This is to certify that the

thesis entitled
RESOURCE USE AND CONSERVATION IN THE PROPOSED MIDDLE JURUA EXTRACTIVE RESERVE: COMMUNITY AND HOUSEHOLD VARIATIONS AND THEIR IMPLICATIONS FOR RESERVE SUCCESS

presented by

Stephen Robert Cameron

has been accepted towards fulfillment
of the requirements for

M.A. degree in Geography

David J. Stys
Major professor

Date 6-9-1999

# RESOURCE USE AND CONSERVATION IN THE PROPOSED MIDDLE JURUÁ EXTRACTIVE RESERVE: COMMUNITY AND HOUSEHOLD VARIATIONS AND THEIR IMPLICATIONS FOR RESERVE SUCCESS

by

Stephen Robert Cameron

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Geography

1999

## Abstract

**RESOURCE USE AND CONSERVATION IN THE PROPOSED MIDDLE JURUÁ EXTRACTIVE RESERVE: COMMUNITY AND HOUSEHOLD VARIATIONS AND THEIR IMPLICATIONS FOR RESERVE SUCCESS**

**by**

**Stephen Robert Cameron**

In 1985 rubber tappers in Brazilian Amazonia issued a statement to the Brazilian Government demanding the formation of extractive reserves throughout the region. Support for these reserves in based on their perceived conservation and development potential. One proposed reserve, The Middle Juruá Extractive Reserve, is currently in the process of formation in the Municipio of Carauarí, in a remote portion of Amazonas State. Household interviews indicate that the resident population of this reserve exhibits a great deal of heterogeneity and faces social and environmental circumstances that differ from those in other reserves. Variations in resource use practices and exchange relations call into question the applicability of the proposed reserve in meeting locally defined conservation and development goals. The reserve will have a differential impact on households and communities within its boundaries, therefore great caution must be exercised to ensure the well-being of the resident population and economic viability of the reserve.

**ACKNOWLEDGMENTS**

This thesis is the culmination of several years of effort by the author. As with most works of this nature, however, there are many others deserving of credit for its completion. First, I would like to graciously thank the good people of the communities of Gumo do Façăo, Pupuaí, Lago do Roque, Bom Jesus, Bauana, and Lago do Tabuleiro for inviting me into their homes and sharing their lives with me. The MEB team of Carauarí provided logistical support and made valuable suggestions for research design. In particular, Eulalia Pereira deserves credit for her support in the initial stages of fieldwork. The Catholic Church of Carauarí provided housing throughout the study period. The Michigan State University Department of Geography provided funding during the period of fieldwork and writing to make this thesis possible. The members of my committee provided valuable comments and suggestions for improvements. David Campbell, who served as chair, was an invaluable source of direction throughout the writing process. Ted Whitesell, who served as chair prior to his departure from Michigan State University, deserves credit for inspiring this work and offering valuable comments on earlier drafts. Finally, I would like to thank my family and friends for their support and faith in me.

TABLE OF CONTENTS

# LIST OF TABLES

Tables

## LIST OF FIGURES

# CHAPTER 1: INTRODUCTION

The plight of Amazonia continues to be one of the major environmental issues confronting human society as we head into the next millennium. Though concern has waned somewhat from the fevered pitch reached in the mid to late 1980s, researchers and laypersons alike continue to rank the loss of tropical forests, specifically in the Amazon Basin, among the most pressing environmental concerns of our time. As this region is home to more than one third of the world's remaining tropical forests, such concern is certainly warranted (Millikan 1992).

After nearly thirty years of development projects and over $15 billion in investments, the Amazonian environment exists in a continuously more impoverished state and the region's traditional inhabitants[1] face a worsening in their material conditions of existence (Moran 1993). Various authors have linked the devastation of the Amazonian environment and the impoverishment of its traditional inhabitants to the dominant top-down development ideology of the Brazilian state and international aid organizations (Hecht 1985; Hecht and Cockburn 1990; Millikan 1992; Schmink and Wood 1987 and 1992). Disillusionment with these

[1] The term traditional inhabitants is used here to refer to cultural groups who have a history of interaction with, and adaptation to, the Amazonian environment. This includes indigenous groups and non-colonist peasants and is used to differentiate between these peoples and non-traditional groups such as colonists, ranchers, loggers, gold miners, and urban inhabitants. See chapter 3 for further discussion on classification of cultural groups in Amazonia.

ineffective, and often counter-productive, top-down strategies has led many to question the dominant development ideology and search for alternatives.

Among the alternatives to top-down projects are approaches that pay greater attention to the basic needs and environmental concerns that rural Amazonians themselves have identified and organized to confront. These so called 'grassroots' or bottom-up approaches have received increased attention from researchers and policy makers alike. With this increased focus on the self-identified needs and goals of local organizations has come a greater appreciation of the environmental knowledge and resource use practices of traditional populations. Moran, speaking on the traditional populations of Amazonia, argues that "[i]f we are to contribute to balancing the use and conservation of this habitat, it will be necessary to begin with an appreciation of the knowledge that these local populations have about the environment." (1993, p. xiv)

In 1985, in the Brazilian State of Acre, the national rubber tappers council, CNS (for *Conselho Nacional dos Seringueiros*), issued a statement demanding certain rights for the traditional peoples of the Amazon. Among these demands was a call for the formation of extractive reserves in areas of the Amazon inhabited by rubber tappers. These reserves are to be formed on lands expropriated from large

rubber estates and granted for use in perpetuity to local inhabitants.

The goal of these reserves is to promote conservation of the Amazonian environment and to better the lives of the reserves' resident populations. Conservation goals are to be met through the restriction of certain activities such as logging and commercial fishing and the promotion of more sustainable activities such as rubber tapping and the collection of naturally occurring fruits and nuts. Improvements in the well-being of the residents is to be accomplished through the cessation of exploitative trade relationships, improved marketing opportunities, and the provision of basic health and education services.

Conservation advocates and policy makers concerned with a more equitable and environmentally benign development strategy for the Amazon have promoted the extractive reserves model as a grassroots approach to conservation and development in the Amazon. The enthusiasm over this new approach stems from an appreciation of the intimate knowledge that rubber tappers have about their surrounding environment and the resource use patterns informed by this knowledge, but also in part from romantic assumptions that rubber tappers are, by nature, more conservation minded than other non-traditional populations of the Amazon (Browder 1992).

This study examines the resource use practices of six communities that are involved in the formation of an extractive reserve in a remote portion of Amazonas State, Brazil. It is argued that a more in-depth understanding of the way in which traditional inhabitants of the forest relate to and utilize their surrounding environment is a prudent and necessary element in any conservation and development strategy.

## 1.1 Statement of Problem

The extractive reserves model of conservation and development, as presented by the CNS and adopted by conservation advocates and international development organizations, is based on many generalized assumptions about the Amazonian environment and the region's traditional inhabitants. These generalizations stem from research conducted in dissimilar portions of vast Amazonia that are subsequently applied to other areas with little attention to their applicability.

The literature on Amazonia is rife with generalizations. The terrestrial environment is generally divided into two broad categories: the *várzea*, a seasonally inundated floodplain; and *terra firme*, the upland forests.[2] The river system is analyzed using an equally simplistic system based on the origin of the sediments carried by a

given river. Whitewater rivers carry and deposit heavy loads of nutrient rich sediments derived from the geologically young Andes. Clearwater rivers drain the ancient crystalline Guiana and Brazilian Shields and carry lesser sediment loads. Blackwater rivers drain through sandy soils and are discolored by the acids and tannins of decaying plant matter. These so called 'rivers of hunger' carry the lowest sediment levels of all. The non-urban population of the Amazon is subjected to a similarly simplistic typology and generally divided into three categories of inhabitants: indigenous peoples, colonists, and *caboclos* or *ribereños*.[3]

These generalizations are useful and necessary at some scales of analysis. When working at a regional level or higher scale of analysis, the generalizations noted above serve as useful analytical categories. It would be difficult to formulate a national policy on indigenous land rights that takes into consideration the often subtle differences between indigenous groups. Likewise, a national directive which prohibits logging in the *várzea* is much more facile than one which differentiates between locally identified micro-environments within the floodplain. At a

---

[2] Some authors, notably Moran (1993), are beginning to call attention to the heterogeneity of the Amazonian environment though most continue to rely on the more simplistic *varzea/terra firme* dichotomy.
[3] *Caboclo* and *ribereño* are the respective Portuguese and Spanish terms for the non-colonist Amazonian peasantry. See chapter 3 for a further discussion of these terms.

lower scale, however, an approach which highlights local variations is more useful.

The extractive reserves model evolved largely out of the struggles of the CNS in Acre under the leadership of Chico Mendes. Faced with the encroachment of colonists and ranching enterprises into the lands they traditionally used for the extraction of rubber, brazil nuts, and other forest products, the rubber tappers organized to press the government for more secure rights to this land. Extractive reserves were seen as the best means to achieve the goals set out by the tappers of Acre.

After initial successes in Acre and Rondônia, international conservation advocates and local affiliates of the CNS began to call for the formation of extractive reserves throughout Amazonia. Extractive reserves are now being planned and implemented in areas of the Amazon significantly different from the locale of their inception, with little attention to the applicability of this approach to unique local circumstances.

One proposed reserve, the Middle Juruá Extractive Reserve, is now in the early stages of planning in the Municipio of Carauarí in Amazonas State, Brazil. Support for this reserve is based on generalized assumptions about the local population and their relationship with the natural environment and the potential of an extractive reserve as a

solution to locally defined problems. Though they share many similarities with *caboclos* in other parts of Amazonia, the population of Carauarí also exhibits striking differences. Among these are the minor importance of extractive products such as rubber and Brazil nuts, the latter virtually non-existent in the local economy, and the absence of many of the specific environmental concerns, such as the encroachment of colonists, loggers, and ranchers, that spurred the call for extractive reserves in Acre.

In addition to the differences between the *caboclos* of Carauarí and other areas of Amazonia, the population of the proposed reserve exhibits a significant degree of heterogeneity itself. These variations justify a more detailed analysis, one which highlights local variations in environmental and social systems and explicitly examines the nature of human-environment interactions in the area of this proposed reserve, as opposed to a reliance on generalizations imported from other areas of Amazonia. Such an analysis would provide a more holistic understanding of *caboclo* society, their unique relationship with the natural environment, and provide a sound base from which to evaluate the potential of alternate development strategies.

## 1.2 Objectives of this Study

This thesis is written with two broad objectives in mind.

- to document and explain the heterogeneity of resource use among the residents of the proposed Middle Juruá Extractive Reserve
- to evaluate the impact of household and community variations and the potential of the extractive reserves model in meeting locally defined conservation and development goals

The first objective of this thesis is to document and explain the heterogeneity of resource use practices among the population of the proposed Middle Juruá Extractive Reserve. Within the growing body of literature in *caboclo* studies, all but a few authors have painted a picture of *caboclos* as a homogenous group whose resource use practices are somewhat static and vary little from one portion of Amazonia to another (see chapter 3 for a further discussion of this topic). This broad and generalized approach to the study of *caboclos* has served to call attention to a segment of the Amazonian population that for some time was largely unnoticed (Nugent 1993). It has also served to highlight the distinctiveness of the group in relation to other segments of the rural Amazonian population, notably indigenous groups and colonists. This study builds on the works of previous authors and offers a more detailed analysis of resource use practices and micro-level human-environment interactions.

The second objective of the study is to evaluate impact of household and community variations and the potential of an extractive reserve in meeting the locally defined conservation and development goals (see chapter 4 for a further discussion of extractive reserves). Coomes (1996) argues that:

> "[p]rograms aimed at promoting extraction-based conservation through enhanced property rights, harvesting technologies or marketing subsidies may meet with very mixed results because ribereño households differ substantially, even with[in] (*sic*) a single community, in their ability to participate in such programs." (p. 60)

By analyzing variations in resource use between communities and individual households in relation to the local and broader political economic forces that inform resource use decisions, this study will highlight the strengths and weaknesses of the extractive reserves model in relation to locally defined goals.

In meeting these objectives, it is hoped that this study will contribute to the struggles of the residents of the study area for a more environmentally sound and socially equitable development of Amazonia. A documentation of the variations in resource use patterns and local-scale human-environment interactions among the study area residents will broaden the body of literature in *caboclo* studies. A detailed analysis of these variations utilizing a political ecology approach will improve our understanding of the way

in which individuals, households, and communities interact with the surrounding environment and the ways in which local and external political-economic forces condition local resource use. It will also call attention to the importance of a theoretical framework that can incorporate local contextualities and human agency with broader structural forces in explanations of resource use and conservation.

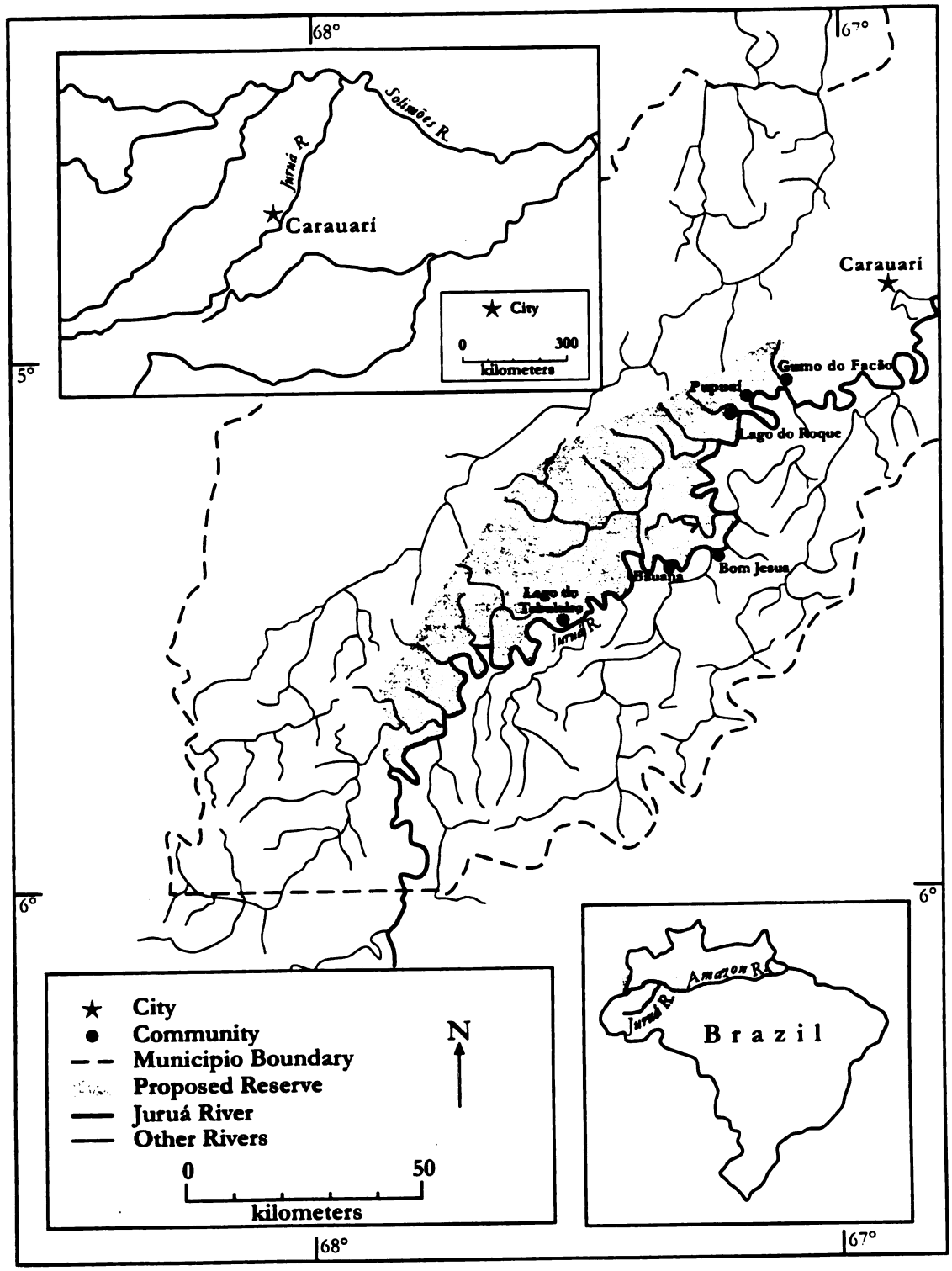
## 1.3 Methodology

Research for the present study was conducted in the Municipio of Carauarí between March and June of 1994 (see figure 1.1 for a map of the study area). Data was collected in six of the seven riverine communities within the boundaries of the proposed reserve. These communities represent only one of three different settlement patterns within the study area.[4] Interviews were conducted in Portuguese with the self-identified head of the household, who in all cases but one was the senior male resident.[5] In all, 97 households out of a total of 99 were surveyed. The two households that are not included in the study were away

[4] Other settlement types, *colocacões* and *campos do barracão*, were omitted from the study due to my limited time in the study area and the logistical difficulty of reaching some households (see section 3.4 for definitions). Though communities account for a significant portion of the local population, it is important to note that the findings of this research do not represent a statistically random sample of the population. Communities were chosen because of their greater accessibility and higher population concentrations and also due to the fact that the communities are the driving force behind the movement for the reserve.

[5] As this study was conducted to examine variations between households and communities, little attention was given to gender differences within or across households. For a more gendered perspective on resource use among *caboclos*, see Campbell (1996), Hecht (1992), and Whitesell (1993).

**Figure 1.1 The Middle Juruá Study Area**




(adapted from Whitesell 1993)

from the study area and unavailable at the time research was conducted.

Data collected in the household surveys was largely aimed at documenting the collection and production of various products for exchange, whether through formal market transactions or more informal trade relations.[6] As households tend to exhibit very similar subsistence needs, less attention was given to these activities. The survey also included questions relating to household demographics, education levels, exchange relations, affiliations with local organizations, material possessions, attitudes toward conservation and the reserve, preferences for certain resource use practices over others, levels of indebtedness, and intentions for future resource use.

In addition to formal household surveys, this study draws on less formal sources of data collected through casual conversations with community members, clergymen, members of MEB (*Movimento de Educacão de Base*, an NGO funded by the Catholic Church of the Netherlands), union leaders, representatives of commercial logging firms, participation in several formal gatherings held to discuss progress toward the reserve, and information gleaned from MEB and ASPROC (*A Associação dos Produtores de* Carauarí) records.

[6] Lacking from this study are data on the actual methods by which products are collected or produced.

The analysis of this data draws on both quantitative and qualitative methods. The more empirical survey data is analyzed to document the heterogeneity of resource use both within and across communities and to help identify relationships between certain resource use practices and other variables thought to inform resource use decisions. Qualitative analysis is used to explain resource use variations as they are conditioned by local and broader structural forces.

It is important to note that no attempts are made to test or contest any standing grand theories of human-environment interaction. The intent here is to provide what sociologists Glaser and Strauss (1967) have termed "grounded theory". What this means is that theoretical inferences will be drawn from the data and presented as contextual hypotheses on the nature of human-environment interactions within the given locale. Though this information provides a small piece to the overall puzzle of theorizing human-environment interactions, its scope is limited and should be taken as such.

## 1.4 Organization of this Thesis

The remainder of this thesis is divided into five chapters. Chapter 2 presents a review of the literature on geographic theory related to human-environment interactions. It begins with a historical overview of geographic thought

on human-environment interactions and then presents political ecology as a synthesis of two separate schools of thought on this topic, cultural ecology and political economy. The chapter ends with an examination of recent trends in political ecology research and presents the author's own views on the use of this approach in the present study.

Chapter 3 reviews the literature on the cultural group to which the study area residents belong, the Amazon *caboclo*. It begins with an examination of how the literature on Amazonia has dealt with the region's traditional peasantries. The second section addresses the evolution of the Amazonian peasantry from its indigenous antecedents. This is followed by an examination of contemporary resource use practices among *caboclos* and other closely related groups. The chapter concludes with an overview of two studies that are similar to this work in their examination of variations between *caboclo* households and communities.

Chapter 4 is an overview of the literature on extractive reserves. It begins by tracking the efforts toward reserves from the grassroots movement in Acre and the subsequent adoption of this approach for conservation and development in the Amazon by other local populations and the international conservation community. Next, the process for

reserve formation is presented, as outlined by the Brazilian government. Finally, the strengths and weaknesses of this approach are analyzed.

Chapter 5 presents the data collected from the communities of the proposed Middle Juruá Extractive Reserve. This begins with a brief description of the area's physical and human geography and an introduction to the communities under investigation. The remainder of the chapter addresses four separate categories of data: the local socio-economic setting, commercial agricultural production, commercial extraction, and conservation efforts. Trends and variations in each category are identified at both the household and community level. These are addressed using a political ecology approach to explain why variations occur and examine the impact of a variety of local and external factors as they relate to the above categories.

Chapter 6, the final chapter, examines the implications that the data presented in chapter 5 bear on the proposed extractive reserve. The chapter concludes with recommendations on the feasibility and appropriateness of an extractive reserve in meeting the conservation and development goals of the study area population and suggests areas for further research.

# CHAPTER 2: THEORETICAL APPROACHES TO HUMAN-ENVIRONMENT INTERACTION[7]

This chapter begins with an overview of the different approaches used in the study of human-environment interaction and concludes with a review of political ecology, a relatively recent approach that is used in the present study. Section 2.1 presents a brief historical account of humanity's interpretation of the relationship between the natural environment and itself. The goal here is to root present geographic debates in their proper historical contexts. Section 2.2 covers two often competing schools of thought on the nature of human-environment interactions, cultural ecology and political economy. Most theorists cite these approaches as the parent disciplines of political ecology. Section 2.3 examines the evolution of the political ecology approach from the framework proposed by geographers Piers Blaikie and Harold Brookfield in their 1987 landmark work, Land Degradation and Society. This section concludes with a discussion of the more recent trends in research and the attempts to expand the scope of political ecology beyond its traditional areas of inquiry.

[7] The term "human-environment interaction" used in this thesis is one of several terms used in geographic literature to denote the dialectical relationship between humanity and the natural environment. Other terms include: society-environment interaction, society-nature interaction, the man/land tradition, etc. The choice of human-environment interaction is a matter of taste and is in no way meant to challenge the validity or usefulness of other terms. It is felt that humans relate to the natural environment as individuals, households, communities, and societies and that the term human-environment interaction is more encompassing than the alternatives.

Section 2.4 addresses the use of a political ecology approach in the present study.

## 2.1 Overview of Thought on Human-environment Interaction

Man has long been concerned with the way in which he interacts with his surrounding environment. Clarence Glacken (1967) states that:

> "In the history of Western thought, men have persistently asked three questions concerning the habitable earth and their relation to it. Is the earth, which is obviously a fit environment for man and other organic life, a purposefully made creation? Have its climates, its relief, the configuration of continents influenced the moral and social nature of individuals, and have they had an influence in molding the character and nature of human culture? In his long tenure of the earth, in what manner has man changed it from its hypothetical pristine condition?" (p. vii)

The first of these questions has generally fallen to philosophers and theologians, while the latter two have been pursued in earnest by geographers and other social scientists and bear their mark on present debates over the nature of human-environment interactions.

In a similar vein, Kates, Turner, and Clark (1990) speak of three broad perspectives that humanity has taken on the human-environment relationship. The first of these is that of humanity in harmony with nature. It serves as the basis for many contemporary efforts at conservation of natural landscapes and biodiversity. This perspective can be expressed in a descriptive form where humanity is seen as

part of nature, and is by default in harmony with his surrounding environment, or in a more prescriptive form, wherein humankind ought to act in a certain way toward his surrounding environment.

Lovelock's Gaia Hypothesis, which is more descriptive than prescriptive, posits that the earth and its atmosphere are similar to a self-regulating, living organism that is capable, at least to a certain limit, of healing the scars left by the workings of man. In its less severe prescriptive forms, this approach advocates environmental protection, sustainable development, and eco-development as the best means for mankind to tread softly upon the earth. In its more extreme forms it calls for the radical reorganization of human society to make it more compatible with the natural world and borders on the misanthropic. On the fringe of the U.S. environmental movement, a small group of ecocentrists led by Dave Foreman has proposed a conservation scheme known as the Wildlands Project that would depopulate large areas of the U.S. and set them aside as uninhabited wilderness reserves.

The second perspective taken is that humanity is at least partially determined by nature. This approach can be traced as far back as the writings of Hippocrates and served as the basis for the environmental and climatic determinism movements of the mid to late 19th and early 20th centuries.

