aviamento* system, Schwartz removed the credit function, paying cash for the product delivered.

With the collection and sale of ornamental fish, going into debt with the patron, characteristic of relations of production in the extractive economy up until that time was significantly reduced. After the first *piabeiros* settled their accounts

with Schwartz, a cash balance was still due them; they were actually able to accumulate capital. One informant noted: “Schwartz always had money; he financed his personnel and paid on delivery, other patrons were often shady.”

With time, Schwartz requested that fishermen bring all types of fish. They transported a mixture of fish species. No one really knew what he or she was collecting; only that Schwartz wanted a variety, which they unquestioningly furnished. Schwartz sent the samples to market; if they sold well, fishing effort for the species in question was organized. In this way, the common variety of fishes exported from the Rio Negro was established. The igarapés that drain the large interfluvial areas between the Rio Deminí and the Rio Jufarís, on the left margin of the Rio Negro, became more important in by 1963, due to the many varieties of fish found there. One informant remembered: “There appeared so many varieties of piaba, it was confusing!”

In 1964, Louro Fontes and his son Silas, as well as and another person discovered the discus (*Symphysodon discus*) and aruanã (*Osteoglossum ferreirai*) in the Paraná Curudiqui, below the mouth of the Rio Branco. In 1965, Anildo Macedo found the heckel discus on the Rio Deminí. The rummy-nose tetra (*Hemigrammus rhodostomus*) was discovered at the same time as the discus, inhabiting the same habitat along the shores of the Rio Negro.

The Paraná Atauí was initially the most productive fishery for cardinal tetras; informants are virtually unanimous on this point. One informant told me: “There were many fish available there, what was lacking at the time were buyers. Cardinals would descend the igarapés in schools ten meters in width.” Another

said “eight persons could collect 700,000 cardinals in three days.” The shore of the Atauí would attract large numbers of cardinal collectors during the early decades. According to one veteran piabeiro, “Schwartz’ competitive position became very strong with the quantity of fish that the Atauí contributed to his overall production. Atauí resolved any supply problem that may have existed at the time.”

Less spectacular, but still significant, production occurred in other fisheries as well. On the Rio Tea “they were catching so many cardinals during the first decade that they often lacked a sufficient number of shipping containers, releasing many thousands of fishes from the holding nets, only to fill them again the next week.” On the Igarapé Marmore of the Rio Cuiuni, piabeiros claim that a crew of three could collect 130,000 cardinals in one day, 485,000 in a week: “we caught a lot, really a lot.” Veteran piabeiros recall that, in general, production was much higher than it is today. Most also say that fish captured during the first decade were larger on average than today.

### **5.2.c. The Cardinal “Rush”**

The possibility of profits from ornamental fish from the Rio Negro did not go unnoticed. Many came to exploit the cardinal rush. By 1964, there were at least six firms exporting ornamental fish from the Rio Negro: “At that time news ran swiftly, ‘boy, go to the Rio Negro. There they have a type of fish that can earn a person a lot of money quickly.’ In those days, it was really quick. Everybody came running from Benjamin Constant and Tabatinga.” Gentil Rocha, mentioned

above, made his way to the Rio Negro shortly after Schwartz began organizing production there, arriving in the middle of the harvest of 1961. Chico Loureiro, a regatão and whose son now operates the business, arrived a bit later from Benjamin Constant and formed Aquário Tabatinga. Ornamental fish dealers from Belém, such as Henrique Lopes also began buying fish in Barcelos. Anildo Macedo, a native of Barcelos entered the fish trade, with Hélio Peretti, a native of São Paulo, forming Aquário Amazonas. Anildo Macedo's brother provided him with a boat to buy fish in 1964. Macedo arranged to have an airport constructed in Barcelos. The landing strip was cleared in 12 days with axes, hoes and machetes. A small plane came twice a week that could carry 78 boxes. Macedo and the municipal government paid the bill. Later, Macedo and Peretti developed irreconcilable differences and separated leaving Macedo to found Cardinal Aquário.

By 1964, the ornamental fish "boom" had reached higher up the Rio Negro. Gutinho Lacerda, the Prefect of Santa Isabel, began dealing in ornamental fish. He had a 60 x 12 concrete tank constructed near the airfield. The tank was fed with freshwater from a nearby stream. Canals to and from the tank were excavated and lined with wood. Shipment from Santa Isabel was also made by air. Fish were shipped in plastic bags with oxygen, packed in cardboard boxes. He paid people with cash. I was informed that at the outset, he was so excited at the economic potential, he encouraged his clients to pay off their debts at the *taberneiro* (general store/ trading post), and prepare to make some money. Between 6-8 million cruzeiros traded hands on the weekend during that time. As

a Stoll engine dealer, he provided boats to his clients, but never he collected the total amount due: "He never worried about recovering his investment in the engines he provided." He stocked fish in the dry season for sale in the rainy season. During the dry season he sold 300,000/week. During the off-season exporters, Anildo Macedo and Willy Schwartz would buy fish from him. In 1970, he was getting a million fish/week. Lacerda left the fish business after suffering several setbacks. In one setback, the storage tank broke, releasing an unknown number of fish. In another, 2,080,000 fishes were killed when some fishermen released *timbó* (vegetal poison) into the headwaters of the stream that supplied water to his holding tank. In the last setback, he sent a shipment to Manaus, paying the boat crew to take care of his fish. He flew back to Manaus to receive the shipment and arrange for its sale. When he met the boat in the port, he found 1,200,000 dead cardinals and a drunken crew. He threw the crewmembers in the river and vowed to leave the fish business, trading his plastic shipping containers for bananas.

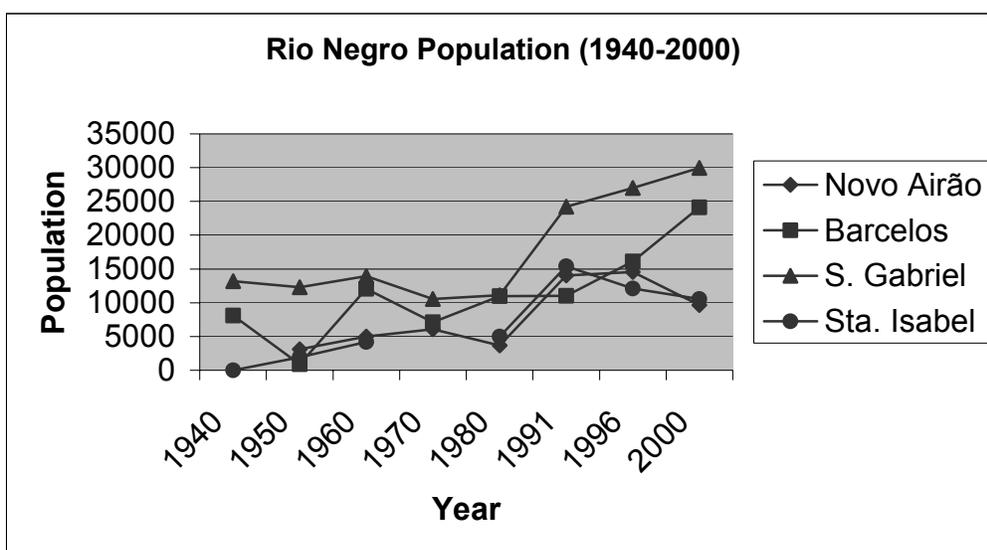
### **5.3. RECENT POLITICAL AND ECONOMIC CHANGES IN THE RIO NEGRO BASIN**

Since the ornamental fishery became a major component of the middle Rio Negro socioeconomy, several important political and economic changes have taken place in the basin: an increase presence of the state, principally the military; a new transportation system; the end of rubber production; the growth

and decline of *sorva*; a growing interest in mining activity; and the urban growth of Barcelos.

In 1968, the military government designated the municipalities of the Rio Negro as part of *Área de Segurança Nacional*, or National Security Area. During the mid-1970s the *Plano de Integração Nacional* (National Integration plan) was created to initiate development projects in Brazil. A road (*Perimetral Norte*, BR 307) was planned to run along the northern frontier, from Boa Vista to São Gabriel. The construction was part of a geopolitical plan of territorial integration and control of the frontier. In 1985, Project Calha Norte was created to promote the occupation and development of the Northern Amazon Region. These projects transformed the upper Rio Negro by increasing the number of migrants and military personnel (see Figure 5) (Oliveira 1995). The middle Rio Negro has both benefited and suffered as a consequence of these projects.

**FIGURE 5**



Source: IBGE

The development schemes in the upper Rio Negro also allowed for an influx of capital, and a restructuring of transportation services in the region. While state intervention in eastern and southern Amazonia was based primarily on the construction of the Transamazonian highway, it was the the *Zona Franca* (Free trade Zone), established in Manaus in 1967, that brought an increase in investment to the state of Amazonas. One of the effects of this intervention was a significant growth of commercial activity in Manaus, leading to a reduction in price of many commonly used products in the interior, as well as some luxuries, especially televisions and radios. The shipment of merchandise, building materials, and passengers to São Gabriel allowed for the regularization of transportation services, and an increase in the number of shippers. With the dissolution of the *casas aviadoras*, transporters became more specialized, operating more like common carriers, than agents. The newer shipping firms were not buyers of extractive products, nor were they sellers of merchandise, they sold transportation services. By 1985, most exporters of ornamental fish utilized the *recreios* (regional boats), to handle weekly shipments.

Food fish have always been in short supply in the upper Rio Negro (Chernela 1992; Wallace 1889), but increased fishing effort to meet the demand of a growing population placed further pressure on the local stocks. The growing population has provided more opportunities for petty commodity producers along the middle Rio Negro, who find a voracious market for food fish. Various communities along the Rio Negro now catch fish which they sell to the passing

recreios on their way to São Gabriel; as well as *armadores* (commercial food fishermen) from Manaus. Many local communities resolve many of their consumption needs through trade with armadores and the passing recreios; they are considered elements of community subsistence strategies. They are provided with ice, a rare and extremely desirable commodity in the interior, fuel, and other desirable things. Tucunaré (peacock bass, *Cichla* sp.) is one of the more abundant species, and is in high demand in the urban centers. This specie is thus generally highly sought. But now many in the municipality of Barcelos complain that food fish are now scarcer. Increased fishing effort to meet the demands of passing recreios and the entrance of Manus-based armadores into productive resources of food fish, coupled with the growing population in the cities of Barcelos and São Gabriel, contributes to pressure on fish stocks.

In the region of the Rio Arirahá, and to a lesser extent in along the Rio Itú, the local communities have come into conflict with a tour operator who recently constructed a jungle lodge from which he initiates “catch and release” fishing excursions.<sup>20</sup> The tour operator complains that the locals are overfishing the area, compromising the viability of the fish stocks, and thus his tourist business. The locals complain that they are entitled to make a living, and that outsiders (the tour operator is American) have no right tell them what they can and cannot do. Where little money enters the local economy, riverine inhabitants come to depend on the periodic visits of recreios and armadores for subsistence items, referring to their trading partners as *amigos da gente* (our friends).

During the decade of 1970, sorva (*Couma* sp.) became an important extractive product in the Rio Negro. There are two types of sorva, which is a latex used to make chewing gum, varnishes and paint: *sorvinha* (*Couma utilis*) and *sorvão* (*Couma macrocarpa*). They are found on the terra firme, and are obtained either by tapping or felling the trees. Exports of sorva began in 1970, reaching a peak in 1976, but were almost nothing by 1990.<sup>21</sup> Many of the former patrons of sorva went on to enter the ranks of the ornamental fishery. Although rubber production has continued to have some importance in certain regions of Amazonia like the Juruá basin and Acre, in the middle Rio Negro production ceased with elimination of federal subsidies in the mid 1980s. Since that time, piassaba and ornamental fish have been the key extractive products exported from the region.

Mining has also gained in importance since WWII. The implementation of the Calha Norte brought with it an increase in requests to prospect for minerals, particularly gold (Oliveira, *et al.* 1994; Oliveira 1995). Large mining companies like Goldamazon and Paranapanema, and independent prospectors (*garimpeiros*), began prospecting in the upper Rio Negro. This new economic activity was accompanied by numerous conflicts related to environmental damage, social disruption, and indigenous land rights. Mining was principally concentrated in the Içana and Cauburis rivers, but *garimpeiros* were working throughout the basin, including the Rio Negro above Santa Isabel, and the Aracá and Padauri rivers in Barcelos.<sup>22</sup> Most of the *garimpeiros* involved were formerly operating on the Rio Tapajós and Rio Madeira. The federal government ordered

the removal of all mining concerns from the basin in 1993. At the time I began my fieldwork there were a number of former *garimpeiros* living and working in Barcelos, who, by 1999, had moved on, mostly to Roraima.

During the last five years, there has been an increase in the mining of tantalite. Tantalite has low radioactivity content and is used in the manufacture of capacitors, and as wire for their connection to circuits, nuclear reactors, jet engines, and cellular phones. The municipal government and merchant class of Barcelos have shown a keen interest in the mining of tantalite in the basins of the Padauri and Aracá. Several of the more prominent merchants and a former *Prefeito* (prefect or mayor) were investing in the extraction of tantalite when I left the field. Tantalite prospecting has offered another petty commodity production alternative for some individuals in the region. Several of my informants in the ornamental fishery had discontinued fish collection in order participate in the tantalite extraction, either by prospecting or providing transportation.

As in other regions of the Amazon, urban growth in the interior of the Rio Negro has been significant (see Ayres 1992; Cleary 1993; Nugent 1993). Since 1990 the population of Barcelos has nearly doubled, and the population of São Gabriel has tripled, while the populations of Santa Isabel and Novo Airão have decreased by about thirty percent (Figure 5). Much of the population increase in Barcelos can be attributed to the increase in commercial activity and government employment in the city, as well as to the provision of health care and education. Many of the current residents in the city of Barcelos have migrated from São

Gabriel, Santa Isabel, and the riverine communities within Barcelos. Migrants from São Gabriel have come because of population pressure and the difficulties associated with subsistence production. The lack of economic opportunities and *movimento* (movement, meaning social activities) in Santa Isabel and the riverine communities has prompted many to move to Barcelos. The process of out-migration is as significant as in-migration. Given the lack of opportunities for gainful employment in Barcelos, many migrants eventually move on to Manaus.

Other than piassaba, minerals, food fishing for local markets, and occasionally Brazil nuts, depending on the market price and yearly yields, the ornamental fishery has become the principal extractive activity for residents of the Rio Negro, contributing nearly sixty percent of local tax revenues, and stimulating demand of the services of resident merchants. There are very few other economic opportunities other than public sector employment, ecotourism, and employment at the palm heart processing plant. 1991 census data (IBGE) reveal that despite the increasing presence of the state, the literacy rate continues to be quite low, less than fifty percent; and lower for women, older, and rural residents. Health care is a continual problem as equipment, medicine, and health professionals are in short supply. It is in this actual context that the importance of ornamental fishery can be understood. An eventual “bust” of the fishery would compound already difficult socioeconomic problems.

#### 5.4. NOTES

<sup>1</sup> Sioli also sent preserved specimens of the fish in 1953 to Ladiges, an expert on South American Characidae, but, apparently, “the collection was lost in the post” (Geisler and Annibal 1986:8).

<sup>2</sup> Sítio Caburis is located at the mouth of the Rio Içana near São Felipe (Ladiges 1956; Weitzman 1956:257; Weitzman & Fink 1983:389).

<sup>3</sup> According to one former fish dealer in Manaus, the pilot in question actually was Comandante Malmer, and not Capitão Mauro. The Comandante lived in São Paulo, but worked out of Belém.

<sup>4</sup> Amanda Bleher is the mother of Heiko Bleher, a well-known international, ornamental fish collector and the founder/publisher of the hobbyist magazine, *Aqua Geographia*.

<sup>5</sup> She also hand carried some fish with her in fish cans, but they died in a bus accident (Géry 1996:83).

<sup>6</sup> According to Socolof (1996:58), it was Cochu who brought in this “wonderful new fish. He had it all alone. This he called the Cardinal Tetra.” Additionally, interviews I conducted with former industry participants in Brazil indicate that Cochu was responsible for the introduction of the cardinal tetra into the US. He had learned about the cardinal tetra’s existence from ethnographer Harald Schultz, who would later write for Axelrod’s magazine. Cochu never entered the debate. It is possible that he was not very interested; possibly because, as Dow (1995:173) has stated, Cochu “did not want discovery credit, but commercial credit.”

<sup>7</sup> “Unquestionably, the most beautiful fish I ever discovered was the cardinal tetra, *Paracheirodon axelrodi*” (Axelrod 1997a:95).

<sup>8</sup> The Opinion of the International Commission on Zoological Nomenclature is reprinted in Axelrod (1980:32-53).

