

**Gold Mining and Land-Use Change in the Brazilian
Amazon.**

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1993



DECLARATION

I am responsible for composing this dissertation. It represents my own work and where the work of others has been used it is duly acknowledged.

Signed

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23/06/93

ABSTRACT

This thesis explores how informal sector gold mining affects land development processes in the Brazilian Amazon. The 1987-1990 invasion of the Yanomami Indian reserve, in the state of Roraima, by 40 000 wildcat gold miners provides the context for research. Having analysed the macro-economic and political factors that sparked the gold rush, consideration is given to its impact on the land-uses in the state. Land-use change is analysed by looking at how different rural producers and urban dwellers adapted their management techniques and livelihood strategies to the opportunities arising in the mineral sector.

Fieldwork in Roraima was undertaken over a 16 month period between November 1990 and March 1992. Quantitative data was collected on the rates at which different groups of land users participated in the gold rush, while subsequent recorded interviews provided qualitative information on their motives for involvement and how they incorporated mining within their other activities.

A large proportion of local smallholders went gold mining in order to supplement their agricultural incomes. Understanding the household economics and risk aversion strategies associated with smallholder migration to the gold fields raises interesting questions concerning the management of the gold rush through appropriate agricultural policies.

While this provides an insight into the geography of the labour movements associated with the gold rush, a detailed study of the relationship between informal sector mining and ranching sheds light on the capital flows linked to the mineral boom. As ranchers invested in the gold fields and successful miners bought ranches, changing circumstances in the mining economy came to influence management practices in the beef production sector. The implications that this has on deforestation and land conflict throughout the Brazilian Amazon are discussed.

In this way, the mining boom is seen to influence people and places which are distant from the gold fields themselves. This is clearly apparent in the case of Roraima's riverine dwellers and Macuxi Indians. Even though these groups had minimal participation in the gold rush, their lives were profoundly altered by the economic and political changes that it provoked. This wider influence of informal sector mining is shown to be particularly influential in shaping the formation of local elites, which in turn may play an important role in defining the future exploitation of mineral resources.

Thus, by recognising the ways in which this and other gold rushes affect the ownership and management of land over wide areas, the research demonstrates that informal sector gold mining is a powerful agent of land use change both in the Brazilian Amazon and further afield.

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Acknowledgements

I am most grateful to the Economic and Social Research Council (ESRC) for funding this research and to the University of Edinburgh for providing the facilities with which to undertake it. I also thank the Royal Mail, the Scottish International Education Trust and the Edinburgh University Student Travel Fund for their assistance towards travel expenses.

I am particularly indebted to my supervisors Dr. Peter Furley and Dr. David Cleary for their friendship as much as their advice.

In Brazil the following gave me invaluable help during the course of my fieldwork: Roberto Monteiro de Oliveira- my orientador. Celso Morato at INPA, Boa Vista. Philip Fearnside, Bruce Forsberg and George Nakamara at INPA, Manaus. Alcida Ramos and Bruce Albert at the University of Brasília. Chris Uhl, Philippe Lená, Christian Geoffrey and Elizette Gaspar in Belém. Francisco Fernandes and Irene Portela at the University of Rio de Janeiro. Paulo Santilli and Nadia Farage at the University of São Paulo.

In Roraima I greatly appreciated the support and friendship of: The Souto Maior family especially Ana Paula and Bjorn, Frederico Caheté, Reinaldo Barbosa, Ari and Léda, Val, Ana-Luce, Yvonne, Oneron Pithon, Ednelson Macuxi, Marcão and Alvaro, Carlos Zaquini, Julio Martins, John Boyle, Aldecir, John Bradshaw, Daniel da Souza, Roberto F. Da Silva, Chico Ceará, Senhor Nonato, and Umberto Mota. I will never forget the patience and hospitality shown by the Roraimense during the many hours of interviewing.

In the UK and USA I would like to thank the following for their diverse contributions to this work: Rebecca Abers and Alberto Carlos, Kenneth Taylor, Nigel Sizer, Liz Allen, Liz Bondi, Jim Hine, Alan Campbell, Anona Lyons, Nicola Exley, George Monbiot, Jane Rutherford, William Milliken, Fiona Watson, Tânia Sanaiotti, Chris Minty, Paulo Cesar, Monica Decanini, Ana Ashmole, Christoph Corves, Monica Wachowicz, Luiz da Souza, Adrian Allan.

Above all, I would like to thank my parents.

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LIST OF ACRONYMS

ALUNORTE	Alumínio do Norte (Aluminum company of the North)
ATPC	Association of Tin Producing Countries
BASA	Banco da Amazônia SA (Amazonian Bank plc)
CCPY	Comissão Pela Criação do Parque Yanomami (Commission for the creation of a Yanomami park)
CEDI	Centro Ecumênico de Documentação e Informação (Church centre for documentation & Information)
CIDR	Centro de Informação de Diocese de Roraima (Information centre for the Church of Roraima)
CIMI	Conselho Indigenista Missionário (Indian Missionary Council)
CIR	Conselho Indígena de Roraima (Indian Council of Roraima)
CODESAIMA	Companhia de Desenvolvimento de Roraima (Roraima development Company)
CPRM	Companhia de pesquisa de Recursos Minerais (Mineral Resources Research Company)
CS	Cultural Survival
CVRD	Companhia Vale do Rio Doce (Rio Doce Valley Company)
CPI	Comissão Pro-Índio (Pro-Indian Commission)
CPT	Comissão Pastoral da Terra (Pastoral Land Commission)
DNER	Departamento Nacional de Estradas e Rodagem (National Roadworks department)
DNPM	Departamento Nacional de Pesquisa Mineral. (National Department for Mineral Research)
EDF	Environmental Defense Fund
FNO	Fundo Constitucional da Região Norte (Constitutional Fund for the Northern Region)
FUNAI	Fundação Nacional de Índio (National Indian Foundation)

IBAMA Inst. Brasileira de Meio Ambiente e Recursos Naturais
(Brazilian Inst. for the environment and natural resources)

IBGE Inst. Brasileiro de Geografia e Estatística.
(Brazilian Inst. for Geography & Statistics)

IMF International Monetary Fund.