During the age of exploration, scientists were faced with the task of explaining the variety of human cultures encountered throughout the globe. Charles Darwin's Origin of the Species (1859) adequately explained the role played by the natural environment in shaping the development of non-human species. It required only a small intuitive leap to apply this same logic to human populations, as in the works of Herbert Spencer, Ellen Churchill Semple, and Ellsworth Huntington (Goudie 1990). In addition to explaining the superiority of the more "advanced" societies of North America and Europe in relation to their less temperate neighbors, the deterministic approach legitimated foreign intervention in the affairs of culturally "inferior" nations (Peet 1985; Peet and Thrift 1989). Peet and Thrift claim that under the auspices of environmental determinism "Euro-American hegemony was the natural, even god-given, consequence of the superior physical environments of Western Europe and North America." (1989, p. 4)

Another area in which deterministic ideas continue to be found, although in a less explicit form, is the arena of population/resource debates. The concept of carrying capacity, borrowed from the biological sciences, sets specific limits on the ability of the natural environment to support life. When applied to human populations, "war, vice, and misery" are the likely result when the strict

limits set by the natural environment are exceeded. Influenced heavily by the writings of Thomas Malthus, present-day neo-Malthusians such as Paul and Anne Erlich and Garrett Hardin continue to view the natural environment as the key limiting factor of human population growth.

Distaste with the racist and imperialistic implications of environmental determinism led to a softening of the original thesis and the promotion of less severe forms through environmental possibilism and probabalism. Olson (1992) claims that the backlash against environmental determinism within academic geography was more significant than its actual contribution. Harlan Barrows and Carl Sauer were among the early critics of determinism. Sauer went on to become one of the leading figures in American geography with the "landscape" school of thought (Goudie 1990). In the post World War Two era, many geographers shifted focus to the more scientifically neutral topics of areal differentiation and spatial analysis. This was done in part to avoid association with the criticisms leveled against environmental determinism (Goudie 1990; Peet and Thrift 1989).

The third perspective portrays mankind as the modifier of nature. In contrast to environmental determinism, this approach sees man, as opposed to the environment, as the active agent in the relationship. Man's desire to conquer

nature and bend it to his will is often traced to biblical passages where man is given dominion over the earth and license to make it bear fruit (Kates, Turner, and Clark 1990). Accounts of the impact that man has had on his surrounding environment date back as far as the writings of Plato. This approach was championed by Marsh in the 19th century with the publication of Man and Nature, which served as the inspiration for several later assessments of man's imprint on the natural world. The most notable of these are Man's Role in Changing the Face of the Earth (Thomas 1956), and The Earth as Transformed by Human Action (Turner II 1990).

Man in Nature was the seminal work in assessing the changes that man had wrought upon his surrounding environment. It was also significant in that it called attention to "... the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world ..." (Marsh 1864, p.3). He went on "... to suggest the possibility and the importance of the restoration of the disturbed harmonies and the material improvement of waste and exhausted regions ..." (*op. cit.*, p. 3). His work set the stage for future efforts of a similar bent, and still serves as an inspiration for the study of anthropogenic change of the natural environment.

In 1955, William Thomas and Carl Sauer organized a symposium at Princeton to commemorate the work of Marsh. In addition to the commemoration of Marsh's work, this symposium was organized to update the assessment of humanity's impact on the environment. The efforts of the contributors were published the following year as Man's Role in Changing the Face of the Earth. In addition to updating Marsh's work, "Man's Role" covered topics that were not included in Man and Nature such as the modification of mid-latitude grasslands and the depletion of mineral resources (Thomas 1956).

The third comprehensive accounting of anthropogenic change of the earth, The Earth as Transformed by Human Action, was explicitly written as a continuation of the two previous works. Changes in the scope of human impact and the scale of alterations led to the call for an updated assessment and the bold statement that the earth had not just been changed by the hand of man, but literally transformed. Whereas the prior volumes were largely concerned with changes wrought upon the face of the earth, this latest work also examined changes in the flows of energy and materials within the biosphere (Turner, Kates, and Clark 1990). Technological improvements in data collection and analysis allowed for the measurement of changes in our atmosphere, specifically the accumulation of

greenhouse gases and ozone depletion in this latest assessment. Three "driving forces" effecting transformation were identified. These are population, technology, and sociocultural organization, ranked in order of importance. Though lacking a comprehensive analysis of why humans alter their environment, The Earth as Transformed by Human Action went beyond its predecessors, which merely sought to catalog changes.

These three perspectives have laid the groundwork for more cogent theories of human-environment interaction within geography. Though they appear mutually exclusive at a brief glance, they are often incorporated together, in whole or in part, in the study of human-environment interaction (Kates, Turner, and Clark 1990). The following section presents two alternative theories that provide a more comprehensive approach to the study of human-environment interaction.

## 2.2 Cultural Ecology and Political Economy

Within geography, two main schools of thought evolved out of debates over the nature of human-environment interactions: cultural ecology and political economy. The former has as its main focus efforts to "...describe systems and to explain the interconnections among people and environments which sustain the system and keep it equilibriated." (Porter 1978, p. 19) This research is usually conducted at the microscale. Political economy, on

the other hand, applies a Marxist analysis to the spatial unevenness of development on a global scale. Our discussion now turns to these two approaches.

### *Cultural Ecology*[8]

The cultural ecology approach is described by Grossman (1981) as follows:

> "Cultural ecology stresses the importance of resource-use patterns and production as the vital elements linking the natural environment and the human population and also influencing relationships among individuals and social groups. Particular emphasis is placed on alterations in: the intricate, complex, reciprocal relationships between the human population and the natural environment; the spatial patterns within the local system; and the influences binding the village community to the outside world." (p. 221)

The modern face of cultural ecology is the result of over a century of experimentation with models borrowed from the biological sciences by social scientists who concern themselves with understanding human-environment relations.

In 1868, German biologist Ernst Haeckel published Natural History of Creation and introduced the concept of ecology as a subdiscipline of zoology. Social scientists, mainly anthropologists and geographers who had become disillusioned with their old models based in environmental determinism, found in ecology a new approach to the study of human-environment interaction. Though not widely accepted

[8] The term cultural ecology is used here in its broadest sense, after the convention of Grossman (1981), to encompass the range of approaches in geography and anthropology that in one fashion or another view the

at first, the human ecology approach became a recognized discipline within geography by the 1930's (Smith and Reeves 1989).

In his 1922 presidential address to the Association of American Geographers, Harlan Barrows put forth a new agenda for human geography, one that would eventually replace the deterministic models of the 19th century. He proclaimed that:

> "...geography is the science of human ecology... [and that] ...geography will aim to make clear the relationships existing between natural environments and the distribution and activities of men. Geographers will, I think, be wise to view this problem in general from the standpoint of man's adjustment to environment, rather than from that of environmental influence." (1923, p. 3)

Smith and Reeves (1989) have described human ecology as "...the study of the relation of human populations to the biophysical environment, which usually includes other human populations." (p. 2) Studies by human ecologists have tended to take place in the non-Western world and focus on the interconnections, as opposed to unidirectional influences, between man and the biological and physical systems of the environment.

Initially, this approach differed slightly within the disciplines of geography and anthropology. Grossman (1977) states that "...geographers have stressed the theme of man's

---

study of human-environment interaction in terms of human adaptation to and of the systems of the natural

adaptation of nature, whereas anthropologists have investigated man's adaptation to nature." (p. 126, emphases added) While anthropologists focused on the social and cultural variables that affected the dialectic relationship between man and nature, geographers were "...mostly concerned with the processes of change that were produced by human activity..." (*op. cit.* 132).[9]

The direction of human ecology within geography was strongly influenced by Carl Sauer, who stamped out the last vestiges of explicit determinism in the mid 20th century. The landscape school was offered as an alternative model. Under the guidance of Sauer, the role of human geography was the investigation of the transition of the natural landscape into a cultural landscape at the hands of man. In the words of Grossman (1977):

> "The landscape approach mostly stressed form and content, the visible, concrete, mappable patterns revealing the human occupance of an area. The social and cultural processes producing the features of the landscape were, however, usually ignored." (p. 129)

In time, this approach was criticized by Harold Brookfield and others for failing to provide a theoretical perspective to replace determinism and for ignoring the obvious role of human values, beliefs, and social organization in the

---

environment.

[9] This focus was a direct descendant of the Marsh school and continued until the adoption of the ecosystems approach in the 1960's.

relationship between man and the environment (Grossman 1977).

In the mid 1960's the approaches in geography and anthropology moved closer together. Anthropologist Julian Steward offered cultural ecology as an alternative to environmental possibilism in the 1950's. Meanwhile Harold Brookfield sought to shift the focus of human geography back to the study of the human ecosystem as opposed to the areal differentiation of man's work. The advances of general systems theory within ecology and the growing acceptance of the ecosystems approach provided cultural ecologists with a conceptual and methodological framework for the study of human-environment interaction.

Grossman (1977), following the work of Stoddart, notes five advantages that the ecosystems approach provided to cultural ecology:

> 1) it is monastic in that man and the environment are analyzed within a single framework
>
> 2) it directs attention to structures within the ecosystem
>
> 3) it focuses on the functioning of the system, emphasizing the quantification of exchanges
>
> 4) ecosystems are a type of general system, and they therefore possess the attributes of all general systems, and
>
> 5) the concept can be applied at any level.

For the first time, geographers had an analytical framework capable of dealing with man and nature together, an obstacle

that had divided the discipline throughout its history (Porter 1978). Instead of investigating how the actions of man influenced his surrounding environment, or the inverse of this relationship, geographers could now view man and the environment as integral parts of a broader system.

In the early 1970's, Kates (1971) applied a systems approach to Gilbert White's work on natural hazards.[10] Kates (1971) placed hazards research within human ecology arguing that:

> "... a natural hazard is an interaction of man and nature, governed by the coexistent state of adjustment in the human use system and the state of nature in the nature event system. It is those extreme events of nature that exceed the capabilities of the system to reflect, absorb, or buffer that lead to the harmful effects ... but it is also the continuous process of adjustment that enables man to survive and indeed benefit from the natural world." (p. 438)

The cultural ecology approach has not been without its critics. Enzensberger (1974) argues that human ecology takes on too great a task, and that the absence of monocausal arguments leads to confusion and the inability to inform realistic policies. Others have gone in the opposite direction. Zimmerer (1994) claims that "... the geographical literature on ecological relations ... is remiss for its negligence of the 'new ecology's' insights on the dynamics of biophysical environments." (p. 108; emphasis in original)

[10] For some within geography, hazards research was seen as a move back toward determinism. See Waddell (1977) and Watts (1983) for a further examination.

He calls for the incorporation of ideas such as disequilibria, instability and chaotic fluctuations of the natural environment into ecological models of human-environment interaction. This criticism relates to the concept of homeostasis whereby the ecosystem is maintained in a state of equilibrium through human adaptation to and of the environmental system.

Another point from which cultural ecology has been criticized is its failure to incorporate the influence of broader political and economic structures in its explanations of human relations with the environment. Campbell and Olson (1990) claim that:

> "Lacking in this approach is the recognition that the capacity of rural people to adapt responses and innovations is determined not only by the interaction of society with its physical environment, but also by both the structure of relations within the society and between local communities and the broader national and international socio-political structure." (p. 13)

Many of the criticisms of this sort leveled at cultural ecology came out of the radical movement in geography and the political economy school examined in the following section.

***Political Economy***

In the 1960's a number of geographers began to apply insights from political economy to critique conventional themes in geography. Though this approach has been applied to the study of human-environment interaction, it is by no

means limited to this. Other areas of inquiry include: the spatial unevenness of development at the global scale; urban social movements; historical change in the process of capital accumulation; the impact of capitalist transition on agrarian societies; and the nature of dependent development in the periphery (Pickles and Watts 1992; Peet and Watts 1996a).

Peet and Thrift (1989) characterize this broad scope stating that:

> "We use the term 'political economy' to encompass a whole range of perspectives which sometimes differ from one another and yet share common concerns and similar viewpoints. The term does not imply geography as a type of economics. Rather economy is understood in its broad sense as social economy, or way of life, founded in production. In turn, social production is viewed not as a neutral act by neutral agents but as a political act carried out by members of classes and other social groupings." (p. 3)

The origins of the political economy approach can be found in the radical geography movement of the 1960's. The failure of conventional models to adequately deal with pressing social events of the day, such as the U.S. involvement in Vietnam and urban social movements in the U.S. and abroad, lead geographers such as David Harvey to propose new, 'critical liberal' formulations as alternatives to conventional theories. Initially concerned with the social injustices of capitalism, the critical liberal approach soon came to address other issues such as

environmental crises and economic recession (Peet and Thrift 1989). This interest in alternatives to the conventional views in geography is evinced in the publication of new journals such as *Antipode* and *Radical Geography* (Peet 1977). The critical liberal approaches were soon found lacking and geographers turned to Marx, more specifically the structuralist approach based on the writings of Althusser and his followers (Peet and Thrift 1989).

Peet and Thrift (1989) divide the history of political economy in the discipline of geography into three phases. The discussion that follows is a summary of that work. The first phase began in the 1970's and ran through the early 80's. It was marked by the introduction of structural Marxism to geography. Marxist analysis was applied to "... the structures of precapitalist societies ... the historical transition and articulation of modes of production ... the state ... and critical analysis of culture, ideology and consciousness." (*op. cit.*, p. 10) The major contribution during this era was, however, the study of the connection between social structures and spatial structures. In the late 70's and continuing into the mid 80's, attention turned to the debate over the relative importance of overriding economic structure versus human agency in the making of history. This 'structure-agency' debate focused on three themes in geography: 1) the relative importance of

structure and agency and how they might be reconciled; 2) the usefulness of a realist methodology; and 3) the importance of localities. From the mid 80's and into the 90's, political economists have engaged in postmodern discourses that question the epistemology and language of human-environment studies.

The political economy approach has played an increasingly significant role in the study of human-environment interaction. The strengths it offers lie not so much in its characterization of the human-environment relationship, but in the application of Marxist analysis to the political and economic forces and power relations that condition the distribution and use of natural resources and the impact of environmental problems. Pickles and Watts (1992) note this as follows:

> "While not explicitly concerned with the physical environment, political economy emphasizes the social relations of production-what Eric Wolf … calls social labor-that provide the realms of possibility and constraint for managing environmental resources." (pp. 309-10)

Watts (1987) likewise argues that "… the *social relations of production and exchange* are central to understanding not only the complexities of land-use decisions but also in broaching the paradox of why-and for whom-the problem of environmental change arises at all." (p. 189, original emphasis)

Some of the major human-environmental themes that political economists have addressed include, but are not limited to: the differential impact of, and reaction to natural hazards by social groups; access to natural resources; and land degradation in its many shapes and guises.

Not surprisingly, the application of a political economy approach to hazards research came about as a critical response to the work being done in human ecology. Political economists argued that the differential impacts and responses to natural hazards were conditioned by broader political and economic structures. Analysis of the Sahelian drought in the early 1970's served as the impetus for much of this work (Olson 1992).

Watts (1983a) offered one of the major critiques of the human ecology approach and sought to apply political economy to hazards research. He argued that "...in spite of the recognition by Kates, White and others of the strategic import of social causality, they have no social theory capable of addressing social process, organization or change." (p. 240) In his study of drought in Northern Nigeria, Watts concludes that household responses can only be understood when placed in the historical context of changing social relations and that "... the forces and social

relations of production constitute the unique starting point for human adaptation." (*op. cit.*, p. 242)

Blaikie (1985) applies a political economy approach to the study of soil erosion in The Political Economy of Soil Erosion in Developing Countries.[11] He argues that "... soil degradation and erosion directly result from cumulative land-use decisions through time and that these decisions must be considered as part of a wider political economic analysis." (*op. cit.*, p. 117) He proposes a 'bottom-up' approach where attention is first directed to land users and intra-household politics. Analysis is then expanded to include village, regional and national scales and the interplay of economic and political forces across these scales. He contrasts this approach to classic and colonial models "... in which the problem of soil erosion is seen primarily as an environmental one, rather than a complex 'socio-environmental' problem ..." and where blame is placed "... on land users themselves, and identifies them as lazy, ignorant, backward or irrational." (*op. cit.*, p. 4)

Criticism of the political economy approach has generally centered on its lack of attention to human agency and local contextualities and an undue emphasis on the importance of macro-structuralist forces. Moore (1996) claims that "[m]acro-structural accounts miss ... local

differentiation among resource users, particularly those mediated by class, gender, ethnicity, and age." (p. 126) Pickles and Watts (1992) approach this from a postmodernist stance claiming that "... postmodernists are skeptical of explanations that reduce causality in human geography to central principles such as economy, culture, and environment-or even space." (p. 318)

## 2.3 POLITICAL ECOLOGY

The political ecology approach used in this study is a relatively recent addition to the tradition of geographic inquiry into the nature of human-environment relations. It builds on the strengths of former approaches, drawing liberally from both political economy and cultural ecology. This section examines the evolution of the political ecology approach, various frameworks used in political ecology research, and applications of the approach to the study of different aspects of human-environment interaction.

Geographers Piers Blaikie and Harold Brookfield (1987) are often cited as the source of the term *political ecology*, but others have traced its origin to earlier works such as Enzensberger (1974), Turshen (1977; cited in Mayer 1996), and Wolf (1982; cited in Sheridan 1988 and Whitesell 1993). It was not until the late 1980's, however, that the term was used in a widely accepted form. For most this was taken to

[11] Although Blaikie did not use the term, many authors cite this book as one of the seminal works in

mean a blending of the political economy and human/cultural ecology approaches (Blaikie and Brookfield 1987; Campbell and Olson 1991; Chapman 1989; Grossman 1993; Mayer 1996; Millikan 1992; Moore 1996; Pickles and Watts 1992; Zimmerer 1991, 1994).

In the words of Pickles and Watts (1992), the political ecology approach:

> "... weaves together the strengths of 1960s cultural ecology, such as sensitivity to patterns of indigenous knowledge and ethnobotany and focuses on the resiliency and stability of ecosystems, and the powerful tools of Marxian political economy that examine structures of access and control." (p. 310)

Researchers utilizing this approach have not always been in agreement on the relative importance of the parent disciplines. Grossman (1993) cautions against an over-emphasis on political economic forces arguing that "... use of this perspective should not imply a lessening of attention to the intricate, complex interactions in human-environment systems that are at the heart of traditional cultural-ecological studies." (p. 348) Thrupp (1991), on the other hand, blatantly states that political economy is the more important component, while Peet and Watts (1996a) note the ties to traditional political economic analysis claiming that:

> "... this new 'political ecology' was not inspired by the isolated rural communities ... but by peasant

---

political ecology (e.g. Bassett 1988; Black 1989; Bryant 1992; Grossman 1993; Hecht and Cockburn 1990).

> and agrarian societies in the throes of complex forms of capitalist transition. Market integration, commercialization, and the dislocation of customary forms of resource management-rather than adaptation and homeostasis-became the lodestones of a critical alternative to the older cultural or human ecology." (p.5)

In the 1980's the boundaries between political economy and cultural ecology began to blur. Cultural ecologists such as Grossman (1981) started to pay greater attention to the role of macro-structural forces in conditioning local adaptation. Meanwhile, political economists such as Watts (1983b) and Blaikie (1985) were attempting to incorporate ideas of human agency and local contextualities into their own work. This broader focus on concepts not adequately covered in their respective disciplines lead to the search for more holistic frameworks. Somewhere in the midst of this blurring, political ecology was born.

In 1987 Blaikie and Brookfield laid the groundwork for future political ecology studies in Land Degradation and Society. Though not explicitly concerned with uniting cultural ecology and political economy, their work provided a more holistic framework for the study of human-environment interactions and is often cited as the starting point for political ecology. They outline a 'regional political ecology' approach for the study of the relationships between land degradation and society claiming that the:

> "... complexity of these relationships demands an approach which can encompass interactive effects,

> the contribution of different geographic scales and hierarchies of socioeconomic organizations (e.g. person, household, village, region, state, world) and the contradictions between social and environmental changes through time." (p.17)

Their approach for understanding land degradation draws on what they term 'chains of explanation'. A chain of explanation begins at the lowest possible scale with land managers and their specific relationship with the land. It is then expanded to include relations among different land mangers and with groups beyond their immediate surroundings that influence land-use decisions. Finally, the relationships with national and international bodies are examined.

They argue that this approach allows for:

> "... complexity, uncertainty and great variety, and ... takes as its point of entry those data which are beset with *least* uncertainty-the direct relationship between the land-user and manager and the land itself." (*op. cit.*, p. 16, original emphasis)

From this information, one is then able to draw 'conditional and multiple hypotheses' about the complex relationships between land degradation and society.

Although lauded as a step in the right direction, Blaikie and Brookfield's regional political ecology approach did not provide the necessary framework for the synthesis of the political economy and cultural ecology approaches. Three years after the publication of Land Degradation and Society, geographers were still lamenting the lack of a

holistic framework. Kates, Turner and Clark (1990) claim that:

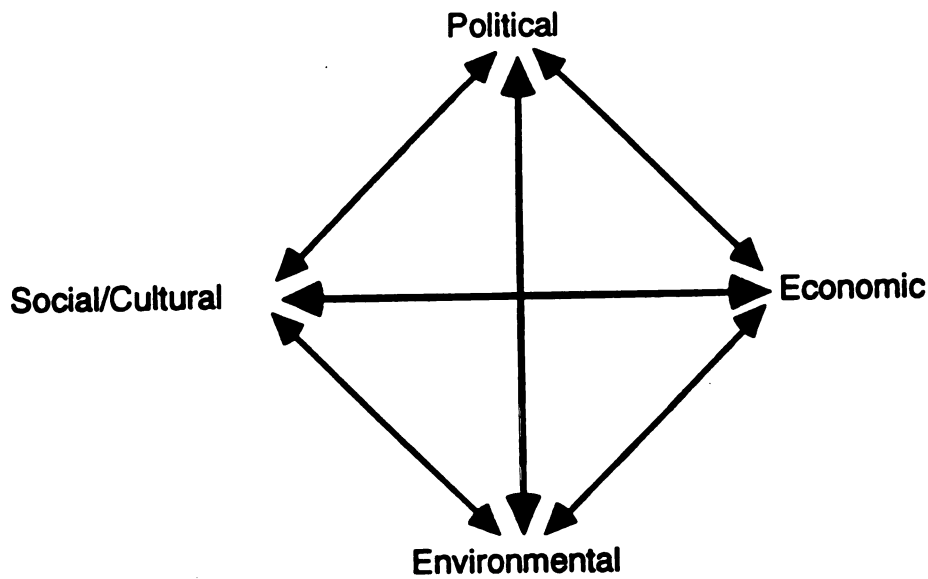
> "...there is a growing recognition of the global and interactive character of nature-society relationships and of the need to develop frameworks that merge the roles of human agency, societal relations, and adaptation in the transformation of the earth." (p. 5)

Another framework designed for a more holistic examination of human-environment interactions was put forth by geographers Campbell and Olson in 1991. It is named 'the Kite' due to the unique shape of its schematic representation of human-environment interactions (see figure 2.1). Campbell and Olson argue that conventional approaches "... view the environment merely as a passive backdrop ... which is either inexhaustible or amenable to management and technological manipulations." (1991, p.4) They also claim that another "... limitation of past approaches is their bounded spatial and linear scales." (*op. cit.*, p.4)

In the Kite model, the environment is taken as one of four 'elemental building blocks' used in the study of human-environment interaction. In addition to the environment, this relationship is conditioned by three other factors: social/cultural; political; and economic. These factors interact horizontally within specific scales of analysis (local, national/regional, and global), and also vertically across these scales. All of this occurs on different

temporal scales that are unique to the factors under investigation. The outcome of these interactions is conditioned by power relationships. "The exercise of power is felt in the interaction between groups with different status, access to resources and influence … but it also affects the direction of interaction between social, political and economic forces." (*op. cit.*, p.19)

**Figure 2.1: The Kite**




The use of the political ecology approach varies from study to study. Authors such as Black (1990) and Campbell and Olson (1991; 1992) have drawn on specific frameworks to guide their study, Blaikie and Brookfield's 'regional political ecology' and the Kite respectively. Others have

drawn pell-mell from aspects of political economy and cultural ecology as suits their needs.

The literature that identifies itself as political ecology has covered a broad spectrum of issues ranging from traditional studies of environmental degradation and conflict over natural resources to the emancipatory potential of social movements. Initially, political ecologists concerned themselves with issues that had formerly been addressed using political economy and cultural ecology approaches.[12] As political ecology has matured, applications have expanded beyond these traditional aspects of the human-environment relationship.

From the outset, political ecologists have addressed issues related to anthropogenic change of the environment. Major themes in this area of inquiry include soil erosion (e.g. Blaikie 1985; Blaikie and Brookfield 1987) and deforestation (e.g. Hecht and Cockburn 1990; Millikan 1992). Other areas of interest include issues of access to natural resources (e.g. Campbell and Olson 1991, 1992; Bassett 1988) and the impact of capitalist penetration in traditional societies (e.g. Black 1990; Schmink and Wood 1987, 1992; Sheridan 1988).