<sup>9</sup> Axelrod has written, “the fact is that it would take TFH a minimum of 30 days to produce and distribute its magazine and that it might take but a few hours to print the 4 page issue of the Stanford Bulletin tends to indicate a little bit of strategy to beat Schultz to the punch with a name” (Axelrod 1980:17). He later wrote: “When Myers heard about Schultz working on the Cardinal Tetra and his plan to name it in my honor, he worked quickly with his student, Stanley Weitzman, and published a four page issue of his *Stanford Ichthyological Journal*” (Axelrod 1997b:173). It should be remembered however, that Myers had known of

cardinal on upper Rio Negro in May of 1955 after speaking with Harald Schultz (Weitzman 1956:258). If Axelrod is correct, why would Meyers wait eight months to publish a description of the holotype?

<sup>10</sup> The exact locality would most likely have been either the Rio Ereré, or adjacent Igarapés downstream, which lies directly across the Rio Negro from Thomar (left margin), or the Rio Arirahá, which lies down stream a few miles (right margin), and from which some of its tributaries are only a short distance behind Thomar. Both rivers are still important collecting localities.

<sup>11</sup> “When Varig Airlines made regular stops at Manaus, the business boomed” (Socolof 1996:152).

<sup>12</sup> Political disturbances also caused exporters to close down or move on.

<sup>13</sup> Harald Schultz was a German anthropologist at the University of São Paulo who did ethnography among several Amazonian indigenous societies and was an avid ornamental fish hobbyist. Schultz had been doing fieldwork on the upper Rio Japurá between 1957 and 1959. He knew many of the Germans in Brazil. Schultz was acquainted with a German ornamental fish/animal dealer in São Paulo named Hans Stegemann. Schultz often brought different fish species back to Stegemann upon returning from fieldwork. Schultz also knew Willy Schwartz during the mid-1950s, but their relationship was not based on the fish commerce. Schultz would later write for Axelrod’s *Tropical Fish Hobbyist* as a means to supplement his field expenses.

<sup>14</sup> Hans Willy Schwartz was originally from Vienna, Austria, although he is known as the “*Alemão*” (German) by many in Barcelos. He went first to Bolivia in 1938 as a kind of adventurer looking to strike it rich prospecting. After the beginning of WWII he moved to Manaus where he opened a photography business and married Robine Benchimol in 1953. In 1955, because of his love for wildlife and some persuasion from Hans Stegemann, Schwartz entered the wild animal trade. He would become well known for capturing and exporting animals to zoos around the world.

<sup>15</sup> According to Axelrod (1997d:127), “the basic finance of [World-wide Aquarium] was assured by the weekly shipments of cardinal tetras from Barcelos on the Rio Negro in Brazil to our wholesale tropical fish establishment.”

<sup>16</sup> In 1953, Americans Mike Tsalickis and Trudy Jerkins became wild animal dealers in Tarpon Springs, Florida (Socolof 1996; Schreider and Schreider 1970). Their business was called the Tarpon Zoo and catered to zoos, medical laboratories and pet shops. Tsalickis ran their Colombian operation from Letícia. One informant who had worked in the region said “he paid his personnel very well, and had a lot of money.” Much of his animal business involved collecting wildlife in Brazil and selling it from Colombia.

Tsalickis also managed a Booth Line agency, and owned a luxury jungle lodge, guide service, brick factory, and ice plant. Tsalickis once stocked an island with squirrel monkeys after ridding it of predatory animals. He became well known after appearing in several episodes of *Wild Kingdom* and featured by the National Geographic Society (Schreider and Schreider 1970).

Fred Cochu assisted Tsalickis in getting started in the animal trade in the upper Solimões region (Socolof 1996:193-194). “Three months later [Tsalickis] showed his appreciation by entering the fish business competing with Fred... Fred never forgave him” (Socolof 1996:106). Tsalickis and Jerkins eventually closed the fish business in favor of the animal business.

Tsalickis was later rumored to be involved in illicit smuggling; he was airport manager in Letícia (Socolof 1996:106). He had been caught dealing in drugs, supposedly cocaine (Socolof 1996:146). He was arrested, fined and deported from Colombia in the mid 1970s.

“Cocaine and marijuana were the big businesses now. The fish collectors mostly worked for drug dealers (they still do). He had for some time been sending, from Letícia, boat loads of rough-cut logs. Using state of the art mechanical aids, and new glues he could cut a slab off the side of the log and hollow out a section. The cocaine was put in the hollowed out section, and then the removed slab glued back” (Socolof 1996:147).

Tsalickis would experience more problems later when the Brazilian police caught him smuggling the rare and protected hyacinthine macaw (*Anodorhynchus hyacinthinus*).

<sup>17</sup> All of the aviadores were affected by the creation of the Rubber Reserve Development and the Banco de Crédito da Borracha. The supply of the seringais and the acquisition of rubber would pass to these to organs, changing the socioeconomic structure profoundly (Reis1997b:163). After the war they would return to their traditional place in the regional commerce, albeit to a lesser extent (Reis1997b:164).

<sup>18</sup> Araújo’s empire would rein supreme from 1920 until his death in 1939, and his son’s in 1940.

<sup>19</sup> The hunting of ocelot, jaguar and other animals for their pelts, and caiman for their skins was a profitable enterprise in Amazonia during the 1950s. This activity was particularly intense in the Rio Jufarís basin.

<sup>20</sup> A large number of people in the region recount, in the most condemning fashion, stories about Armadores from Manaus entering the lake at the mouth of the Arirahá about 10 – 15 years ago. Apparently they trawled the lake so

extensively that fish and turtles (abundant in this area) for subsistence were scarce for some considerable time.

<sup>21</sup> Data were obtained from the Anuário Estatístico do Amazonas, Produtos Extrativos e Produtos Diversos, volumes 1-15, 1972 -1997. State of Amazonas: Comissão de Desenvolvimento do Estado do Amazonas, CODEAMA. Secretaria de Estado do Planejamento e Coordenação Geral, SEPLAN; also from: CODEAMA. 1972. Estado do Amazonas Estatística da Produção – Séries Retrospectivas:1961-1971. Produtos Extrativos e Produtos Diversos. Secretaria de Estado do Planejamento e Coordenação Geral, SEPLAN .Estudos Específicos 8(43).

<sup>22</sup> Mining activities were intense enough in the region that each time I was introduced to residents in the settlements and sítios of the interior as a researcher, the first question asked was whether I was researching minerals.

## **CHAPTER 6**

### **THE CARDINAL TETRA: FROM HABITAT TO CONSUMPTION**

In this chapter I will outline the linkages from local level to the global level of the ornamental fish industry by following trajectory of the cardinal tetra from their natural environment to the aquarium of some enthusiast. In this manner I will demonstrate the ethnographic aspects of the ornamental fish industry in order to explore the issue of sustainability of the ornamental fishery of the Rio Negro. In the first three sections, I describe the key environmental factors that influence the ornamental fish collectory, ecology of the cardinal tetra, and fishing methods and handling processes. In the fourth section I examine the relations of production at the local level and the link to the regional level. Section five describes the export process at the regional and national level. In the last section I describe the trade chain through the remainder of the commercial process, following the cardinal tetra to its final home in the hobbyist's aquarium.

#### **6.1. THE PHYSICAL GEOGRAPHY OF THE RIO NEGRO BASIN**

The area of the Rio Negro basin occupies about eleven percent (.75 million km<sup>2</sup>) of the Amazon Basin (7 million km<sup>2</sup>). The Rio Negro is the largest tributary of the Amazon River, contributing about fifteen percent of the Amazon's

annual discharge. The Rio Negro drains three geological formations: the ancient Precambrian Guyana Shield, late Cretaceous to early Tertiary lowlands, and Quaternary lowlands (Goulding, *et al.* 1988:17; Lundberg, *et al.* 1998:17). The extension of the Rio Negro from its mouth to its northwest headwaters in pre-Andean Colombia is more than 1,700 km, and 1,500 km to its northeast headwaters on the Guyana shield.

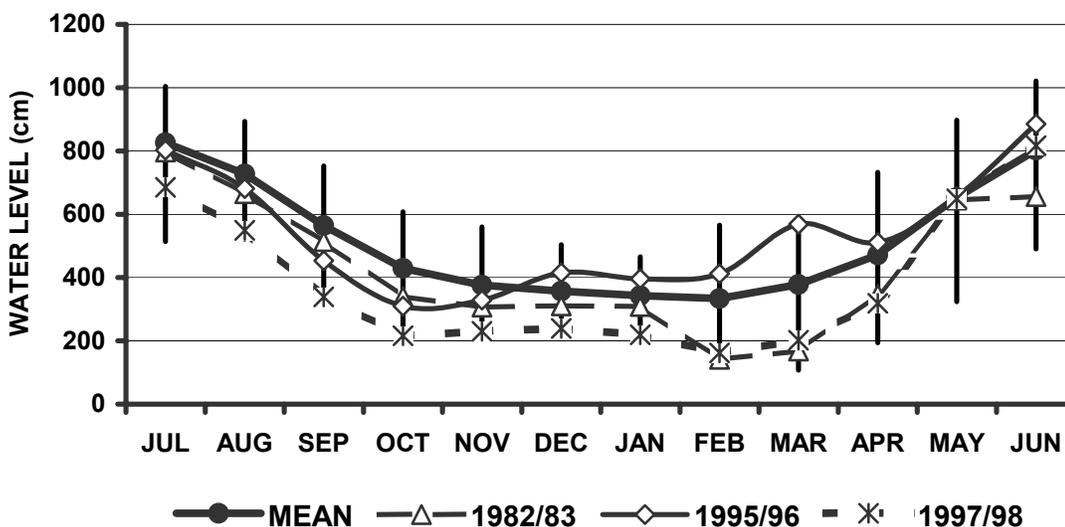
The Rio Negro, as its name suggests, is a blackwater river system, characterized by coffee-colored water, a high content of humic and fulvic acids, low pH (3.5 – 5.5), and a low concentration of dissolved nutrients and suspended solids (hardness <2mg/l, electric conductivity ~20 $\mu$ S).<sup>1</sup> Blackwater is formed by the decomposition of leaf litter through the leaching of rainwater in hydromorphic podzols (discussed in more detail below). Because the geological formations it drains are some of the oldest in the world, the Rio Negro is poor in dissolved mineral nutrients. The low pH is due to the high acidity of the ancient soils, the decomposition of leaf litter and the lack of buffering capacity due to the lack of calcium carbonates. Although the water of the Rio Negro is relatively transparent, light only penetrates between one to two meters. The dark color also allows for more absorption of solar radiation, making the water temperature somewhat warmer than other river systems of the Amazon basin (75-83F).

Annual precipitation in Barcelos is about 2,100 mm. The monthly average is above 230 mm from April to July, but less than 130 mm from September to March (Salati and Marques 1984). The rainy season lasts about five months, March to July. The water is highest from June to August, and lowest from

December to March (Figure 6). In Barcelos the water level raises about seven meters, and four meters in the floodplain (Chao 2001:164).

The archipelago Mariuá with over 600 islands, considered the largest fluvial archipelago in the world, occupies the stretch of the Rio Negro in the prefecture of Barcelos (municipality). Some of the islands are greater than 30km long and, like the floodplain (*igapó*), are inundated each year. There are numerous beaches of quartz sand washed from the Guyana Shield. Unlike the Rio Solimões-Amazonas, the Rio Negro does not transport many fallen trees and floating plants, but the shifting sands banks of the main river channel can complicate navigation.

**FIGURE 6**  
**WATER LEVEL STAGES OF RIO NEGRO AT BARCELOS (1967-1998)**



Source: Chao (2001:166).

Note: Vertical bars across the mean indicate the maximum and minimum ranges.

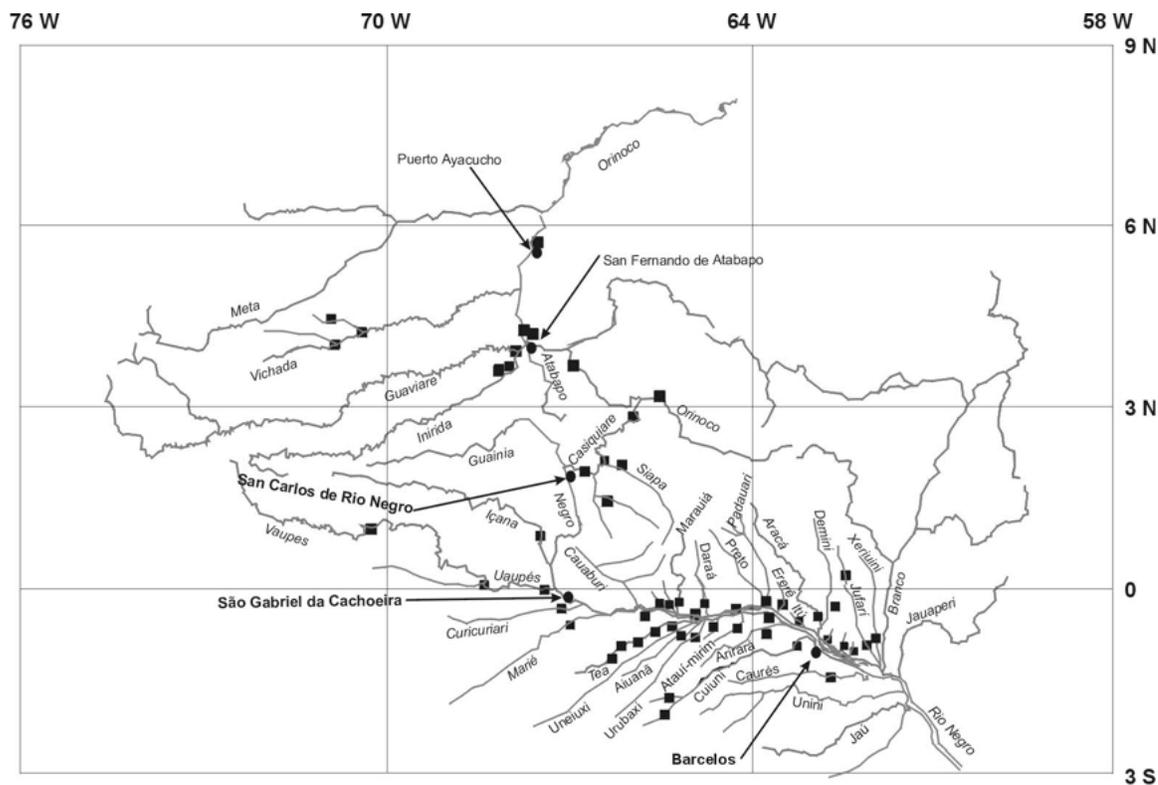
The height of the forest in the Rio Negro basin is less than that found in the whitewater basins of Amazonia. The headwaters of the clearwater streams of the Rio Negro are found in terra firme forest growing on latosols (yellow clay) (Goulding, *et al.* 1988). Terra firme forest also grows on oxisols (hydrated oxides of iron and aluminum) (Emperaire and Pinton 1993). The headwaters of blackwater streams are located on *caatingas* and *campinas*, stunted, almost shrub-like plant communities growing on sandy leached soils (podzolics), derived from degraded granite (Sioli 1984), or on gleys (sticky, bluish soil layer, formed under influence of water). For the piabeiros, *caatingas* and *campinas* are differentiated on the basis of height and openness. *Caatinga* refers to low, dense forest, found in the basins of the Urubaxi, Aiuanã, Uneuixi, and Tea, whereas *campina* refers to lower, sparser forest or savanna. There are many *campinas* in the areas where the fires of 1912 and 1926 caused considerable damage, particularly the igapós between the Jufarís and Preto rivers.<sup>2</sup>

## 6.2. ECOLOGY OF THE CARDINAL TETRA

Cardinal tetras occur naturally throughout the middle to upper Rio Negro basin and parts of the Rio Orinoco basin, and depend on the presence of wetlands (Harris and Petry 2001:213-214, see Figure 7). The eastern limit of their distribution is the Rio Caures on the right margin of the Rio Negro, and the Rio Xeriuni on the left margin. To the west, cardinal tetras appear in every tributary of the right margin to the Rio Içana, including the lower regions of the Rio Uaupés.

Cardinal tetras also occur in Colombia along the Atabapo river and its tributaries, and its occurrence has been reported in tributaries of the Rio Casiquiare and in the western tributaries of the Rio Orinoco in Venezuela .On the left margin of the Rio Negro, in Brazilian territory, the cardinal tetra occurs from the Rio Xeriuni to the Igarapé Jaradi, west of Santa Isabel. It does not occur between the Igarapé Jaradi and the Venezuelan border.<sup>3</sup>

**FIGURE 7**  
**KNOWN GEOGRAPHIC DISTRIBUTION OF *PARACHEIRODON AXELRODI* IN NORTHWEST AMAZONIA**



Source: Harris and Petry (2001:210).

Cardinal habitats are found in the shallow areas near the fringe of the floodplain, where there is sufficient shade. During the dry season, they also prefer to occupy areas with very little current, near a particular watercourse or

main current, called *remansos*. In the *remansos*, “the water seems almost to stand still or move in a weak counter-current to the main current” (Geisler and Annibal 1986:17). Although the cardinal tetra is endemic to a blackwater ecosystem, it is not necessarily a “black water” fish as it avoids water with high dissolved humus content, seeking out the clearest water whenever possible (Geisler and Annibal 1986:16).