INCRA Inst. Nacional de Colonização e Reforma Agraria.
(Nat. Inst. for colonisation & Land reform)

INPA Inst. Nacional de Pesquisas da Amazônia
(National Institute for Amazonian Research)

MEVA Missão Evangelica da Amazônia
(Evangelical Mission for the Amazon)

NDI Núcleo dos Direitos Indígenas
(Nucleus for Indian Rights)

NGO Non Governmental Organisation.

PAR Projeto de Assentamento Rapido
(Rapid Settlement Project)

PIC Projeto Integrado de Colonização
(Integrated Colonisation Project)

PIN Plano de Integração Nacional
(Plan for National Integration)

POLAMAZONIA Programma de Polos Agropecuários e Agrominerais da Amazônia
(Programme for Agro-ranching, and Agro-mineral development poles in Amazonia)

SEICOM Secretária da Economia, Industria e Comércio
(Economy, Industry and Business Secretariat)

SEPLAN Secretária de Planejamento
(Planning Secretariat)

SI Survival International

SPVEA Superintendência da Valorização da Amazônia.
(Superintendency for Amazonian Development)

SUCAM Superintendência de Combate a Malária.
(Anti-Malarial Superintendency)

SUDAM Superintendência de Desenvolvimento da Amazônia
(Superintendency for Amazonian Development)

UDR União Democrática Ruralista
(Rural Democratic Union)

UNCED United Nations Conference on Environment
and Development

USAGAL União de Sindicato dos Garimpeiros
de Amazônia Legal.
(Union of Amazonian Garimpeiros)

WRI World Resources Institute

GLOSSARY OF BRAZILIAN TERMS

Mining terminology

Garimpo: an informal sector mine.

Garimpeiro: anybody involved in garimpagem, the term is used broadly to cover both those involved in the mineral extraction process itself, as well as pilots, cooks, merchants etc. who work in the garimpos.

Garimpagem: informal sector mining.

Blefado: skint, penniless.

Bamburrado: struck it rich.

Barranco: Plot of land in a garimpo to mine on.

Fofoca: The word literally means 'gossip', but signifies a rush of garimpeiros to a particular site which rumours suggest is producing well. A garimpo can be described as being in fofoca, when it is at the centre of a rush, usually in the immediate aftermath of a substantial find.

(par de) Maquinas: a set of pumping equipment, for semi-mechanised mining.

Pista: airstrip.

Balsa: a raft upon which mining equipment is mounted for working river-bed sediments.

Dono: 'owner'. Dono do garimpo means owner of the mine. A dono da maquina is owner of a set of mining equipment. Dono da pista- owner of an airstrip etc.

Draga: A large mechanised dredger.

Meia-Praça: work relationship under which the dono do garimpo or dono da maquina engage their workforce. In both cases the dono provides food and employment for the workers who are paid with a percentage of the gold production.

Conta-Própria: work relationship in which the garimpeiros organise their own catering and are

considered to be working independently, not for somebody else.

Other terminology

Aviamento: a system of debt peonage in the extractive economy which was most prevalent during the Amazon rubber boom.

Barrica: a measure of Brazil nuts which weighs 72-78 kilograms.

Caboclos: riverine dwellers who usually live off a combination of fishing, hunting agriculture and extractivism.

Caatinga: thorny , scrubby vegetation typical of nutrient-poor sandy soils.

Cerrado: savannah.

Farinha: manioc flour

Fazenda: cattle ranch.

Fazendeiro: rancher.

Posseiro: a squatter- somebody who lays claim to land which does not belong to them.

Roça: plot of land devoted to food production.

Sorte: payment of management on a fazendas in which the manager receives a proportion of the new stock raised each year.

Tapuio: name given to the detribalised Indians who survived Pombal's Directorate.

Terra Firme: land that is not seasonally inundated by the rising water of rivers.

Terras devolutas: land which has no owner and therefore belongs to the federal government.

Titulo Definitivo: The most secure land title.

Preface

This thesis explores how wildcat mining in Amazonia affects regional land development processes. The focus on informal sector mineral production, or *garimpagem* as it is known locally, was not immediate. Indeed, I was initially reluctant to place the subject at the centre of my research, as some specialists had argued that studying the recent growth of the Amazonian informal mining sector would detract from the more fundamental issue of regional land development. Besides, following the current Amazonian gold rush via the considerable media coverage that it generated, suggested that the event was already the focus of detailed academic attention. As it transpired the impressions gathered from both sources were misleading. On arriving in Roraima, Brazil's northernmost state, the dominance of informal sector mining over all other facets of the local economy was unmistakable. Perhaps just as importantly, nobody was studying the impacts of a local gold rush which had brought very considerable changes to that area during the late 1980s. Within this context I set about investigating the relationship between informal sector mining and other Amazonian land-uses, seeking to dispel the myth that *garimpagem* is a peripheral activity in processes of regional development.