[12] It is interesting to note that the reasons cited for utilizing a political ecology approach in many of these studies was the inadequacy of traditional explanations of environmental degradation such as over population, inappropriate technology, and ignorance on the part of land-users as opposed to the short comings of political economy and cultural ecology.

More recently, political ecologists have applied the approach to a broader range of issues. Several authors have promoted a political ecology that goes beyond the examination of human-environmental problems to address issues of conservation and sustainability. Whitesell (1993) claims that "... political ecology studies will have the most practical utility if, collectively, they address both the causes and the possible solutions of anthropogenic environmental degradation." (pp. 87-88) Blaikie (1994b) calls for an application of political ecology to the study of sustainability.

Others have proposed a postmodern form of political ecology. Peet and Watts suggest a more activist perspective. They use the term *liberation ecology* to denote this new approach and claim that their

> "...intention is not simply to *add* politics to political ecology, but to raise the emancipatory potential of environmental ideas and to engage directly with the larger landscape of debates over modernity, its institutions , and its knowledges." (1996a, p. 37, original emphasis)

Blaikie (1994a) notes a similar role stating that "[p]olitical ecology is the arena in which epistemology, ideology, and politics of environmental information must be critically examined." (p. 5)

In a similar vein, feminist social scientists have called for the incorporation of a gendered perspective in political ecology research. Rocheleau, Thomas-Slayter and

Wangari (1996) criticize the absence of a gendered perspective in most human-environment studies and identify three areas of analysis where gender should be included: the basis of environmental knowledge; environmental rights and responsibilities; and environmental politics and grassroots activism. They note the components of a feminist approach stating that:

> "Feminist political ecology treats gender as a critical variable in shaping resource access and control, interacting with class, caste, race culture, and ethnicity to shape processes of ecological change, the struggle of men and women to sustain ecologically viable livelihoods, and the prospects of any community for 'sustainable development'." (*op. cit.*, p. 4)

Mayer (1996) argues that political ecology has adequately addressed human-environmental problems such as famine, soil erosion and deforestation but has failed to examine the health implications such as disease and mortality that accompany these problems. He claims that "... the emergence of diseases can frequently be traced to intentional or unintentional social policy, political decisions and profit-driven land development decisions." (*op. cit.*, p. 452)

Mayer demonstrates the application of political ecology to medical geography with a brief examination of lyme disease in the U.S. He claims that recent changes in settlement patterns and land-use policy have increased the risk of exposure to the disease. These changes are directly

linked to the U.S. housing market, the process of suburbanization and reforestation projects. Mayer concludes stating that political ecology "... has great potential in leading to a greater systemic understanding of health and disease." ( *op. cit.*, p. 441)

While not unified under a holistic theory of human environment interaction, the literature that identifies itself as political ecology shares certain similarities. Whitesell (1993) notes the following "common, though not universal, characteristics" (p. 55):

- a central empirical concern with anthropogenic environmental change
- the application of a systems approach where the ecosystem and social system are seen as interactive
- a recognition that the interaction of these systems need not result in equilibrium
- an examination of social and ecological factors at many levels/scales of analysis
- the provision of contextualized conclusions, rather than general theories of human-environment interaction
- the attempt to unite empirical studies with a search for policy options to achieve conservation with social equity

Though lacking as a full-fledged theory of human-environment interaction, political ecology has served as a useful guide to researchers investigating this complex relationship. Whitesell (1993) sums this up, stating that:

> "What is emerging under the rubric of political ecology, is a convergence, among certain natural and social scientists, around a political economic, ecological, cultural, historical and multi-level approach to the study of human/environment interactions." (p. 81)

Political ecology is thus best viewed as a framework, within which researchers can analyze the interaction of the myriad components that condition human-environment interaction and offer explanations and solutions derived from contextual findings.

## 2.4 The Use of Political Ecology in the Present Study

The purpose of this thesis is to investigate and explain the variations in community and household resource use in a proposed extractive reserve. A deeper understanding of the factors that influence land-use decisions is necessary to evaluate the potential of the proposed reserve in meeting locally defined conservation and development goals. Some of the characteristics that make political ecology a useful analytical approach in this study are addressed below.

Resource use in the study area is the result of the interaction of many factors. Aspects of the ecological system and the social system interact across different scales to influence land-use decisions. Mayer (1996) argues that "...scale is an artificial construct, what happens at one scale is not extraneous to occurrences at another, but rather that all scales are mutually enmeshed." (p. 447)

Scales may be 'enmeshed', but for analytical purposes it is useful to examine interactions as they occur across and between different scales. One of the main features of the political ecology approach is its ability to deal with multi-scale analysis. Blaikie (1994a) notes this stating that:

> "[s]ince political ecology is usually located, as part of its concerns, in place-based and locally specific interactions as well as in larger, pervasive and often non-place-based political and ideational forces (e.g. environmental ideologies or state policies), a number of different levels or scales of analysis are implied. These have to be made specific…but also linked by credible explanations …" (p.7)

Social relations of production are one of the key factors influencing the resource use decisions of Amazonian *caboclos*. One of the main objectives of the extractive reserves proposal is to overcome the system of debt peonage that has characterized Amazonian extractivism from the outset. Present forms of surplus extraction are closely linked to the history of capital penetration and accumulation in the region. Political ecology provides a framework for the analysis of recent shifts in power relations between producers and land owners and the impact that these changes have on resource use decisions.

The natural environment is another significant factor conditioning land-use decisions in the study area. It plays an active, though not deterministic role by providing

opportunities and imposing certain risks. Blaikie (1994a) calls attention to the active role given to the environment within a political ecology framework stating:

> "[o]ne of the most productive ways political ecology can approach environment-society relations is to treat the environment as 'enabling,' in the sense of providing resources and services as they are defined and redefined by a constantly changing society. Environment therefore is constantly in a state of being conceived of, learned about, acted upon, created and recreated and modified, thus providing a constantly shifting 'action space,' both productive and ideational for different players, as they create and recreate their own history." (p.6)

Political ecology has proved a useful approach to the present study in two ways. First, it served as a guide to direct field research by identifying specific factors for the investigation of human-environment interaction in the study area. Second, it provides a framework for the analysis of the data collected. My use of the political ecology approach does not rely directly on either of the specific frameworks outlined in the previous section. I do, however, draw from aspects of both. The Kite points to the principal factors that influence resource use decisions. It also provides a heuristic device for examining the interaction of these factors across different scales. Blaikie and Brookfield's concept of 'chains of explanation' is a useful tool for linking these factors and explaining the outcome of their interaction.

The political ecology approach is not without its problems. One the main criticisms leveled at the approach is its inability to derive generalized theories of human environment-environment interaction from contextual research. Pickles and Watts (1992) claim that:

> "Geography … is becoming more pluralistic and less comfortable with calls for grand theory. In place of unified theory are varied frameworks of analysis that in one sense reflect the lesson … that our scientific concepts do not mirror nature but are socially constructed." (p.318)

At this early point in the author's career it is deemed best to simply state that this study is not intended to contribute to grand theory, but rather to make theoretical inferences to the nature of human-environment interaction in a small part of Amazonia and let the chips fall where they may.

# CHAPTER 3: *CABOCLOS*, RUBBER TAPPERS, AND *RIBEREÑOS*

The Amazon *caboclo* is one of three broad cultural categories used to subdivide the rural population of Amazonia. The term is used to separate the group from other peasants, such as newly arrived colonists, and other 'traditional' populations such as the region's various indigenous tribes. This chapter provides an overview of the literature from *caboclo* studies relevant to the present study. Section 3.1 examines the conceptualization of this unique cultural group in the literature. Particular emphasis is given to the various definitions used and the utility of theoretical generalizations made about such a diverse group of resource users. Research on the evolution of the Amazonian peasantry is presented in section 3.2. Section 3.3 summarizes several studies of *caboclo* resource use and environmental knowledge. Research closely related to the present study is addressed in section 3.4

## 3.1 Conceptualization of the Amazon *Caboclo*

*Caboclos* have been defined by Hecht and Cockburn as "... the population of backwoods folk formed out of the long history of detribalization, miscegenation, and extraction from each immigrant wave that left people behind in the region." (1990, p. 167) Initially applied to deculturated indians, the term came to be used for anyone who eked out a

living in the forest through traditional land-use practices. At times, the term is also used in a pejorative sense to refer to persons of rural or indigenous heritage or a lower social status (Moran 1974; Nugent 1993; Wagley 1985).

Within the literature several other terms are used to refer to specialized sub-groups or regional variants of the Amazon *caboclo*. Rubber tappers (or *seringueiros* in Portuguese) are a subset of the overall category who have a historical reliance on the extraction of rubber as a cash-generating activity. While nearly all rubber tappers would meet the definition of *caboclos* used in this study, not all *caboclos* are rubber tappers. The term *ribereños* (or *ribeirinhos* in Portuguese), literally those persons who live along the 'river's edge', is most commonly used in areas of Spanish speaking Amazonia. These alternate terms are used in the present study when necessary, but where possible the more general term *caboclo* is preferred.

In his study of ribereño villages in the vicinity of Iquitos, Peru, anthropologist Michael Chibnik found that community residents seldom identify themselves by the terms commonly used in the literature. Instead, "... self-identity of the residents ... involves a complicated mixture of descent, cultural features, class distinctions, occupational categories, and regionality." (1994, p. 82) The terms most

commonly encountered were based on class and occupation (e.g. *campesino*) and place of residence (e.g. Loretano).

My own cursory research into how the inhabitants of Amazonas State define the term *caboclo* elicited varied responses: "The people who live there in the interior [of the forest]." (an urban-born resident of Manaus), "The indians." (a resident of one of the communities investigated in this study), "All of us here in the Amazon." (a teacher in the town of Carauarí). Though these responses were not part of a formal survey, they demonstrate the broad spectrum of Amazonian peoples to whom the term is applied. For the purposes of this study, the term *caboclo* is used to refer to those non-tribal rural inhabitants of Amazonia who have spent a significant portion, if not all, of their lives in the Amazon region and who rely on traditional methods of resource use (e.g. swidden agriculture, hunting and fishing, and the marketing of naturally occurring forest products) to meet the majority of their subsistence and cash needs.

Nugent (1993) claims that much of the ambiguity about the Amazon *caboclo* stems from the fact that until recently, they have been largely 'invisible' to policy-makers and researchers alike. For Nugent this invisibility is based on the fact that they are not explicitly considered to be part of the natural world, as are Amerindians, nor part of the modernization process, as are colonists. They are instead

an anomaly, or hybrid of sorts, that does not easily lend itself to inclusion in Amazonian conservation or development agendas. He claims that "[r]ather than credited as survivors, *caboclos* have tended to be regarded as marginally adaptive hybrids." (1993, p. 45; emphasis in original)

When *caboclos* are dealt with by policy-makers and researchers, they are often treated as a homogenous group of resource users. Generalizations drawn from a few limited studies are used to represent populations drawn from a variety of social and environmental settings. The publication of Charles Wagley's Amazon Town in 1953 introduced the Amazon *caboclo* to academia and served as the basis for much further research on the non-tribal, traditional populations of Amazonia. Nugent (1993), noting the influence of Wagley's work, claims that "... Amazon Town, although dealing with one Amazonian settlement, has served as a standard account of the region as a whole." (p. 107, emphasis in original) Though research has expanded to cover other settings within the region, simplified generalizations of *caboclo* society and resource use are still the norm.

There are several other reasons for the continuance of generalizations about the Amazon *caboclo*. Hiraoka (1992) claims that the location of research sites is in part to blame. He argues that:

> "Findings occur in two types of places: near major urban centers like Belém, Manaus, Pôrto

> Velho, and Iquitos, or along the Amazon and its major affluents … Such a pattern suggests strong market-influenced land uses, and life-styles close to those of urban folk. Generalizations formulated from such bases are bound to illustrate only a segment of reality." (p. 147)

Chibnik (1994) suggests that the long-term ethnographic research methods of anthropologists contribute to the assumptions of a homogenous *caboclo* culture as well. While numerous publications detailing the activities of a specific community or even a single household contribute to a more intimate understanding of the given site, they do little to call attention to the diversity that exists throughout the region.

Recently researchers have begun to recognize the heterogeneity of *caboclo* society (e.g. Chibnik 1993; Coomes 1992; 1996; Hiraoka 1992; Padoch and De Jong 1992; Whitesell 1993), but very few make more than a passing reference to this important fact. Fewer still make any attempt to explain or analyze the diversity they encounter. Padoch and De Jong (1992) note twelve different patterns of agricultural land use in their study of the *ribereño* community of Santa Rosa near Iquitos. They claim, however, that the "[f]actors determining exactly which strategy is employed by any particular household are many and complex and will not be discussed in detail …" (pp. 168-9). Two studies that make a greater effort to examine heterogeneity are examined in section 3.4.

## 3.2 Evolution of the Amazonian Peasantry

The emergence of a distinct *caboclo* culture occurred in the early nineteenth century (Parker 1985b; 1989). Parker addresses the detribalization of the indigenous population through three distinct phases of external control over native Amazonian labor, with the end result being the emergence of the Amazon *caboclo*. The first period, extending from 1615 to 1655, was characterized by settler slave raids into the interior to replace the declining slave populations in colonized areas. The abuses reported during this period led to the intervention of the Jesuits in 1653.

By 1655, the Jesuits had established control over the indigenous population and remained in this position of power until 1755. During this second period, the indigenous population was settled into household villages, with each household consisting of one nuclear family, much after their European counterparts. This was in marked contrast to the traditional extra-familial households common prior to the arrival of the Jesuits. In addition to a new form of settlement patterns, the Jesuits promoted the adoption of a *lingua geral* based on the Tupí language. This served to strengthen the unity of settlements composed of natives coming from diverse cultural backgrounds and suppress tribal differences. These two major changes led to a degree of homogenization among the indigenous slave population.

The third period, 1757 to 1799, saw the expulsion of the Jesuits and the implementation of the Directorate. This system was aimed at the incorporation of the indigenous population into the colonial society through the promotion of the Portuguese language and integration into the colonial economy.[13] The break-up of the Directorate in 1798 led to the dispersal of isolated nuclear households along the rivers and their tributaries in settlement patterns still found today.

Moran (1974) breaks the emergence of *caboclo* culture into two phases. His initial phase corresponds roughly with the three periods outlined above. The second phase begins with the rubber boom and ends with the more recent trends of colonization throughout Amazonia. This period resulted in the incorporation of other groups into the largely indigenous *caboclo* population. The majority of immigrants arriving in Amazonia during the rubber boom came from Brazil's dry Northeast and were largely of African descent (Parker 1985a; 1989; Ross 1978; Weinstein 1985). These migratory trends were in part spurred by a series of severe droughts in the Northeast beginning in 1877. Many of these migrants returned after the rubber boom (Parker 1985a; Ross

[13] Parallels can be drawn between this attempt at integrating Amazonia into the broader, then colonial, economy and more recent attempts to create linkages between Brazil's "hollow interior" and its industrial Southeast. See section 4.1 for more on the latter.

1978). Those who remained behind were absorbed into *caboclo* society. According to Moran, this absorption

> "...resulted from a combination of the isolation inherent in the regional economic system and the requirements for subsistence in the tropical rain forest, which led to the abandonment of non-Amazonian ways within one generation." (1974, p. 137)

Following the rubber boom , and until the 1960's, migration to the Amazon continued at a slow pace, largely determined by the drought cycle in the Northeast (Parker 1985a; 1989). This pace was broken by a brief resurgence of the rubber economy brought about by the World War II demand for rubber in the United States. The post 1960 boom in road building and subsequent colonization of parts of Amazonia has had varied impacts on *caboclo* populations. Parker claims that *caboclo* culture has been little changed by the massive influx of colonists due to the fact that "... caboclos and migrant populations have simply been in different places." (1992, p. 257) Schmink (1985) and Schmink and Wood (1992), however, have documented significant changes in the community of São Felix do Xingu with the extension of connector road PA 279 to the area. Other reports of the dramatic impact that roads and colonization have on *caboclo* culture can be found in Miller (1985) and Wesche (1985).

## 3.3 Resource Use

*Caboclo* resource use practices have their roots in the history of the extractive economy. This has resulted in a combination of extractive and agricultural practices aimed at meeting both subsistence and market demands. Many of these practices are based on the techniques and intimate knowledge of the natural environment perfected over centuries by their indigenous cultural ancestors. Parker goes so far as to label *caboclos* the "indigenous rural population" of Amazonia, contrasting this with the region's indigenous tribal population.

The studies discussed in the remainder of this section are located in three distinctive settings within the Amazon. They are drawn from both anthropology and geography and are representative of the majority of research conducted on *caboclo* resource use. All rely upon a cultural ecological approach to the study of human-environment interactions, and portray the Amazon *caboclo* as a rather homogenous group of resource users who, through the processes of adaptation to and of the natural environment, live in relative harmony with nature, though the third study attempts to include the history of the Amazonian economy as a significant factor influencing resource use. While the authors provide a detailed analysis of resource use practices and environmental knowledge, no effort is made to draw

distinctions between different resource users within the study areas or to compare their findings to research conducted elsewhere.

Hiraoka (1985a; 1985b) provides an overview of the land- use practices of a *ribereño* population in the vicinity of Iquitos, Peru. A variety of products are extracted for subsistence needs and sale to the local market. The importance of subsistence extraction is highlighted by the fact that it provides the bulk of animal protein intake in the local diet. Extraction and the extractive economy are covered in greater detail in section 4.3.

Agriculture is practiced across two broad ecological zones; the *várzea*, a seasonally inundated flood plain along the river's edge, and upland, *terra firme* forests. In turn, these two zones are subdivided into eleven different biotypes. The majority of food and cash crops are grown in the *várzea*, which receives deposits of rich alluvial sediments annually. A similar reliance on the *várzea* for food and cash crops is noted by Wesche (1985). *Terra firme* swidden plots are used to supplement flood plain production. This zone also provides the majority of extractive products. Many different crops and varieties of the same crop are spread between these two zones to insure against crop failures. Resource use practices in both zones are conditioned by seasonal, environmental variations as the

rise and fall of the river dictates access to the flood plain and most faunal resources.

Frecione, *et al* (1989) investigate the environmental knowledge of a *caboclo* native to the State of Amazonas. Forty different resource units based on specific plant-animal-soil relationships were identified by the informant from the area of Lake Coari in Amazonas State. These units were divided across both horizontal and vertical zones in the *várzea, terra firme* and aquatic ecosystems and were exploited at different times of the year based on water levels and precipitation. Within these forty units, sixty-two varieties of fish, thirty-eight mammals, ninety-two birds, and thirty-one reptile species were exploited to meet subsistence and market demands. For many researchers (e.g. Chibnik 1994; Coomes 1992; 1995; 1996; Padoch and De Jong 1992), differential access to the variety of environmental zones is a major feature in determining *caboclo* resource use patterns.

Anthropologist Nugent, in his 1993 study near Santarém, notes a distinctive *"caboclo* complex" of resource use. This is discussed in contrast to alternative strategies employed by Japanese and Nordestino colonists. For Nugent:

> "... the caboclo complex represents an extensive form of resource use embracing agriculture, terrestrial and riverine extraction, small-scale mercantile activities, wage labor and the production of goods and services in the urban setting ..." (1993, p. 179)

He goes on to note that:

> "... the caboclo complex represents not merely a crude accommodation to rigid environmental features, but represents a dynamic system which accommodates not only environmental features, but the wreckage of a colonial system abandoned after the collapse of the rubber boom." (*op. cit.*, p. 182)

To his credit, Nugent challenges the general models of adaptation to the environment found in most studies of *caboclo* resource use noting that "Amazonian anthropology has always embodied a notion of environmental determinism, expressed in the persistence of adaptationist arguments ..." (*op. cit.*, p. 106). He suggests that "[p]easantries in Amazonia are not simply social groups adapting to local conditions, rather they are societies which have been adapted for Amazonian conditions." (*op. cit.*, p. 106, emphasis in original)

Nugent argues that the situation observed in his study is the outcome of local circumstances, unique to the area surrounding Santarém, and their interaction with broader historical processes throughout Amazonia whereby the local has been subordinated by the external. Chibnik (1994) notes a similar situation of "core-periphery" relations where profits are siphoned from interior regions to support urban or extra-regional elites. While Nugent recognizes the importance of place and the role of non-environmental factors, little attention is given to how other factors such

as the "broader historical processes" embodied in the extractive economy may have differential impacts throughout Amazonia.

## 3.4 Research Related to the Present Study

This chapter concludes with a review of two contemporary studies of Amazonian peasantries that bear a significant influence on the present study. Both are unique in their use of alternative analytical frameworks and the greater attention given to the diversity of traditional Amazonian peasantries.

### *Whitesell's study of the Middle Juruá*

Whitesell's 1993 study of the Middle Juruá provides a detailed description of the human geography of one of Amazonia's most isolated regions. It is unique in its location as well as its application of a political ecology approach to the analysis of Amazonian extraction. The study includes a sample of 170 households within the Municipio of Carauarí many of which are members of the communities examined in the present study. Whitesell does not explicitly examine variations in resource use practices among these households but does provide aggregate data on household involvement across a variety of sectors. A more detailed account of the diversity of social relations that encompass local production and exchange challenges

traditional assumptions about the homogenous and static nature of the extractive economy.

Though data on the involvement in various sectors of the local economy are given as aggregate measures, they do provide a picture of the general trends in local resource use. This information is useful in comparing the *caboclo* population of this remote portion of Amazonia to other areas existing in alternate socio-economic and environmental contexts. Within the extractive economy roughly 70 percent of the households were involved in the extraction and sale of rubber. The sale of wild meat and logging were undertaken by 57 and 44 percent of the households, respectively. Although the sale of dried and salted fish is included in the analysis, no figures on the number of households involved in this particular sector are provided.

The high percentage of households involved in the rubber economy is one of the most striking differences observed between Whitesell's work and the present study (see section 5.4). Whitesell notes the unique position of rubber stating that even though "... rubber provides for a small fraction of household needs ... the people of this region are seen by others, just as most see themselves, as rubber tappers first and foremost." (1993, p. 142) Later, he astutely notes the precarious role of rubber claiming that "... should more lucrative options materialize, rubber

production would be abandoned in large numbers." (*op. cit.*, p. 240)

In relation to the present study, one of the most significant contributions of Whitesell's work is his examination of the variety of production and exchange relations encountered in the study area. He examines the social relations of production in five different locations: a *campo do barracão*[14], three communities[15], and a grouping of *colocações*[16].

Within the *campo do barracão* of Seringal Idílio Whitesell found what have been characterized as 'traditional' patron-client relations. The caretaker of the local *barracão* was seen as the patron by all of the heads of household in this location. Residents were forbidden to participate in the local agricultural union and were required to trade exclusively with the patron. None of the residents felt that they had rights to the land they worked and acknowledged paying a form of rent imposed as a 20 percent reduction in the price of all goods they sold or traded to the patron.

The communities of Lago do Tabuleiro, Gumo do Facão, and Pupuaí exhibited a broad range of social relations. All

---

[14] A *campo do barracão* is a small grouping of residences (generally 5 to 8 households) located in close proximity to a small trading post run by the local land owner or one of his representatives.

[15] Communities in the Middle Juruá generally consist of 8 or more households who have chosen to live in close proximity to one another away from the residence of the local land owner or *barracão*.

but one of the 16 heads of household in Lago do Tabuleiro recognized the caretaker of the local *barracão* as their patron and traded exclusively with him. All residents recognized some form of rent, roughly 20 percent of all production, owed to the patron. 40 percent of the residents asserted that they had a legitimate claim on the land they occupied and worked.

Half of the 10 heads of household in Gumo do Facão recognized the local *seringalista* (the owner of a *seringal* or large rubber estate) as their patron. Of those who had a patron, 60 percent noted an exclusive trade obligation. All residents of this community recognized the *seringalista* as the rightful land owner and acknowledged paying some form of rent. Gumo do Facão is the only community for which union membership data are supplied. 44 percent of the adult male population were union members.

Eight out of 10 of the heads of household of Pupuaí recognized the caretaker of the nearest *barracão* as their patron though none acknowledged any form of rent or trade obligations. Only 1 (10 percent) asserted any rights to the land he occupied.

The *colocações* of Igarapé Bauana are located in an area where the local land is not claimed by a *seringalista* and is therefore owned by the state. Still 7 of the 12 heads of

[16] *Colocações* is the plural form of *colocação*, a settlement type consisting of one or two households

household claimed to have a patron though none faced rent or trade obligations. Even though the land was owned by the state, only two heads of household asserted rights to the land. Over half (58 percent) of the adult males in this location were members of the local agricultural union.