The seasonal variation in water levels determines the rhythm of life for the cardinal tetra. As the water level rises, the cardinal tetras migrate upstream (*arribação*) and towards the edge of the flooding zones to spawn, and as it falls, they return downstream (*arriação*). According to piabeiros, when water neither rises nor falls, the fish stay put. When the water level begins dropping precipitously, cardinals begin migrating downstream in small schools of twelve to thirty fishes. In the *igarapés* of the left margin of the Rio Negro, between the Rio Branco to the Paran Atauf, cardinals migrate downstream to the margins of lower reach lakes (*lagos-rio*), or are concentrated in the backwaters. In very dry seasons, cardinals may migrate as far as the margin of the Rio Negro itself. In the rivers of the right margin of the Rio Negro, cardinals follow the river course until they are forced into the narrowing *igaraps*, and may even enter the main river channels.

The breeding season of the cardinal tetra, which coincides with the annual flood cycle, begins in late March/ early April and terminates around the end of June. However, reproduction is not limited to the rainy season alone. Breeding can also occur during *repiquetes*, or rises in water level due to heavy rains during

interpluvial periods. The rural Amazonians report that a repiquete will stimulate reproduction when the water level to rise by at least one meter.

The spawning of the cardinal tetra most frequently occurs in low marshy woodlands called *chavascais*. The *chavascal* (the singular form of *chavascais*) is characterized by a low canopy (>20m), with *jará* palms (*Leopoldinia pulchra*), *buriti* palms (*Mauritia flexuosa*), *apui* bushes (*clusia* sp.) and extensive patches razor grass, *zaruzaru* or simply *zaru* (Cyperaceae: *Rhynchospora* sp.), and *arumã* (*Ischnosiphon* sp.). Chavascais are found in the extensive floodplains along the courses of the right margin tributaries and in *campos*, or headwater marshes. The campos are essentially extensions of the floodplain, in which large lakes are formed during the high water season. Three large campos are located in the interfluvial regions of the Rio Aracá and Rio Padauri, Demini and Jufarís, as well as the Cuiuni and Urubaxi.

Spawning takes place near the floodplain margins, or on the water edge of *damissás* (high ground islands) within the flooded marshes. Reproduction is dependent upon the expansion of the aquatic habitat; better water quality, less crowded conditions and more abundant food resources. All of these conditions lead to healthier fish, and higher reproduction levels. The water is poor in nutrients and plankton, but there are other sources of nutrition. Leaf litter is colonized by chironomid larvae that form the base of the trophic web in the igapó (Walker 1985; Walker, *et al.* 1991). These larvae provide the principal source of nourishment for the cardinal tetra (Paulo Petry, personal communication).

Piabeiros also report that the fruit of the *jará* palm composes an important source

of nutrition for cardinal fry, although field observations have yet to confirm this claim. Geisler and Annibal (1986:21) consider the jará palm as an “indicator plant” for the occurrence of the cardinal tetra.

Several authors have noted the annual life cycle of ornamental fish (Junk 1974; Thomerson 1976), and cardinal tetras (Chao 1993; Chao and Prada-Pedrerros 1995; Geisler and Annibal 1986). Chao (1995:4 and 2001:169) has shown that the El Niño events of 1982-83 and 1997/98 caused cardinal production to drop significantly, but stocks were able to recover within two years. The lifespan of the cardinal is largely controlled by the duration and intensity of the dry season, which determines the cardinals' access to food sources, and modulates predation pressure. Most of the spawning fish born during the rainy season and repiquetes in the previous year die at the end of the spawning season. In addition to a high rate of natural depredation, fish collectors claim that the fish are terribly weakened by the lack of food sources as the floodplain shrinks during the dry season. During the prolonged drought of 1995, many fish died in dried up streams and lakes, while those that lived had to wait to take advantage of the optimal conditions of the flooded forest. Consequently, the breeding season was delayed. For the first three months of the 1995-96 fishing season (August-October), the collectors and intermediaries complained that the yield and size of cardinal tetras was below normal. They claimed that the reason was because the young fish had not had sufficient time to feed and grow in the flooded forest. Larger fish are healthier and are less likely to succumb to disease and die in transport, and therefore sell for higher prices than do small ones.

### 6.3. THE FISH COLLECTORY

#### 6.3.a. Locating Fish Stocks

Fishing activity on the Rio Negro is dependent upon the international demand for certain ornamental fish species. Many observers of the ornamental fish trade mistakenly believe that fish collectors catch any fish that enters their fishing equipment, later dividing them up for export. In actuality, collectors only capture those species of fish the exporters have requested.<sup>4</sup> At the beginning of each fishing season, as well as during the season, production requirements are established by the exporters. The intermediaries, or their clients, initiate *pesquisa* (research) in the known habitats of the species desired. Initial research is important because a major factor affecting collector productivity is the distance that must be traveled by canoe to locate schools (*bolinhos* or balls) of cardinals. Fishing areas (*pesqueiros*) frequently cannot be penetrated without clearing paths through the igapós, zaru and arumã. Cutting paths with axes and machetes often requires considerable effort, only to find that there are no fishes in the area. The research then, is crucial for understanding fishing efficiency and productivity.

Intermediaries and collectors must monitor the dropping water levels to determine whether conditions are such that the fish are descending the shrinking floodplain. Changes in the water level, or *posição d'água*, is commonly determined by inserting a thin, flat headed stick into the substrate near the water edge until the head is even with the surface of the water. Changes in water level

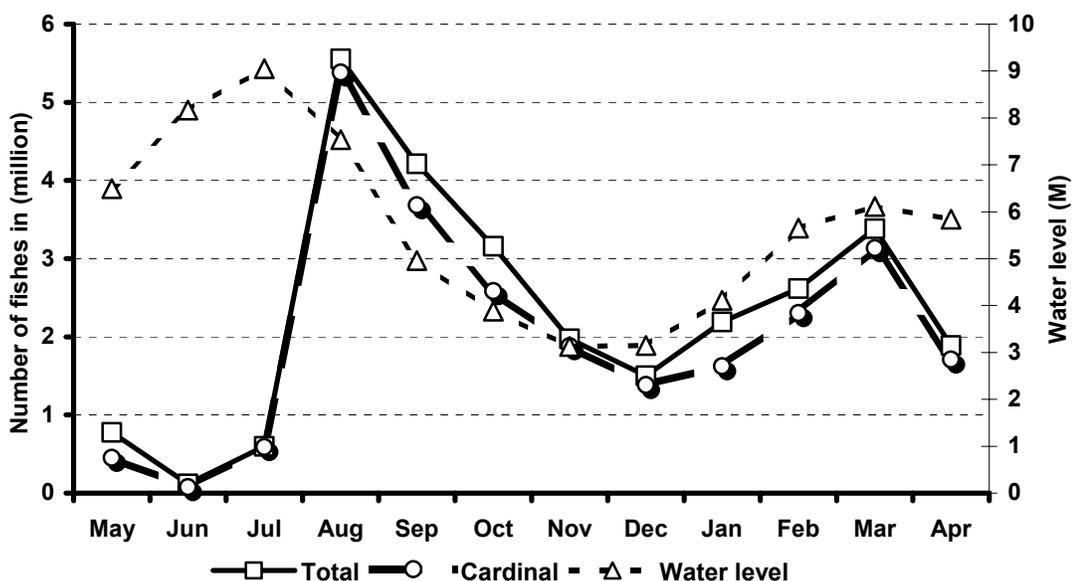
are measured in terms of the hand: *dedo* refers to the width of one finger; *palma*, or palm, refers to the width of the hand with open fingers; and *chave*, key, refers to the index finger pointed down. In subsequent days it can be determined whether the water level is changing; if the water level remains stationary, it is considered to be *ruim de peixe*, or of less than optimal fishing conditions. Fish appear to be more easily located when the water level is either rising or dropping (Figure 8). The researcher must then locate the areas where the fish are found in enough abundance to justify the fishing effort. The ethnoecological factors that the collectors utilize to establish the indication of the localities of the species desired remains to be understood.

Whether or not intermediaries finance the research of fish location depends upon the possession of necessary capital by the client. The *aviamento* of the initial research is often as much for the provision of subsistence items for the collector/intermediary's family in town, as it is for outfitting the research voyage itself. By the end of the flood season, many collectors and intermediaries are cash poor, and thus require *aviamento* initially.

When the water drops precipitously, cardinals and most other ornamental fish begin migrating downstream. At this time, the *fábrica de piaba*, or fishing season, begins. Figure 8 demonstrates that cardinal production is highest in August and September, when the water level drops. During this period, many urban and rural residents from all areas of Barcelos temporarily fish for cardinals, taking advantage of the concentrated numbers of fish. When productivity drops,

the temporary collectors return to other economic activities; particularly important at the beginning of the dry season are gardening activities and food fishing.

**FIGURE 8**  
**WEEKLY SURVEY OF ORNAMENTAL FISH SHIPMENTS FROM BARCELOS**  
**(MAY 1998 TO APRIL 1999)**



Source: Chao (2001:172).

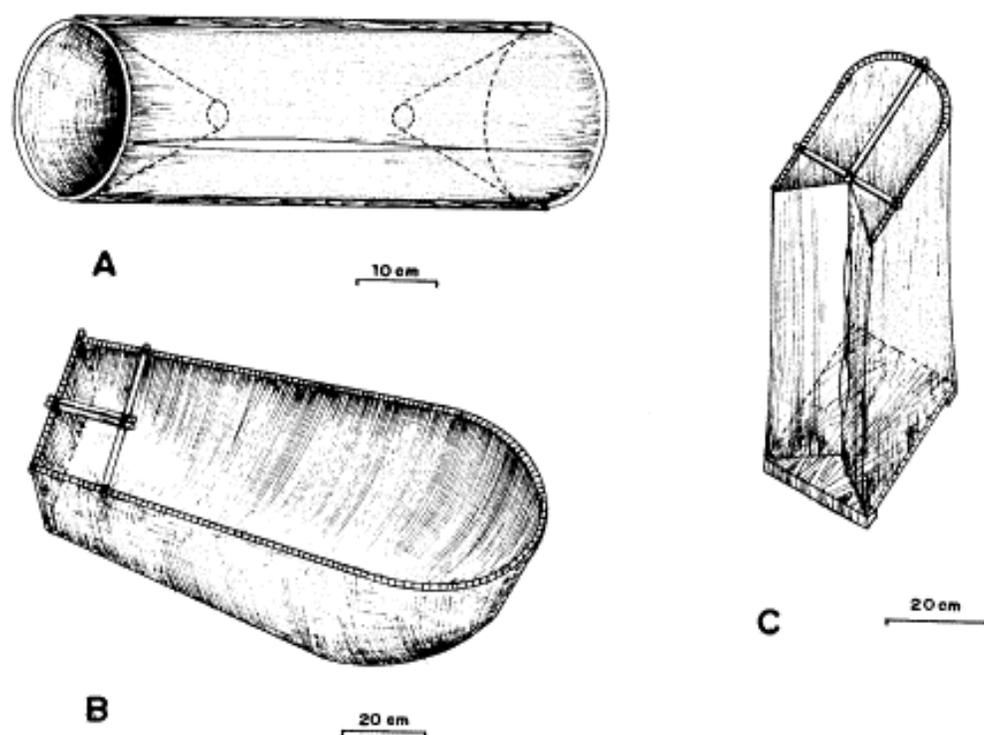
### 6.3.b. Fishing Methods

The methods and equipment utilized in the capture of ornamental fish are rudimentary and artisanal. There are two basic methods of collection of the cardinal tetra: *cacurís* or traps, and *rapichés* or dip nets (Figure 9). Each collector fabricates his own fishing equipment using polyester mosquito netting, generally sold to him by his patron. The method used depends on the environment in which the fish are located. The *cacurí* is used principally in the *chavascais*, and is the principal means of capture in the floodplains of the major tributaries of the

right margin of the Rio Negro. The cacurí is also commonly employed in left margin igarapés of the Rio Negro at the beginning of the fishing season (*safra* or harvest) when the fish have not yet begun to appear in the igarapés. The rapiché is used when fish are found along the water edge of the igarapés, particularly in tributaries of the left margin. Both fishing methods require that the presence of fish be ascertained visually since the species targeted are determined *a priori*. In addition, the amount of time spent paddling to and from the fishing areas may account for more than half of the time spent in the collection process.

Whether collecting with cacurí or rapiché, most collectors share the same preferences for the fishing gear they carry to fishing areas: shotgun and ammunition for killing game and fowl; a plastic bowl (*cubico* or *cuiá*) for scooping fishes and changing water; a *terçado* or machete for clearing trails, etc.; a *zagaia* or trident for killing large fish; fishing line and hooks; a knife; an *arpoeira* or harpoon designed to penetrate the shell of turtles on the stream bottom; and *esticadeiras* or *espinheis*, or long lines for the capture of food and bait fish, particularly in the igapó. Each fish collector also carries one or two *paneiros* (hand woven baskets) lined with plastic bags, or *rodas* (a twig formed into a ring) supporting a plastic bag, placed between two canoe benches. The *paneiro* and *roda* are the principle means of transporting the fish from the fishing areas to the camp or community.

**FIGURE 9  
FISHING GEAR**



**A. Collapsible minnow-trap used by Project Piaba; B. *rapiché* (dip-net); C. *cacurí* (trap).**

In the left margin tributaries (*igarapés*) fishing is generally done from dugout canoes in which the collector is seated in the bow, with the stern being weighted down with sand, rocks, or old car batteries. Canoes are generally larger than those used in the rivers of the right margin of the Rio Negro, measuring as little as three meters, but most commonly about 4 - 4.5 meters long, by 80cm to a meter wide. The canoes for the *igarapés* of the left margin have three parts: the *casco* (shell), 15cm of *pavés* (boarder), with a *falca* or middle section. The method of capture using the *rapiché* involves the location of a school of the

desired species, which often requires more time than the actual netting of the fish. After the fish have been located, the collector gently extends the net horizontally into the stream, cutting off the downstream path of the cardinal tetras. He then carefully coaxes the fish down stream into the net with a canoe paddle. Although the collector generally fishes from the canoe, if necessary he will walk along the shore in order to capture the fish. It is also not uncommon for fishing partners to collaborate in the capture of fish by means of corralling fish into one or the other's rapiché. The cardinal tetra is relatively easy to capture as it is not a rapid swimmer, nor does it flee rapidly. The collectors characterize the fish as *meia besta*, meaning sort of foolish, as it is very easily corralled into the net.

Once the fish have been captured in the rapiché, the collector uses the plastic bowl to scoop out the fish. In this process the fish desired (or not desired, depending on the number of each) is isolated in the net, then the net surface is dipped into the water, and the bowl is then quickly slipped between the fish and the net. Piabeiros go to great lengths to ensure that the volume of fish they transport back to the temporary storage facilities is as homogeneous as possible. The two basic reasons for this are that oxygenation of water is simplified, and more aggressive species must be separated from the selected species. The fish are then placed in the paneiro, where fresh water has been placed. Depending on the amount of detritus and the temperature of the water, the collector will use the bowl to throw out the old water and replace it with fresh water. This process is repeated at regular intervals, as the collector finds necessary, until they arrive

at their place of residence, temporary or permanent. The fresh water is usually thrown in from about 20 – 50cm above the paneiro in order to oxygenate the water. The water change process in the canoe, however, is the same whether fishing with a cacurí or rapiché.

The typical day of fishing by rapiché can vary from 6 – 10 hours, depending on the availability of fish, pressing domestic obligations, and personal motivation. Generally, the collector must paddle his canoe for 1 – 2 hours to the fishing area. He will then collect fish 2 – 3 hours, stopping to lunch for about an hour. After lunch, he may fish for another 1 – 3 hours, or return to his camp or home. The day of fishing is generally mixed with efforts to obtain protein in the form of game or fish, but this really depends upon whether there is a large enough assemblage of collectors in one place, either a permanent community as in Daraquá of Rio Itú and Floresta/Santa Rita of Rio Ereré, or temporary fishing camps as in the igarapés Zamula and Puxurituba. In these locations, fish collectors may assign certain individuals to concentrate more on obtaining food, than fish. Food getting may be a specialization for some, while for others it is part of a rotation; for others still, it is a daily task that is performed alongside fish collection activities.

The collection of cardinal tetras using a cacurí, a more passive means of capture, requires a different fishing method than the rapiché. The canoes used on the rivers of the right margin of the Rio Negro are dugouts with two parts: the casco and 15cm of pavés, without the falca. They are generally about three meters in length, by 80cm in width, with three benches. Unlike the canoes used

on the left margin igarapés of the Rio Negro where the paddler sits in the front, the middle bench is used. The reason for this is that the igapós and the zaru are very “*fechado*,” or closed. Sitting in this position allows the paddler to have more balance to pull himself between small trees that are ubiquitous in the igapó of the rivers.