In chapter one the theory underpinning the adopted methodology is discussed and here I simply outline how the fieldwork was conducted. The basic intention was to examine how different social groups, who practise varying land-uses, responded to the changing socio-economic circumstances of the gold rush. The first task therefore, was to make contact with the range of rural producers that I had chosen to study. This was achieved by tapping into an extensive social network which links the state capital Boa Vista to rural areas. Having discovered it,

this network proved to be an invaluable mode of communication, and was used throughout the fieldwork to strengthen contacts, as well as to send photographs and messages between the city and the countryside. For example, Indians on short visits to the city frequently stayed at a hostel on the edge of Boa Vista run by the Indian Council of Roraima (CIR). Regular conversations with the hostel's residents provided useful information on the latest events in the villages, and generated invitations to stay in certain communities. Smallholder farmers and riverine dwellers had a similar network which revolved around the marketplace in the state capital Boa Vista. Every week government transport would bring them from all over the state to sell their produce there. Ranchers were the only group which I aimed to study who did not have such an accessible urban forum. It was via a working relationship with government agencies like INCRA and the agricultural secretariat that I came into contact with these larger producers since many of them held positions in these organisations.

In broad terms the research was approached on three different tiers. At the level of the state, data on land-use changes and alterations in the rural economy was collected from governmental agencies as well as from relevant statistical and cartographic sources. This provided the necessary background against which the particular responses of land-users could be understood. The second level of analysis was that of the social group itself. Here I wanted to gather quantitative data on the extent to which each group was directly involved in the gold rush. This in turn would prepare both myself, and the respondents, for the third tier of analysis built around qualitative interviews at the level of the household. The questions at this scale explored how *garimpagem* was integrated within pre-existing land-use activities, and how land management strategies adjusted in response to the gold rush.

Working in rural Amazonia is however far from straight forward, and some of these objectives proved to be easier to fulfil than others. I present here a brief account of the main problems that I encountered, together with a synopsis of the data that I succeeded in collecting.

Building up a picture of land-use change at a state level proved to be more difficult than I had anticipated, as relevant data was scarce. My intended comparison of the 1985 agricultural census of Roraima with that of 1990, to gain an insight into the main trends of land-use associated with the gold rush, was thwarted when the 1990 census was never executed. Thematic Mapper (TM) satellite images might have provided an alternative source for some of the information, but they were prohibitively expensive. This is not to say that a macro-picture of land-use change was not obtained, only that it derived from a variety of different sources most of which were qualitative not quantitative. Some relevant material was available in the documentation of government agencies, but it was through discussions with politicians, agricultural extension workers, and land-owners that I gathered the clearest understanding of how the local economy was changing.

Quantitative data was obtained on the involvement of each social group in the gold rush, and this did much to illustrate the dynamics of change on a macro-level. Research techniques were tailored to specific situations; it is for example inappropriate to approach riverine dwellers or Indians in the same way as ranchers. The only direct questionnaire survey was applied to heads of Macuxi villages who had gathered for a meeting to discuss the demarcation of their lands. Filling in the questionnaire defitted both the formality of the meeting and their status as village heads, and they were asked to give data on their village as a whole. In contrast, colonist farmers were very suspicious of any official-

looking documentation, and so data was gleaned through conversations which covered the key points. Once the interviewee had replied to all of the questions in the course of this wide ranging discussion, the relevant information was noted down against a checklist whilst confirmation was sought from the respondent. This same technique was used when interviewing riverine producers, only with them the conversations tended to be longer.

Collecting quantitative data from the ranchers proved to be difficult because they seldom reside on their holdings. I was, however, able to persuade a lawyer undertaking a survey of 180 ranches on the savannah to collect data on ranchers' participation in *garimpagem*. This survey was commissioned by the Indigenous Council of Roraima (CIR), and the relevant information was actually collected from Indian villages next to the ranches. As most of the villages contained members who worked on the ranches in question, they were able to provide accurate data on their neighbours' involvement in mining and other activities. The only shortfall here was not having comparative data from ranchers in the forested part of the state, and so, while the responses are useful they cannot be taken to be a representative sample of Roraima's ranching population as a whole.

At the final count therefore, quantitative information concerning individuals' participation in the gold rush had been gathered from: 288 colonist households, 137 ranchers, 71 riverine households, and 53 Macuxi villages. As there is no accurate record on the numbers of people who practise these different land uses in the state, it is hard to know what percentage of the respective populations have been sampled. A rough estimate extrapolated from the 1985 agricultural census (IBGE 1990) suggests that there are approximately 6000 smallholders, 2000 ranchers, 200 Macuxi villages, and 250 riverine households, yielding the following sample populations; colonist households 4.8%; ranchers 6.8%;

Macuxi villages 26%; riverine households 24%. In addition, 66 wildcat miners (*garimpeiros*) were interviewed entering a rapidly expanding gold mine on the Rio Jatapú in 1991.

Micro-economic analyses are used occasionally to illustrate the behaviour of certain people or groups. All data on prices and monetary values are expressed in US dollars in order to facilitate comparisons. Conversions from Cruzeiros into US\$ were made at the parallel rate of exchange. Verbal data on local incomes or prices during the fieldwork period were converted according to the rates published in the national press on the day concerned, which is how transactions of this kind are usually calculated in Boa Vista. Sums gathered from dated published material, such as newspapers or government documents, were converted according to a chart produced by the Bank of Brazil. This then provides a crude standard, in a highly inflationary economy, against which transactions made at different times within the state can be compared. However, due to its distance from the main economic centres, the cost of living in Roraima tends to be considerably higher than in other parts of both Amazonia and Brazil. Furthermore, one of the most notable effects of the gold rush was to push up the prices of this already inflated local economy even further. Thus, it is problematic to compare the economic data presented in this volume with similar information gathered elsewhere. The principal exception concerns the data on gold miners' incomes which is expressed in quantities of gold. The price of gold has fallen from US\$ 18.3/g in 1987 to US\$ 12 in 1991 and so all conversions of gold during the study period are calculated at the rate of US\$1 = 15 grams. All measures of weight and distance referred to are metric unless otherwise stated.