Whitesell notes a high degree of variation in the social relations of production in his study area. He claims that:

> "Patron dependency was found to be present in all settlement types but it varied in degree and detail throughout the study area. Its variety and fluidity was much greater than would have been predicted by the schematic dichotomy that ascribes to remote extractive zones a relatively uniform and static set of social relations." (*op. cit.*, p. 270)

He also notes a high degree of geographic mobility. Though settlement types did not play a causal role in determining social relations, relocation was often the result of poor relations with a former patron or the desire to take advantage of opportunities associated with an alternative settlement type or location. He argues that:

> "The most important variable governing the residential location of resource extractors seems to be access, specifically access to resources (both natural resources and purchased goods), to markets and to social interaction." (*op. cit.*, p. 179)

---

generally separated from the nearest neighbor by a short walk or canoe trip.

### *Coomes' study of the Tahuayo River Basin*

Coomes' 1992 study of the Tahuayo River Basin near Iquitos, Peru is unique in its application of a neoclassical economics approach to the study of the Amazonian peasantry. He investigates the process of income formation among 501 households located throughout 18 different settlement areas. Coomes (1992) claims that

> "Most studies of Amazonian peasants focus on the techniques, practices, and indigenous knowledge embodied in traditional livelihood activities [e.g. studies drawing on a cultural ecology perspective] which serve subsistence rather than cash needs ..." (p. 233)

While principally concerned with income formation, the study includes an explicit examination of village and household level variations in resource use.

Coomes identifies three general factors that contribute to the diversity of resource use in the area. First, all the villages investigated in the study are located within 1 day of Iquitos, a large urban market that is home to over 300,000 inhabitants. This provides the opportunity to market a great variety of crops throughout the year. Second, these villages are located in a highly diverse environment with resource endowments that vary significantly from one village to the next. With respect to the differences between lowland and upland environments, Coomes claims that "[s]o distinct are differences in the knowledge and practices of uplanders and lowlanders, that each tends

to consider the other almost as a distinct people ..." (*op. cit.*, p. 351) Finally, the villages are home to a diverse population of residents including traditional *ribereños* (a diverse group unto themselves), colonists, retirees, and former military service personnel.

Resource use practices are distributed across seven broad sectors of economic activity. These sectors and their relative importance to income formation are presented in table 3.1. Upland agroforestry involves the year-round

**Table 3.1**
**Resource Use Sectors in the Tahuayo River Basin**

| Sector | Economic Returns ($US per hectare) | Percentage of Study Area Income |
|---|---|---|
| Upland Agroforestry | 63 | 30.4 |
| Lowland Agriculture | 97 | 17.8 |
| Fishing | 56 | 17.1 |
| Livestock | >100 | 12.6 |
| Forest Extraction | <2 | 9.9 |
| Credit Subsidized Agriculture | 89 | 8.9 |
| Hunting | <1 | 3.3 |

(source: Coomes 1992)

production of a variety of crops produced in traditional swidden and fallowed plots in various stages of succession. Lowland agriculture is seasonal and makes use of the many

micro-environments of the floodplain. Fishing is practiced throughout the year though its contribution to income varies significantly with the annual cycle of water levels. Sales of fish account for a greater share of total income than any other specific product. Animal husbandry is a year round activity. Due to the reliance on hogs and water fowl, the returns per hectare are much higher than would be expected were cattle the main focus. Though making significant contributions to income, livestock is generally held as a store of wealth. Forest extraction includes the collection of many forest products, the most significant of which are charcoal, fruit of the *aguaje* palm (*Mauritia flexuosa*), and aquarium fish. Most of the products collected are available on a seasonal basis. Credit subsidized agriculture is a relatively recent addition to the area's portfolio of resource use options and is generally limited to colonist villages. Principal crops include corn, rice, and pineapple. Commercial hunting is a rather limited activity, practiced mainly by those with specialized skills honed through years of experience. Though economic returns to labor can be competitive with other sectors, access to large areas of undisturbed forest and the need for specialized skills limit participation in this activity.

Coomes notes the variety of products marketed by residents of the Tahuayo Basin. In all, 55 different

products were marketed by the residents of the 18 villages included in his study, though 21 of these accounted for 97 percent of the total value of products sold. No single product accounted for more than 14 percent of the total value of marketed goods.

Comes identifies two primary factors that influence resource use at the village level. The most significant factor was settlement type. Three distinct settlement types are identified: upland villages; lowland villages; and colonist villages. In addition to differential access to environmental resources, the three settlement types varied in their access to other resources such as seeds, technological innovations, and credit. Village age was also found to bear a significant influence on the types of products marketed. This was most evident in areas of colonization and upland villages. Recent colonists tended to rely on annual cash crops and savings while those who were more established had a greater reliance on perennials. In a similar vein, established upland villages had access to more developed agroforestry plots.

Ten of the 18 settlement areas exhibited specializations in one or more sectors. A settlement was considered to be specialized if a majority of its member households relied on similar sectors for the majority of their cash needs. In addition to sectoral specializations,

some villages were recognized by consumers and merchants for production of a specific product such as the largest and sweetest melons or the best tasting fish.

Coomes finds a significant degree of variation at the household level as well. He claims that "... households vary considerably in their degree of market specialization (or diversification) as well as in the choice of which specific product(s) to emphasize." (*op. cit.*, p. 277) Of the 501 households investigated, nearly three quarters (74 percent) relied on only one or two sectors while over 50 percent relied on one specific crop to meet the majority of their cash needs. On average households marketed 7 different products. Factors found to significantly affect household product choice include location, village age, and the tastes, skills and knowledges possessed by household members.

The degree of household specialization was closely related to household structure and stage in the lifecycle. Coomes claims that "... households may first specialize essentially by default, then diversify market production to secure a steadier stream of income, and then choose to specialize in particular market products." (*op. cit.*, p. 365)

# CHAPTER 4: EXTRACTIVE RESERVES: PROSPECTS FOR CONSERVATION AND DEVELOPMENT IN BRAZILIAN AMAZONIA

This chapter examines the literature on extractive reserves and their role as a tool for promoting both conservation and development in the Brazilian Amazon. It is argued here that the rubber tappers' movement that called for the formation of extractive reserves, and the subsequent legislation by the Brazilian government that began the process of their establishment, are part of a broader discourse on conservation and development. This discourse is governed in part by attitudes about nature and humanity's role as both protector and destroyer of the natural environment. Though the principal platform of the rubber tappers was, and continues to be, aimed at social reforms, the environmentalist stance they have adopted has led to important alliances with conservation-minded groups domestically and abroad.[17] To evaluate the role to be played by extractive reserves in promoting conservation and development in the Amazon, it is necessary to understand the local, national, and global context within which they were and continue to be formed.

This chapter is broken into four general sections. The first section provides background information and a summary

of efforts made toward the formation of extractive reserves to date. Section 4.2 addresses the broad topic of conservation within extractive reserves. The intent here is not to provide a comprehensive overview of the vast literature on conservation but merely to touch on some of the more pertinent issues as they relate to Amazonian extractive reserves. Section 4.3 examines extractive reserves in relation to their development goals, with special attention given to the extractive economy. The final section provides a summary and discussion of literature covered in chapters 2, 3, and 4.

## 4.1 BACKGROUND ON EXTRACTIVE RESERVES

The 1985 proposal by rubber tappers in the Brazilian State of Acre for the establishment of extractive reserves throughout the Brazilian Amazon came at a time of increasing concern over the depletion of the world's tropical rain forests. Development projects implemented by the Brazilian government in conjunction with the World Bank and donor nations were largely aimed at integrating the northern region into the national economy (Hecht and Cockburn 1990). These projects were also spurred on by geopolitical concerns about Brazilian sovereignty in its "unoccupied" interior.

[17] Some social theorists have claimed that environmental movements in the developing world are essentially social movements, and that they address conservation only in terms of its impact on the provision of basic human needs. (see Pepper 1993; and Redclift 1987 cited in the same volume)

The Trans-Amazon highway system was an integral part of these plans. It was to link the nation's interior with its more developed regions on the littoral, a land without people to a people without land. In addition to providing infrastructure for the region, the goal of these projects was to occupy the area with 'proper' Brazilians as opposed to the area's traditional inhabitants. Massive colonization projects, in addition to peopling the sparsely inhabited interior, were intended to relieve pressures for agrarian reform in other parts of the country. Colonization projects brought a great deal of planned migration to the area, but also wave after wave of unanticipated, spontaneous migrants. This mass influx of land hungry peasants and the acquisition of huge tracts of land for ranching by southern entrepreneurs brought about much of the devastation that alarmed the world. Government policies, though requiring that 50 percent of all granted lands remain in forest cover, also recognized the clearing of forest as a sign of rational land use (Hecht and Cockburn 1990). The end result of these practices was the displacement of traditional forest inhabitants who no longer had access to the forest resources from which they traditionally earned their living (Hecht and Cockburn 1990; Schmink and Wood 1992).

In 1985, the national rubber tappers council, CNS, held their first annual meeting and issued demands to the

national government. Among these demands was the following statement:

> "We demand a development policy for the Amazon that addresses the interests of rubber tappers and respects our rights. We do not accept an Amazonian Development policy that favors large entrepreneurs who exploit and massacre workers and destroy nature … We demand that all projects and plans include the preservation of forests occupied and used by us *seringueiros* … We want a development policy that helps the struggle of Amazonian workers who are involved in extractivism, and other types of production of interest to us, and that preserve forests and natural resources … We rubber tappers demand to be recognized as producers of rubber and the true defenders of the forest." (Hecht and Cockburn 1990, pp. 261-2; emphasis in original)

In this same document they proposed their own strategy for conservation and development in the lands they traditionally inhabited, arguing that "[a]reas occupied by rubber tappers should be placed in extractive reserves, secured for their use by rubber tappers." (*op. cit.*, p. 262) These extractive reserves have been defined by Lisansky as follows:

> A formally defined and protected area where both conservation and development goals will be pursued by: 1) Reserving the area for the exclusive use of a defined population whose livelihood activities include the sustained harvesting of renewable natural resources and other non-destructive activities, and 2) by providing development assistance. The objectives include increasing the socio-economic welfare of the reserve communities, conserving the forest eco-system, and making the reserve ecologically and economically self sustaining. (1991, p. 2)

In July of 1987, the rubber tappers' efforts began to bear fruit when INCRA, the Brazilian National Institute of

Colonization and Agrarian Reform, issued the extractive settlements directive. This was the first attempt to meet the rubber tappers' demands for the formation of extractive reserves in Amazonia. INCRA's Extractive Settlements Directive led the way for the formation of 10 extractive settlements, involving nearly 3,000 families and 900,000 hectares of land in the states of Acre, Amapá, and Amazonas (ELI 1995).[18] In consultation with members of the area's traditional populations, INCRA formulated plans for the formation of the settlements. Unfortunately, the principles set down were poorly enforced, which led to the formation of settlements that differed little from INCRA's failed agricultural colonization projects (ELI 1995).

On January 23, 1990, the first Amazonian extractive reserve, the *Reserva Extrativista do Alto Juruá*, was created by decree No. 98,863. Six days later, President Sarney signed the General Extractive Reserves Decree. By the end of 1990, three more reserves had been created, each by separate decree. In 1992, five other reserves were created though all were located outside of Amazonia.

One of the major changes that the General Extractive Reserves Decree made over the 1987 Extractive Settlements Directive was that IBAMA, the Brazilian Institute for the

[18] There is some confusion in the literature as to the differences between the extractive settlements formed under INCRA and the extractive reserves established by IBAMA. Lisansky (1991) and Schwartzman

Environment and Natural Renewable Resources, was to replace INCRA in implementing and overseeing the reserves. Article 3 of the General Decree explains how the reserves are to be created:

> "The act of creation shall include defining the geographical boundaries, the beneficiary population and the measures to be taken by the Executive Power for implementation of the utilization plan; condemnations which may be necessary are the responsibility of IBAMA." (ELI 1995, p. 24)

Article 4 of the General Decree sets out the basic organization of the reserves and contains seven elements:

1) Lands within the reserves are to be publicly owned;

2) An agreement between IBAMA and the extractive community will transfer to the community an exclusive right to use the resources of the reserve;

3) IBAMA can dissolve the concession agreement if the community attempts to transfer it to some other party;

4) The community will then grant to its members free authorizations to use the lands of the reserve;

5) *Inter-vivos* transfers of these authorizations are prohibited;

6) Authorizations of use granted to individuals can be rescinded in the event that the holder causes any damage to the resources or environment of the Reserve; and

7) Individuals who hold these authorizations must comply with the utilization plan for the Reserve. (ELI 1995)

---

(1992) have chosen to lump both under the title of "extractive reserves". To avoid confusion, the two are treated as separate entities here.

Since the signing of the General Decree, 8 other extractive reserves have been established in Brazil though five of these lie outside of legal Amazonia (see table 4.1). Combined, these reserves have set aside roughly 2.2 million hectares of land. When the land from the extractive settlements is included, over 3 million hectares have been protected and reserved for the use of extractivist populations.

**Table 4.1: Existing Extractive Reserves**

| Extractive Reserve | State | Size (ha) | Population | Economic Activities |
|---|---|---|---|---|
| Alto Juruá | Acre | 506,186 | 6,000 | rubber, sub. ag. |
| Chico Mendes | Acre | 970,570 | 7,500 | rubber, Brazil nut, *copaíba*[1], sub. ag. |
| Rio Caraji | Amapá | 481,650 | 3,479 | rubber, Brazil nut, *copaíba*, *açaí*[2], sub. ag. |
| Rio Ouro Preto | Rondônia | 204,583 | 640 | rubber, Brazil nut, *copaíba*, sub. ag. |
| Marinha do Pirajubaé | Santa Catarina | 1,444 | 1,000 | *berbingão*[3], fish, crustaceans, sub. ag. |
| Extremo Norte do Tocantins | Tocantins | 9,280 | 2,000 | *babaçu*[4], fish, sub. ag. |
| Ciriaco | Maranhão | 7,050 | 1,150 | *babaçu*, sub. ag. |
| Mata Grande | Maranhão | 10,450 | 1,500 | *babaçu*, fish, sub. ag. |
| Quilombo do Frechal | Maranhão | 9,542 | 900 | *babaçu*, *buriti*[5], fish, sub. ag. |

1. *Copaíba* (*Copaifera longsdorfii*) is a redwood tree used for furniture and construction, it produces a dark oil used for medicinal purposes.
2. *Acaí* (*Euterpe sp.*) is a palm tree used for fruit and palm hearts.
3. *Berbingão* (*Amonolocardia brasiliana Gmel.*) is the Portuguese term for scallops.
4. *Babaçu* (*Orbignya sp.*) is a successional oil palm used for cooking oil, charcoal, and fodder.
5. *Buriti* (*Mauritia flexuosa*) is a palm with large edible fruits.

(source, ELI 1995)

Many of the major problems encountered by these reserves involved the process of land condemnation whereby

the IBAMA appropriates the land from private owners. Reserves created in areas containing private lands require that IBAMA compensate title holders for their loss. This in and of itself is not such a problem when the title is clearly defined and has no conflicting claims. In many cases, principally in Acre and Rondônia, titles are poorly defined and the condemnation process is hindering the full implementation of the reserves.

At present there are eight other extractive reserves under consideration by IBAMA, though only two of these are located within Amazônia. The Middle Juruá Extractive Reserve, under investigation in the present study, is still in the earliest stages of formation.

## 4.2 EXTRACTIVE RESERVES AND CONSERVATION

The conservationist stance adopted by the CNS was based in part on the realization that their continued livelihood within the rain forest depended not only on their access to forest resources, but also the safeguarding of these resources for future generations. The promotion of this aspect of their movement in a global forum speaks to their political astuteness as much as to their potential as defenders of the forest. This section examines some of the issues in the global debate over conservation as they relate to the rubber tappers' movement as well as to the potential

of extractive reserves in meeting locally defined conservation goals.

When discussing conservation, it is important to ask what it is that is being conserved and for whom that conservation is taking place. The rubber tappers' movement came at a time of increasing global concern over deforestation, accumulation of greenhouse gases, loss of biodiversity, and depletion of the ozone layer. Though the rubber tappers' main concern was to conserve for continued use the resources from which they gained their livelihood, the protection of these resources meshed nicely with the goals of northern conservationists. In light of this, it is not surprising that alliances were formed.

On occasion, the goals of northern conservationists are at odds with those of the rubber tappers and it is therefore necessary to keep the clearly defined goals of extractive reserves in mind. Some authors have suggested that the recent emphasis on global aspects of environmental problems co-opt local concerns, or that a global perspective may even be used to place blame on local populations in developing countries (Ingold 1993; Shiva 1993). In this way, swidden agriculture in the Amazon Basin is blamed for increasing levels of carbon dioxide in the global atmosphere and the decrease in worldwide biodiversity. In extreme cases this can lead to a form of eco-imperialism, where the

conservation goals of the developed world are imposed on developing countries in the name of the greater good for all (Shiva 1993). In the words of John Browder,

> "The concept of extractive reserves was appropriated by conservation groups in the United States and Europe, repackaged as a sustainable tropical development alternative, and marketed to donors for financial support to save tropical forests." (1992, p. 286)

A significant amount of the interest surrounding extractive reserves has evolved out of the assumption that extractive reserves are a viable means of preserving biodiversity in the Amazon Basin. This concern over biodiversity comes on the heels of an increased realization that alarming numbers of species are becoming extinct at the hands of man. Merchant (1992) claims that "... a quarter of the earth's species of plants, animals, microbes, and fungi will become extinct over the next several years unless extraordinary measures are taken to protect the ecosystems in which they live." (p. 21) This is especially important in the Amazon region as it is commonly recognized that tropical forest ecosystems are among the most biologically diverse on the globe.

Biodiversity is a relatively recent topic and much confusion still exists over the various definitions and the best methods for its preservation and or promotion. Blaikie and Jeanrenaud (1994) call attention to three different types of biodiversity:

1) Genetic diversity, which refers to the heritable variation within and between populations

2) Species diversity, which refers to the number of species in a site or habitat, and

3) Ecosystem diversity, which refers to the diversity and health of ecological complexes.

Citing Inskipp, they then list five reasons why maintaining biodiversity is important to human welfare:

1) Ethical reasons: the belief that every life form warrants respect independent of its worth to people

2) Maintaining ecosystems: a myriad of life forms are essential for keeping air clean; stabilizing weather; disposing wastes; recycling nutrients; creating soils; controlling diseases; pollination; etc.

3) Material and economic benefits to people: biodiversity contributes to agriculture; fisheries; medicines; industry; etc.

4) Maintaining evolutionary processes: biodiversity is the raw material of further evolution. If the genetic resource base is drastically reduced, the result is likely to be a depletion of evolution's capacities for speciation and adaptation persisting far into the future.

5) Aesthetics: many species inspire beauty and awe.

Much of the international fervor over the loss of biodiversity can be traced to the works of ecologists Paul and Anne Ehrlich and their "rivet-popper" hypothesis. (Baskin 1994) This approach holds that species can be compared to rivets on an airplane in that the loss of one or

two species will have little impact, but as the number lost grows, the chances of a crash increases exponentially. Allegretti (1992; 1995), one of the most vocal extractive reserve proponents, claims that they are a very cost effective method of promoting conservation in Amazonia. Browder (1992), however, has argued that extractive reserves will serve little purpose in conserving biodiversity because of the extremely low percentage of land that can actually be protected in this manner, and the fact that the extractive reserves already established are located in areas of relatively low species diversity.

The growing concern over the loss of biodiversity has led to many attempts to rank areas on their level of species diversity with the intent of concentrating conservation efforts on the highest ranking areas. One realization that came out of these attempts was that many of the most 'diverse' areas were inhabited by indigenous and other traditional peoples (Durning 1993).

Another feature that has made extractive reserves attractive to conservationists is the presence of a local population of inhabitants who have a vested interest in the area's protection. Fearnside argues that "[t]he local origin of the extractive reserve proposal greatly increases the likelihood that the facilities and the system will be maintained as planned." (1989, p. 388) Latin American

governments have a history of establishing parks or reserves by demarcating their boundaries on maps with little effort to actually enforce those boundaries. The result is that these 'paper parks' are little different than the surrounding unprotected areas. It is assumed that this would not be the case with extractive reserves.

An important concern with respect to the conservation potential of extractive reserves is the fact that many of the expectations that northern conservationists have about the conservation potential of rubber tappers and extractive reserves may be based on false assumptions. Our own cultural attitudes about traditional societies and the way in which they interact with nature may cloud our perspective. In order to understand the position of northern conservationists on extractive reserves, it is necessary to provide a brief analysis of the debate on conservation and traditional populations.

For some, the role of the rubber tappers as defenders of the rain forest stems not only from their vested interest in the conserved resources, but also from their social and cultural backgrounds (Hecht and Cockburn 1990; Anderson 1992). As noted in chapter 3, the traditional populations of the Amazon are generally subject to broad generalizations that portray them as a homogenous group of resource users who relate to their surrounding environment in a very benign

and even harmonious manner. While these assumptions may be intuitively appealing, it is import to examine the evidence with greater scrutiny.

Support for indigenous or traditional peoples' role in promoting conservation generally assumes that they enjoy a unique relationship with their surrounding environment. Durning (1993) claims that indigenous peoples "... have ancient ties to the land, water, and wildlife of their ancestral domains ..." (p. 80) Similar comments can be found in Davis (1993), who argues that "...[w]hat distinguishes indigenous peoples from other populations is their strong collective attachment to their ancestral lands and the habitats where they live." (p. 1) and Alcorn (1994), "Indigenous describes people who have close, personal relationships with the lands where they are residents ... including the waters, forests, sky, and mountains associated with those lands." (p. 10)

Hecht and Cockburn's The Fate of the Forest is subtitled "Developers, Destroyers, and Defenders of the Amazon." (1990) Perhaps it would be more useful to split the category of 'defenders' into 'non-destroyers' and 'defenders' for analytical purposes. Much of the literature on indigenous and traditional peoples assumes that as non-destroyers these populations are by default defenders (Rockwell 1994). The presence of an intact ecosystem is

generally taken as evidence of a local population's position as defenders, without substantiating the fact that they are actively defending their environment (Durning 1993). The intent here is not to discount the important role that indigenous and traditional peoples can play in conserving the environment, but merely to call attention to the fact that such assumptions are often made without documentation of actual conservationist practices.

The rubber tappers who put forth the proposal for the establishment of extractive reserves share many similarities with indigenous Amazonian groups and have adapted many of their present forms of resource use from indigenous ways. Rubber tappers do posses an intimate connection to and knowledge of their local environment, but this in and of itself does not ensure that they will use that knowledge to promote conservation under all circumstances.

Browder (1992) calls into question the ability of extractive populations to conserve their environment stating that:

> "In contrast to the popular image of extractors living in prosperous harmony with their rain forest environment, ample evidence exists that most extractor households are poor, even by rural Amazonia standards. However, small-scale extractors are fully capable of destroying commercial forest resources when pressed by circumstances threatening their survival. The recent shortages of açaí palm hearts in Belém and the degradation of extractive reserves by rubber tappers in Acre bear witness to the tenuous foundation that prevailing extractive systems

> provide to a model of sustainable natural forest development based on extraction." (p. 37)

A similar account of the ability of indigenous groups to degrade their environment can be found in Johnson (1989).

Homma (1992; 1995) casts doubt on the ability of extractive reserves to conserve the resources they are designed to sustainably exploit, arguing that it is the nature of extractive economies to over-exploit the resource base upon which they rely (see section 4.3 for a further discussion of the extractive economy and Homma's thesis).

Other approaches used to explain the more benign relationships witnessed between indigenous and traditional peoples and their environment focus on the role of socio-economic factors in influencing human-environment interaction. Gadgil and Guha (1992), in their examination of the ecological history of India, point to different 'modes of resource use' as the determining factor in human-environment interactions. They list four modes of resource use that have been encountered throughout human history:

1) gathering
2) nomadic pastoralism
3) settled cultivation, and
4) the industrial mode of resource use

Each of these modes brings with it its own technology, economy, social organization, ideology, and level of ecological impact. Thus the 'stewardship' ethic attributed to some groups is the result of a mode of resource use that

has a less severe impact on the surrounding resource base. Marxists approach the topic of conservation in a similar manner, pointing to the mode of production as the determining factor in human-environment relationships. Still others have argued that it is merely the lack of advanced technologies or the opportunity to over exploit their local environment that causes some populations to act in a more stewardly manner.

As only one of sixteen different classifications of protected lands in Brazil, extractive reserves will likely serve as only part of an overall conservation plan for Amazonia (ELI 1995). By slowing the expansion of ranching and colonization, extractive reserves can help to prevent the destruction of large areas of tropical rain forest ecosystems, but it remains to be seen whether this is the best method of promoting conservation in the Amazon basin. There is a growing consensus among conservationists that where local populations are involved in conservation efforts, the economic security of that population and the perceived benefits of a given program greatly influence their ability and desire to conserve the protected resources (Barzetti 1993; Wells and Brandon 1992). These issues are addressed in the following section.