Each collector utilizes about 20 - 25 cacurís on a normal day of fishing. The collector employing cacurís to capture fish differs from those who use a rapiché in that the preferred fishing equipment also includes an aluminum pan, or plastic bucket, of bait. They look for cardinals in areas close to the margin, in about 30cm - 60 cm in depth. Where the cacurí is used, the piabeiro “*chama os peixes*” (calls the fish) by flicking his finger onto the surface of the water (as if shooting a marble), to replicate the sound of palm fruit hitting the water. If 5 - 10 fish appear, they clear an area (*limpar, roçar*) with a machete. The collector pulls out the cacurí; measures it up with a stick cut from branches, bush or young trees (arumã is the preferred stick); places the stick vertically in the cacurí to give it support; cuts 1 - 2 more sticks which are sliced at an angle at one end to secure the *cacurí* into the ground. Two fine twigs (*escora*) are used to open the trap. The thickness of the *escora* determines the size of the fish that enters the trap. The cacurís are generally set in about 20 - 50cm of water. Bait (*pitiú*), composed of freshly salted fish that is bathed (*escaldado*) in hot cooking oil, is then placed in the bottom of the cacurí.<sup>5</sup> It appears that many fish don’t make good bait. The best bait is the flesh of the *reco-reco* fish (*Amblydoras* sp.). The oil rises immediately to the surface and flows with the current. Generally, the

piabeiro assists in dispersion of the oil by splashing the surface of the water around the cacurí. He then moves on to find another favorable area until all his cacurís are set, forming a *varadouro* (path). The cacurís are left for 1 – 3 hours, and may be left for additional 1 – 3 hours, depending on the productiveness on the day in question. The collection phase is rapid. The piabeiro simply retraces his route, dumps the fish into a *paneiro*, throws the bait back into the bucket, and paddles back to camp, changing water regularly.

### 6.3.c. Handling Processes

The basic handling process is the same for collectors who use either the rapiché or the cacurí. When they get back to their camp or residence, fishes are immediately placed into stackable *bacias* (*caixas* or boxes, plastic tubs which measure 58cm x 38cm x 18cm),<sup>6</sup> ranging from 300 – 600 fish. Water is then added, and the collector, or family members, removes (*catar*) the *piabas doidas* (unwanted fish) and *piabas brabas* (aggressive fish) that remain. If the fish are thought to be *batido* (beaten, stressed, or in poor condition), a tablespoon or two of table salt is added to the water. The following day, any dead fish are removed and the remaining fish are placed in *viveiros* or *gaiolas*, reservoirs made of mosquito netting. The viveiro can be set into a floating frame, or *grade*, which vary in size, but the average size is 1.5m x 2.5m x 80cm. Reservoirs may hold more than 5,000 fish, and are placed along the river bank by the encampment where a gentle current renews the water passively. If the fish are kept more than a couple of days, they are fed with foods including farinha, eggs, and cooked

fish, but are not fed on the days preceding transport. Each day the dead fish are removed. Viveiros are cleaned once a week, generally Sunday, or when dirty. Fishes may remain in the viveiros for periods ranging from three days to three weeks, depending on when they are to be shipped to Barcelos or Santa Isabel, before making the journey to Manaus.

At a predetermined date, the patron/intermediary will visit the riverine communities/fishing camps to pick up the fish and transport them to Santa Isabel or Barcelos. The patron may also be present during the entire collecting period as well. How often fish are taken to the cities for transshipment to Manaus depends on the quantity of fish available for shipping, and/or economic necessity. The process of embarking the fish (*embarque*) involves the following activities: one end of the viveiro is lifted from the water; fishes are put into a *paneiro*; 400-1,000 fish are placed in the *bacias*, depending on their size; about 5cm of water is poured into the *bacias*. The *bacias* are then loaded onto the boat; tetracycline and/or table salt may be added; the total for each collector is noted in the patron's *caderno*, or notebook; and the fish are transported to Barcelos or Santa Isabel. Once the fish are placed in *bacias*, water changes (about 50 percent) are made every 24 hours or so, until they shipment reaches Manaus.

#### **6.3.d. The Fishery and Conservation**

I propose that there are two factors which exemplify the conservation ethic of the collectors/intermediaries of ornamental fish in the Rio Negro region: fish mortality and the prohibition of collecting during the spawning season. I have

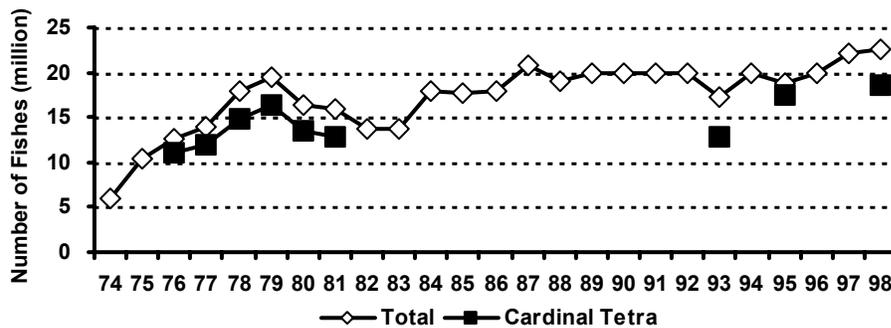
made several prolonged fishing trips with various piabeiros, and have never observed a rate of mortality of more than two percent while in the possession of the collectors.<sup>7</sup> As I pointed out in the previous section (6.3.c.), mortality is reduced by constantly changing the water during the fishing excursion, fish are treated for stress, albeit in a rudimentary way, storage netting and tubs are regularly cleaned, and the fish are well fed. In fact, the collectors are often upset and puzzled by the fact that their shipments to exporters are sometimes discounted for mortality.

Although the mortality and water quality data during the transport of fish from Barcelos and Santa Isabel remain inconclusive, it is this phase of the commercial process that appears to be the most critical. Waichman, *et al.* (2001) have shown that while the fish remain in the bacias for longer periods of time, poor water quality leads to physiological stress of the fish. Twenty hours into the voyage from Barcelos to Manaus, oxygen levels in the bacias drop by 20 percent, while ammonia levels may increase by 225 percent (Waichman, *et al.* 2001:289). Further, when water is changed about fourteen hours into the voyage, pH levels in the river from which the water is drawn are generally higher than that which the fish is accustomed in nature. Compounding the stress to the fish is the rather violent nature of water changes. With the aid of a pump which draws water directly from the river, the caretakers of the fish refill the basin with a 3cm hose which send the fish whirling at great speed around the bacia. It would thus seem that the fish collectors often pay for the risks of transport, rather than create the conditions for poor fish health.

Fish collectors are also aware of the importance of fish reproduction in maintaining a productive fish collectory, and environmental degradation as a consequence of the fishing effort is limited to the discarded litter of the collectors themselves. Fish collectors were never observed to fish in the same area for more than a day or two, and do not concentrate fishing effort, spreading out in different directions to collect. When the immediate yields begin to drop in an area fished for more than fifteen minutes or so, the collector moves on: *vou pegar os peixinhos depois* (I'll get those little fish later); meaning the fish will show up again in greater quantity. The piabeiros have also learned that pregnant females die quickly if captured during the spawning season, noticeably diminishing the actual and future captures.

Most collectors pride themselves on the fact that they leave fish behind (*deixar para semente*, or leave as seeds) so that they will be able to produce more fish for the next season. The collectors at Igarapé Puxurituba, for example, sometimes leave the stream to fish elsewhere when their returns begin to diminish, and will wait for the water level to rise significantly before they return to fish. Piabeiros learned that productivity is greatly reduced in the next *fabrico* (fishing season) when collecting continues into the breeding season. In 1985, piabeiros from Barcelos met with representatives of the Brazilian environmental protection agency (SUDEPE, now IBAMA) to recommend the prohibition of fishing between May and July during the spawning season of the cardinal tetra. Over the last three decades (1976-93), the export of cardinal tetras from Amazonas has remained in the range of 12-19 million per year (Figure 10).

**FIGURE 10**  
**ORNAMENTAL FISH EXPORTS FROM AMAZONAS, BRAZIL (1974-1998)**



Source: Chao (2001:167)

#### 6.4. THE LOCAL/REGIONAL ORGANIZATION OF PRODUCTION

##### 6.4.a. Estimation of the Labor Force and the Economic Contribution of the Fish collectory

Based on interviews I conducted with ornamental fish buyers over four years, there may be over 1,000 piabeiros involved in the capture and sale of ornamental fishes in the region during a fishing season (August-April).<sup>8</sup> The number of intermediaries varies over time, but there are roughly 60 – 70. Each intermediary maintains a *freguêsia* (personnel, a group of clients) ranging from 2-15 full-time collectors. Thus, the maximum number of collectors would be 1,050, which could only be possible during the peak production periods, since most intermediaries usually have less than ten clients. Interviews with exporters confirm this estimate.<sup>9</sup> In terms of full-time piabeiros, I estimate no more than

500, which is probably generous. This figure does not reflect all of those who provide auxiliary labor in the fishery however, particularly family members.

Eisenstadt (1992:2) has estimated that possibly 80 percent of the local population has some relation to the trade, although I can find no justification for this statement.

In 1998, ornamental fish exports from the state of Amazonas, Brazil totaled US\$ 2,216,508.90 (IBAMA 1999), while total exports amounted to more than US\$ 138,000,000 in 1996 (Benchimol 1997). Although the contribution of ornamental fishes to the overall total of exports might seem small, it has a large impact on local livelihood in the middle Rio Negro. Given the lack of economic alternatives and the relative lack of capital in circulation, fish collectors play a key role in the local economy in several respects. Since there are few economic opportunities, in town and the interior, it is frequently the case that piabeiros must assist members of their large extended family and kin networks in their everyday needs; how many people this includes is still unknown. This pattern resembles what Ayres (1992: 191) found in her study on the Solimões: “The volume of economic activity depends entirely on the number of consumers ‘and not at all on the number of workers’ (Chayanov 1966:78).”

Additionally, if it were not for the demand for merchandise by the collectors and intermediaries, many of the local merchants would lack clientele. Based on discussions with state revenue service employees, and calculations based on production data from Chao (2001:171), I estimate the contribution of the ornamental fishery to the circulation of money in the municipality of Barcelos

to be greater than 350,000 Reais (the Brazilian currency, Real is the singular form) per year. In 1999, 30,727,800 cardinals were shipped to Manaus. If this figure is divided by 1,000, the common denominator for establishing value in the fish collectory, and multiplied by the average price of fifteen Reais, minus a 20 percent discount for mortality by the exporters, then the total amount of currency that enters the economy of Barcelos adds up to roughly R\$368,373 just for the cardinal tetra ( $30,727,800/1,000 - 20 \text{ percent} \times \text{R}\$15.00$ ).

#### **6.4.b. The Exporters**

Of the more than 25 exporters with permission from IBAMA (Brazilian environmental protection agency) to export ornamental fishes from the state of Amazonas, only 12 are currently doing so (Table 1). The largest four exporters control slightly more than 90 percent of the value of ornamental fish exports from Manaus, Amazonas. Since I arrived in 1994, two have gone out of business, and two started and went out of business as fast as they went in. The socioeconomic organization of ornamental fish extraction, from the exporters to the collectors, has strong undertones of family and kinship. Among the current exporters, five come from two families, and most are family owned and operated. None of the pioneering exporters remain, but three have entered the ornamental fish trade because of family or kin ties, while another three took over the operation of their former employer, due to death or withdrawal.

**TABLE 1**  
**EXPORTERS OF ORNAMENTAL FISH IN MANAUS AMAZONAS (1998)**

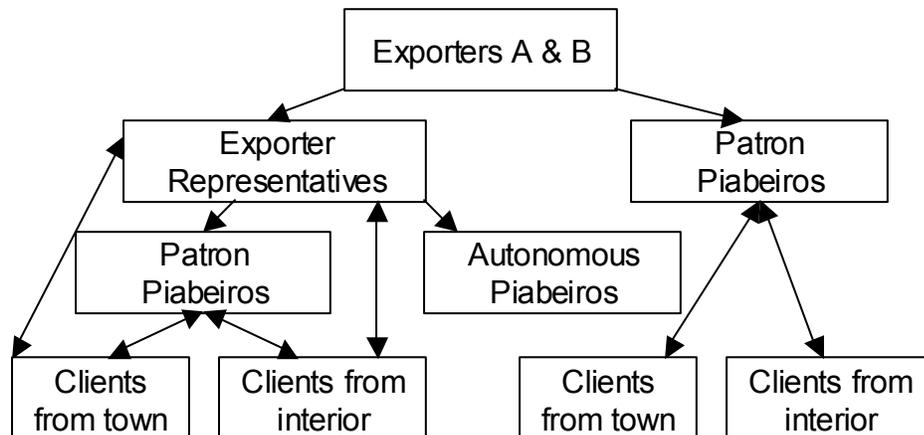
<b>Exporter</b>	<b>Quantity</b>	<b>Value</b>	<b>Market share</b>
Allanadeck Rodrigues de Melo	9,920	5,181.50	.02 percent
Aquamazon Imp. e Exp.	450,946	51,644.00	2 percent
Aquarium Corydoras Tetra	2,269,447	366,609.40	16 percent
Cosmopolita Aquário	156,618	13,686.00	.06 percent
Edson Perreira Corrêa*	21,373	2,455.10	.01 percent
K.M. de Oliveira Comercial	3,220	8,050.00	.04 percent
P. O. do Rio Amazonas	40,300	2,850.00	.01 percent
Prestige Aquarium	2,138,008	166,252.38	7.5 percent
Shopping do Peixe*	405,245	74,292.48	3 percent
Tabatinga Aquarium	4,261,969	446,611.50	20 percent
Talou Aquário	63,930	7,550.00	.03 percent
Turkys Aquário	4,878,644	1,071,336.54	48 percent
<b>Total</b>	<b>14,699,620</b>	<b>2,216,508.90</b>	<b>±100 percent</b>

Source: IBAMA (1999).

\* Denotes affiliation with Aquarium Corydoras Tetra

Each exporter has its own system for procuring wild-caught fishes from intermediaries (Figures 11 -13). Two of the exporters – I shall call exporters A and B (Figure 11) to maintain anonymity - have representatives who reside in Barcelos and receive fishes from intermediaries at their floating receiving facilities and send them on to Manaus.<sup>10</sup> Both of these representatives have about twenty intermediaries under their charge. Exporter A also has a representative in Santa Isabel and four buyer/intermediaries (described below) distributed throughout the Rio Negro basin which operate from boats of 24 - 124hp. The representative from Santa Isabel is the uncle of the representative in Barcelos, whose brother is one of the four buyer/intermediaries. All representatives retain some clients directly, in addition to purchasing the stocks of other smaller buyer/intermediaries. Exporters A and B reimburse all intermediaries for transportation costs.

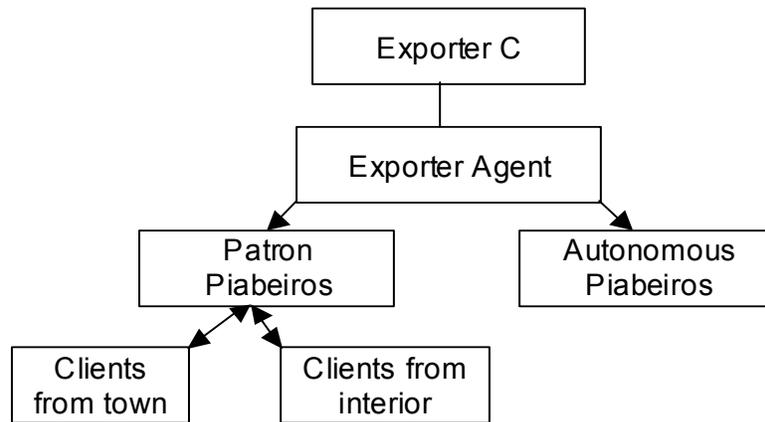
**FIGURE 11  
EXPORTERS A & B**



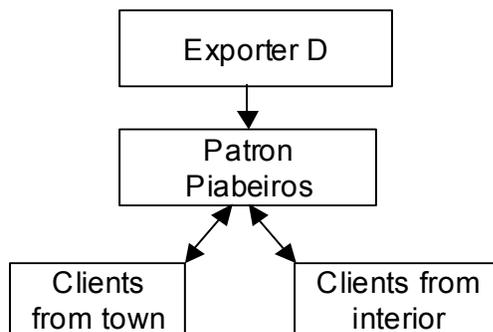
Note: single direction arrows indicate cash dealings, double arrows indicate cash and merchandise flows.

In addition to the representative in Barcelos, Exporter B has 4 - 5 additional buyer/intermediaries operating in the Rio Negro basin, and pays transportation costs as well. A third exporter, Exporter C (Figure 12), is owned and operated by large extended family and has about 20 buyers in Barcelos. The actual number fluctuates from year to year, but at least 10 remain loyal. This exporter sends an agent (sibling) to Barcelos weekly by regional boat to receive the fish, and has additional buyer/intermediaries on the upper and lower reaches of the Rio Negro. Transportation costs are assumed by, at least some of, the buyer/intermediaries.