The quantitative surveys drew out the main points for further discussion, and helped identify key respondents for more detailed interviewing. Individuals

who had experience of a specific area of interest were usually selected for these longer conversations. They were asked to recount their life-histories, and specific situations mentioned within this context were discussed to illustrate their behaviour at certain times. 20 hours of discussions were recorded with 34 respondents from the various groups, and the tapes were subsequently transcribed. In many cases these interviews are the product of relationships which took months to build up and the interviews were frequently steered around points that were familiar to both of us. As a result they form some of the most valuable fieldwork data on how individuals respond to the changes going on around them and I make no apologies for drawing freely upon them in the course of this thesis.

Fieldwork was conducted over a sixteen month period from November 1990 to March 1992. Much of this time was spent making visits to colonisation projects, ranches, Indian villages, and *garimpos* (informal sector mines). For the most part these trips were about two weeks long, and only two out of a total of fourteen visits exceeded a month in duration. I often returned to certain communities two or three times, and maintained contact during the interval through the rural-urban network described above. I soon learnt that while friendships were formed by spending time in certain communities, they were strengthened in a new way by returning even months later. Coming back to a place symbolised an altogether different type of commitment. Thus, structuring the fieldwork in this way permitted the collection of data in some depth from a number of different social groups.

The whole experience of being immersed in the field of study for a prolonged period fosters an understanding which can not be easily labelled. Through listening to the local radio, reading the newspapers, and talking to people in the queue at the bank, I was continually absorbing information about the people and the region.

Much of the data gathered about the dynamics of the gold rush itself came from talking to *garimpeiros* over a drink in Boa Vista. There is a whole social geography of the bars they frequent and it is only the most influential mine owners and mineral dealers who are absent from this street life. Manual gold miners would always be encountered in the wooden stalls around the market place during the early evening. Alternatively, *garimpo* pilots usually passed their time in a series of snack-stands around the airport. Other centrally-located bars along the river attracted a clientele of wealthier miners and petty mineral dealers, who were themselves in regular contact with colleagues throughout the *garimpos* of Amazonia.

The thesis is structured in three main parts. The first section provides relevant background and historical information. Here, a brief overview of the fieldwork has been presented to illustrate how data was collected. The first chapter outlines the research objectives and the reasons for selecting Roraima as a fieldwork site, before introducing the social and geographical context of the study. Chapter 2 then looks at the history of mining in Roraima, focusing specifically on the 1987-1990 gold rush on the lands of the Yanomami Indians.

The second section of the thesis considers the impacts that this mining boom has on other Amazonian land-uses. Chapter 3 deals with its influence on smallholder agriculture offering insight into the movements of labour attributable to the *garimpo*. In chapter 4 the focus turns to capital flows, and the relationship between the gold rush and ranching is assessed in this light. The following chapter (5) looks at the response of Indian and riverine peoples to the opportunities provided by the *garimpo* illustrating that although many of them did not participate directly in the gold rush it nonetheless affected their livelihoods.

The third and final section of the thesis considers this largely empirical data in its wider context. Chapter 6 assesses the political changes precipitated by the growth in the Amazonian *garimpo* over the 1980s. By gaining an insight into the forces that shaped the turn of events both in Roraima and elsewhere the structures which determine the allocation of Amazonian mineral resources are exposed. The penultimate chapter (7) distils the principal research findings into a framework which illustrates the various impacts of the *garimpo* on Amazonian land development processes. It is here that some of the theoretical and practical difficulties of undertaking such research are discussed. Finally, a brief look at the metal markets in chapter 8 suggests that informal sector mining will continue to influence land development processes throughout the humid tropics over the foreseeable future.

Chapter 1. Introduction

During the 1980s wildcat mining has been one of the most significant catalysts for development in Amazonia (Pereira 1990), 'no other factor has produced as large a migration of people to the Brazilian Amazon in so short a time as gold-fever' (IDB/UNDP/TCA 1992: 38). Its significance in shaping regional land-use changes has grown relative to public sector investment in ranching, road building, and colonisation which have underpinned Amazonian development since the 1960s. A sharp rise in the price of gold in the late 1970s sparked a mineral boom in the Brazilian Amazon which outstrips the American Klondike rush both in terms of production and employment (Cleary 1990). However, the exact scale of the gold rush can only be guessed at, and there is considerable divergence between the relevant data provided by the government mining department (DNPM) and the Union of Amazonian Garimpeiros (USAGAL). Somewhere between one million (Feijão & Pinto 1990) and 240 000 (DNPM 1990) people are directly employed in *garimpagem* in the Brazilian Amazon and the true figure may well be around the 400 000 mark ¹. But these estimates only tell part of the story, because for every person working directly in the mines, there are at least as many again who depend on the mining economy indirectly. This has led one authoritative source to suggest that 30% of Brazil's Amazonian population are either directly or indirectly