## 4.3 Extractive Reserves and Development

The livelihood of extractive reserve residents is drawn from a combination of activities including extractivism, subsistence farming, animal husbandry, occasional wage labor, and a small amount of commercial farming. According to Clüsner-Godt and Sachs (1995), extractivism "... encompasses rubber-tapping and gathering of other forest products intended for sale within regional, national or international markets." (p. 5) Agriculture has as its main focus the production of manioc, a tuber used to produce a coarse flour known as *farinha*, the region's main staple. Lescure *et al* (1995) have argued that control of manioc flour was one of the methods by which traditional extractivists have been kept in a system of debt peonage by land owners. As extractivist populations were discouraged or even prevented from producing manioc to meet their own household needs, they found themselves dependent on the land holder who controlled its price and availability. Lescure also argues that it is only recently, with the erosion of the power of the land owners and the formation of communities, that manioc production has become widespread among extractivist populations (personal communication, 1994).[19]

[19] He argues that the amount of labor required to clear forested land for large-scale manioc production precluded its production in the absence of collective labor regimes or prior to the formation of communities.

The ecosystems of the Amazon provide a variety of naturally occurring products that are exploited by extractivists. Table 4.2 provides a list of many of the products that are used to meet subsistence needs and/or sold to generate income by extractivists. Lescure *et al* ( 1995) claim that extractivism is much more versatile than agriculture and animal husbandry in that it can be practiced during idle time between other fixed obligations such as planting or harvesting crops or done to meet emergency needs for cash or trade goods. The most important extractive products found in the Amazonian reserves, based purely on the quantity produced and their income generating capacity, are rubber and Brazil nuts (Lescure, *et al* 1995; Schwartzman 1989).

The socio-economic system within which present-day extractivism is situated has its roots in the extractive economy begun in the colonial period and refined during the rubber boom. Much of the contemporary literature suggests that these relations have changed, and are no longer impediments to socio-economic development in extractive reserves. Whitesell (1993) argues that this assumption is false, and that any evaluations of the extractive reserve system that fail to take account of the social relations of production within the extractivist economy are bound to lead to erroneous conclusions. Evidence that the unjust social

## Table 4.2: Commonly Extracted Products

| Brazilian Name | Species | Parts Used | Collection Method | Product |
|---|---|---|---|---|
| Açaí do mato | Euterpe precatoria | fruits | picking | fruits |
| Açaí do Pará | Euterpe oleracea | fruits, buds | picking, pruning | fruits, palm hearts |
| Andiroba | Carapa guianensis | seeds | gathering | oil |
| Andiroba | Carapa procera | seeds | gathering | oil |
| Babaçu | Orbignya cf. phalerata | leaves | pruning | thatching |
| Baçu | Manicaria martiana | leaves | pruning | thatching |
| Balata | Manikara bidentata | latex | felling | gum |
| Barbatimâo | Stryphnodendron barbadetima | bark | bark removal | tannin |
| Buriti | Mauritia flexuosa | fruits | picking | fruits |
| Castanha do Pará | Bertholletia excelsa | seeds | gathering | seeds |
| Caucho | Castilloa ulei | latex | tapping | gum |
| Chambira | Astrocaryum chambira | leaves | pruning | fibers |
| Cipó-imbé | Philodendron bipinnatifidum | stem | pruning | fibers |
| Cipó-titica | Heteropsis spp. | aerial roots | pruning | fibers |
| Copaíba | Copaifera spp. | seeds | tapping | oleo-resin |
| Cumaru | Dipteryx odorata | seeds | gathering | cumarin |
| Guaxima | Urena lobata | stem | pruning | fibers |
| Jatobá | Hymanaea courbaril | resin | tapping | medicinal |
| Jauari | Astrocaryum jauari | bud | pruning | palm hearts |
| Licuri | Sheela martiana | copra | gathering | oil |
| Maçaranduba | Manikara spp. | latex | felling | gum |
| Malva | Sida rhombifolia | stem | pruning | fibers |
| Mangaba | Hancornia speciosa | fruits | gathering | fruits |

## Table 4.2 Continued

| Brazilian Name | Species | Parts Used | Collection Method | Product |
|---|---|---|---|---|
| Mangue | Rhizophora mangle | bark | bark removal | tannin |
| Maripuama | Ptychopetalum olacoids | roots | lifting | medicinal |
| Murumuru | Astrocaryum sciophilum | seeds | gathering | oil |
| Palmito | Euterpe spp. | bud | pruning | palm hearts |
| Pataua | Jessenia bataua | fruits | gathering | fruits |
| Pau rosa | Aniba rosaeodora | stem | felling | iinalol |
| Pedra-hime-kaá | Myrcia citrifolia | leaves | pruning | medicinal |
| Piçabeira | Leopaldina piassaba | leaves, sheaths | pruning | fibers |
| Puxuri | Licaria pucherii | seeds | gathering | medicinal |
| Seringas | Hevea spp. | latex | tapping | gum |
| Sorvas | Couma macrocarpa | latex | felling, tapping | gum |
| Timbós | Derris spp. | roots | lifting | rotenone |
| Tucumã | Astrocaryum aculaetum | fruits | gathering | fruits |
| Ucuúba | Virola surinamiensis | seeds | gathering | oil |
| Urucu | Bixa orellana | fruits | gathering | colorant |

relations continue to play a significant role in the extractivist economy can be found in the reforms called for by the rubber tappers in 1985.

Whitesell (1993) notes two separate socio-economic aspects of the traditional extractive economy, patron-client relations and the *aviamento* system. Under *aviamento*, an extractive worker is advanced goods necessary for the

collection of forest products and his own maintenance over a period of time. This 'loan' is made by a land owner or trader who also serves as the worker's patron. The collector then repays this debt by supplying marketable products to his creditor/patron. The collector is often coerced through force, or threat of force or eviction, to trade exclusively with his creditor/patron (Moran 1974). Any surplus generated by the collector at the end of the season is then used to purchase other necessities from the creditor/patron. The terms of exchange in this relationship favor the creditor who inflates the price of goods supplied to the collector and devalues the products collected. The creditor is in turn indebted to persons of greater means than himself, forming a pyramid of debt relations with the collector at the bottom.

The *aviamento* system is tied to the broader social organization of patron-client and fictive kinship relationships prevalent throughout Brazil (Moran 1974). This semi-symbiotic relationship between patron and client provides a moral component to the economic trappings of *aviamento*. Patronage involves vertical, reciprocal social relations. Patrons acquire much of their financial and political power from their clients. This is accomplished through unequal exchange relations and client support in elections. In return, these greater financial and political

assets are used to aid the client in times of crisis. The patron is expected to supply credit and help the client in times of need. He may also serve as a godparent to the client's children. The client in return exchanges his goods with the patron and supports the patron with his vote in political elections. Whitesell notes the necessity of such a system in remote and weakly governed areas claiming that:

> "When individuals are powerless to protect their own interests and when there are insufficient institutional or collective social mechanisms to guarantee their interests, then dependency upon a more powerful individual becomes socially -and economically- advantageous." (1993, pp. 296-297)

By placing ownership of the reserve lands in the hands of the national government, to be administered by IBAMA, and granting use concessions to local organizations, it is hoped that extractive reserves will end the dependency relations that many extractivists presently face. What remains to be seen is whether the institutions replacing the patrons, be they national, international, or local, will give the extractivists a greater degree of autonomy or merely continue the traditional systems of dependency and patronage in a new guise.

The formation of product marketing cooperatives can place a greater portion of the profits in the hands of the producers themselves. In a similar manner, the location of value-adding processing facilities within the extractive reserves, manned by the extractivists themselves, will

capture an even greater share of the profits. The establishment of a Brazil nut processing plant in the Chico Mendes Extractive Reserve in Acre serves as an example of what can be accomplished. Profits from the processing plant have been used to help build and staff a local school. This case does support the premise that an extractive reserve can lead to greater autonomy for the extractivist population but should not be taken as irrefutable proof.

Much of the optimism over the development potential of extractive reserves can be attributed to an article published in Nature in 1989. Peters *et al* (1989) estimated the net present value of one hectare of rain forest in the Peruvian Amazon to be $6,330 given the sustainable harvest of fruits and latex. This compares to a value of $1,000 for the timber that would be provided by clear-cutting the same area. Unfortunately, the evidence in favor of the economic sustainability of extractive reserves is not so cut and dry.

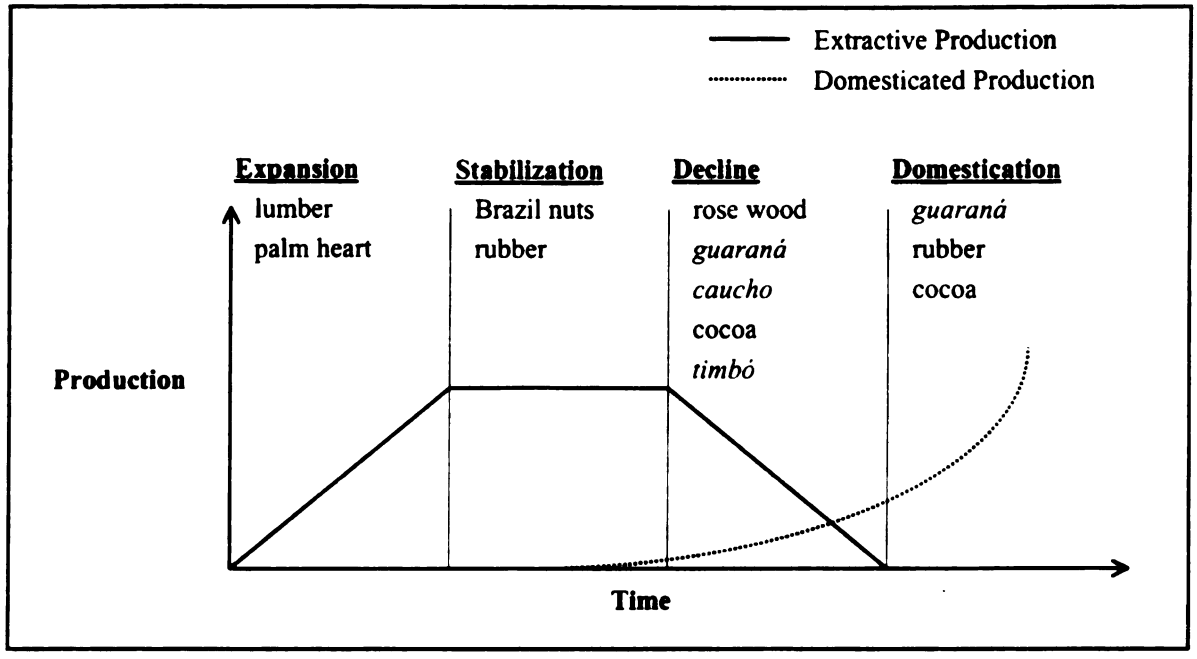
Anderson (1992), in a study of Amazonian extractivism, examined three different sustainable land-use strategies: forest extraction (extractivism), extensive agroforestry, and intensive agroforestry. Of the three, intensive agroforestry had the highest return per unit of labor but the lowest per unit of capital invested, $16.46 and $1.47 respectively. Forest extraction showed the second highest rates of return with a $4.38 return per unit of labor and

$10.75 per unit of capital. Extensive agroforestry gave returns of $4.18 and $14.72 respectively. The high rate of return to labor cited in the intensive agroforestry case occurred at a Japanese colony near the town of Tomé-Açu and is not likely to be reproduced under different conditions. Lescure *et al* (1995) in a similar study, found that cultivation of manioc yielded a return of $2.40 per unit of labor while cultivation of the *açaí* palm for its fruits yielded $8.60 per unit of labor. This compared to returns of $7.50 and $6.17 for the extraction of *açaí* and *piaçaba*, respectively. Both studies conclude with a recommendation for a combination of cultivation and extractivism to ensure the long-term economic viability of extractive reserves. Recommendations such as this have led critics to question the sensibility of extractive reserves that do not have as their primary focus, or are even void of, extractivism.[20]

Homma (1992; 1995) provides a historical perspective on the dynamics of Amazonian extraction. He argues that studies of the extractive sector have been more descriptive than analytical and thus attempts to provide an analysis of the evolution of Amazonian extractive industries. In his schema, Amazonian extraction is characterized by four distinct phases. (see figure 4.1) In the expansion phase, ample resources exist for exploitation. Growth occurs and

[20] One author has even suggested renaming extractive reserves 'sustainable development reserves'.

## Figure 4.1:
## The Cycle of Plant Extractivism in the Amazon




(source: Homma, 1995)

is fueled by monopoly positions in the market and product reserves. At present, the extraction of timber in Amazonia is in the expansion phase. In the stabilization phase, an equilibrium is reached between a product's supply and demand, at close to maximum capacity. As demand increases, prices rise due to the inability of supply to keep pace. Brazil nut and rubber extraction, the economic base of most existing Amazonian extractive reserves, are presently in or reaching the stabilization phase. The decline phase is characterized by a shrinkage of the resource base due to over exploitation and competition from other land uses. Rosewood extraction exemplifies the decline phase. The

final phase, domestication, may begin during the stabilization phase as profit seekers see demand outstripping supply. Domestication is, however, only likely under certain conditions. These include: the technological ability to domesticate the given species, a lack of natural or synthetic substitutes, and continued profitability. Substitution by natural or synthetic substitutes is likely when possible, but natural sources still retain some value.

Homma (1992) claims that extractive reserves "... have importance as a means of slowing down the expansion of the agricultural frontier for the short and middle term. In the long term, however, the disappearance of extraction is inevitable." (p. 31) Whitesell (1993) questions Homma's thesis and points to the continuance of extraction as an economically viable enterprise in the industrialized world, citing the Prescott-Allens' (1986) study of the economic importance of gathering in the U.S. and Canada, as evidence that extractive activities need not follow the progression suggested by Homma.

Anderson (1992) cites the present settlement patterns of reserve populations as a major hindrance to social and economic development. He claims that the present population densities in areas of extractivism are between 1 and 1.7 persons per square kilometer. Such dispersion greatly increases the costs of providing basic health and

educational services. He notes that the extensive patterns of resource use found in conjunction with dispersed settlement are likely to be replaced by more intensive forms of land-use in the near future. His recommendation is to intensify land-use in the area of concentrated settlements and allow extractivism to occur on the fringes of settled areas. Others (Allegretti 1995; Fearnside 1989; and Lescure *et al* 1995) have allocated similar plans for extractive reserves with extractivism as one of several income generating activities practiced within the reserve boundaries.

**Section 4.4 Discussion Of the Literature**

The extractive reserves proposal put forth by the national rubber tappers' council in 1985 called for the formation of extractive reserves throughout Brazilian Amazonia. Though initially designed to protect the livelihoods of the regions' traditional extractivist populations, extractive reserves were soon touted as a sustainable alternative to the destruction of tropical rain forests. The first reserves were formed in the Amazonian states of Acre and Rondônia in 1990 to protect against the encroachment of ranchers and colonists. Subsequent reserves have been formed in areas facing dissimilar environmental and political/economic circumstances. At present, local groups and international conservationists are promoting the

formation of extractive reserves throughout Brazil with little attention to the ability of such reserves to meet local or international objectives.

Support for the extractive reserves is based on a loose coalition of conservationists, national and regional developers, and local populations and stems from the assumption that extractive reserves are capable of meeting the objectives defined by these groups. While the main objective (i.e. to promote a more sustainable and equitable development of the Amazon region) serves as common ground, differences do exist. Conservationists at both the international and national levels are concerned, first and foremost, with the preservation of standing forests and the biodiversity they harbor. The Brazilian government, though gaining political capital by supporting conservation, continues to concern itself with incorporating its vast Amazonian territory into the national economy. Local support is offered by those struggling to gain secure rights to the lands they have traditionally inhabited. Information presented in the following chapter suggests that the local population of the proposed Middle Juruá Extractive Reserve perceives secure rights to land as the most significant benefit of the reserve.

The ability of extractive reserves to meet the conservation and development goals defined by their

supporters remains to be tested. One of the main advantages cited by proponents of the reserves is the presence of a resident population that has a vested interest in the sustainable use of the forest as well as the environmental knowledge and skills necessary to co-exist with the Amazonian ecosystem (Allegretti 1990; 1995; Anderson 1992; Fearnside 1989). Critics have pointed to the ability of extractivist populations to degrade their surrounding environment (e.g. Browder) and the precarious nature of the extractive economy (e.g. Homma) as evidence that extractive reserves will ensure neither conservation of the Amazonian ecosystem nor the economic well-being of extractivist populations.

The *caboclo* population of the Amazon Basin, a cultural group consisting of rubber tappers and other traditional Amazonian peasants, is the main focus of the extractive reserves proposal. They are to be the immediate beneficiaries as well as the facilitators of the reserves' conservation and development goals. As the cultural descendants of the region's indigenous population, *caboclos* are generally portrayed as a homogenous group of environmentally benign resource users.

Most assumptions about *caboclo* resource use are based on a handful of cultural ecology studies conducted near major urban centers or along the main channel of the

Amazon/Solimões River. The work of Wagley conducted over 40 years ago still serves as the general account of *caboclo* resource use. Though several authors (e.g. Coomes 1992; 1996; Padoch and De Jong 1992; and Whitesell 1993) have made efforts to document the heterogeneity of the group, very few attempts have been made to explain differences in resource use, and none have addressed the implications that heterogeneous resource use bear on conservation and development programs such as extractive reserves.

This study is designed to investigate the resource use practices of a *caboclo* population in the process of forming an extractive reserve in one of Amazonia's most isolated regions, the Municipio of Carauarí in Amazonas State. While sharing many similarities with *caboclos* from other parts of Amazonia, the residents of the communities examined in this study face a unique set of circumstances. Their resource use practices are conditioned by a *caboclo* heritage tied to the history of the region's boom and bust extractive economy. Community and household activities are, however, subject to the influence of very localized interactions between *caboclo* culture, the physical environment, contextual socio-economic factors, and the broader political/economic forces that condition resource use throughout the region. An analysis of the variations in local resource use and conservation and the forces that

influence these practices is an important and necessary step in the evaluation of the proposed reserve.

Geographers have a long tradition of studying the intricate relationship between humanity and the natural environment. In the mid twentieth century two opposing schools of thought evolved out of the disillusionment with past approaches. Cultural ecologists concerned themselves with the relationship between traditional societies and their adaptation to and of the natural environment. Political economists drew on the tools of Marxist analysis to investigate the roles that political and economic structures played in conditioning the relationship between humanity and the earth.

In the 1980's political ecology was put forth as a compromise of sorts between these two opposing schools. This new approach drew on the strengths of its predecessors and offered a more holistic approach to the study of human-environment interaction. While recognizing the importance of local contextualities, political ecology also calls attention to the importance of broader structural forces in conditioning resource use decisions.

One of the greatest strengths of a political ecology approach is its rejection of monocausal explanations of resource use decisions. It is recognized that resource use is the outcome of the interaction of many factors that range

from specific place-based phenomena to the workings of the global economy. This holistic nature is also one of political ecology's major drawbacks. The amount of data and multidisciplinary expertise required to conduct a thorough investigation is beyond the capabilities of most researchers.

A political ecology approach is used in the present study to investigate the variations in resource use practices between the communities and households of the proposed Middle Juruá Extractive Reserve. On the recommendation of Blaikie and Brookfield (1987), this study presents the data 'beset with the least uncertainty', the direct relationship between the proposed reserve's population and the resources they rely on to meet their cash and subsistence needs. The resource use practices of 6 communities are presented in chapter 5. A political ecology approach is used to explain how and why resource use varies from community to community and household to household. Finally, these findings are applied to an analysis of the proposed reserve in chapter 6.

# CHAPTER 5: THE MIDDLE JURUÁ STUDY AREA: RESOURCE USE AND CONSERVATION

The communities of the proposed Middle Juruá Extractive Reserve are home to a diverse population of resource users in the throes of complex social and economic changes. Though identified as rubber tappers, the residents have an increasing reliance on other more lucrative activities such as small-scale agriculture and logging. This shift from traditional extractivism to other livelihoods came at the same time as efforts toward the formation of an extractive reserve. The designation of the area as a reserve would limit many of these more lucrative activities.

This chapter presents the data collected among 6 communities of the proposed reserve and an analysis of the community and household level variations in resource use and conservation. Section 5.1 provides a brief description of the study area, including its history, the physical environment, an introduction to the communities under investigation, and an overview of the subsistence activities of community members. The socio-economic setting is examined in section 5.2. Specific attention is given to factors thought to impinge on resource use practices. These include: social affiliations; debt and patronage; and exchange relations. Section 5.3 presents data on agricultural production. Five crops are examined: manioc;

bananas; beans; rice; and limes. In Section 5.4 the extraction of timber, fish, and other forest products are examined. Section 5.5 addresses attitudes toward conservation and the formation of the proposed reserve. The chapter concludes with a discussion of the household and community level variations in resource use and conservation.

## 5.1 Study Area Description[21]

The Municipio of Carauarí is situated some 650 km. upstream from the mouth of the Juruá river, an important right-bank tributary of the upper Solimões. (see figure 1.1) The municipal seat, also named Carauarí, is only accessible by boat or plane as the nearest road is roughly 400 km. to the South in the State of Acre. Small propeller planes service the city daily from Tefé in the North. The price of airfare makes travel by boat the only option for most. Though cheaper, the round-trip journey to Manaus by boat takes over a week. Originally situated along the main trunk of the river, the municipal seat found itself further isolated in 1959 when the river's main course changed and left the town at the end of a *sacado*.[22] The town is now located 8 km. from the main trunk of the river but still enjoys year-round access due to annual dredging. Carauarí is home to more than 15,000 inhabitants and serves as the

[21] For a more detailed examination of the physical and human geography of this area see Whitesell (1993).
[22] The Juruá is one of the most meandering rivers of the Amazon basin. This results in the formation of various oxbow lakes and dead ends known as *sacados*.

commercial and administrative center for the municipio's urban and rural inhabitants.

The Juruá River is one of the main whitewater tributaries of the Amazon system. It drains an area of over 200 thousand square kilometers and contributes nearly 200 billion cubic meters of water to the Amazon system per year (Gibbs 1967, cited in Whitesell 1993). During the high water months of March, April and May, the river covers a swath of 15 to 25 km. in width and rises as much as 14 meters from its low point in September (Whitesell 1993).

The rise and fall of the river closely follows local precipitation. During the wettest months, April and May, the area can receive as much as 500 millimeters of rainfall. The drier months, June through August, bring an average of 100 millimeters but can bring as little as 6 millimeters of precipitation (Whitesell 1993). These fluctuations in precipitation and the river level bear a significant influence on the lives of the households examined in this study.

During the colonial period, the area of the Middle Juruá served as a source for indigenous slaves who were put to work elsewhere in the region. During the 1850's and 60's rubber tappers from other parts of Amazonia began to make occasional forays to exploit the rich sources of rubber in the area. In 1869 the first *seringal*, or rubber estate, was

formed. Between the 1870's and early 1900's vast amounts of land were claimed as *seringais* (plural form of *seringal*) by entrepreneurs who sought to make their fortune in the booming rubber economy.

Due to the lack of adequate indigenous labor in the area it was necessary to import laborers from elsewhere. Severe droughts in Brazil's Northeast in 1877 and 1888 served as the stimulus for many Northeasterners to migrate to Amazonia. Whitesell (1993) notes a steady increase in baptisms throughout the early boom and bust periods of the rubber economy and correlates this with population growth in the study area. This trend in population growth continued until the depression of the 1930's but picked up once again during the WWII rubber boom. Since the 1940's the area's natural rate of population increase has continued at a steady rate, excepting out-migration to the region's urban centers.

The present population of the study area has its roots in the history of migration from other regions of Brazil. Whitesell (1993) indicates that 31.6 percent of the heads of household interviewed had parents who migrated to the area from outside Amazonas State while over 50 percent claimed that their grandparents were immigrants. The most common source of these immigrants was the Northeast. This history of immigration, coupled with miscegenation, has lead to a

variety of racial characteristics in the study area population. Whitesell (1993) notes the following distribution of phenotypes: Pardo (54 percent); Afro-Brazilian (24 percent); Caucasian (16 percent); and Indigenous (7 percent).

The communities examined in the present study were home to nearly 700 people during the period of data collection in 1994. Table 5.1 presents some basic information on these communities. All communities are located in the *terra firme* zone but have access to the *várzea* as well.