**FIGURE 12  
EXPORTER C**



**FIGURE 13  
EXPORTER D**



Exporter D, whose father was a pioneer in the Rio Negro ornamental fishery in Barcelos, has 10-12 buyer/intermediaries. Exporter D's intermediaries often accompany their own shipments of fish to Manaus, or contract with the owners of the regional transport boats to care for their stock until it arrives in Manaus. As Figure 13 indicates, this exporter seems to be most closely related to the aviamento system of the rubber boom, but this is only because of the

simplicity of his organizational structure. Exporter D pays for the transportation costs of his intermediaries.

The other exporters negotiate with various buyer/intermediaries who might be considered independents, considering they deliver fishes to the buyer/exporter who offers the best price on a weekly, monthly, or seasonal basis (a risky business as will be shown below). Although three exporters pay their buyers upon delivery, the rest do not pay transportation costs, paying only for those fishes that arrive alive in Manaus the next week or later. The issue here is interesting. Exporters pay their intermediaries for the fishes requested, albeit not always on time. The point is that they are all sending cash to Barcelos, not merchandise. Exporters validate the notion that mercantile capitalism controls exchange without entering the production process; claiming that what happens to the money once it gets to their commercial agents is not their responsibility.

Exporters also discipline exchange by controlling the distribution of bacias to their intermediaries. Fish collectors and intermediaries are often critical of the exporters for being slow to return their bacias from Manaus. They find it frustrating when the fish are available, but they have no bacia in which to deliver their fish. Sometimes they go for several weeks before the bacias arrive. Some have attributed the lack of shipping containers to the exporters' desire to obtain fish in other regions of the Amazon region. It must be remembered, however, that the external demand for fish determines production. When exporters' supplies are greater than demand, they are able withhold the distribution of bacias to avoid stocking unnecessary quantities of fish.

An issue that requires further clarification is the practice of discounting the number of fish received by the exporters. The discounting of fish deliveries is a constant complaint of both collectors and intermediaries. One of the reasons for this deduction is attributed to the fact that the number of bacias delivered never total a 1,000 fish, or *um milheiro*, the reference of value in the ornamental fish collectory; collectors like to assume that each bacia is worth “um milheiro.” A bacia or caixa then is the basis upon which production as well as consumption is conceived. The other reason given by exporters is the incidence of mortality, which I showed above to be attributed to the transportation function, not the poor handling practices of the collectors.

Making an accurate count of a bacia with numerous fish of less than 3cm in length is no easy accomplishment, and is serious business for all concerned. At the floating facilities of the exporter’s representatives in Barcelos, establishing the volume of fish deliveries involves a sampling procedure in which the fish from 3 – 4 bacias of each collector/intermediary are counted. The fish are painstakingly counted by removing them with a plastic bowl, counting them, and placing them in another bacia. The average from the 3 - 4 bacias is then multiplied by the number of bacias delivered. No one argues about the final number, and most agree that the method is sufficiently accurate.

It is assumed that this same process is undertaken at the remaining exporters facilities in Manaus as well. However, many intermediaries who deliver their fish to Manaus claim that they are frequently not present when this procedure is performed. It is probable that this procedure is commonly skipped,

and the exporter simply discounts the delivery by a fixed margin: 10 - 20 percent. From some of the *notas*, or receipts, from various exporters I was able to examine, I learned that some exporters reduced 10 percent from every shipment, without deviation. The discount then resembles the *tara* mentioned in section 4.3.d. This practice may be a simple question of exploitation, or a consequence of customary bookkeeping or built-in risk reduction practices in the Amazonian informal economy. This practice of discounting is, of course, not unique to the ornamental fish trade. It appears in the piassaba, food fish, and rubber economies; possibly most forms of extractivism in Amazonia. Further research is needed in order to better understand this issue.

#### **6.4.c. The Patron**

To be a patron in the ornamental fish collectory, it is necessary to first own a boat; the bigger the boat, the more fish it can carry. I suspect that the boat is the most important symbol of socioeconomic status for participants in the ornamental fish collectory. The patrons, or intermediaries, in the ornamental fish extractive economy are variously known as piabeiros (ornamental collectors), *atravessadores* and *compradores* (buyers).

The term piabeiro is somewhat ambiguous, however, being used to describe both the patron and the client involved in the activity. According to the representative of Exporter A in Barcelos, “we’re all piabeiros because even the patron fishes.” One might expect a terminology comparable with that used in the rubber trade (i.e. *seringalista*, or patron, and *seringueiro*, or client). Thus, terms

such as *piabalista* (patron) and piabeiro (client) would seem appropriate. But given that this is not the case, it may just prove a linguistic separation from *aviamento*, reflecting the socioeconomic reality of the fish collectory.

Another distinction of the ornamental fish trade on the Rio Negro is that the category of patron who possesses a boat can be further divided in terms of involvement in the production process. There are piabeiros who only buy fish from client/collectors, those who buy fish and fish themselves as well, and those who only fish (autonomous). There are very few of this category of piabeiros. The autonomous piabeiro is one who has his own boat, and generally is accompanied by some or all of his family members. He may deliver fish to either another patron or directly to an exporter. All categories of piabeiros frequently employ *ajudantes*, or helpers, from Barcelos and the interior.

Typical of the *aviamento* system, the larger patrons who work directly with the exporters do obtain merchandise to trade with their clients. Basic necessities are generally bought in Barcelos, while higher value consumer durables are purchased in Manaus. Obtaining goods on credit, however, is not obligatory. Some clients buy goods from patrons on credit and others do not, some do at times and at other times do not. Many intermediaries have accumulated enough capital to open general stores in Barcelos to cut out the Barcelos merchant so that his margin with his client/collectors sharpens a bit, or as a simple entrepreneurial endeavor. The representative of Exporter A also has a small cattle ranch in Barcelos. Many piabeiros eventually leave the fish trade, choosing to enter other economic activities or to move to other regions.

One of the keys to being a successful patron is establishing amicable relationships. Fregueses (clients) are always addressed by patron according their relationship with them: *compadre*, *tio* (uncle), *cunhado* (brother-in-law), etc., even *finado* (deceased clients). During exchanges, the patron invariably tries to convey the idea that they are doing a favor for their client: “don’t forget your farinha! You got it? Okay!” Loyalty is another important value, on both parts. Clients who seek other patrons for a small difference in price often find it difficult to obtain work in the future when prices change again. Patrons who don’t provide a sufficient quantity of supplies to their clients in the fishery arrive to find their clients have traded their fish stocks to some other patron passing by, particularly with regard to farinha which is the staple food in the region. Because of the labor surplus in the Rio Negro, patrons are selective in recruitment. But productive collectors can also be selective. According to one patron “Good workers have good patrons, bad workers have bad patrons.”

Most intermediaries are children of Nordestino (mostly from Ceará) or Portuguese fathers who were born in the region; less than twenty are from outside the region. Kinship, family, marriage, and *compadrio* (relationships created among parents in the Catholic ritual of baptism) relations mediate the organization of production in the Rio Negro fish collectory, both in terms of patrons and clients. At least fifteen of the intermediaries are the sons of current or former intermediaries who bought boats for them with capital accumulated in the ornamental fish collectory, and a few run their father’s operation. There are also a large number of marriage alliances that increase the density of kinship

relationships, both endogamously and exogamously. Seventeen of the 60 – 70 intermediaries are linked through kinship and marriage, across three generations, and at least seven more are linked by *compadrio* relations. This core group of intermediaries makes up roughly thirty percent of the total number of patrons. Piabeiros in this core group do a lot of swapping of species on the river to meet the requests of the exporters. This situation also creates difficulties for exporters. An exporter once asked me why he was unable to obtain quantities of a certain fish for which other exporters had no difficulty. I discovered that the fish was most abundant in the region of the Rio Itú, and that his patrons did not possess any kin or fictive-kin affiliations there. Within a system of usufruct and community rights (discussed below), exporters must have to strategize at some level in order to maintain stable sources of supply.

Not infrequently, the patron/client arrangement operates within family and kin relations. But in all cases, production is conceived of in a corporate manner. There are many tasks to be completed in maintaining and transporting live fish: upkeep of the boats, water changes cleaning of handling equipment, removing unwanted and dead fish from viveiros and tubs, etc. Who performs what tasks depends on the composition of the work groups, and whether or not they are working from permanent or temporary residences.

In Amazonia, and Latin America in general, the Catholic ritual of *compadrio* (*compadrazgo* in Spanish) is an important flexible social mechanism (Mintz and Wolf 1950; Gudeman 1971). Different from the practice in the U.S., the more important relation is not between the godparent and godchild, but

between the co-parents (*compadres*). Elites who are equals use this fictive kinship arrangement to allow for creating alliances, and the peasants, both hierarchically and horizontally, to promote and ensure security in times of need. In compadrio relations of a hierarchical nature serve to manipulate the “impersonal structure in terms of person-to-person relationships” (Mintz and Wolf 1950: 346), making the bond between the patron and client less onerous (Moran 1974:141). Through the spiritual/commercial relationship the patron can form a large labor force, securing a steady supply of commodities, and the client can receive economic and moral security. Compadrio relations are not confined to vertical socioeconomic relations however. Most client fish collectors have many *compadres* that serve various social, political, and economic objectives, including simple friendship.

According to Wagley (1976: 157), “the number of godchildren and co-fathers which an individual can claim is an index of social position.” One of the largest ornamental fish patrons claims to have so many godchildren that he cannot remember how many he has, “probably more than 300.” I have observed, during many trips made to the fish collectories of the Rio Negro, that the *compadres* of patrons almost always give some gift to their *compadre/patrão* before he returns to Barcelos, generally food: fishes, turtles, or game.

There are two varieties of *compadres*: *legítimo* (legitimate) and *de fogueira* (campfire), the former being the result of a church baptism, and the latter a pledge of solidarity between consulting colleagues. The latter variety has special significance in the fish collectory, particularly for those who spend much of the

year at temporary fishing campsites. Brazil has a tradition in late June in which large bonfires are built on St. John's Day and on St. Peter's Day. At these fires friends can pledge solidarity by pronouncing themselves *compadres de fogueira* (Wagley 1976:153). These ties are not as binding as those established at baptism, but have the effect of increasing one's web of secure personal relations (Wagley 1976: 153-154). In the Rio Negro ornamental fish collectory, *compadres de fogueira* do not necessarily wait for these religious holidays. This type of *compadrio* relation is almost exclusively maintained between status equals, that is to say clients.

#### **6.4.d. The Client**

Client/collector can be classified in many ways: by type of fish collected and/or fishing methods employed, or whether they fish in rivers or streams. How they are recruited into the ornamental fishery in geographical terms seems to me to be more appropriate given the large distances that must be traveled to procure fish for export. As such, there are two categories of client/collector: (1) those from the interior, and (2) those from town.

The category 1 client/collector from the interior can be further divided into subcategories: (1a) relatively immobile, and (1b) mobile. The category 1a collectors are those who live in one of the communities or *sítios* of the interior near productive fishing areas. The category 1a collector most closely resembles the commodity producer as defined in Chapter 1, section 1.2.e. They are part-time agriculturalists, they fish and hunt for food, collect ornamental fish in the low

water season, and collect other extractive products like piassaba in the high water season. Generally these collectors, if they are married, plant *roças* (gardens) between 1 –1.5 hectares.<sup>11</sup> Thus, fish collecting serves as a supplemental activity to subsistence production. During the fishing season, many only fish when they feel the economic urgency. Older males who do not consider themselves piabeiros will fish on rare instances to help make ends meet. Frequently entire families will leave their homes to help in fish collection when migrating fish become abundant. I have met several wives of collectors who explained to me that they wanted to capture some set number of boxes of fish to buy needed household items, separating their production from that of their husbands.

Examples of the category 1a collector are found in the communities of Santa Rita and Floresta, separated by a distance of about two kilometers and located near the mouth of the Rio Ereré, about 150km from Barcelos. All males between 10 and 50 can be categorized as either current or ex-piabeiros. The cardinal tetra is the principle species sought in the Rio Ereré. The client/collectors recruited in this area add up to 25, although this number fluctuates monthly. They are divided relatively evenly between two piabeiro/patrons, one from Exporter C and one from Exporter D, although two piabeiro/patrons for the representative of Exporter A visit when the rummy nose tetras (*Hemigrammus rodostomus*) or bleeding heart tetras (*Hyphessobrycon* sp.) are more available. In the interior, merchandise is very desirable because there is no commerce, and the distance to the town makes shopping prohibitive. As

such, the piabeiro/patrons are welcomed for the goods they bring. In Santa Rita and Floresta, most fish are bartered, although if the fishing has been good the collector will receive cash after having paid for his merchandise or, as often is the case, he will ask the patron to credit his account to pay for an oven, a “boom box,” or a motor for his canoe. When fishing productivity is low, many clients in these communities turn to other economic activities, or take holidays having stocked up on household merchandise sufficient to meet individual or family needs.

The category 1b collector lives in the interior and travels to the fishing area of his patron and might be considered a full-time collector. Most often, he travels without his family and can be called upon with no notice whatsoever. He usually is picked up as his patron passes by his home. Frequently, the 1b collector is the ajudante referred to above, possessing a good knowledge of the waterways and forest. In addition to fish collecting, he also guides the patron’s boat, and hunts and fishes for food. It is the client/collector of this category who generally, but not exclusively, works for the piabeiro ambulante. Like the category 1a collector, he may be involved in barter negotiations, but it is more often that he accepts cash and credit. In certain fishing areas in which the 1b collector is present, the patrons claim that these individuals prefer *troca* (barter) during the *safra* (harvest, dry season), but at the end of the season the patron pays the client in cash to ride out the rainy season (*entresafra*).

The category 2 collector lives in either the town of Barcelos or Santa Isabel and either accompanies the patron to the fishing area on a regular basis,

or sets up camp in one or another *paragem* (singular form of *paragens*) to fish for some period, generally one to two months. It is this category of collector that exemplifies the blurring of the distinction between town and country (Nugent 1993:124). Often this category of collector is also the *ajudante*. These collectors are more interested in earning cash than supporting themselves and their families in the interior. Most are unmarried, and often are related to the patron, or a friend of close family members of the patron.

The ornamental fishery offers a significant contribution to the well being of client/fish collectors. During the months of August to October, a fish collector can collect, on average, 20,000 cardinal tetras per week (240,000/3 months). During November, and from January to April (in December, most fishing activity stops) he will average about 7,500 cardinal tetras per week (120,000/4 months). Thus, one fish collector might collect up to 360,000 cardinal tetras during a fishing season. The client was earning approximately \$5.00/1,000 fishes, or \$1,800/fishing season (360 x 5). This amounts to roughly \$257.00/month during the fishing season, or \$150/month over the year. The minimum salary in Brazil is roughly \$100/month. After the patron mark-up on goods sold of approximately 40 percent, the client earns approximately \$90/month. Although the Brazilian minimum wage is based on US\$100.00, it had not been adjusted to 100 percent since the economic crisis of January 1999 when I researched the issue. The minimum wage in Brazilian currency (Reais, R\$) is currently R\$130, while the dollar in 1999, was worth ±R\$1.80. The \$90.00/mo. The informant earns still ensures a monthly wage higher than the national minimum (90 x 1.8

=R\$162.00/mo.). The client is doing relatively well then, when compared to a good portion of his fellow countrymen who are unemployed.

#### **6.4.e. Fishing Areas**

Patrons generally procure fishes in several traditional fishing areas to hedge low production. Although ownership of inland waterways is not permitted under Brazilian law, all generally respect traditional fishing areas. Most patrons have fixed fishing areas that are defended on traditional values of usufruct rights, which are mostly respected. Some patrons are considered *ambulantes*, or itinerant piabeiros. The ambulantes move from fishing area to fishing area, based on the type of fish requested by the exporter, or the availability of fish in a particular stream or river. If a patron leaves the trade, the area is up for contention; and for this reason most fishing areas are rarely vacated during the fishing season, except to prevent over fishing of an area.

There are three basic social forms of usufruct rights found in the fishery of the Rio Negro that are associated with riverine communities and indigenous lands, private ownership of land in which smaller streams are located, and open resources. Below I describe the nature of these forms and provide examples of conflict for which I have evidence.

According to Brazilian law, riverine communities that are dependent upon certain natural resources are granted special legal status which gives them stewardship over those resources. They can negotiate the entry of outsiders into that resource for economic purposes as was shown in section 5.3. Communities

like those found at Baturité, Samauma, and Daraquá, who control access to the Rio Arirahá, Lago do Rei (Deminí), and Ig. Daraquá respectively, generally prevent fishing without their expressed permission. I have learned of no real conflicts regarding fish collection in these areas except for one complaint that a bass fishing boat owned by one of the tour operators was responsible for the death of stocks of fish when its wake smashed into a few viveiros on the shore of one community.<sup>12</sup> The local guides who operate the boats were highly criticized, and similar incidences have not occurred, in spite of constant fears.