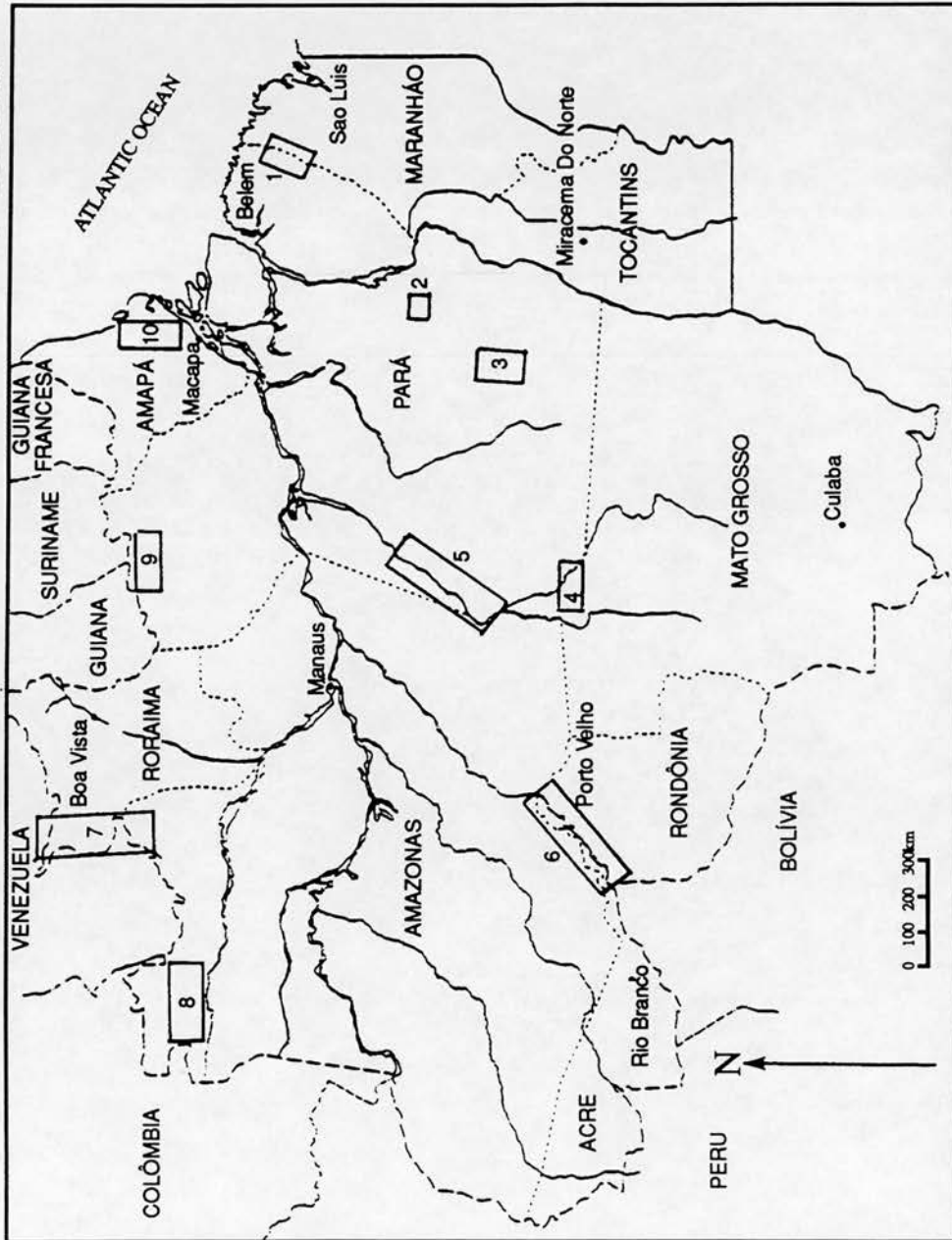
¹ A survey of *garimpos* carried out by DNPM in 1990 registered 400 000 *garimpeiros* working throughout Brazil, of which 240 000 reside in Amazonia, but this is probably conservative. During an interview in September 1991 Antonio Feijão suggested that there are between 400-500 000 *garimpeiros* working in Amazonia Legal. He conceded that USAGAL's official estimate of 1,000,000 is a 'political figure', which is high.

engaged in the activity (IDB/UNDP/TCA 1992: 37). Production data is equally elusive. USAGAL believes that 100 metric tons of gold are produced annually in the *garimpos* of Amazonia Legal, but other sources (Dourojeanni & Padua 1992) have suggested it could be three times this figure. Be that as it may, one indisputable point emerges from these hazy estimates; *garimpagem* is currently one of the principal earners and employers in contemporary Amazonia.

Notwithstanding this considerable influence, informal sector mining has attracted only limited academic attention. There are only two principal texts on the subject; Cleary's doctoral thesis (1990) provides a pioneering ethnography of life in the *garimpos* focusing on the complex social and economic relations within them; Pereira's masters thesis (1990) subsequently analysed the macro-economic processes that influence *garimpagem*, and argued that a 'mineral frontier' has characterised the occupation of the Brazilian Amazon during the 1980s. Although more recent work recognises the significance of the *garimpo* in shaping regional development processes (Schmink and Wood 1992, Abers 1992), the exact nature and extent of this relationship still remains poorly understood. The research presented here seeks to address this knowledge gap.

Recent events in Roraima offered an excellent opportunity to investigate this topic. As figure 1.1 illustrates, Roraima is one of ten major gold producing regions throughout the Brazilian Amazon. In common with most of these other sites, it has a long history of informal mining which gained a new impetus in the 1980s.