**Table 5.1**
**Communities of the Study Area**

| Community | Fluvial Distance from Carauarí[23] | Seringal | Number of Households | Population |
|---|---|---|---|---|
| Gumo do Facão | 105 km. | Providência | 14 | 82 |
| Pupuaí | 130 km. | Pupunhas | 19 | 135 |
| Lago do Roque | 140 km. | Pupunhas | 29 | 182 |
| Bom Jesus | 215 km. | Imperatriz | 11 | 88 |
| Bauana | 230 km. | Bauana | 8 | 43 |
| Lago do Tabuleiro | 325 km. | Paixaúba | 16 | 123 |

Gumo do Facão was settled in 1959 at its present location. Of the communities under investigation, Gumo

[23] Distances are calculated from those given in Derickx (1992) and Whitesell (1993).

residents enjoy the greatest access to the market and services in Carauarí; they are nearest to the municipal seat and have year-round access to the main trunk of the Juruá. Important commercial activities include agriculture, fishing and logging. Both the *várzea* and *terra firme* are exploited for agricultural use. Community assets include a *casa de farinha* (a small hut with an oven and tools for the processing of *farinha*), a community meeting hall, and a school that offers education through the 4th grade level.

Pupuaí and Lago do Roque are the two largest communities in the study area. They were first organized as communities in 1980 and 1969, respectively. Though relatively close to Carauarí, neither has direct access to the waterway during the dry season. Household members spend most of their time as small-scale agriculturists. Neither community is involved in logging or commercial fishing. As the largest communities, Pupuaí and Lago do Roque have received more help from the municipal government. Both communities have the following assets: a *casa de farinha*, a school, a community meeting hall, a community water well, a health station, and a generator.[24] Lago do Roque is noteworthy in that it recently divided into two sections,

[24] The health stations noted in this section are small buildings with limited stores of medical supplies. They are maintained by a community member with basic medical training. Both of the stations were without asprin and and any form of antiseptic when I visited. The generators supplied by the municipal government were used to power lights and an occasional radio. Neither had been functioning for some time. These ammenities were supplied to the communities in an election year.

one inhabited by Protestants and the other by Catholics. Aside from their separate living areas the inhabitants work together as a single community.

The communities of Bom Jesus and Bauana both relocated from nearby *várzea* locations recently. This was done in order to have better access to the main trunk of the Juruá and *terra firme* land for agriculture. Both communities devote their time to agriculture, fishing and logging. As smaller, recently relocated communities they lack many of the amenities found in the larger, more established communities. Bom Jesus does, however, have a *casa de farinha* which is also used in the processing of sugar cane to produce thick, sweet product known as *mel de cana*.

Lago do Tabuleiro has been in its present location since the early 1980's. Its distance from Carauarí and lack of access to the main trunk of the river during the dry season make it the most isolated community in this study. Agriculture and logging are the main commercial activities. The community assets are limited to a school and a *casa de farinha*.

The households of these communities vary in both size and composition. The largest household in the study area had 13 members while the smallest had only two. Larger households often contain more than one family or relations beyond the immediate nuclear group. The smallest are

usually composed of a young couple who have recently settled on their own or older couples whose children are independent adults. With the exception of the very young and very old, all members contribute to the household economy. Household finances and external economic relationships are usually controlled by the most economically active male.

Household labor is often divided by gender though many activities are undertaken by both sexes. Typically tasks undertaken by men are more physically demanding or require specialized skills. These include: logging, clearing and burning land for swidden plots, hunting, construction, and the transport of weighty items for sale. Tasks performed by women are no less important though they are often less visible. They include domestic chores (cooking, cleaning, fetching water, childcare, etc.), collection of herbs and other specialized forest products, and tending to livestock. Many of the most important tasks such as fishing and the planting and harvesting of crops are shared by men and women. Children play a significant role in the household economy as well, taking on important roles such as fishing when not working side by side with their parents.

Community members rely on the natural environment to meet the majority of their subsistence needs. With the exception of a few unique households who receive monthly cash payments (retirees, teachers, a clergyman, and a wage

laborer), subsistence activities are similar from household to household. The inclusion of information on subsistence activities is merely intended to draw attention to the fact that community members depend on their surrounding environment for subsistence as well as commercial resources.

The main staple, *farinha*, is a coarse flour prepared from bitter manioc root (*Manihot esculenta*). Nearly 90 percent of the community inhabitants produce their own manioc for consumption. This tuber is grown in both *terra firme* swidden plots and the *várzea*. *Farinha* is consumed at almost every meal, generally in conjunction with some form of fish. Fish is the most common source of animal protein in the local diet and families devote time to fishing on a daily basis. This standard fare is supplemented by other fruits and vegetables and the occasional game animal when available.

In addition to providing goods for sustenance, the natural environment supplies a host of other materials used in day-to-day life. Several medicinal plants are collected for use as topical cures or in the brewing of teas (see Whitesell 1993 for a more detailed analysis). Houses are constructed with posts from local trees such as *mulateiro* (*Calycophyllum spruceanum*) and boards fashioned from the trunks of *paixiúba* (*Socratea exorrhiza*). Roofs are made

with the fronds of the *caranã* palm (*Mauritia* sp.).[25] These thatched roofs are replaced in whole or in part every three years. Local trees also provide the materials for canoes, paddles and wooden tool handles.

## 5.2 The Socio-economic Setting

The communities investigated in this thesis were experiencing drastic changes in their social and economic systems in the early 1990's. The collapse of the local rubber economy and the organization of an agricultural cooperative have lead to the formation of new relationships both between the community members themselves and with the broader political/economic forces of the area. The traditional socio-economic setting of the study area is closely tied to the systems of *aviamento* and patronage inherent in the extractive economy. (see section 4.3 for a further discussion) This section addresses three aspects of the socio-economy of the study area: affiliations with extra-community organizations; debt and patronage; and trade relations.

### *Affiliations*

In the early 1990's the residents of Gumo do Facão, Pupuaí, and Lago do Roque formed an agricultural cooperative

[25] In the early 1990's metallic roofs began to appear on school buildings and the homes of those who could afford them. These roofs serve as a status symbol and have some practical utility in that they need not be replaced as frequently. The main drawback aside from cost is their tendency to trap heat and lead to less comfortable living conditions.

in order to market their crops outside the traditional systems mentioned above. This cooperative was dubbed ASPROC for the *Associacão dos Produtores de* Carauarí (The Association of Producers of Carauarí). They were aided by MEB, (*O Movimento de Educação de Base*), the Base Education Movement, an NGO supported by the Catholic Church, and the STR (*Sindicato dos Trabalhadores Rurais*), the rural workers union. The association's crops were originally transported on a boat supplied by the municipal government. Association members planned to complete the construction of their own boat in 1995 with funds solicited by João Derickx, the former Catholic priest of Carauarí.

By marketing their products directly to consumers, association members are able to capture the profits that generally fell to patrons and merchants. Through ASPROC these communities have lessened the reliance on traditional patronage relationships with local land-owners and merchants. They have also managed to break free of the restrictive trade relationships inherent in the *aviamento* system. The communities of Bom Jesus, Bauana, and Lago do Tabuleiro voted to join the association in June of 1994 and planned to begin marketing agricultural products with the association in 1995. Though the founding communities of ASPROC managed to abolish most of their debts and patron

ties, it remains to be seen if this will be repeated in other communities.

The apparent increase in autonomy of these communities must be viewed with a bit of skepticism, however. It seems unlikely that the achievements of ASPROC would have been possible in the absence of support from the municipal government and MEB. Whitesell (1993) calls attention to this situation and cautions against labeling a shift in dependence on an unsavory group (e.g. the landowners) to a more palatable group as an increase in autonomy.

The STR has played a less significant role in the communities under investigation since the formation of ASPROC but continues its traditional role as the main disseminator of information and organizing force in other settlement areas. Table 5.2 lists the adult male membership in ASPROC and STR in 1994.

Membership in organizations such as ASPROC and the STR impose certain obligations but also provide opportunities not available to others. Dues, approximately $US 10 annually for each organization, are paid in cash or agricultural products, usually *farinha*. At the time of data collection, ASPROC membership was restricted to the households of only three communities, Gumo do Facão, Pupuaí, and Lago do Roque. Roughly 80 percent of the households in these three communities are members. The majority of non-

member households in these communities market relatively few agricultural products. By comparison, non-member households marketed only 20 percent the amount of *farinha*, and less than 10 percent the amount of beans, rice, and bananas on average. These households are largely composed of elderly or very young couples who do not have the means to participate in the agricultural economy to the same degree. The distance of the three remaining communities, Bom Jesus, Bauana, and Lago do Tabuleiro, and the absence of free transport were the main factor in the initial exclusion of these communities.

**Table 5.2**
**ASPROC and STR Membership 1994**

| Community | Percentage Membership in ASPROC | Percentage Membership in STR |
|---|---|---|
| Gumo do Facão | 86 | 79 |
| Pupuaí | 90 | 84 |
| Lago do Roque | 72 | 72 |
| Bom Jesus | 0 | 91 |
| Bauana | 0 | 62.5 |
| Lago do Tabuleiro | 0 | 75 |

Membership in the STR is much more uniform throughout the study area. The percentage of household membership ranges from 62.5 percent in *Bauana* to a high of 91 percent

in *Bom Jesus*. Whitesell (1993) notes a similar pattern of union membership in his study. He also notes a correlation between union membership and political activity expressed through voting frequency. Union members enjoy the benefits of small short-term loans, agricultural extension services and the use of the communal meeting hall as a place of residence while in the town of Carauarí. It is interesting to note, however, that the latter two of these benefits do not appear to be denied to non-union members.

***Debt and Patronage***

Debt among study area households is closely associated with the tradition of patron-client relations inherent in Brazilian society. Roughly 65 percent of the heads of household with a debt indicated their creditor as their patron. The remaining respondents viewed the owner of the *seringal* where they resided as their patron. Table 5.3 presents the data on patronage and debt in 1994.

The patrons of the study area fill a similar role to patrons in other areas of Brazil. They support their clients in time of need and extract an economic surplus through restrictive trade and debt relations. The aid offered by patrons can take several forms: transport to the city to receive medical attention, credit, resolution of conflicts between residents, and political or legal support. Four different types of patrons were encountered in the

study area: *seringalistas*, representatives of the *seringalistas*, *regatões*, and representatives of logging firms. Some patrons also positions of power within the municipal government. In the absence of strong community organization or aid from external sources such as the municipal government or the church, study area residents are left with other options than a patron in times of dire need.

**Table 5.3**
**Patronage and Debt in 1994**

| Community | % Households With Debt | Average Debt $ U.S. | % of Households With Patron |
|---|---|---|---|
| Gumo do Facão | 29 | 18 | 0 |
| Pupuaí | 16 | 24 | 0 |
| Lago do Roque | 34 | 33 | 14 |
| Bom Jesus | 55 | 169 | 18 |
| Bauana | 62.5 | 583 | 50 |
| Lago do Tabuleiro | 82 | 182 | 81 |

Households of the study area exhibit a broad range of indebtedness. The average household debt for the study area was $72 in 1994. Though 55 percent of all households were debt free, one household that had recently purchased a chain saw had a debt of $1917. Variations in the level of household debt bear a strong correlation with community location, ties to a patron, and ASPROC membership. The

average debt of households in the three communities closest to Carauarí is $8 compared to $185 in the more distant communities. At the household level, those with a patron had an average debt of $220 whereas those without had an average of only $23. ASPROC members had an average debt of $6.25 while non-members had an average level of $141. As noted earlier, ASPROC members were able to lessen their debt burdens by marketing their products directly to consumers, thereby capturing a greater share of the profits of their labor.

***Exchange Relations***

Whitesell (1993) notes the situation of unequal exchange relations for households in his study claiming that the lender:

> "... may raise the prices of market goods by over 200%; alter the register of rubber received or goods dispensed; arbitrarily discount the value of rubber received, ostensibly for reasons such as water content or transportation costs; tamper with the scales used in the exchange of rubber and market goods; arbitrarily set interest charges on loans; etc." (p. 122)

Study area residents have several options for marketing their products. The most extreme forms of *aviamento* that required producers to exchange all of their products with the patron have been eliminated within the communities in the study area. Many residents still find trade with their patron a viable option, however. Others exchange goods with a neighbor or through a traveling merchant known as a

*regatão* who may also serve as a patron. These transactions may not provide the same level of profits as direct sale at the market, but they do have the advantage of being conducted closer to home, even at one's doorstep in the case of a *regatão*. It often requires a week away from other obligations to transport and sell goods in town, a commitment that many cannot afford. Those with the means to market their goods in Carauarí, either personally or through a neighbor or relative, generally do so, however. Table 5.4 presents a summary of the data on product exchange.

Two factors contribute to the majority of variation in product exchange: accessibility to the market and the nature of the product being exchanged. Households located near the municipal center have greater options for marketing their products in town, either through the transport opportunities afforded by membership in ASPROC or transport via canoe with or without the luxury of an outboard motor. Nearly 90 percent of the households from the communities of Gumo do Facão, Pupuaí, and Lago do Roque market the majority of their products in Carauarí, compared to only 22 percent of the households in the more distant communities. Of the 8 households who regularly sent goods to market from the morek distant communities, 75 percent either owned or had ready access to a motorized canoe.

**Table 5.4**
**Product Exchange**

| Product | % of Households Exchanging With[26] | | | | % Exchanging for | |
|---|---|---|---|---|---|---|
| | patron | other[27] | neighbor | ASPROC | cash | goods |
| farinha | 10 | 15 | 8 | 78 | 80 | 22 |
| bananas | 1 | 12 | 0 | 87.5 | 88 | 12 |
| beans | 0 | 7 | 0 | 93 | 97 | 3 |
| rice | 0 | 7 | 0 | 93 | 97 | 3 |
| limes | 0 | 0 | 0 | 100 | 100 | 0 |
| timber | 77 | 23 | 0 | 0 | 25 | 75 |
| fish | 40 | 57 | 5 | 0 | 38 | 62 |
| other ex.[28] | 0 | 50 | 21 | 29 | 57 | 43 |

ASPROC played a major role in increasing the percentage of agricultural products marketed directly to consumers in Carauarí, however, commercial activities outside of agriculture continue to be dominated by more traditional exchange relations. Timber and fish are generally traded with a patron or *regatão*. The exchange of other extractive products varies to a much greater degree (see section 5.4 for a further discussion of the extractive products marketed in the study area). Oils such as *andiroba* and *copaiba* were

[26] Some households market their crops through more than one outlet, this may lead to totals of over 100%.
[27] This is generally a *regatão* but also includes sales of agricultural products in Carauari outside of ASPROC and logging interests that are not actually patrons.
[28] See table 5.14.

sold in Carauarí, while turtles were generally exchanged with a *regatão* for goods. Juice from the *açaí* palm was sold to neighbors or in Carauarí.

The nature of many products limits the avenues available for exchange. Most agricultural products can be exchanged through all of the outlets noted in table 5.4. *Farinha*, because of its widespread production, exhibits the greatest variety. Other agricultural products are marketed almost exclusively by ASPROC members through the association, however. Fish, due to its perishability, is most often exchanged with a *regatão* or patron. Timber is unique in that its exploitation is usually accomplished through some form of contract labor. Loggers work directly for a patron or other landowner and are paid in cash or goods by the cubic meter of wood cut.

The medium of exchange is most often determined by the trade outlet being used. Marketing through ASPROC is exclusively for cash. Exchange between neighbors may be for cash or goods depending on the preferences of the parties involved. Likewise, most *regatões* (plural form of *regatão*) and patrons are willing to exchange for cash or goods. Though producers realize that they pay a premium on all goods they receive in these exchanges, this is often the simplest method to acquire manufactured necessities such as batteries or salt.

## 5.3 Agricultural Production

Agriculture plays an important role in the lives of the residents of the communities examined in this thesis. As a form of resource use it ranks first in importance for both subsistence and commercial activities. Over 80 percent of the households in the study area produce agricultural crops for sale, while nearly 95 percent cultivate some combination of subsistence crops. The majority of agricultural products are produced through traditional methods of swidden-fallow agriculture in upland *terra firme* forest. Production on the rich alluvial deposits of the *várzea* is limited and is often noted by researchers as a target for potential increases in agricultural productivity (Whitesell 1993).[29] All the crops marketed in 1994 are noted in table 5.5.

This section presents data on the commercial production of the 5 most widely exchanged crops: manioc, bananas, beans, rice, and limes. These crops were chosen for inclusion based on their sale by at least 10 percent of the study area households. Community and household variations in the production of these crops is addressed at the end of each sub-section. Although a majority of households raise some sort of livestock (usually ducks, chickens or hogs), animal husbandry is not addressed in this study as very few households reported livestock sales in 1994.

**Table 5.5**
**Agricultural Products Marketed 1993-94**

| Product | Percentage of Households Marketing |
|---|---|
| farinha | 79 |
| bananas | 58 |
| beans | 29 |
| rice | 16 |
| limes | 15 |
| yams | 9 |
| avocado | 8 |
| *mel de cana* | 8 |
| pineapple | 8 |
| corn | 6 |
| melons | 5 |
| squash | 4 |
| tobacco | 2 |
| papaya | 1 |

***Farinha***

*Farinha* is the most frequently sold product. It is marketed by nearly 80 percent of study area households, who on average sold 37 sacs. The range of these sales was between 2 and 300 sacs. Table 5.6 presents data on *farinha* sales for each community. Only 4 of the families who engage in commercial agriculture do not market *farinha*. As in subsistence production, manioc is grown in both *terra firme* and *várzea* locations. Swidden plots of manioc are generally grown within an hour's distance of the household. Several of the households from Bauana were still cultivating *várzea*

[29] The underutilization of the *várzea* is not specifically addressed in this study due to an absence of relevant data from the household survey conducted by the researcher.

plots as far as 2 hours away because of their recent relocation.

**Table 5.6**
***Farinha* Sales in Sacs 1993-94**

| Community | Number of Households Selling | Percentage of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 10 | 71 | 20 | 28.5 |
| Pupuaí | 18 | 95 | 36 | 38 |
| Lago do Roque | 27 | 93 | 39 | 42 |
| Bom Jesus | 8 | 73 | 29 | 39 |
| Bauana | 3 | 37.5 | 9 | 23 |
| Lago do Tabuleiro | 11 | 69 | 22 | 32 |

While manioc is harvested by individual families, processing is often a communal effort. Women clean and peel the roots. Men grind the peeled roots, often with the aid of a small gas-powered engine, and then remove the toxic juices in a wooden press. The final process of baking is performed by both men and women in a communal oven.

Most study area communities exhibit a high percentage, over two thirds, of household involvement in the marketing of *farinha*. Bauana is the sole exception, where only 37.5 percent of households were involved. In addition, those households in Bauana who do market *farinha* had a much lower average level of sales than their counterparts in other

communities. The community decision to relocate in 1993 plays a major role in these differences. Though residents of Bom Jesus also relocated in 1993, the shorter distance involved provided greater opportunities to exploit former plots.

The high percentage of household involvement in the marketing of *farinha* is attributable to several factors. Its importance as the main staple in the local diet helps to maintain a constant demand, so excess product always has a variety of marketing options. In addition, the nature of the product allows it to serve as a store of value whether as processed *farinha* to be consumed or sold as needs arise, or as a standing crop that can be left in the ground until need or labor availability make its harvest a more attractive option. Finally, the hardiness of manioc allows it to be grown in both *várzea* and *terra firme* environments.

Variations in *farinha* production among individual households is most strongly influenced by household structure. Households who market little or no *farinha* are generally those with little labor available to devote to agricultural production as a whole. These include smaller households composed of very young or old couples as well as those who receive cash income from other sources (wage labor, pensions, salaries, etc.) and find it preferable to purchase their foodstuffs.

***Bananas***

Bananas are the second most frequently marketed product, involving nearly 60 percent of households. Men harvest and transport the bananas in large stems that average around 15 kg. each. On average, households exchanging bananas sold 132 stems. Production for these households ranged from 10 to 500 stems. Bananas are grown exclusively on swidden plots, generally in conjunction with other crops. Production often continues for several years after a plot is left to fallow. Table 5.7 presents the data on banana sales.

**Table 5.7**
**Banana Sales in Stems 1993-94**

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 9 | 64 | 47.5 | 74 |
| Pupuaí | 17 | 89 | 140 | 156 |
| Lago do Roque | 23 | 79 | 124 | 156 |
| Bom Jesus | 5 | 45 | 32 | 70 |
| Bauana | 0 | 0 | 0 | 0 |
| Lago do Tabuleiro | 2 | 12.5 | 5 | 42.5 |

Community level variations in banana sales are largely a function of distance and the presence or absence of ASPROC. Only 7 of the 56 households who market bananas are

located outside the 3 communities closest to Carauarí. 95 percent of sales from these three communities are conducted through ASPROC. Variations at the household level are influenced by household structure though the relationship between banana sales and ASPROC membership is the most significant pattern.

***Beans***

Though they are a relatively new commercial crop, beans are sold by 29 percent of study area households. Over 40 percent of the respondents intended either to begin or increase bean production in the 94-95 season. The average sales for those participating in 1994 was 247 kg. Individual households sold between 33 and 1000 kg. Beans are planted in both *terra firme* and *várzea* plots. They are harvested by men and women and transported in large sacks weighing approximately 60 kg. each. Tables 5.8 presents figures on 1994 bean sales.

The vast majority of bean production occurs in the communities of Gumo do Facão, Pupuaí, and Lago do Roque. Of the 28 households marketing beans, only 2 were located outside these communities. These two households exhibited characteristics such as higher levels of education, political involvement, and contact with the town of Carauarí, that suggest that they are unique examples of innovators and risk takers as opposed to evidence of any

discernible trends. As with most other agricultural products, ASPROC plays a significant role in production at the household and community level.

**Table 5.8**
**Bean Sales in kg. 1993-94**

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 7 | 50 | 92.5 | 185 |
| Pupuaí | 8 | 42 | 88 | 209 |
| Lago do Roque | 11 | 38 | 112 | 295 |
| Bom Jesus | 1 | 9 | 61 | 676 |
| Bauana | 1 | 12.5 | 12.5 | 100 |
| Lago do Tabuleiro | 0 | 0 | 0 | 0 |

***Rice***

Rice is marketed by 16 percent of the study area households. Similar to beans in many respects, rice is a relatively new addition to the commercial portfolio of area residents. 25 percent of households noted intentions to become involved with or increase rice production the following season. From 1993-94 the average sale of rice was 523 kg. Production ranged from 120 to 1500 kg. Table 5.9 presents the data on community rice production for the 1993-94 season.

Only 3 communities were involved in rice sales in 1994, Gumo do Facão, Pupuaí, and Bom Jesus. Pupuaí was the only location to exhibit a significant level of participation in commercial rice production with 58 percent of the households taking part. Households in Gumo do Facão and Bom Jesus more readily fit the characteristics of outliers and innovators noted for bean production. The absence of production in Lago do Roque is noteworthy in that it falls outside the trend of ASPROC influence seen for most other agricultural products.

**Table 5.9**
**Rice Sales in kg. 1993-94**

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 4 | 29 | 1200 | 300 |
| Pupuaí | 11 | 58 | 6875 | 625 |
| Lago do Roque | 0 | 0 | 0 | 0 |
| Bom Jesus | 1 | 9 | 300 | 300 |
| Bauana | 0 | 0 | 0 | 0 |
| Lago do Tabuleiro | 0 | 0 | 0 | 0 |

***Limes***

Limes are another relatively recent addition to the crops marketed by community households. Only 15 households across two communities marketed limes in the 1993-94 season.

The average sales for these households was only 3 sacs. Sales ranged between 1 and 10 sacs. Limes are produced in fallowed swidden plots and harvested by both men and women. They are sold in 60 kg. sacks. Lime production is presented in table 5.10.

**Table 5.10**
**Lime Sales in Sacs 1993-94**

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 5 | 36 | <1 | 2.4 |
| Pupuaí | 0 | 0 | 0 | 0 |
| Lago do Roque | 10 | 34 | 1 | 3.2 |
| Bom Jesus | 0 | 0 | 0 | 0 |
| Bauana | 0 | 0 | 0 | 0 |
| Lago do Tabuleiro | 0 | 0 | 0 | 0 |

The two communities that do market limes are strong in ASPROC membership though no correlation can be drawn between membership and production at the household level. Whitesell (1993) makes no indication of lime production or sale in his survey conducted in 1989, though apparently 1 household in the community of Gumo do Facão was marketing limes during this period. The head of this household, Elso Pacheco da Silva, served as the CNS representative for Carauarí at several national meetings and is one of the more outspoken

community leaders and innovators. He relocated to the community of Pupuaí in the early 1990s and is responsible for the introduction of lime production in the study area (Whitesell 1998, personal comment).

## 5.4 Extractive Production

Even in the absence of rubber tapping, extraction continues to play an important role in the economic lives of study area residents. This section examines three different activities: logging, commercial fishing, and the extraction of other marketable goods often referred to in the literature as 'non-timber forest products'. General trends and variations are discussed at the end of each subsection.