There is sometimes conflict with indigenous communities in demarcated areas in the upper reaches of the Rio Negro. Ricardo (2000:284) reports that in one instance in October 1999, one intermediary arrived in the community of Castanheiro in Santa Isabel, and asked for permission from the *capitão*, or community leader, to collect. The capitão proposed that the community members would fish and then sell him the production. The intermediary rejected the counterproposal and argued that “the law doesn’t apply,” and that if they wanted to pursue their rights, they would never find them, “not even in hell” (Ricardo 2000:284). Most piabeiros, collectors and intermediaries alike, claim that incidences like this are rare. They claim that if outsiders act as gentlemen, and treat their counterparts with respect, beneficial and mutual results are realized. The issue seems to be rather one of “good patrão” versus “bad patrão.”

There are some piabeiros that own title to the lands in which productive fishing grounds are located, mostly in the stretch of the Rio Negro between the Rio Deminí and Rio Jufarís. According to Brazilian law, land titles only apply to

the land that is beyond a certain number of meters from the water edge. Since fishing in Brazilian inland waterways is open to all who possess a fishing license, land title does not prevent others from fishing within the boundaries of private property, except in the case of community property or indigenous lands. There have been several cases in which the more itinerant patrons have fished within privately owned lands. In one such case, the property owners went to court to demand that the individual desist from fishing. The judge in Barcelos empathized with the complainants, but explained that the invader was within his rights. It should be emphasized however, that most piabeiros honor the land titles as being accompanied by the right of the owner to allow or deny outsiders to fish within property boundaries.

In another case, an interior resident without title has been more successful keeping outsiders out of “his” igarapé. He negotiates with prospective collectors/intermediaries in the same way that the communities do, upsetting those who are unable to strike a deal with him. Despite the lack of legal backing for his defense of “his” igarapé, those lacking his permission, honor the denial, most likely because they fear reprisals.

Most tributaries of the middle Rio Negro are open to anyone who desires to fish, but the general rule is based on usufruct rights to water resources; the only exception to this rule seems to be the Paran Atau, where intermediaries from all areas rush to send clients when the fish are migrating downstream in large numbers.<sup>13</sup> Particularly along the larger river courses, where many patrons have been controlling production, or have fished for many years, the rule is that

others may fish anywhere they please, but it would be an offense to utilize the *paragens* (stops or campsites) and reap the benefits of the trails through the igapós that they have painstakingly cut. Additionally, and probably most importantly, non-traditional patrons create conflict when they attempt to compete for others established clients (*mexe com pessoal*, or mess with personnel). In 1998, two intermediaries (kin) left their traditional fishing areas on the Rio Jufarís to fish on the Aiuanã. I was unable to ascertain the reason for the change or expansion in areas, but there was conflict between these two and two others who had been organizing production in the river for more than ten years. It may be that the conflict was responsible for a fire that burned at least forty hectares of igapó and terra firme on the right margin (see also Ricardo 2000:284). One of the parties involved called the incident a *besteira* (foolishness); claiming, “the area burned was a spawning ground which produced over 600 caixas of cardinals per year.” Whether that means it was intentional, he would not say. At the time of my departure from the field, the federal environmental protection agency (IBAMA), Indian affairs agency (FUNAI), and the federal police were investigating the case, forcing one of the invading patrons to hire an attorney for his defense.

### 6.5. THE EXPORT PROCESS

According to some exporters, competition among exporters keeps prices low. At least one exporter sets the price for his intermediaries. The principal complaints among the exporters are the costs of international freight and bureaucratic documentation: one form for IBAMA (the Brazilian environmental

protection agency) which is responsible for monitoring the industry's impact on the environment;<sup>14</sup> one for Ministry of Agriculture which is responsible for monitoring quality control in the exporter facilities (who "does nothing" according to exporters); and one for the Banco do Brazil which processes the export documentation and forwards the transaction details to the Receita Federal (federal revenue service). Each form requires a cover form with essentially redundant information. Further, documentation must be processed ahead of time, so orders cannot be changed easily and the flight schedules of the carriers are fixed, often leading to delays in shipments. To facilitate the export process, customhouse brokers are employed by the exporters.

From both conservation and fiscal perspectives, record keeping practices suffer from serious drawbacks. A lack of financial and human resources to monitor the fishery and exports limit the effectiveness of IBAMA. There are few trained specialists in the identification of species, and the few conservation agents employed in the state of Amazonas must divide their duties among numerous environmental issues. These agents further suffer from their perception as a police force on the part of the riverine peasants. Local petty commodity producers object to the agents' practice of hindering their ability to ameliorate their poverty via extractivist activities: "*a gente tem que comer,*" we have to eat. Most of my informants argue, for example, that if IBAMA would like them to stop capturing and selling contraband, i.e. turtles, then they should pay them to do something else.

Chao's (2001) effort to calculate the annual capture of ornamental fish

proves that export statistics are of little value, reflecting neither the correct total of fish captured, nor the correct identification of species in many cases. Whether at the municipal, state or national level, the reporting of income is universally under reported. Most participants from the local to international level are extremely careful when responding to questions concerning this matter. Based on interviews I conducted throughout the trade chain, it would seem that officials from the state revenue service are sensitive to the nature of the informal economy, and therefore exert little pressure on the participants. It cannot be overemphasized, however, that this reality is not isolated to the ornamental fish trade, but the whole of Amazonian extractivism.

Mortality while fish remain in the exporters facilities is reported to be less than five percent. Upon receiving fish from the interior, fish are placed in concrete tanks, lined with ceramic tile, or in polyurethane pools. They are generally treated and fed for at least a week before being shipped. Exports are typically shipped directly to importers or retailers, but in the case of shipment to Japan or Europe, may have to be transshipped. Fish are shipped in oxygenated plastic bags that may include treatments of tranquilizers. Packing density depends upon the species being shipped. Bags are placed in shipping containers of either corrugated cardboard or Styrofoam, measuring 42cm<sup>3</sup>, depending on the length of travel. At the airport in Manaus, IBAMA and the Receita Federal inspect shipments randomly to confirm that there is no contraband or underreporting of shipments.

Exporters prefer shipping fewer but larger shipments since shipping

charges are high, and airfreight rates decrease as the total weight increases. Exporters in Manaus complain that international airfreight costs reduce their competitive position relative to the neighboring nations. Colombian ornamental fish exporters, for example, were paying freight bills of only \$1.50/kg for shipments over 500kg to Miami, while exporters in Manaus were forced to pay around \$2.20/kg.<sup>15</sup>

Shipping costs represent up to 50 percent, or more, of the landed cost of ornamental fish exports, and each link in the trade chain. Since only healthy fish have better market value, quality control (water management and trained staff) at the level of export and import adds value to the fish (Basleer 1994: 242). The price of ornamental fish, in reality then, represents the risk associated with shipping live animals in large volumes of water. For the exporter, particularly, the risks are the highest. The exporter assumes all responsibility for the mortality of fish in the international transport phase. Importers may reject part or all of a shipment, depending on the number of "dead on arrivals" (DOAs). For example, if the number of DOAs is greater than 25 percent, the importer assumes that the entire bag/box of fish is likely to succumb to the same forces that caused the deaths of the other fish, and has the prerogative of not paying for the remaining live fish, nor the freight charges incurred. The situation allows for unscrupulous importers to seriously prejudice the exporters.

Losses due to mortality do not seem to be very high however, at least with regard to the cardinal tetra. According to Paulo Petry (personal communication), who has examined cardinal tetra mortality of one London based importer who

imported fish from an exporter in Manaus over a period of three years, DOAs in 19 shipments (227 boxes, containing 190,300 fish) averaged only 3.9 percent per shipment. If two shipments that included episodic high mortality rates of 13 and 19 percent are factored out as outliers, the overall mortality rate is only 1.8 percent. Whether these figures apply to all exporters remains to be determined.

The exporter has other risks as well. Importers may refuse any shipment that has experienced inordinate delays. Although the exporter is generally not to blame, it is he who assumes the loss of the value of the product, handling fees, freight charges, and packing materials. The exporter also assumes the risk of non-payment by the importer, which by all accounts is common. Industry insiders lament that many people enter the importing business without proper knowledge of the shipping process or the business acumen for running an import operation. Apparently many hobbyists try to enter the trade who are unprepared for the responsibilities associated with the trade. Their inexperience leads to cash flow problems, and the exporter is the last to receive his fair share in the case of bankruptcy.

Most exporters have a fixed client base in one or more regions of the world. The largest importing countries in terms of value are Germany, the US, the Netherlands, and Japan, respectively (IBAMA 1999). The figures provided by IBAMA do not reflect the possibility of transshipment however. Dutch and German carriers have more frequent air routes to Brazil, and thus many shipments to Great Britain are not reflected in the official export statistics. I am unable to determine why an accurate profile of exports is not produced by

IBAMA, as the exporters must include a copy of the actual invoice as part of the normal documentation submitted. A complete accounting of this data in export summaries is thus possible, and extremely useful. Data included list the species, quantity, and value, but are not adequately correlated with the final destination, or over time. This data can provide a detailed understanding of the structure of global trade in Amazonian ornamental fish, and demonstrate consumer preferences, both temporally and spatially.

## **6.6. THE TRADE CHAIN: IMPORTATION TO CONSUMPTION**

To facilitate the description of the distribution of ornamental fish, I will confine my analysis in this section to the United States. The Pet Industry Joint Advisory Council (PIJAC 1998:1) has estimated that there are about 100 ornamental fish importers in the US. US importers enjoy economies of scale by importing large quantities of fish from around the world, stocking them in their large storage facilities. Fish are generally quarantined before they are eventually shipped to wholesalers or retailers. Importers pay from \$0.05-.12/cardinal tetra imported from Manaus. There are more than 500 ornamental fish wholesalers in the US (PIJAC 1998:1). Wholesaler revenues in the US for 1986 were between \$25-30 million (Fitzgerald 1986:260). In the US, over 300 Florida fish farmers and 500 specialized breeders (PIJAC 1998:1) in other states compete with imported wild caught fish. Wholesalers with whom I have spoken, claim to pay about \$0.26/ per cardinal tetra, and this figure has remained stable since 1992. The

wholesale price for cardinal tetras is about \$0.65. From the wholesaler, the fish are then shipped on to retail pet shops who charge anywhere from \$1.00- 2.50. Wholesalers claim that they net less than 10 percent profit: "Most of the fast bucks have been made." In each phase of the trade chain the number of fish shipped decreases, while the price increases. The principal reason for the increases in price along the chain, from the exporter to the retailer, can be attributed to the following cost factors, transportation, mortality, water quality, utilities, installation, labor, food and medical treatment for fish, customs, taxes, packaging and marketing (see Table 2).

**TABLE 2**  
**PRICE OF THE CARDINAL TETRA ALONG THE COMMERCIAL PROCESS,**  
**MARCH 1999.**

Point in distribution of fish	Price per thousand cardinal tetras sold*	Price as percentage of price paid to collectors	Principle expenses involved in commerce, and other considerations
Piabeiro	\$5.00/1,000 or \$0.005/fish		Canoe, knife, machete, nylon mosquito netting
Buyer	\$10.00/1,000 or \$0.01/fish	100%	Boat, fuel and oil, repairs, non-payment of advances, mortality of fishes, Transport of fish (Barcelos-Manaus),
Exporter	\$100.00/1,000 or \$0.10/fish	2,000%	Transport of fish (Barcelos-Manaus), mortality, water, utilities, installation, labor, food and medical treatment for fish, customs, taxes, packaging and marketing
Importer	\$260.00/1,000 or \$0.26/fish	5,200%	Transportation (Manaus-Miami), mortality, water, utilities, installation, labor, food and medical treatment for fish, customs, taxes, packaging and marketing
Wholesaler	\$650/1,000 or \$0.65/fish	13,000%	Transportation (Miami-Detroit), mortality, water, utilities, installation, labor, food and medical treatment for fish, customs, taxes, packaging
Retailer	\$2,000/1,000 or \$2.00/fish	40,000 percent	Mortality, water, utilities, installation, labor, food and medical treatment for fish, customs, taxes, packaging; buying in small lots and selling on a small scale

Note: Research conducted in March 1999. Prices are result of informal survey conducted in Barcelos and Manaus, Amazonas and Detroit, Michigan.

There are between 9,000-12,000 pet stores that supply the American hobbyist (PIJAC 1998:1). Industry insiders insist that the number of retailers is dropping considerably at this time as Walmart and large pet store chains like Petco and PETsMART are forcing the smaller “mom-‘n-pop” pet shops out of

business (see Chapter 2, section 2.4.a.). These large retailers are not very interested in wild caught species, which require more highly trained personnel and a larger investment in handling and water quality. As such, they prefer the domesticated variety of fishes from Florida and Southeast Asia. In 1992, 74.5 percent of imports of ornamental fish into the US originated in Southeast Asia alone, while imports from South America only amounted to 14 percent; of which cardinal tetra represented 1.5 percent (Chapman, *et al.* 1997:4-6). As had happened during the 1960s, it appears that these discount retailers are causing a negative impact on the popularity of the hobby. Although this claim requires further research, more recent data on the trade seem to support this claim. According to Aquaculture.org (2000:1), the market for ornamental fish in the US decreased between 1996 and 2000. In that four-year period, the value of ornamental fish exports fell by nearly 50 percent, while ornamental fish imports, totaling \$20.5 million in the first-half of 2000 fell by 27 percent.<sup>16</sup>

Americans were said to spend \$215 million on live fishes during 1986 (Fitzgerald 1989:259), and total spending for the hobby (including equipment, accessories and live plants) in 1988 amounted to about \$739 million (Andrews 1990:53). The number of Americans who maintain aquariums ranges from 20-22 million: McLarney (1988:22) estimates that 22 million Americans possess aquariums, while Conniff (1989:99) estimates 20 million. According to Conniff (1989:99), 51 percent of fish keepers in the US are college educated; 58 percent are female; and 80 percent are between the ages of 21 and 49. PIJAC (1998:1) further estimates that ten percent of US households (approximately 9.4 million)

maintain freshwater aquaria, averaging 1.2 aquariums and 8.8 fish per household. These figures do not include the number of aquaria in offices, hospitals, businesses or public spaces.

The consumer market for ornamental fish seems to be greater in urban areas of temperate climates where long winters cause people to spend more time in the home. Hobbyists may spend a lot of time studying about the fish they keep, their natural habitat, and fish keeping. There are hundreds of general and specialized hobby clubs, centralized under the Federation of American Aquarium Societies (FAAS), in which hobbyists can become involved.

The ornamental fish hobby can be roughly divided into four market segments: decorative, educational, what I will call “dabbler,” and “true” hobbyist. In the decorative segment, the hobbyist is simply interested in using aquaria as an element of interior decorating, or possibly to relax and ponder a micro ecology in their own home.<sup>17</sup> The educational segment buys aquaria and stocks them with fish as a means for their children to understand more about nature. The “dabbler” segment enjoys buying fish as a leisure activity, and is likely to possess larger fishes that become more like personal companions. None of the first three segments are very interested in breeding their fish however. The “true” hobbyist then is an ornamental fish breeder. The true hobbyists are typically very well versed in the scientific aspects of the hobby. They are knowledgeable about taxonomic nomenclature, geography, water chemistry, and pathology as it pertains to their fish. True hobbyists may have as many as 100 aquariums in their “fish rooms.”

The true hobbyist plays a significant role in the global ornamental fish industry as breeding success is often translated into commercial success, which has consequences for petty commodity producers in regions of the world like the Rio Negro. Once a fish has been bred successfully, a chain of events can be triggered, causing a disruption in the industry. The FAAS "Breeder Award Program" is instructive in this respect. In the "Breeder Award Program" hobbyists receive points for breeding species of fish. Fish are identified according to their degree of wildness (F0, F1, F2, F3, etc.; F refers to filial). F0 refers to wild stock, F1 is first-generation stock bred from wild stock, F2 refers to second-generation stock, etc. The lower the F-number, the higher the number of points one is awarded. One of the roles of hobby clubs is to certify that members in fact successfully bred the species in question. F1 fish are more highly desired because they don't "bring 'baggage' from wild stocks," but do keep the wild and desirable characteristics, i.e. size and compoment. The rarity of fish, therefore, is translated into points. The breeding of rare fish is also translated into money, but according to most hobbyists, "nobody makes any money in the end."

It is not just hobbyists that utilize this system of fish identification however; many commercial breeders use it as well. The object of commercial breeding is to find F0 or F1 fishes that have a high market value, and turn them into F5s. This has already happened with numerous species from Amazonia such as the discus fish (*Symphysodon* sp.), the neon tetra (*Paracheirodon innesi*), and the angelfish (*Pterophylum* sp.), to name a few. Southeast Asia is now the principal exporter of the discus fish and the neon tetra, while the angelfish is bred in

Florida and in the homes of thousands of hobbyists in the US. Just as Homma (1989) predicts, the cardinal tetra is now being produced in captivity in the Czech Republic. I am not sure of the details about their breeding success. It is hoped that the cardinal tetra does not become an F5 fish before economic alternatives are introduced into the middle Rio Negro basin.