FIGURE 1.1 THE BRAZILIAN AMAZON SHOWING THE PRINCIPAL GOLD PRODUCING REGIONS



- 1. Gurupi (MA)
- 2. Serra Pelada (PA)
- 3. Cumaru (PA)
- 4. Alto Floresta (MT/PA)
- 5. Tapajos (PA)
- 6. Rio Madeira (RO)
- 7. Western Roraima
- 8. Alto Rio Negro (AM)
- 9. Trombetas (PA)
- 10. Amapa

The discovery of significant gold and cassiterite (tin ore) deposits on the Yanomami indigenous reserve brought the cutting edge of the Amazonian mineral boom to this remote area in 1986. By the end of the decade Roraima was producing an estimated 10% of all gold extracted in the Brazilian Amazon (Feijão & Pinto 1990), fuelling a rapid expansion of the local economy. Large numbers of people and considerable amounts of capital flooded into the state from all over Brazil, but the prosperity was unexpectedly short-lived. Government intervention seeking to prohibit access to the Yanomami homelands on which the clandestine placer mines were situated, inflicted a sharp contraction of the local economy in 1990. The net result was a brief but very intense gold rush, which had a clearly defined impact on the social and physical landscape of Roraima.

The objective here is to assess how the people and land-uses of Roraima were shaped by this rush as it swept across the region ². The crux of such a study lies in understanding how a wide range of different social groups reacted to the rapid socio-economic changes precipitated by the mineral boom. This perspective not only affords a privileged insight into the relationship between *garimpagem* and other land-uses, but it also sheds light on a wider debate of global significance;

'One of the key potential contributions from social science to the conservation and development fields is in the analysis of local responses (by specific social groups in

² Hecht & Cockburn (1989: 205) favour this approach arguing that it is important to study 'the economic forces that have swept over the region and shaped its people and land uses'

particular ecosystems) to macro-level economic and political changes' (Schmink 1991: 2).

But, rather than fulfilling a trait in contemporary Amazonian research of examining individual social groups in isolation of one another, this work considers the interactions between several groups in a particular place, Roraima. The bulk of what follows therefore is essentially a regional geography, designed to highlight the complex interrelationships between people and the land which characterise modern Amazonia. This local information is then placed into its broader context by referring to events in other Amazonian states (notably Pará, Rondônia, and Mato Grosso) which have been documented in depth. In this way, wider-reaching development processes can be identified without divorcing them from the heterogeneous landscape in which they operate.

The first step in this analysis is to identify the dominant Amazonian land-uses, and recognise who practises them. Currently, sizeable parts of the Amazon basin are not managed. But in the areas that have been altered by human activity most of the land is subject to three principal management practices. These can be broadly categorised as Indian and folk land-uses, ranching and smallholder agriculture. Although no precise data is available, other land-uses such as mining, urban areas and hydro-electric reservoirs affect a much smaller land area ³. Timber extraction is an increasingly important activity, and in certain areas like Pará, and Rondônia which are

³ Fearnside (1991a) p.16 provides some relevant information on areas deforested by hydro-electric projects, but similar data for urban areas and mineral developments is unavailable. Altogether these land-uses probably do not affect more than 2% of the Amazon land surface.

particularly rich in valuable hardwoods (most notably mahogany; *Swietenia* spp. Meliaceae), logging has been identified as a catalyst for development (Uhl et al. 1991). Nevertheless, in most parts of Amazonia, including Roraima, sawn timber remains a secondary product resulting from forest clearance for ranching and agricultural use, and for this reason logging will not be given separate consideration in this study.

As it is people who are the agents of change, our attention will focus less on the land-uses themselves than on the individuals who practise them. In this respect rural producers take centre stage but not to the extent that their urban counterparts are ignored. Large numbers of people move between these two sectors of the Amazonian economy, and developments in one sphere cannot be studied without frequent reference to the other. The remainder of this chapter introduces the land-users who practise the principal Amazonian management strategies outlined above. Recognising the position of individuals in relation to environmental constraints and economic pressures is of primary importance to subsequent analysis. With this in mind, the historical development of each activity in Roraima, as well as the origins of the social groups who practise them are traced. This not only illustrates the degree to which Roraima's producers are either similar to or different from other Amazonians, but it also provides an understanding of the particular context against which the gold rush took-off.

1.1(a) Indigenous land-use practices.

Indigenous peoples are the only original Amazonian land-users, and their management techniques have evolved in relation to their local environment over a longer period than any other group. As a result, indigenous land-use strategies are so well adapted to local ecosystems that their impact is often indistinguishable from the legacy of nature herself. The full extent of Indian management is therefore poorly understood, and its influence on the distribution of certain tree species and soil types is only recently becoming apparent (Posey & Balée 1989). Balée (1989) estimates that anthropogenic forests of palm, bamboo, Brazil nut, and liana, together with forest islands, and *caatinga* vegetation comprise at least 11.8% of the legally defined Amazon (Amazonia Legal). The extent to which native strategies alter the environment are further illustrated by the Kayapó Indians of Pará whose management techniques improve soil fertility, and enhance the expansion of the forest into areas of savannah (known as *cerrado*) (Anderson & Posey 1989)⁴. The important point made by these and other studies (Irvine 1989, Smole 1989) is that indigenous peoples have developed extremely sophisticated management techniques, enabling them to support considerable populations on nutrient-poor soils over thousands of years (Roosevelt 1992). It has been argued that these practices actually enhance, not degrade, the fertility and biological diversity of ecosystems.