### *Logging*

Members of several communities are very active in logging though this practice appears to be declining in importance. In the communities of Bom Jesus, Bauana, and Lago do Tabuleiro, more than 70 percent of households engaged in logging between 1993 and 1994. 38 percent were involved for the study area as a whole. This represents a decline of roughly 13 percent in logging since Whitesell's study.[30] Individual households marketed between 15 and 250 $m^3$. The average for the study area households was 84 $m^3$. Table 5.11 presents the data on logging.

[30] As Whitesell only reported aggregate measures of the percentage of households engaged in logging it is difficult to draw comparisons. Apparently serveral communities in this study, namely Bauana and Bom Jesus, have experienced dramatic increases in logging (Whitesell 1998, personal comment).

**Table 5.11**
**Timber Sales in meters[3] 1993-94**

| Community | Number of Households Logging | % of Households Logging | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 7 | 50 | 43 | 86 |
| Pupuaí | 1 | 5 | 4 | 85 |
| Lago do Roque | 0 | 0 | 0 | 0 |
| Bom Jesus | 8 | 73 | 66 | 91 |
| Bauana | 7 | 87.5 | 37 | 42 |
| Lago do Tabuleiro | 14 | 87.5 | 87 | 99 |

Logging is conducted exclusively in the *várzea*. Brazilian law prohibits this activity though enforcement of environmental laws in the depths of this isolated region area are a rarity. Trees are felled during the dry season and floated out to the main channel of the river when water levels rise. Most logging is done with traditional axes and crosscut saws by teams of two or three men. Two households had recently purchased a chain saw and planned to increase the amount of time devoted to this activity in 1995. Due to the danger and hard labor involved nearly 30 percent of the respondents did not intend to continue logging in 1995.

The data on logging is somewhat sketchy. Many respondents could recall the total quantity of timber marketed but not the actual number of specific tree species

felled. The species most commonly exploited are presented in table 5.12. The percentage of households marketing a given species is based on a sample of the 37 households involved in logging.

**Table 5.12**
**Tree Species Cut Between 1993-1994**

| Common Name | Scientific Name[31] | Percentage of Households Marketing (n=37) |
|---|---|---|
| *samaúma* | *Ceiba pentandra* | 84 |
| *virola* | *Virola surinamensis* | 65 |
| *açacu* | *Hura Creptans* | 65 |
| *copaiba* | *Copaifera reticulata* | 57 |
| *muiratinga* | *Olmediophaena maxima* | 43 |
| *jacareúba* | *Callophyllum brasiliense* | 19 |
| *louro* | *Ocotea barcelensis* | 14 |
| *macacaúba* | *Platymiscium duckei (?)* | 11 |
| *macacare-cúia* | *Jugastrum sp. (?)* | 8 |
| *andiroba* | *Carapa guianensis* | 5 |
| *cedro* | *Cedrela odorata* | 5 |

Variation in the importance of logging across communities is noteworthy. Two communities, Pupuaí and Lago do Roque have implemented bans on logging within their local

[31] Scientific names are those used by Whitesell (1993).

environs (see section 5.5 for a further discussion). Both of these communities have a strong ASPROC presence and thus agricultural opportunities not open to the more distant communities. The continued importance of logging in Gumo do Facão, where 50 percent of the households are involved, goes against this argument, however, as all of the households engaged in logging are also ASPROC members. It would seem that the communal attitude against this form of resource use, as expressed by the ban, is the sole factor in limiting its practice in Pupuaí and Lago do Roque.

The households who do engage in logging bear few distinguishing characteristics that set them apart from others. Logically, those few households who have purchased a chain saw are more efficient and prone to continue logging in the future. Unique households that are only marginally involved in commercial agriculture are likewise incapable of or not interested in logging. As logging is difficult and dangerous work, personal skills and tastes seem to dictate the majority of household level variations.

***Commercial Fishing***

Commercial fishing plays a less significant role than logging and involved only 13 percent of the study area households. Only one community, Bauana, had a high percentage (62.5 percent) of households engaged in the marketing of fish during the period of this study.

Throughout the study area households sold an average of 247 kg. each. Actual sales ranged between 50 and 500 kg. Table 5.13 presents the data on fish sales between 1993 and 1994.

**Table 5.13**
**Community Fish Sales in kg. 1993-94**

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 5 | 36 | 30 | 85 |
| Pupuaí | 0 | 0 | 0 | 0 |
| Lago do Roque | 0 | 0 | 0 | 0 |
| Bom Jesus | 3 | 27 | 86 | 317 |
| Bauana | 5 | 62.5 | 225 | 360 |
| Lago do Tabuleiro | 0 | 0 | 0 | 0 |

Two varieties of fish are marketed by the study area residents. *Peixe liso*, scaleless fish of several varieties, account for roughly 90 percent of fish sales by weight. They are captured in the main channel of the Juruá with a hook and line. Though residents market these fish year round, most sales are made in the dry summer months. *Pirarucú (Arapaima gigas)*, a gigantic fish found in many lakes of the study area, accounts for the remaining 10 percent of fish sales. The harpoon is the most common tool used in the capture of the *pirarucú* due to its large size. Nearly 30 percent of the households involved in commercial

fishing planned to discontinue this activity in 1995 in favor of other activities such as increased agricultural production.

Similar to logging, participation in commercial fishing is conditioned by community conservation efforts. Three communities had enacted commercial fishing bans as of 1994. The high level of involvement in Bauana appears to reflect personal household preferences and the low level of agricultural production tied to the community's relocation in 1993. With the exception of the unique situation of Bauana, households engaged in commercial fishing exhibit no distinguishing characteristics.

***Other Extractive Products***

In the early 1990's many community members left their lifelong occupation as rubber tappers. The drop in international prices for rubber, due in part to increased production in other parts of the world (e.g. Malaysia), the reduction of government subsidies, and the improved opportunities for marketing agricultural products, made rubber tapping a less attractive option. The majority of respondents (nearly 70 percent) cited the drop in price as the main reason for leaving this occupation. Other significant reasons included the attractiveness of other activities (agriculture, logging, etc.) and dissatisfaction with the long, arduous hours involved in tapping. Forty

percent of respondents had quit tapping rubber between 1991 and 1993. The remaining 60 percent quit prior to 1991. Over 50 percent claimed that they would, however, return to tapping if given a better price.

Due to the decline of rubber tapping, extractivism played only a marginal role for the majority of households in this study. Excluding timber and fish, only 14 percent of the households marketed extractive products between 1993 and 1994. The average income from the marketing of these products was only $US 65. Sales for those households involved ranged from $US 20 to a suspicious $US 500 for one family who marketed juice from the açaí palm to individuals in Carauarí. The most commonly sold products are listed in table 5.14. Table 5.15 lists the community sales of these products.

Community involvement in the marketing of non-timber forest products is rather limited. Though those communities located relatively close to the municipal seat exhibit higher levels of involvement, the level of difference does not suggest any significant trends. A similar pattern of randomness is encountered at the household level.

## 5.5 Conservation Efforts

Concern over the environment and attitudes against participation in certain activities have influenced resource use within the study area. Whitesell (1993) noted two

Table 5.14
Other Extracted Products 1993-1994

| Common Name | Scientific Name | Percentage of Households Marketing |
|---|---|---|
| *açaí* (juice) | *Euterpe precatoria* | 6 |
| *bichos de casca* (turtles) | *Podocnemis* spp. | 3 |
| *copaiba* oil | *Copaifera reticulata* | 2 |
| *andiroba* oil | *Carapa guianensis* | 2 |
| wild honey | | 2 |
| *patoá* (juice) | *Jessenia bataua* | 1 |

Table 5.15
Other Extractive Product Sales in $US 1993-1994

| Community | Number of Households Selling | % of Households Selling | Average Community Sales | Average Household Sale |
|---|---|---|---|---|
| Gumo do Facão | 4 | 29 | 14 | 50 |
| Pupuaí | 2 | 11 | 27 | 260 |
| Lago do Roque | 6 | 21 | 18 | 87 |
| Bom Jesus | 1 | 9 | <1 | 7 |
| Bauana | 0 | 0 | 0 | 0 |
| Lago do Tabuleiro | 1 | 6.25 | 2 | 27 |

significant areas of concern over environmental resources in his study, aquatic resources and logging. The quality of fish stocks was the greatest concern for both male (89

percent of those surveyed) and female (78 percent) respondents. Other aquatic concerns included water quality, mostly by women, and turtle stocks. Concern over the depletion of the area's arboreal resources was expressed by 27 percent of the men and 6 percent of the women surveyed.

Similar areas of concern are found in the communities of this study. Three of the six communities have made a collective decision not to market fish. The scarcity of certain varieties of fish, namely *tambaquí* (*Colossaoma macropomum*) and *pirarucú* (*Arapaima gigas*), and the smaller size of fish captured were the concerns most commonly expressed. Bans on logging have been implemented by two communities. Concern over logging was expressed by those who harvest timber and those who do not. Loggers cited the disappearance of valuable species as the most significant problem while non-loggers were more concerned with the general impact on the local ecosystem.[32] Data concerning conservation practices is presented in table 5.16.

Depletion of the local fish stocks is generally blamed on the predatory practices of commercial fishing enterprises. Commercial fleets from Tefé and Manaus exploit the area's relatively productive lakes with freezer vessels on a regular basis. Derickx (1992) cites various instances where the crews of these ships were observed emptying their

freezers of previous catches in order to make room for more valuable species.

**Table 5.16**
**Community Conservation Efforts**

| Community | Commercial Fishing Ban | Logging Ban | Lakes of Procreation | Lakes in Reserve |
|---|---|---|---|---|
| Gumo do Facão | no | no | 1 | 1 |
| Pupuaí | yes | yes[33] | 0 | 1 |
| Lago do Roque | yes | yes | 1 | 1 |
| Bom Jesus | no | no | 0 | 1 |
| Bauana | no | no | 0 | 1 |
| Lago do Tabuleiro | yes | no | 0 | 1 |

Aside from bans on commercial fishing, communities have developed two different forms of lake conservation to protect fish stocks. Lakes of procreation are set aside to help replenish the fish population of the area as a whole. No fishing is permitted in these lakes. Lakes in reserve are used only for subsistence fishing during certain parts of the year. On occasion these lakes are penetrated by commercial fleets or local fisherman from outside the community. Residents use a form of resistance similar to the *empates* of rubber tappers in Acre and Rondônia when dealing with these intruders.[34]

[32] *Magenco*, a Japanese-backed logging firm, was promoting local reforestation of commercially valuable species in 1994. Company officials were not available for interviews during the period of research.

Desire for more secure and permanent conservation of the local environment is evinced by the efforts toward the formation of the Middle Juruá Extractive Reserve. Resident members of the CNS began promoting the reserve in the late 1980's. Lake conservation projects, and logging and fishing bans can be taken as preliminary measures to the formation of the reserve as these activities would be strictly limited within the reserve boundaries.

Support for the reserve is nearly unanimous (99 percent) among the 90 heads of household who have heard of the proposal.[35] Only 7 of the respondents were unfamiliar with the proposal. Unfortunately, support for the reserve does not indicate a significant understanding of what it would accomplish. The question "Why are you in favor of the proposed Middle Juruá Extractive Reserve?" was asked of the 90 residents who were familiar with the reserve proposal. The most common responses are listed in table 5.17. Over two thirds of the respondents who supported the reserve were unsure of the specific benefits to be gained.

The data on community conservation efforts speaks little to the day to day activities of study area residents that lessen or increase the human imprint on the natural

---

[33] One household in *Pupuai* was logging outside the community's *seringal* in 1993-94.

[34] *Empates* are a form of non-violent resistence used by rubber tappers to confront loggers and colonists who encroach on areas used for the extraction of rubber and other forest products.

[35] The one resident who was not in favor of the reserve raises hogs and a few cattle and is also the most affluent member of the 6 communities studied. His lack of interest in the reserve is based on the claim that extractivism does not provide financial returns commensurate with other activities.

world. As a whole, the participants in this study appear to have a great reverence for the environment that provides for their daily needs. Agricultural and extractive activities are undertaken with great attention to their potential impact on the environment. Individuals do, however, exploit resources in an unsustainable manner when the perceived benefits outweigh the potential costs involved. Instances of individuals fishing in protected lakes or felling choice trees in protected areas do occur. Unfortunately, a more detailed analysis of this topic is beyond the scope of the present study.

**Table 5.17**
**Reasons for Supporting the Reserve**

| Response | Percentage of Respondents |
|---|---|
| our lives will improve/people say things will be better | 41 |
| not sure | 26 |
| to have land of our own | 14 |
| the land/lakes will be protected | 8 |
| freedom from patronage | 7 |
| improved exchange relations | 3 |

### *Discussion of Household and Community Level Variations*

The variations in resource use and conservation exhibited in this study are the culmination of a myriad

decisions made by communities and individual resource users. Each decision is conditioned by the unique attitudes, skills, and experiences of the decision makers as well as the perceived benefits and consequences of different resource use practices. Given these parameters, one would be daft not to expect a great deal of variation based purely upon random processes. Though much of the variety exhibited in the study area can be attributed to such randomness, several factors stand apart as causal forces in shaping human-environment relationships as they play out on the land of the proposed extractive reserve.

Five primary factors are noted for discussion here: ASPROC membership; distance from the municipal seat of Carauarí, household structure, community conservation efforts, and political-economic forces. Though a more detailed quantitative analysis would likely uncover more intricate causal relationships, the factors noted above will serve for the purposes of this study.

Membership in ASPROC affords certain opportunities not available to non-member households. Marketing products directly to consumers allows producers to capture a greater share of the profits of their labor. Though the time committed to marketing must be spent away from actual production, the exclusive use of this outlet of exchange for

agricultural products by member households indicates that the benefits greatly outweigh the costs.

As members of the association are all located in the three communities closest to the municipal seat, the effects of distance from the market in Carauarí are difficult to separate from the influence of ASPROC. Non-member households who are fortunate enough to have access to a motorized canoe do, however, market a greater percentage of their crops in Carauarí. In the same respect, households located at a greater distance with respect to time or actual geographic location, have fewer opportunities to trade outside the exploitative relationships with *regatões* or patrons.

Household structure was shown to be a principal cause of variation in the commercial production of most products. Households composed of young couples often lack the labor or skills necessary to engage in a variety of activities. These families tend to focus on the production of necessary subsistence crops such as *farinha* and work with other family members for a small share of the profits in other activities. Households who receive cash income from other sources such as wage labor, pensions, or salaries either lack the time or the means to participate in agricultural or extractive production. Large households with an abundant

supply of able-bodied workers are generally involved in a variety of economic activities.

The conservation measures implemented by several of the study area communities place restrictions on the economic activities open to their members. Bans on logging and fishing were instigated in part, in anticipation of the proposed reserve. The process of reserve formation that began with the support of a handful of CNS representatives has brought international attention to the local struggles of the area's rural inhabitants. Pressure from the international conservationist community played a key factor in the formation of previous reserves and will likely help to determine the fate of the environment and resource users examined in this study.

Finally, the broader political-economic forces that brought about the drop in the global price of rubber and influenced the Brazilian government's decision to end rubber subsidies changed the traditional reliance on rubber tapping that characterized much of the interior of the Amazon Region for nearly two centuries. These same forces presently dictate the economic viability of many other practices such as logging and the collection of oils from *andiroba* and *copaiba* trees. The future of the proposed reserve and its inhabitants is addressed in the final chapter.

# CHAPTER 6: CONCLUSION

This final chapter is divided into three sections. Section 6.1 examines the implications of the data on resource use and conservation as they relate to the proposed Middle Juruá Extractive Reserve. Recent increases in agricultural production and a lessened reliance on extractivism lead one to question the effectiveness of the proposed reserve in meeting locally defined conservation and development goals. A summary of this thesis and general conclusions are presented in section 6.2. The final section, 6.3, suggests areas for related research.

## 6.1 Implications of Research Findings on the Proposed Middle Juruá Extractive Reserve

The findings of this thesis call attention to several important issues regarding the applicability of the proposed reserve in meeting the conservation and development goals of the study area residents. The limited opportunities for the profitable exploitation of rubber and other extractivist products calls into question the appropriateness of a development schema based on extractivism. Concern over limitations on access to resources in the proposed reserve suggests further restrictions on the viability of extractivism. The continued reliance on external sources of aid, whether a patron, the municipal government, or the church, points to the inability of study area residents to

attain true autonomy and self sustainability. Finally, the heterogeneity of households suggests that the formation of the proposed reserve will have a differential impact throughout the study area. This section provides a further examination of these issues.

***The Limitations of Extractivism***

The drop in the price of rubber on the global market and subsequent termination of governmental price supports heralded the end to an era of widespread rubber production throughout Brazilian Amazonia. Homma (1992; 1995) characterizes this as part of the natural cycle of extractive economies. Rubber tappers in certain areas of Amazonia, namely the States of Acre and Rondônia, have managed to continue their lifestyles as *seringueiros* through the formation of extractive reserves and cooperatives to exchange forest products on the global market. The economies of these reserves is based largely on the sustainable extraction of naturally occurring rubber and Brazil nuts.

Millikan's 1994 study of the Rio Ouro Preto Extractive Reserve in Rondônia presents an examination of the economy of one reserve that has been deemed successful. Though not representative of other reserves that rely more heavily on the sale of Brazil nuts it does provide some assessment of the economic viability of reserves. Residents of this

reserve rely mainly on the sale of rubber, *farinha*, Brazil nuts, beans and rice. These products accounted for 57.8 , 24.02, 7.15, 5.8 and 5.05 percent of annual income respectively. Annual incomes averaged $US 1328, slightly above the Brazilian minimum wage.

Rubber was market solely through the reserve cooperative, which extracted a small amount of surplus to maintain itself. Brazil nuts were market through the cooperative to a Bolivian firm a short distance across the border. Agricultural products were sold though the cooperative to the local population. In the past, residents marketed *copaíba* oil to the NGO 'Cultural Survival Enterprises' but have since discontinued production as the price offered fell by 50 percent.

The communities examined in this study are in the process of implementing their own reserve in hopes of gaining tenure to the lands they exploit, improving their opportunities for trade, and protecting the forests where they reside. The economy of this reserve is to be based primarily on the exploitation of natural rubber trees. This is to be supplemented by the sale of other natural forest products such as *açaí* juice, oils from *copaiba* and *andiroba* trees and a limited amount of commercial agriculture. Reserve residents, in consultation with IBAMA, must decide what resource use practices are to be allowed and disallowed

within the reserve boundaries prior to its implementation. As of this writing, logging and commercial fishing are assumed to be prohibited while commercial agriculture is to be permitted on a limited basis.[36]

The wholesale exodus from rubber tapping in the early 1990s was largely the result of a drop in the price received by producers and new opportunities in other more lucrative activities. Though many residents claimed that they had cut enough rubber for one lifetime, the majority asserted that they would return to the life of the *seringueiro* given a better price for rubber. The success of other reserves indicates that rubber can still be profitable in the absence of restrictive trade relations. After several years of abandonment, however, the rubber trails and equipment used by the tappers have fallen into disrepair. It will require a significant investment of labor and capital for the reserve's occupants to return to their former vocation.

*Açaí* juice is an economically viable commodity in the local economies of other cities in the region (e.g. Coari and Tefé). It stands to reason that it would be profitable in Carauarí as well. The perishability of the product limits it sale beyond the local market, however. Commercial agriculture has proven to be one of the most profitable

[36] At the time of field work it was proposed that residents be allowed to market fallen and submerged logs, presumably those that were abandoned or lost in previous years, from within the reserve boundaries. The author is uncertain as to the feasibility or status of this activity.

activities for study area residents, though the limits on production within the reserve will likely relegate this activity to lesser importance in the future.

One of the concerns most commonly expressed by study area residents was the question of how access to resources would be allocated within the proposed reserve. The relocation of the communities of Bauana and Bom Jesus in 1993 indicates the importance that access to a variety of environmental zones and the transportation advantages afforded by location near the main trunk of the river hold. If residents receive tenure to specific plots of land, as has occurred in several other reserves, then the resources found on a given plot may become a limiting factor on the economic well-being of the tenured family. The absence of commercially exploitable extractive products from given plots may leave certain housholds with few options.

Though reserves in other areas of Amazonia have proven economically viable, the limits to rubber production, the absence of Brazil nuts in the Middle Juruá region and the questionable marketability of *copaiba* and *andiroba* oils leads one to question the viability of this reserve.[37] Restrictions on more profitable activities and the reliance on a few extractive products may serve to impede the

[37] Conversations with a fellow researcher in the field indicated that there is an opportunity to market *copaiba* and *andiroba* oils in Manaus but that the small quantity and low quality of the oils produced by reserve residents were likely to limit their marketability. (Lescure, personal comment 1994)

development of the study area and doom its residents to the poverty historically associated with extractive populations.

***The Continuance of Dependency***

Though the formation of ASPROC aided many households in ending patron dependency and restrictive trade relations, it is unclear whether this accomplishment can be repeated in other communities or settlement areas within the proposed reserve. The provision of free transportation by the municipal government greatly increased the opportunity to market goods directly in Carauarí. In addition to cutting the cost of delivering products to the market, the backing of the municipal government provided *de facto* support for the sale of products outside the traditional systems of *aviamento* and patron-client relations. It remains to be seen whether this shift in power will be maintained in the absence of direct municipal involvement and whether the momentum gained by the initial member communities will carry over to others.

The construction of a boat by ASPROC members signals a decreased reliance on the municipal government but one must note that this boat was to be constructed with funds solicited through the Catholic Church. It is hoped that ASPROC will expand its activities to cover the marketing of all goods produced in the proposed reserve and be able to provide sufficient economic and political backing such that

dependence on external sources of aid becomes a thing of the past.

***Household and Community Variations***

Finally, variations in household structure and resource use and conservation suggest that the formation of the proposed reserve will have a differential impact on the study area households. Households vary in both size and composition. Smaller households tend to be composed of very young couples who have just struck out on their own or the elderly whose children are independent. These households have fewer economic opportunities available to them due to a lack of labor, expertise, or the capital necessary to engage in a variety of activities. Similarly, households engaged in wage labor lack the time to devote to other enterprises. These households are unlikely to reap the same benefits as those more fully involved in those activities designated as appropriate within the reserve boundaries. Questions arise as to whether these residents will have equal voice in the administration of the reserve and access to land tenure opportunities.

Households of the study area exhibited great variety in resource use and conservation practices. While the majority engaged in some form of commercial agriculture, fewer were involved in the sale of timber, fish, or other forest products. Households who actively market other forest

products will have experience and skills that allow them to benefit under the restrictions imposed by the reserve. Bans on logging and commercial fishing have helped three of the communities protect their local environment and prepared them for some of the resource use restrictions that the reserve will bring.

Households who have made significant investments of labor and or capital to participate in activities such as commercial agriculture, logging and fishing will be more affected by the restrictions. Though some commercial agriculture is likely to be permitted within the boundaries of the reserve, logging and commercial fishing are assumed to be prohibited. Residents may continue these activities outside the reserve, however, the level of involvement to be permitted is unclear. Those households who wish to continue at the same level of involvement in these activities may be forced to relocate beyond the reserve boundaries.

## 6.2 Summary and Conclusions

Extractive reserves have been promoted as a model for conservation and development throughout Brazilian Amazonia. Following the initial proposal put forth by rubber tappers in the State of Acre in 1985, both the Brazilian Government and conservationists in Brazil and abroad have adopted the platform of the rubber tappers as a model for sustainable use of the Amazon. After the initial successes in the

States of Acre and Rondônia, tappers in other areas of Brazil began to press for the formation of their own reserves.

The residents of the six communities examined in this thesis began efforts toward the formation of the Middle Juruá Extractive Reserve in the late 1980s. Though they did not face many of the issues that prompted organization in Acre and Rondônia (i.e. the encroachment of loggers, ranchers and colonists into the forests where they earned their living), the formation of a reserve was seen as the best means to gain title to the lands they inhabited, escape the restrictive trade and dependency relations inherent in the extractive economy, and protect the resources upon which they depended.

Support for the Middle Juruá Reserve is based on assumptions that the reserve is the best means to achieve the goals of the local population as well as those of other conservation-minded groups. The findings of this study demonstrate that the reserves' resident population is a diverse group of resource users with varying expectations of what the reserve will accomplish, the most important of which appears to be the opportunity to gain legal rights to the land of the reserve. The heterogeneity of the resident population, with respect to their resource use practices, socio-economic setting, expectations about the reserve, and

attitudes toward conservation indicate that the reserve will have a differential impact on this population.