### 6.7. NOTES

<sup>1</sup> The Rio Negro carries less than three percent of the amount of suspended nutrients and chemicals that the Rio Solimões does (Goulding, et al. 1988:19).

<sup>2</sup> A large area of the Rio Itú again burned during the el Niño event of 1997, principally the Igarapé Casurucu, but also the Igarapé Aduiá. The fire burned for nearly a month and could be seen from the city of Barcelos.

<sup>3</sup> The gap in the distribution of the cardinal tetra is attributed by Harris and Petry (2001:213) to the fact that the rivers in this range have steeper gradients, and thus less extensive floodplains.

<sup>4</sup> During the decade of the 1960s, fish were shipped without separation. This practice ceased when the variety of species with a significant demand was firmly established, and it was discovered that certain more aggressive species caused a high incidence of mortality of the cardinal tetra and others.

<sup>5</sup> Pitiú is utilized in the cacurís only twice; baitfish is salted again when it is brought back to camp/boat. This explains the large amount of salt that the piabeiros bought during the transactions with the patrão that I witnessed. Purchases of salt are also common with piabeiros on the left margin of the Rio Negro as well: as preparation of meals, preserving food and some for fish treatment, but not to the degree where the cacurí is the principal fishing method.

<sup>6</sup> Willi Schwartz introduced these bacias around 1970. They are produced for the food processing industry in São Paulo. The bacias are ubiquitous throughout the region. Old and damaged bacias are utilized for storage of personal items, washing clothes or dishes, herb gardens, temporary location for greasy motor parts during repairs, etc.

<sup>7</sup> In 1999, I provided Dr. Andrea Waichman of the Universidade do Amazonas with data concerning water chemistry parameters and mortality data for a period of two weeks, including the transport to Manaus. I have unfortunately not yet received the results from this study.

<sup>8</sup> The possibility of correctly estimating the number of collectors is hampered by several variables. First, buyers and exporters are leery about giving out information that might compromise their competitive position. Second, the geographic area confronted in conducting a socioeconomic census is overwhelming (0.2 inhabitants/km<sup>2</sup>); the Brazilian census agency (IBGE) does not survey the specific occupations of respondents. Third, whole families, including women and children, may be involved in the collection, transportation handling processes, at various points of the fishing season, and over years. Last, the turnover of client/collectors is high and varies monthly and annually.

<sup>9</sup> Of the largest exporters, one claims that his firm has at least 600 piabeiros who deliver fish to him through his commercial agents, while another exporter claims to have around 300.

<sup>10</sup> Although exporters of ornamental fishes in Manaus buy fishes from all over Brazil, I will be referring only to their activities on the Rio Negro.

<sup>11</sup> Manioc is the principal crop planted. During my fieldwork, I only met one family that planted more than two hectares, which allowed for the production of surplus for sale or barter. The head of this household traded most of the surplus to intermediaries of piassaba and ornamental fish. Most produce “so para nosso próprio consumo,” for our own consumption.

<sup>12</sup> Tour operators insist that the boats only cause a wake at very low speeds, and therefore do not present a threat to the viveiros unless they land at the beaches where they are located.

<sup>13</sup> Apparently the situation was different until about 1980 when a large fire was accidentally sparked by some piabeiros. Piabeiros relate that it took almost ten years before the Atauí was once again productive.

<sup>14</sup> This agency is the key institution in the monitoring of the ornamental fish commerce. Although the state environmental protection agency (IPAAM), and the municipal environmental protection unit (Secretary of the Environment, working under the jurisdiction of IBAMA) are charged with monitoring the fish collectory as well, there are few structures instituted which provide for any meaningful intervention.

<sup>15</sup> It should be noted that the bulk of transportation costs involve the shipment of water that varies between 25 – 30kg.

<sup>16</sup> Some exporters think that the Internet is the cause of the decrease in demand for ornamental fish as well, as consumers are spending more money on hobbies involving computer technology than on pets.

<sup>17</sup> In 1983, University of Pennsylvania ecologist Alan M. Beck did a study in which he concluded that contemplating an aquarium containing fish might lower blood pressure and heart rate (Conniff 1989:92).

## CHAPTER 7

### CONCLUSION

I conclude this dissertation by dispelling some of the myths related to the trade in wild caught ornamental fishes. Appadurai (1986:41) has suggested that commodities can be regarded as having social “life histories” or “careers,” and as such, “it becomes useful to look at the distribution of knowledge at various points in their careers.” Further, “Mythological understandings of the circulation of commodities are generated because of the detachment, indifference, or ignorance of participants as regards all but a single aspect of the economic trajectory of the commodity” (Appadurai 1986:54). Thus, following the trajectory of the “life history” of the cardinal tetras from the environment to the consumer, the discrepancies in knowledge about their conservation and place in social relationships in a mercantile capitalist economic system can be examined.

Unlike Appadurai, however, as I stated in Chapter 2, who emphasizes producers, distributors, and consumers as a commodity ecumene, I also include any social agents that have some social, economic, political or cultural association with wild caught ornamental fishes. Therefore, I have organized this chapter by exposing a number of myths regarding the mercantile commerce of wild caught ornamental fish, and subjecting them to the results of my research.

## 7.1. ECOLOGICAL MYTHS

### 7.1.a. Fish Mortality

Many observers of the ornamental fish trade attribute a high mortality rate during the period of capture, but provide little more than anecdotal data (see Conroy 1975:15; Thomerson 1976:57-58; Welcomme, *et al.* 1978:10; Hemley 1984:20; McLarney 1988: 49; Leite and Zuanon 1991:328; Eisenstadt 1992:4; Adeodato and Oliveira 1994:70). In section 6.3.d., however, I showed that mortality is generally no higher than two percent. Although collectors recount that the number of fish lost during the collection and transport phases during the first decades of the fishery was high (up to 100 percent), survival rates today are greatly improved, largely because of improved capture and handling procedures, and fish health remedies. Consequently, I would argue that in terms of handling the fish, the collectors are extremely conscientious of their environment, not because of some romantic conservation ethic, but rather by economic necessity.

### 7.1.b. Fish Stock Reduction

Although some researchers have proposed that some cardinal tetra stocks are diminishing (Bayley and Petrere 1989; Andrews 1990 and 1992), they do not provide any concrete data and seem to be based on hearsay. Bayley and Petrere (1989:385-386) wrote: “intensive fishing has caused commercial extinction of discus, *Symphysodon* sp. in the lower Rio Negro and the cardinal, *Paracheirodon axelrodi* in the middle Rio Negro region (M. Goulding, pers. comm.).” McGrath

(1990, in Eisenstadt 1992:5) wrote that complaints by piabeiros apparently led to the suspension of all collecting for one year (August 1988 to July 1989) on the Rios Jufarís and Téa.<sup>1</sup> I was able to ascertain that the Rio Téa was closed to collecting in 1986, but I do not have information about the Jufarís. It may be that McGrath was aware that in 1988, the president of the ornamental fish exporters association in Manaus (ACEPOAM) and a member of the state assembly, Sebastião Corrêa, proposed closing down the rivers Jufarís, Cuarés, and Aiuanã for two years to preserve cardinal tetra stocks (A Crítica 1989); this never happened however. Corrêa did succeed in prohibiting the fishing of cardinals between May and July, and their exportation in June and July. According to many piabeiros, however, they had been arguing for such a prohibition for some time, at least since 1985.

Interviews with piabeiros indicate that support for the closure of the Téa followed patron loyalties. On the one hand, some argued that over fishing and fishing during the reproduction period was occurring; on the other hand, many thought the measures were a consequence of personal jealousies regarding the inability of certain parties in establishing collection activities on the Rio Téa. The impartial observers' positions on the matter seem to tilt the scales in favor of the latter interpretation. The Rio Téa is said to be responsible for 15 percent of annual cardinal tetra production in the region, and four kin members control production that is divided between two exporters. This case also hints of exporter involvement in the maintenance of fishing areas. It appears that when fishing production diminishes in certain areas, exporters may not meet their supply

requirements if they are not represented by intermediaries in multiple fishing areas. Further research is needed on this matter.

The argument that commercial extinction has occurred seems to be flawed for several reasons. First, there is no primary data offered regarding fish stocks; obtaining this data is not an easy undertaking. The area is immense, the number of collectors is still unknown, and there are many questions to be answered regarding the correlation between climatic conditions and the reproductive biology of the fish. This is particularly true in the vast campos of the interfluvial areas of the left margin of the Rio Negro. Piabeiros relate that the productivity in the streams that drain these campos varies annually, such that production from any one might be higher than the others in any given year. Second, fishing effort does not include a saturation of particular fishing areas that would put undue pressure on stocks. Fish collectors regularly move from *pesqueiro* to *pesqueiro* in search of fish as fishing effort increases. As I showed in section 6.3.d., collectors are proud of their conservation ethic. Third, the principal fishing areas have been in production now for forty years, with no expansion into other areas; and some fishing areas are not intensely exploited due to the difficulties presented by the natural environment. Further, the stability of exports of cardinal tetras from Amazonas (see Figure 10) suggests that production levels have not caused the stocks to be endangered. Fourth, although some collectors and intermediaries lament that it now takes a week to capture the same number of fish that once took one day about thirty years ago, the

number of collectors has grown considerably in the last twenty years due to the lack of economic alternatives.

Finally, It may be that a stable demand for the cardinal tetra is not significant enough to carry the cardinal tetra to commercial extinction. Often overlooked in research on sustainable development in general, and the live ornamental fish trade specifically, is the economic law of supply and demand. The ornamental fisheries and the variety of fishes sought are controlled by the international consumer demand for ornamental fishes. Thus, the exporters in Manaus only ask their collectors to deliver quantities and varieties of fish for which they have requests.

## **7.2. AVIAMENTO BASED MYTHS**

Without a clear understanding of the ornamental fishery in the Rio Negro basin, the actual relations of production can be easily misrepresented. It is best to understand the historical context on which cultural formation develops: “Change always proceeds in the face of prior structures (a given sociocultural heritage). The direction and nature of change is always affected by the organizational material (sociocultural patterns) at hand when the change begins” (Kottak 1999: 34). Observers of the ornamental fishery of the Rio Negro frequently employ the term *aviamento* in order to describe it; the assumption seems to be that history has stood still since the rubber bust. I have shown (Chapter 4 – 6) that *aviamento* has taken on various forms since Portuguese

colonial expansion began in earnest. My research shows that although credit remains an important element in the regional socioeconomy, numerous changes have taken place since the rubber period. These changes were conditioned by prior social forms, but it would be unfair to assume that only the negative sociocultural patterns survived.

It was shown above that during the rubber boom period on the Rio Negro, a monopoly of river transport was possessed by the famous aviador J. G. Araújo. Today, river transportation is highly competitive. There are four regional transportation lines currently operating out of Barcelos, and another four operating out of São Gabriel do Cachoeira that also serve Barcelos. Not surprisingly, the competition for cargo along the Rio Negro is intense. Further, these lines specialize in transportation services only, and do not act as merchandisers and credit agencies like the aviador or regatão.

### **7.2.a. Myths about Exporters**

Both academic observers and producers have accused the exporters of monopolizing the trade in ornamental fishes in the region. Within Barcelos, many people believe the exporters operate like a cartel. Crampton (1999:43) is more ambivalent about the supposed monopoly, proposing that they by preventing new businesses from setting up, the exporters actually “provide a “powerful brake on an accelerated depletion of *Symphysodon* stocks,” and “prevent an uncontrolled boom in supply.” I would argue that no monopoly exists, as entry is not barred (>25 firms have licenses), and many try to enter the trade with the minimum of

infrastructure and know-how. It appears that several traditional exporters continuously suffer from cash flow problems, and I have learned of exporters loaning money to help their comrades stay afloat. The fact that two veteran exporters have dropped out in recent years is further refutation of the cartel theory. I should emphasize that exporting is a risky business, as I explained in section 6.4.b.; establishing an ornamental fish export business is not as easy as it might first seem. It is true, however, that the ornamental fish exporters' association (ACEPOAM) has been trying for years to convince the Brazilian environmental protection agency (IBAMA) to set minimum financial, infrastructural and sanitary guidelines for exporters in order to be licensed, and as a means regulating the trade.

Unlike aviadores, exporters do not engage in extending credit to their intermediaries, although during the initial years of the trade, many provided boats to be repaid with deliveries of fishes. One exporter explained that he has several intermediaries who have never asked him for a loan of any type. In addition, it can be seen that the current structure of the relations of production has undergone many alterations (see Figures 11-13). Ultimately, like rubber, the majority of ornamental fishes are exported (and not as raw materials for industry), but the commercial process is much more flexible in terms of local relations of production, and money now enters the local economy as a means of exchange.

The exporters have also been accused of avoiding taxes and engaging in contraband activities, both by officials of IBAMA, and academic observers (see

Goulding, *et al.* 1996:113). Trying to make sense of the value and quantity of fish captured and shipped, as well data provided by state and municipal revenue agencies, suggests a vast informal economy. But as Nugent (1993: 34) cogently noted: "Major sources of forest income are realized through non-standard and episodic transactions which are beyond the sight of cost-benefit analysis." I have news clippings for about the last ten years that deal with the ornamental fish commerce in the state of Amazonas. Regularly, about once a year, some inspection by IBAMA identifies the practice of contraband by one or another exporter. The exporters seem to make a convenient whipping boy for IBAMA and others, who fail to acknowledge that in nearly every extractive activity in Amazonia, legal improprieties can be identified at every turn. It would seem that it is easier to select an industry whose commercial value and political representation is relatively low, and pales in relation to such industries as timber and minerals, where the likelihood of backlash is much greater. Rumors in Manaus abound regarding the "wild west" nature of the timber agents who come to meetings at IBAMA with side arms.

Another example of the informal economy is instructive on this matter. In 1999, the state of Amazonas initiated a public campaign in Manaus to provide an incentive for consumers to insist upon receiving a receipt for their purchases. The campaign was a form of lottery entitled "*eu quero a nota*," or I want the receipt. Citizens were asked to bring their receipts to post offices in order to participate in the lottery. Thus, the informal economy is not just an issue of extractivism, but a social reality in all of Amazonia, probably Brazil, and Latin America in general.

### 7.2.b. Myths about Patrons

The fishery has been erroneously associated with the form of *aviamento* common during the rubber boom (Oliveira, *et al.* 1994:84), even feudalism (Goulding, *et al.* 1996:111). Goulding and Smith (1997:23) have characterized the ornamental fisheries as “the last strongholds of the traditional indentured labor system of the Amazon. This economic system is especially obvious in the Rio Negro basin.” Based on my research of the ornamental fishery, I find such characterizations simply rhetorical and over-simplified.

In using the term *aviamento* as driven by debt bondage, observers of the relations of production in the extractive economy imply that patrons hinder the conversion of a barter economy to a monetarized economy (Empeaire and Pinton 1993). It is worth repeating that debt bondage entails an advance payment, in some form or other, together with the prohibition of working for other employers so long as the debt remains outstanding. In most instances in the ornamental trade, the patron with clients in the interior will advance them goods, generally food items, various domestic sundries, and clothing, but such goods are requested, not forced upon them. Small transactions often leave a positive or zero balance for the client. The client can demand the cash balance left over to purchase items from other passers-by, or he can credit the balance for other merchandise upon the patron’s return. There are other transactions that do, however, closely resemble debt bondage, but the prohibition of working for others is not enforced, even if desired. The point is that there are some good patrons, and some bad ones.

Unlike debt bondage, the patron/piabeiro will allow the client, albeit reluctantly, to partake in other economic activities so long as the outstanding debt is paid. The client is not always a good bet, however, and many patrons, if prompted, will begin to list the outstanding debts that were never recovered. As such the patron raises the price of each item, generally about 40%, to reduce the risk of failure to repay the advance, and to pay the expenses of transport and his time spent searching for the items requested. In fact, most patrons claim they make nothing through barter, they come out even. They see the delivery of merchandise as a form of courtesy to their clients. It is on the fishes delivered that they earn their living.

The typical debt situation arises when clients request items of greater value that are difficult to obtain so far from major urban centers. The clients are advanced the goods, which are given value by the patron in terms of thousands of fish to be delivered. The riverine peasants of the Rio Negro, as well as some Amerindians, have strong consumer desires (Hughes-Jones 1992). Riverine societies are regularly exposed to the dream worlds presented in the television media, as well as the consumption patterns of the national society, and many are motivated by instant gratification of their desires. I have witnessed collectors requesting high priced items, such as hi-fi stereos at the beginning of the fishing season before they have any meaningful production. It should also be emphasized that credit purchases are not confined to the ornamental fishery, a visit to any merchant in Barcelos will confirm this. High rates of interest on transactions in the extractive economies of Amazonia follow a common pattern

found in all of Brazil, even the US. If one buys a freezer on credit (*parcelado*) at an appliance store in Manaus, or even the “Rent-a-Center” in the US, the effective price of the item over a twelve-month period may be double or more. Thus, the practice of charging interest on goods is not isolated to the ornamental fishery of the Rio Negro; despite whatever sympathy we have for the unfortunate debtor.