The land-uses employed by indigenous peoples are as diverse as the region's natural resources but, even

⁴ Although these findings are controversial; see Parker (1990)

so, a number of common elements may be identified among them ⁵. Essentially they combine a variety of different activities such as fishing, swidden agriculture, hunting, and vegetable extraction within an overall management strategy. The importance of each activity alters in accordance with seasonal and spatial variations in resource availability which may also determine migratory patterns (Moran 1989). Furthermore, the social organisation and cosmological beliefs of native peoples have been shown to be closely related to their management strategies and frequently regulate patterns of resource exploitation (Ribeiro & Kenhiri 1989).

The area of Amazonia managed by Indians is decreasing rapidly in spite of the aptitude of their management techniques. This trend dates from the discovery of Amazonia by Europeans in 1492 and continues to the present day. It is the result of a sharp contraction in the size of native populations due to the introduction of old world diseases, coupled with an often violent expropriation of their lands by European settlers. The number of Indians in the Amazon basin has fallen from over seven million in 1492 to a current population of between 1-2.5 million (IDB/UNDP/TCA 1992: 27). In the Brazilian Amazon alone, there are 213,300 Indians who represent less than 2% of the total population (17 million), and indigenous reserves currently encompass only 1.6 % of the five million square kilometres of Amazonia Legal (ibid). Many of the surviving indigenous groups in Amazonia live in upland areas (*terra-firme*), and are either

⁵ Clay (1988) and Eden (1990) both provide overviews of indigenous management practices throughout the Amazon basin.

communities that have traditionally inhabited those areas, or have migrated there in the colonial period from more fertile flood plains to avoid contact with European settlers.

The history of Roraima's Indian populations is illustrative. Throughout the eighteenth century slave traders raided the numerous Arauak and Carib-speaking tribes who inhabited the *cerrado*. Carmelite missionaries from Airão (then called Santo Elias dos Tarumas) and Manaus (then called Fort Barra), considered Roraima's grassland tribes to be 'easily tamed' and for this reason they sent numerous slaving expeditions up the Rio Branco. Roraima's Indians represented a particularly important source of labour to them during the first half of the eighteenth century as their access to other groups in the headwaters of the Rio Negro was blocked at that time by the aggressive Manao tribe who lived at the current site of Barcellos ⁶. The Amerindian slave trade was outlawed in 1750 but reforms pioneered under the Marquis of Pombal's Directorate Programme (1757-1799) proved no less damaging to the native population. Instead of control by missionary groups these settlements were placed under the management of village overseers who frequently exploited their authority to the detriment of the Indians. This led to uprisings which were put down with brutal measures including deportation. In the early 1790s three of the six villages of the Rio Branco were fully transferred to other Directorate settlements hundreds of kilometres distant on the Solimões, Madeira, and Amazon rivers. A few years later a further

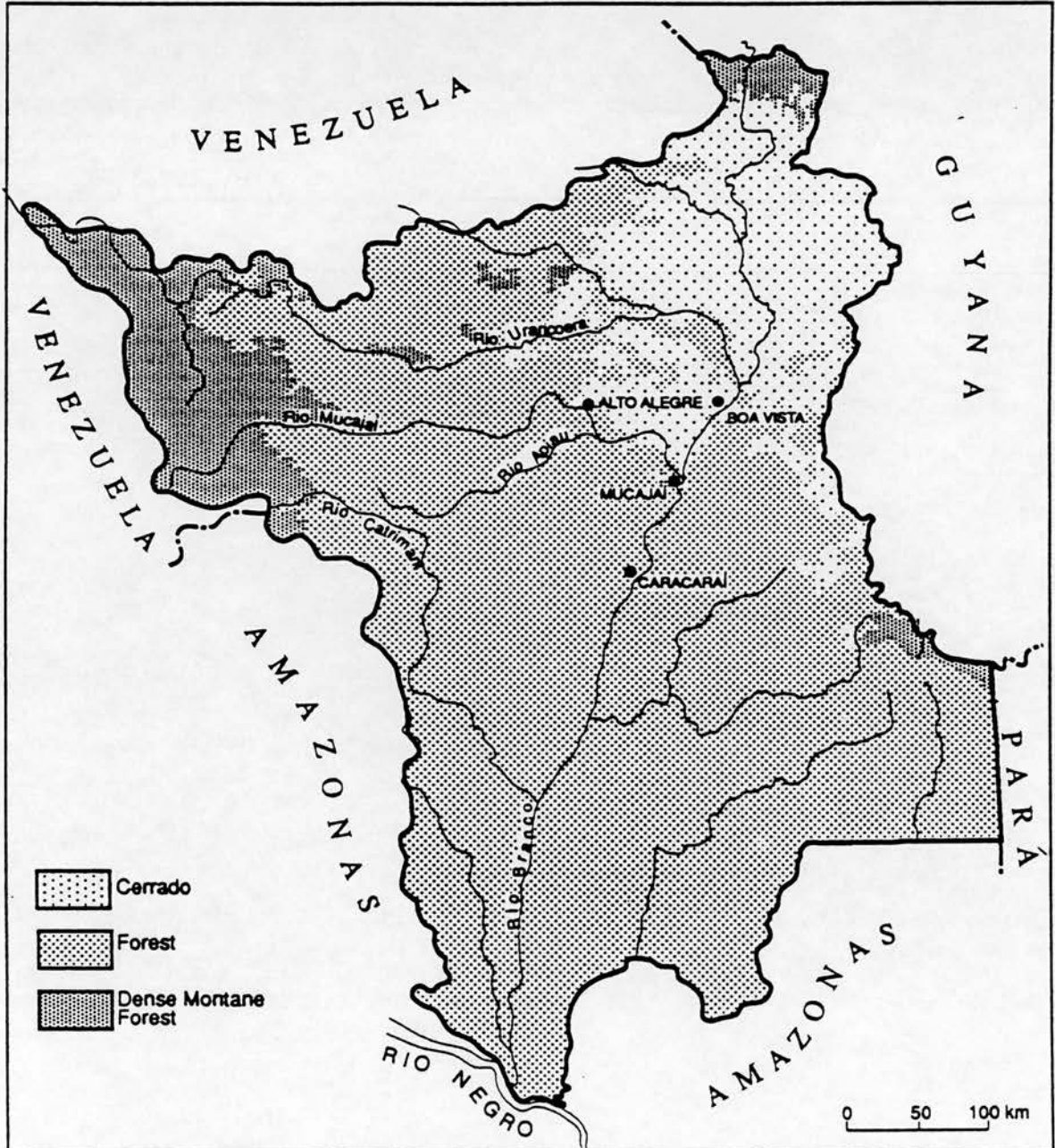
⁶ Most of this data comes from Hemming 1990a, p 301-302. Farage (1991) provides a more detailed and exhaustive account of the early occupation of Roraima.