Chapters 2, 3, and 4 provided a review of related literature on theories of human-environment interaction, the Amazon *caboclo*, and extractive reserves, respectively. Social scientists have a long tradition of studying the complex relationship between humanity and the natural environment. Political ecology, a relatively recent approach that draws on the strengths of both cultural ecology and political economy, provides the theoretical framework for the examination of variations between households and communities and the implications that these variations bear on the proposed reserve. Studies of the Amazon *caboclo* generally treat the group as a homogenous population of resource users, giving little attention to the importance of local contextualities throughout the region and variations within neighboring populations. Assumptions about the applicability of extractive reserves in different areas of Amazonia are based on generalizations about a diverse group of resource users.

This thesis was written with two main objectives in mind:

- to document and explain the heterogeneity of resource use among the residents of the proposed Middle Juruá Extractive Reserve

- to evaluate the impact of household and community variations and the potential of the extractive reserves model in meeting locally defined conservation and development goals

Variations between households and communities were examined across four different categories: the socio-economic setting; agricultural production; extractive production; and conservation efforts. The significant variations encountered within this very small area of Amazonia suggest that even greater heterogeneity exists at the regional scale. Conservation and development models that ignore this heterogeneity are likely to impose agendas that do not mesh with locally defined goals and miss opportunities to build on the unique strengths of resident populations.

Five primary sources of variation were noted within the study area: membership in the agricultural cooperative ASPROC; distance from the municipal seat; household structure; community level conservation efforts; and local and external political-economic forces. These contextual variations are important in evaluating the applicability of the proposed reserve. Three areas of concern are identified: the limits of extractivism; the continuance of dependency; and the differential impacts that the reserve will have throughout the study area.

Though the area of the proposed reserve is rich with natural stands of rubber trees, the absence of Brazil nuts and limited number of other economically viable extractive products calls into question the ability of the reserve to provide economic development. Though patron dependency and the traditional exchange relations through *aviamento* have declined in importance, it remains to been seen whether reserve residents will be able to achieve actual autonomy. Though a shift to dependence on the Catholic Church and the municipal government is taken as an improvement, it falls short of ideal. Some households and communities are more prepared to take advantage of the benefits the reserve has to offer. Those with the will and labor to engage in widespread latex collection will fare better than others. Households and communities who are dependent on activities that will be restricted or prohibited within the reserve will fare worse.

Given the limited opportunities for traditional populations to gain legal tenure to the land and protect the aquatic and terrestrial resources in the forests where they reside, it is this author's opinion that the proposed Middle Juruá Extractive Reserve <u>is</u> the most appropriate method to meet the conservation and development goals defined by the study area residents. This recommendation is, however, made with several caveats. 1)Restrictions on commercial

agricultural production should be limited. The uncertainty of economic returns from rubber production and the limited number of other economically viable extractive products would likely impede development goals in the absence of other economic activities. 2)Residents should not be prohibited from engaging in other activities outside the reserve boundaries. Households who are dependent on other activities such as logging, fishing, or wage labor, or who are not equipped or inclined to return to rubber tapping should not be excluded from occupancy within the reserve. 3)Finally, other methods of achieving locally defined conservation and development goals should continue to be investigated.

## 6.3 Suggestions for Further Research

As one may expect, the findings of the present study suggest topics for related research. Three areas for future study are noted here.

- Variations in resource use encountered in different settlement types and other areas of Amazonia
- The implications of household structure on resource use and conservation
- Options other than extractive reserves that may promote conservation and development in the context of traditional resource use

Though several authors are beginning to call attention to the heterogeneity of resource use exhibited by traditional Amazonian peoples, most continue to rely on the

accounts of a handful of studies as representative of the population as a whole. Those who do recognize the fact that variations exist seldom exert the effort to understand or account for this heterogeneity in models of conservation and development.

This study documents a significant amount of variation in the commercial resource use practices of 6 communities located within the territory of a proposed extractive reserve. Though not examined in this study, the activities of households located outside these communities exhibit further heterogeneity.[38] Research that documents the variety of resource use practices across varying settlement types and different areas of Amazonia would provide a more accurate portrayal of these activities and prove valuable in the design and implementation of conservation and development projects.

Household structure was shown to play an important role in determining the resource use choices of individual households. The lack of available labor, whether due to the age of household members or employment in other cash generating activities such as wage labor or salaried employment restricted involvement in certain activities. Studies of the relationship between household structure and

[38] The author had the opportunity to spend several days with the inhabitants of a *colocação* located between the communities of Lago do Tabuleiro and Bauana while waiting for the opportunity to hitch a ride on a

resource use, especially those directed at changes resulting from the evolution of the household through the lifecycle, would shed light on the importance of labor availability and the acquisition of specialized skills in determining resource use.

Support for the proposed extractive reserve was nearly unanimous among the households of the 6 communities examined in this study. One of the most important perceived benefits of the reserve was the opportunity to gain legal tenure to the lands traditionally exploited by the reserve's occupant population. Other important factors included the opportunity to protect the local environment and improve trade relations. The trends of increased agricultural production, continued reliance on logging and commercial fishing, and the low level of involvement in the marketing of other extractive products calls into question the appropriateness of an extractive reserve in this particular location, however. Research into other models of conservation and development that provide the same opportunities for land tenure and protection of the environment while offering greater leeway in the choice of resource use practices available to residents seems apropos.

It is hoped that this thesis and research along the lines suggested above will increase our understanding of

---

passing boat. This household was still actively involved in rubber tapping and paid a 20 percent *renda* on

resource use in Amazonia and contribute to the struggles of those who fight for a more equitable, environmentally sound form of development the world over.

all commercial production to the *seringalista*.

# BIBLIOGRAPHY


Alcorn, J.B.(1989). "Process as Resource: The Traditional Agricultural Ideology of Bora and Haustec Resource Management and its Implications for Research." Advances in Economic Botany **7**: 63-77.

Alcorn, J.B. (1994). "Noble Savage or Noble State?: Northern Myths and Southern Realities in Biodiversity Conservation." Ethnoecológia **2**(3): 7-19.

Allegretti, M.H. (1990). Extractive Reserves: An Alternative for Reconciling Development and Conservation in Amazonia. Alternatives to Deforestation: Steps Toward Sustainable Use of the Amazon Rain Forest, New York, Columbia University Press. pp. 252-264.

Allegretti, M.H. (1995). "Policies for the Use of Renewable Natural Resources: The Amazon Region and Extractive Activities." MAB Digest **18**: 14-33.

Anderson, A.B. (1992). "Land-use Strategies for Extractive Economies in Amazonia." Advances in Economic Botany **9**: 67-77.

Aubertin, C. and F. Pinton (1993). "Le Pouvoir Local Face à L'exploitation des Resources Naturelles." INPA, mimiograph.

Balée, W. (1989). "The Culture of Amazonian Forests." Advances in Economic Botany **9**: 1-21.

Barrows, H. (1923). "Geography as Human Ecology." Annals of the Association of American Geographers **13**(1): 1-13.

Barzetti, V. Ed. (1993). Parks and Progress: Protected Areas and Economic Development in Latin America and the Caribbean. Washington, D.C., IUCN.

Baskin, Y. (1994). "Ecosystem Function and Biodiversity: Regarding Ideal Levels of Species Richness, The Data are Few and Unclear." Bioscience **44**(10): 657-660.

Bassett, T.J. (1988). "The Political Ecology of Peasant-Herder Conflicts in Northern Ivory Coast." Annals of the Association of American Geographers. **78**(3): 453-72.

Blaikie, P. (1985). The Political Economy of Soil Erosion in Developing Countries. London: Longman.

Blaikie, P. (1994a). Political Ecology in the 1990's: An Evolving View of Nature and Society. East Lansing, MSU Press.

Blaike, P. and H. Brookfield (1987). Land Degradation and Society. London and New York, Methuen.

Blaike, P. and S. Jeanrenaud (1994). "A Political Economy Approach to Biodiversity." (draft prepared for political ecology workshop, East Lansing, MI).

Brechin, S.R., P.C. West, D. Harmon, and K. Kutay (1991). "Resident People and Protected Areas: A Framework for Inquiry." Resident People and National Parks. Tucson, The University of Arizona Press. pp. 5-28.

Browder, J.O. (1991). "Extractive Reserves." Bioscience **41**(5): 286.

Browder, J.O. (1992). "Social and Economic Constraints on the Development of Market Oriented Extractive Reserves in Amazon Rain Forests." Advances in Economic Botany **9**: 33-41.

Campbell, C. and The Women's Group of Xapuri (1996). Out on the Front Lines but Still Struggling for Voice: Women in the Rubber Tappers' Defense of the Forest in Xapuri, Acre, Brazil. Feminist Political Ecology: Global Issues and Local Experiences. Routeledge, London. pp. 27-61.

Campbell, D.J. and J.M. Olson (1991). "Framework for Environment and Development: The Kite." Casid Occasional Paper No. 10. East Lansing: Center for Advanced Study of International Development, Michigan State University.

Campbell, D.J. and J.M. Olson (1992). "Environment and Development in Kenya: Flying the Kite in Kajiado District." The Centennial Review, XXXV(**2**): pp. 295-314.

Carson, R. (1962). Silent Spring. Boston, Houghton Mifflin.

Chibnik M. (1994) Risky rivers : The Economics and Politics of Floodplain Farming in Amazonia. Tucson, University of Arizona Press.

Clüsener-Godt, M. and I Sachs (1995). "Perceptions of Extractivism: Introduction and Overview." MAB Digest **18**: 5-13.

Coomes, O.T. (1992). Making a Living in the Amazon Rain Forest: Peasants, Land, and Economy in the Tahuayo River Basin of Northeastern Peru. Ph.D. Dissertation, University of Wisconsin-Madison.

Coomes, O.T. (1995). "A Century of Rain Forest Use in Western Amazonia: Lessons for Extraction-based Conservation of Tropical Forest Resources." Forest and Conservation History. **39**(3): 108-120.

Coomes, O.T. (1996). "Income Formation among Amazonian Peasant Households in Northeastern Peru: Empirical Observations & Implications for Market-oriented Conservation." Yearbook, Conference of Latin Americanist Geographers **22**: 51-64.

Darwin, Charles (1859). Origin of the Species.

Davis, S.H., Ed. (1993). Indigenous Views of Land and the Environment. World Bank Discussion Paper 188.

Derickx, J. (1992). No Coração da Amazônia: Juruá o Rio que Chora. Petrópolis, Vozes.

Diegues, A.C.S. (1992). "Sustainable Development and People's Participation in Wetland Ecosystem Conservation in Brazil: Two Comparative Case Studies." Grassroots Environmental Action: People's Participation in Economic Development. London, Routledge. pp. 141-157.

Dinerstein, E. and E.D. Wikramayake (1992). "Beyond 'Hot Spots': How to Prioritize Investments to Conserve Biodiversity in the Indo-Pacific Region." Conservation Biology **7**(1): 53-65.

Durning, A.T. (1993). "Supporting Indigenous Peoples." State of the World 1993: A Worldwatch Institute Report on Progress Toward a Sustainable Society. Pp. 80-100.

Eden, M.J. (1990). Ecology and Land Management in Amazonia. London, Belhaven Press.

Enzensberger, H.M. (1974) "A Critique of Political Ecology." New Left Review. **8**(4); 3-32.

ELI (Environmental Law Institute) (1995). Brazil's Extractive Reserves: Fundamental Aspects of Their Implementation. Washington, D.C., ELI.

Fearnside, P.H. (1989). "Extractive Reserves in Brazilian Amazonia: An Opportunity to Maintain Tropical Rain Forest Under Sustainable Use." Bioscience **39**(6): 387-393.

Foresta, R.A. (1991). Amazon Conservation in the Age of Development: The Limits to Providence. Gainsville, FL, University of Florida Press, pp. 256-266.

Frecione, J., D.A. Posey, et al. (1989). "The Perception of Ecological Zones and Natural Resources in the Brazilian Amazon: An Ethnoecology of Lake Coari," Advances in Economic Botany **7**: 260-282.

Friedman, J. (1992). Empowerment: The Politics of Alternative Development. Cambridge, Blackwell.

Gadgil, M. and R. Guha (1992). This Fissured Land: An Ecological History of India. Oxford, Oxford University Press.

Glaser, B.G. and A.L. Strauss (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. Chicago, Aldine Publishing Company.

Gómez-Pompa, A. and A. Kaus (1992). "Taming the Wilderness Myth." Bioscience **42**(4): 271-279.

Goudie, A. (1990). The Human Impact on the Natural Environment. Oxford, Basil Blackwell.

Grossman, L. (1977). "Man-Environment Relationships in Antropology and Geography." Annals of the Association of American Geographers **67**: 126-144.

Grossman, L. (1981). "The Cultural Ecology of Economic Development." Annals of the Association of American Geographers **71**: 220-236.

Grove, R.H. (1995). Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600-1860. Cambridge, Cambridge University Press.

Haeckel, E. (1868). Natural History of Creation. New York, D. Appleton.

Hecht, S. and A. Cockburn (1990). The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon. New York, Harper Collins.

Hecht, S.B. (1992). "Extractive Communities, Biodiversity and Gender Issues in Amazonia." In L.M. Borkenhagen and J.N. Abramovitz (eds.) Proceedings of the International Conference on Women and Biodiversity. Washington D.C.: World Resources Institute.

Hiraoka, M. (1985a). "Mestizo Subsistence in Riparian Amazonia." National Geographic Research **1**: 236-246.

Hiraoka, M. (1985b). "Cash Cropping, Wage Labor, and Urbanward Migrations: Changing Subsistence in the Peruvian Amazon." Studies in Third World Societies **32**: 199-242.

Homma, A. (1992). "The Dynamics of Extraction in Amazonia: A Historical Perspective." Advances in Economic Botany **9**: 23-31.

Homma, A. (1995). "Plant Extractivism in the Amazon: Limitations and Possibilities." MAB Digest. **18**: 34-57.

Ingold, T. (1993). Globes and Spheres: The Topology of Environmentalism. Environmentalism: The View From Anthropology. New York, Routledge. pp. 31-42.

IDB (Inter-America Development Bank) (1992). Amazonia Without Myths. Washington, D.C. , IDB.

Johnson, A. (1989). "How the Machiguenga Manage Resources: Conservation or Exploitation of Nature?" Advances in Economic Botany **9**: 213-222.

Kates, R.W. (1971). "Natural Hazards in Human Ecological Perspective: Hypotheses and Models." Economic Geography **47**: 438-51.

Kates, R.W., B.L. Turner II, and W.C. Clark (1990). The Great Transformation. The Earth as Transformed by Human Action. Cambridge, Cambridge University Press.

Katzman, M.T. and W.G. Cale Jr. (1990). "Tropical Preservation Using Economic Incentives: A Proposal of Conservation Easements." Bioscience **40**(11): 827-832.

Lescure, J.P., F. Piton and L. Emperaire (1995). "People and Forest Products in Central Amazonia: The

Multidisciplinary Approach of Extractivism." MAB Digest **18**: 58-89.

Little, P.D. (1994). The Link Between Local Participation and Improved Conservation: A Review of Issues and Experiences. Natural Connections: Perspectives in Community-based Conservation. Washington, D.C. Island Press. pp. 347-372.

Lisansky, J. (1991). Guidelines for the Designation and Implementation of Extractive Reserves. (draft for discussion purposes only) The World Bank.

Luke, T. (1988). "The Dreams of Deep Ecology." Telos(76): 65-92

Maligo, P. (1991). "Symbolic Territory: The Representation of Amazonia in Brazilian Literature." The Centennial Review **35**(2): 229-248.

Mann, C.C. and M.L. Plummer (1993). "The High Cost of Biodiversity." Science **260**: 1868-1871.

Marsh, G.P. (1864). Man and Nature: Or Physical Geography as Modified by Human Action. New York, Charles Scribner and Company.

Martins, J.d.S. (1990). The Political Impasses of Rural Social Movements in Amazonia. The Future of Amazonia: Destruction or Sustainable Development? New York, St. Martin's Press. 245-263.

Mayer, D.M. (1996). "The Political Ecology of Disease as One New Focus for Medical Geography." Progress in Human Geography. **20**(4): 441-56.

Mendes, C. (1989). Fight for the Forest. Great Britain, Latin American Bureau.

Merchant, C. (1992). Radical Ecology: The Search for a Livable World. New York, Routledge.

Miller, D. (1985). "Highways and Gold: Change in a Caboclo Community." Studies in Third World Societies **32**: 167-198.

Millikan, B.H. (1992). "Tropical Deforestation, Land Degradation, and Society." Latin American Perspectives **19**(1): 45-72.

Millikan, B.H. (1994). Levantamento Sócio-Econômico da Reserva Extrativista do Rio Ouro Preto. Porto Velho, Instituto dos Estudos Amazônicos e Ambientais.

Moran, E.F. (1974). The Adaptive System of the Amazon Caboclo. Man and the Amazon. Gainsville, University Presses of Florida. 136-159.

Moran, E.F. (1989). "Models of Native and Folk Adaption in the Amazon." Advances in Economic Botany **9**: 22-29.

Moran, E.F. (1991). "Human Adaptive Strategies in Amazonian Blackwater Ecosystems." American Anthropologist **93**(2): 361-382.

Norgaard, R. (1994). Development Betrayed: The End of Progress and a Coevolutionary Revisioning of the Future. London and New York, Routledge.

Noss, R.F. and A.Y. Cooperider (1994). Saving Nature's Legacy: Protecting and Restoring Biodiversity. Washington, D.C., Island Press.

Olson, J. (1992). "The Historic Origins of Current Society/Environment Thought in American Geography." unpublished manuscript.

Parker, E. (1985a). "The Amazon Caboclo: An Introduction and Overview." Studies in Third World Societies **32**: xvii-li.

Parker E. (1985b). "Cabocloization: The Transformation of the Amerindian in Amazonia 1615-1800." Studies in Third World Societies **32**: 1-49.

Parker, E.P. (1989). "A Neglected Human Resource in Amazonia: The Amazon Caboclo." Advances in Economic Botany **7**: 249-259.

Peet, R. (1977). "The Development of Radical Geography in the United States." Progress in Human Geography **1**: 64-87.

Peet, R. (1985). "The Social Origins of Environmental Determinism." Annals of the Association of American Geographers **75**(3): 309-333.

Peet, R. and N. Thrift (1989). Political Economy and Human Geography. New Models in Geography: The Political Economy Perspective. London: Unwin Hyman Ltd.

Peluso, N. (1992). "The Rattan Trade of East Kalimantan, Indonesia." Advances in Economic Botany **9**: 115-127.

Pendleton, L.H. (1992). Trouble in Paradise: Practical Obstacles to Nontimber Forestry in Latin America. Sustainable Harvest and Marketing of Rain Forest Products. Washington, D.C., Island Press. 252-262.

Pepper, D. (1993). Eco-socialism: From Deep Ecology to Social Justice. London, Routeledge.

Peters, C.M., A.H. Gentry, et al. (1989). "Valuation of an Amazonian Rain Forest." Nature **339**: 655-656.

Porter, P. W. (1978). "Geography as Human Ecology: A decade of Progress in a Quarter Century." American Behavioral Scientist **22**: 15-39.

Posey, D.A. (1992). Traditional Knowledge, Conservation, and "The Rain Forest Harvest". Sustainable Harvest and Marketing of Rain Forest Products. Washington, D.C., Island Press. 46-50.

Redford, K.H. and A,M. Stearman (1992). "Forest-dwelling Native Amazonians and the Conservation of Biodiversity: Interests in Common or in Collusion?" Conservation Biology **7**(2): 248-254.

Rockwell, R.C. (1994). "Culture and Culture Change." Changes in Land Use and Land Cover: A Global Perspective. Cambridge, Cambridge University Press.

Romanoff, S. (1992). "Food and Debt Among Rubber Tappers in the Bolivian Amazon." Human Organization **51**(2): 122-135.

Ross, E. (1978). "The Evolution of the Amazonian Peasantry." Journal of Latin American Studies **10**: 192-218.

Rocheleau, D., B. Thomas-Slayter, and E. Wangari (1996). Genderand Environment: A Feminist Political Ecology Perspective. in Feminist Political Ecology: Global Issues and Local Experiences. London and New York: Routledge, pp. 3-23.

Schmink, M. (1985). "São Felix do Xingo: A Caboclo Community in Transition." Studies in Third World Societies **32**: 143-166.

Schmink, M. and C.H. Wood (1992). Contested Frontiers in Amazonia. New York, Columbia University Press.

Schwartzman, S. (1991). Land Distribution and Social Costs of Frontier Development in Brazil: Social and Historical Context of Extractive Reserves. Non-timber Forest Products from Tropical Forests: Evaluation of a Conservation and Development Strategy. New York, The New York Botanical Garden, pp. 51-66.

Sheridan, T.E. (1988). Where the Dove Calls: The Political Ecology of a Peasant Corporate Community in Northwestern Mexico. Tuscon: The University of Arizonia Press.

Shiva, V. (1993). The Greening of the Global Reach. Global Ecology: A New Arena of Political Conflict. New Jersey, Zed Books. Pp. 149-156.

Schrader-Frechette, K.S. and E.D. McCoy (1993). Method in Ecology: Strategies for Conservation. Cambridge, Cambridge University Press.

Silberling, L. (1991). "Extractive Reserves." Bioscience **41**(5): 285-286

Silberling, L.S. (1992). Social Movements and Successful Common Property Regimes: The Case of the Brazilian Rubber Tappers. Cornell University.

Smith, S. and E. Reeves (1989). Introduction, *Sheldon Smith and Ed Reeves*. Human Systems Ecology. Boulder: Westview Press.

Thomas, W.L., Jr. (1956). Man's Role in Changing the Face of the Earth. Chicago, University of Chicago Press.

Thrupp, L.A. (1991). Political Ecology of Sustainable Rural Development: Social Dynamics of Human/Natural Resource Degradation in Central America. Washington D.C.: World Resources Institute.

Turner, B.L. II, Ed. The Earth as Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years. Cambridge, Cambridge University Press.

Turshen, M. (1977). "The Political Ecology of Disease." Review of Radical Political Economics **9**: 45-60.

Waddell, E. (1977). "The Hazards of Scientism: A Review Article." Human Ecology **5**: 69-76.

Wagley, C. (1985). "The Amazon Caboclo." Studies in Third World Societies **32**: vii-xvi.

Watts, M.J. (1983) Silent Voice: Food Famine and Peasantry in Northern Nigeria. Berkeley: University of California Press.

Watts, M.J. (1985). On the Poverty of Theory: Natural Hazards Research in Context. Interpretations of Calamity from the Viewpoint of Human Ecology. K. Hewitt ed., pp. 231-62. Boston: Allen and Unwin.

Watts, M.J. (1987). Drought, Environment and Food Security: Some Reflections on Peasants, Pastoralists and Commoditization in Dryland West Africa. Drought and Hunger in Africa. Cambridge: Cambridge University Press. Pp. 171-211.

Weinstein, B. (1985). "Persistence of Caboclo Culture in the Amazon: The Impact of the Rubber Trade 1850-1920." Studies in Third World Societies **32**: 89-113.

Wells, M., K. Brandon, et al. (1992). People and Parks: Linking Protected Area Management with Local Communities. Washington, D.C., IBRD.

Wesche, R. (1985). "The Transformation of Rural Caboclo Society Upon Integration into Brazil's Amazonian Frontier: A Study of Itacoatiara." Studies in Third World Societies **32**: 115-142.

West, P.C. and S.R. Brechin (1991). National Parks, Protected Areas, and Resident Peoples: A Comparative Assessment and Integration. Resident People and National Parks. Tucson, The University of Arizona Press. pp. 363-400.

Whitesell, E.A. (1988). Rubber Extraction on the Juruá in Amazonas Brazil: Obstacle to Progress or Development Paradigm? M.A. Thesis, University of California, Berkeley.

Whitesell, E.A. (1993). Changing Courses: The Juruá River, Its People and Amazonian Extractive Reserves. Ph.D. Dissertation, University of California, Berkeley.

Wilson, A. (1992). From Reserve to Microenvironment: Nature Parks and Zoos. The Culture of Nature: North American Landscape from Disney to Exxon Valdez. Cambridge, Blackwell. Pp. 223-256.

Wolf, E.R. (1982). Europe and the People without History. Berkeley: University of California Press.

World Commission on Environment and Development (1987). Our Common Future. New Delhi, Oxford University Press.

Worster, D. (1993). John Muir and the Roots of American Environmentalism. The Wealth of Nature: Environmental History and the Ecological Imagination. pp. 184-202.

Zimmerer, K. S. (1991). "Wetland production and Smallholder Persistence: Agricultural Change in a Highland Peruvian Region." Annals of the Association of American Geographers **81**(3): 443-463.

Zimmerer, K. S. (1994). "Human Geography and the 'New Ecology": The Prospect and Promise of Integration." Annals of the Association of American Geographers **84**(1): 108-125.

Zimmerman, M.E. (1994). Contesting Earth's Future: Radical Ecology and Postmodernity. Berkeley, University of California Press.