I asked several patrons about the absence of salaries. They give a fairly cultural explanation. They claim that the peasant collectors (and I am speaking more in regard to those from the interior than those from the towns) do not know how to save their money. According to one patron: “If my clients were paid cash monthly they would not fish. They would spend all their money, plus some, on *cachaça* (sugar cane alcohol).” Even if barter were eliminated as the means of exchange, there are few alternatives for the collector in the interior. During the rubber boom a number of foreign companies, unsatisfied with production levels under *aviamento*, experimented with cash payment as a labor incentive, basically attempting to turn the tappers into wage laborers, or autonomous suppliers of latex. The experiments failed, and for good reason: “the *aviadores* may have inflated prices and supplied [tappers] with inferior merchandise, but their willingness to take special orders for food, clothing, or medicine made a significant difference to the tapper working in a remote rubber district” (Weinstein 1986: 69).

In the rubber trade, the patron’s goal was more to avoid the loss of labor rather than to increase production. In the ornamental fish trade on the Rio Negro,

I find exactly the opposite is true; labor is not an issue. In fact, there exists an ample work force in Barcelos given the lack of other solid economic alternatives in the region. Many client/collectors switch patrons as frequently as they switch extractive activities, depending on who is paying the best price. In addition, potential collectors living in various communities along the Rio Negro are involved in fishing activities only when patrons find it profitable to capture certain species of fishes in their area. Further, with a surplus of labor, patrons can be selective. If collectors cannot produce, jeopardize the patron, or are irresponsible in their habits, they are released.

Just as during the rubber boom years, fictive kinship is an important element in the socioeconomic relations of production in the fishery; and the patrons of piaba are involved in many of these social bonds. Hierarchical bonds created through compadrio still remain important in the extractive economy of the Rio Negro, although they are by no means the exclusive form present in the fishery. Harris (2000:190) found that riverine peasants in the várzea of the lower Amazon preferred horizontal compadrio relations. I take this to indicate Amazonian societies will emphasize vertical compadrio relations in regions where commodity production takes precedence over subsistence production, and reflects environmental constraints, such as the absence of fertile floodplains and highly productive food fisheries in the Rio Negro basin.

Despite many researchers having found that oppression and exploitation are present in the Rio Negro extractive economy, there is some room for variation, even enough room for amicable relations between patron and client.

According to Emperaire and Pinton (1993:786), who have conducted research on the piassaba commerce in Barcelos, extractivists lack any reference point for market prices, and are indebted from the first transaction. One of their responses to such indebtedness is to ally themselves with other patrons, or break away from the patron completely and enter the cash economy (e.g. agriculture, ornamental fishes) or move to town (Emperaire and Pinton 1993; Lescure and Pinton 1993).

Researchers and government officials investigating the fishery must also understand the total socioeconomic context before jumping to conclusions about exploitation. If we bear in mind that participants in Amazonian extractive economies “are under the same pressures to combine income-earning strategies... in order to survive in a marginal economy” (Whitesell 1993:130), social relations will be better understood. Depending on who one talks to in the region, various fishery participants will be criticized. When everyone is “fighting over crumbs,” so to speak, jealousies and intrigues abound. I have heard individuals complain about the patrons of the fishery, but when we ran down a list of the individual’s patrons over a period years, the response to whether each patron was good or bad was invariably “not bad” for all patrons listed.

There is one interesting example, however, of the origin of pronounced animosity on the part of several veteran patrons, and deserves special consideration. In 1982, when one of the current exporters took control of the operation from his in-laws in Manaus, he selected an individual to serve as his representative in Barcelos. The individual selected had been collecting cardinals

for his uncle for about ten years. It seems obvious that the new exporter was interested in rationalizing the deliveries of fish, most likely to simplify the processing of deliveries, or maybe to avoid his insertion into personalistic patron/client relations. The veterans claim that by centralizing the exchange with the representative, their profit margins are reduced:

He now makes the money from piaba that used to be ours. Who is making money now is him. He has a beautiful house, a building in the city, everywhere. He's buying a car, buying, buying. That was our money, we fishermen, as it was in the beginning. We took the fish to Manaus and sold it directly to the exporter. We did well, and money left over to fix our boats, to buy boats in those days.

The relations of production in the ornamental fish extractive economy are transformations of those of the rubber boom years. Today, although free wage labor does not exist in the fishery, there are more structural categories of both patron and client, and cash has become as common as barter. As I have shown above, the producer is not left with next to nothing. What he earns is not a lot, but it is at least acceptable within his own moral standards associated with a semi-isolated existence. His relationship with the patron is more collaborative and legitimate than it is exploitative. However, the ornamental fish trade has much in common with the conservative model of merchant capitalism. Production is unquestionably disciplined at the local level through the international demand for aquarium fishes, and the relations of production of the hobbyist (wage laborer, etc.) do not resemble those of the collector; that is ornamental fish hobbyists are not peasants. Further, difference in the price paid to the collectors and the price paid by the hobbyist is substantial (Table 1), but many reasons explain this state

of affairs. The markup for the consumer of Rio Negro ornamental fishes may be high, but failure to consider the costs of freight and handling, medicines, losses, and other transaction costs makes criticisms of the trade shallow and sensationalist.

### **7.3. THE MYTH OF SUSTAINABILITY AND THE ORNAMENTAL FISHERY OF THE RIO NEGRO**

When considering the sustainable development of the ornamental fishery of the Rio Negro, we might remember a lesson the U.S. and Brazilian governments learned during WWII when they tried to rationalize rubber production in the Amazon. According to Higbee (1951:415), “a successful achievement of their objectives would have called for a drastic overhaul of economic and political customs of long standing.” I argue that in order to ensure the sustainable development of the ornamental fishery of the Rio Negro, it is necessary to work within the framework of the socioeconomic organization that is now in place.

Sustainable development initiatives will be unsuccessful if erroneous assumptions are maintained about the role of the intermediary in the extractive economy. Ornamental fish collectors are not indentured feudal peasants. The fact that they can switch patrons does not make this position justifiable. The patron usually has the same level of education as his clients: little. He participates in the same rituals and community events, sends his children to the

same schools, enjoys the same food and shares in the same common cultural traditions. Patrons are cultural and political intermediaries for their clients in the interior, bringing news of the “world out there,” and would ensure fisher participation in educational, social and environmental programs. Further, local and state politicians seek the patron’s vote because he has the ability to influence his clients. Resource management schemes that exclude him are doomed to political roadblocks.

Within the paternalistic patron/client structure, inequalities in wealth, status, and power are given some legitimacy because of the relative absence of impersonal state-sponsored legal and economic security, and the inability of kinship or the traditional village to offer personal security or social mobility (Scott 1972b). Fish collectors might be organized and the intermediary function eliminated, but the intermediary himself must be included in any restructuring of the commercial process because of his socioeconomic status in the society. Efforts to organize cooperatives of fish collectors will require a long-term commitment and expensive educational programs (formal and technical) for participants given the lack of entrepreneurial orientation and formal education. The logistics of attending to 1,000 piabeiros would be complicated due to the large distances between them, spread throughout the Rio Negro basin. Additionally, there are significant webs of relationships based on marriage, kin and fictive kin relations that would likely politicize cooperative efforts. In other words, the organizers of such cooperatives will have to assume the role of patron for a number of years:

Outside agents for progressive change, even those that are intimately familiar with local conditions and do not take a “top-down” approach to the creation of [sustainable development projects], have so far found it impossible to prevent themselves from assuming the role of the *bom patrão* (i.e., the “good patron”), in the eyes of workers. (Whitesell 1993: 311)

A good sized staff with knowledge of the local environment and culture, and knowledge of the world market for ornamental fishes will be necessary to lead these mostly illiterate peasants to autonomy, assuming the international demand for ornamental fishes does not take the road of natural rubber. The problem of inequalities in the redistribution of wealth in the extractive economy in the Amazon doesn't really stem from the social relations of production, but from larger structural problems within the local, regional, national and global economies.

The extraction of ornamental fish on the Rio Negro is one of the few opportunities for producers to earn enough to obtain basic necessities, even consumer durable goods. It has the effect of keeping the peasant fish collectors in the interior and not in Manaus where unemployment is high (more than 14 percent (IBGE 1998), but probably higher) and rural immigrants continue to arrive daily. As Chao (1993) accurately noted, without the ornamental fish trade on the Rio Negro, the economic alternatives such as mining, deforestation and uncontrolled predation on aquatic and forest fauna would have certain negative social and ecological costs.

Anderson (1990a:11, see also Kottak 1999:26) writes: “Sustainable forms of land use are currently limited to a small minority of the rural population under

highly specific conditions.” The ornamental fishery of the Rio Negro would seem to represent such a case. Fishing activity has not significantly impacted the environment in any drastic fashion, and thus appears to be sustainable. However, it is apparent that although the fishery contributes greatly to the local economy, it is by no means able to support but a fraction of the local people. If we recall Homma’s (1989) warning that extractive products tend to be replaced by cultivated species or synthetic products, we can predict that the cardinal tetra will eventually be produced in captivity like so many other Amazonian fish species. The fish have already been bred commercially in the Czech Republic, and it is just a matter of time before breeding will be done on a large scale, particularly given the current structure of the retail sector. So, the cardinal tetra is sustainable ecologically, but certainly not socially and economically.

Although the economic contribution from the ornamental fishery in the region is substantial, probably less than 1,000 people divide this income among themselves and their family and kin. Those who fish make a reasonable wage (or equivalent), but it must be redistributed among many blood, collateral, and fictive kin who are not gainfully employed. With a population of more than 24,000, the income from piaba does not go very far for the non-piabeiro sector of the economy. Without concentrated governmental efforts to encourage agricultural projects adapted to the Rio Negro ecological conditions, and other economic activities like tourism, ornamental fish collecting will remain the principle economic activity. Given Brazil’s large external debt, it will take some time before

the state finds the financial resources to take care of its internal economic and social ills, like those found in the Rio Negro basin.

#### **7.4. NOTES**

<sup>1</sup> I have been unable to locate a copy of this article.

## **APPENDIX A**

### **MISSION STATEMENT FOR PROJECT PIABA**

Project Piaba is a community based interdisciplinary project established to understand the ecological and socio-cultural systems of the middle Rio Negro basin, Amazonas, Brazil, in order to conserve and maintain the live ornamental fishery at commercially feasible, and ecologically sustainable levels. The live ornamental fishery has a significant role in poverty alleviation for the riverine people of the region.

Fishes and their aquatic environments are often overlooked in conservation and sustainable development projects in Amazonia, yet the diversity of fishes (over 3,000 species) and the socio-economic value of the fisheries have a great importance for the region. Fishes are not only the principal source of protein (about 70 kg/capita/yr.) for Amazonian, many are also traded live as ornamental fishes worldwide. The middle Rio Negro basin is the major fishing grounds for live ornamental aquarium fish. Official records have shown that 20 million live fishes are exported from the region annually and generated about US\$ 3,000,000 for the local economy.

The ornamental fishery is the principal subsistence activity for the riverine communities in the municipality of Barcelos (population 11,000; area 122,490 km<sup>2</sup>). The trade in ornamental fish now contributes at least 60% of the income revenues in

the municipality. Great fluctuations in fish production, mortality rates and price are the principle variables for the fishers' subsistence. In years when incomes from ornamental fishing are reduced, some fishers turn to more environmentally degrading economic activities, while others migrate to already overcrowded urban areas hoping to find "modern" employment. Fortunately, the annually inundated, floodplain habitats of ornamental fishes have remained largely intact. Many forest fishes have a short life cycle (less than 2 years), so fish populations can be quickly replenished. It may, therefore, be possible through proper management to protect the habitat from degradation, while maintaining "bountiful" harvests at the same time.

The development of an appropriate resource management strategy first requires a more profound understanding of the ecosystems and socio-cultural systems of concern. Furthermore, the commercial methods for the ornamental fisheries are largely based on long-term partnerships among fishermen, middlemen, exporters and importers. Thus, the issues concerning improvements for the ornamental fishery must be addressed with direct involvement of all interested parties. A locally controlled ornamental fishery is essential for the long-term sustainable harvest of ornamental fishes, and to ensure the retention of revenues at the production center to raise local living standards.

During the past 10 years (1989-1999), researchers and students of the Universidade do Amazonas and INPA- Instituto Nacional de Pesquisa da Amazônia, have conducted baseline survey on fish diversity and socio-cultural implication of the ornamental fishery. We have also promoted the conservation of

Amazon fishes and habitats through the service of volunteers, ecotourism, tropical fish hobbyist publications and education programs at public aquariums and in Barcelos.

### **The Objectives of Project Piaba**

Project Piaba intends to expand its areas of research to include habitat destruction, ecosystem functioning, shipping and handling of live fish, fish pathology, and genetics. Although the Project has received funding from various sources, additional funds are necessary to achieve its objectives. By providing a scientific basis for management, we hope to contribute to the management of aquatic resources, and the long-term preservation of the Amazon ecosystem. Project Piaba has been working progressively for the past ten years (1989-1999) on research that contributes to the sustainability of aquatic resources that will ensure the survival of both the Amazonian rain forest and its human inhabitants. Significant progress has been made during this time, but much more baseline data are required before firm resource management strategies can be formulated. The new phase of Project Piaba aims to generate these data relating to a wide range of issues, from population levels of individual species, to the function of the ecosystem, and to develop measures that will help improve the lives of the riverine people. The goals are to promote a viable fishery for the riverine communities at commercially and ecologically sustainable levels, and to promote the reduction of environmentally destructive economic practices and prevent rural exodus from the Rio Negro region.

**Specific Objectives are:**

1. Investigate the spatial and temporal variation of aquatic habitats and their influence on distribution and abundance of fishes and turtles, and to study the life history of exploited species;
2. Identify and preserve the integrity of the ecosystems which sustain the food chain and diversity of aquatic fauna;
3. Study the genetic diversity of floodplain fishes to understand the phylogeography of the region to set a comprehensive management strategy for the fisheries;
4. Improve the technology on water quality control, fish health management and handling techniques at all levels of commerce (fishers, traders and hobbyists);
5. Investigate the socio-economic and cultural factors involved in the extraction and commercialization of natural resources.

Survey the feasibility, logistics and the political/business environments of establishing a locally controlled ornamental fishery and its trade processes.

**APPENDIX B**  
**RELATIONSHIP OF VILLAGE LOCATION TO RESOURCE BASES DURING**  
**THE 18TH CENTURY**

<b>Village</b>	<b>Waterways exploited</b>	<b>Principle resources</b>
Moura	1. Branco* (L); 2. Jufaris (L); 3. Jauperi (L); 4. Unini (R)	1. Turtle, cacao, <sup>1</sup> fish, game; 2. Not mentioned; 3. Not mentioned; 4. Turtle, copaiba <sup>2</sup>
Carvoeira	1. Branco* (L); 2. Jufaris (L); 3. Igarapés on right margin; 4. Caurés (R)	1. Cultivation; 2. Turtle, cacao, fish, game; 3. Not mentioned; 4. Manatee, cultivation
Poiares	1. Igarapés on right margin	1. Cultivation
Barcelos	1. Demini* (L); 2. Aracá (L); 3. Itú (L); 4. Cuiuni (R); 5. Ig. Baruri (R); 6. Igarapés on left margin	1. Manatee, game, fish; 2. Cultivation; 3. Not mentioned; 4. Puxiri; 5. Cultivation; 6. Cultivation
Moreira	1. Demini* (L); 2. Aracá (L); 3. Itú (L); 4. Arirahá (R); 5. Igarapés on left margin	1. Manatee, game, fish; 2. Not utilized; 3. Not mentioned; 4. Turtle, fish, Manatee; 5. Cultivation
Thomar & Lamalonga	1. Paduari* (L); 2. Preto (L); 3. Atauí (L); 4. Ereré (L); 5. Urubaxi (R); 6. Aiuanã (R); 7. Uenuixi (R); 8. Téa (R); 9. Igarapés on left margin	1. Piassaba, <sup>3</sup> fish, sarsaparilla, <sup>4</sup> copaiba, turtle, cultivation, game, fish 2. Not mentioned; 3. Cultivation; 4. Cultivation, piassaba; 5. Puxiri, <sup>5</sup> fish; 6. Not mentioned; 7. Not mentioned; 8. Not mentioned; 9. Cultivation

Sources: Sampaio (1825); Baena (1969); Ferreira (1984); Spix and von Martius 1981:262

\* Indicates white water river systems; the rest are all blackwater river systems

<sup>1</sup> *Theobroma cacao*.

<sup>2</sup> *Copaifera paupera*.

<sup>3</sup> *Leopoldinia piassaba*.

<sup>4</sup> *Petroselinum sativum*: root of small tree of the *Labitae* family or of *Smilax*, a genus of climbers of the lily family. Dried sarsaparilla roots were sent to Europe to make medicinal teas and restoratives.

<sup>5</sup> *Aerodictidium puchury*.

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