rebellion occurred as the Carib-speaking Paravilhana and the Arauak-speaking Wapixana confronted the director of their village. The Portuguese responded with a punitive expedition which slaughtered numerous Indians on the shores of the Rio Branco at a site that became known as the bloody beach (Praia de Sangue). This was the final event in a series of violent incidents that left Roraima virtually depopulated by the start of the nineteenth century.

The state's contemporary Indian population therefore differs greatly from that which existed in the seventeenth century. The Carib-speaking Paravilhana and Sapará tribes which inhabited the *cerrado* at that time no longer exist today. However, the population of the *cerrado* tribes that did survive initial contact has grown in more recent years. The Macuxi and Wapixana have tripled in size since 1950, principally as a result of healthcare provided by Catholic and Protestant missionaries, but probably also due to their increased resistance to disease. The Carib-speaking Macuxi are now the most numerous group in Roraima with 12 000 members, while their traditional adversaries the Wapixana (Arauak) have a total population of about 5000. Two smaller Carib-speaking groups also reside on the *cerrado*; the Taurepang and Ingarikó number 550 and 500 people respectively (Hemming 1990b) (see fig 1.3 for a map of the current indigenous reserves).

As these *cerrado* groups have had such a long history of contact with colonial society, most of their members now speak Portuguese. The Wapixana and Macuxi are integrated within the local economy and large numbers of them currently reside in Boa Vista (Ferri 1990). Those who remain on the *cerrado* typically maintain a subsistence livelihood by fishing, hunting,

Fig 1. 2 Roraima - principal vegetation types



Source: FIBRE / Gov. do. Ter. Fed. de Roraima (1981) P.19

and practising swidden agriculture, which is dominated by the production of manioc (*Manihot esculenta*). Many of them, particularly young men, choose to supplement this income by engaging in waged employment on the surrounding ranches or in the local diamond *garimpos*. The Macuxi are therefore active participants in a distinct *cerrado* economy, which receives greater attention at a later stage in this chapter.

The marked geographical division between the northern savannah plains and the remaining forested area (see fig 1.2) has strongly influenced the human occupation of Roraima during the colonial period. Many of the indigenous groups, who either lived on or fled to the upland (*terra-firme*) forested areas and the dense montane forests, were less affected by the activities of eighteenth century missionaries which tended to be restricted to the flood-plains and the *cerrado*. There are currently three Indian groups in the forest; the Carib-speaking Wai-Wai (population of 170) who straddle the Guyanese border, the Waimiri-Atroari (332) who are two culturally distinct tribes that now share the same Indian reserve on the boundary with Amazonas state; and the Maiangong who live along the Uraricoera basin in the Northwest corner of the state. Yanomama is the only other indigenous language of Roraima, which is spoken by the Sanuma, Yanomam (Waika), Ninam or Yanam (Xiriana, Xirixana, and Jawari) peoples (Migliazza 1978). Even though there are cultural and linguistic variations between these groups, they are collectively referred to as the Yanomami. They inhabit the watershed which separates the Orinoco in Venezuela from various tributaries of the Rio Negro and Rio Branco in Brazil. FUNAI et al. (1991) estimate that there are 9000 out of a total

population of 20 000 Yanomami living on the Brazilian side of the national border in both Roraima (7000) and Amazonas (2000). Because of their isolation, the Yanomami have had very little interaction with non-indigenous people until a new phase of Amazonian land development dating from the 1960s brought them, and other forest dwelling groups, into contact with the rest of Brazilian society. This, in conjunction with the gold rush under study, should be interpreted as one further step in a process of contact between Amerindian and Old World societies which now has a five hundred year history.

1.1(b) Folk strategies; *caboclos*.

Contact with the Indians in Amazonia also gave rise to a distinct folk culture which was born from the collapse of Pombal's Directorate at the end of the eighteenth century ⁷. By settling indigenous peoples in villages, the Directorate effectively created a new detribalised Indian known as the *tapuio* (Ayres 1992 P.83). In the aftermath of the program these disenfranchised survivors of the Indian tribes, many of whom were of mixed blood, dispersed along riverine areas to live in fragmented settlements. Although their livelihood was predominantly subsistence, they also extracted various forest products and traded them along an extensive network of riverine commerce. They were the first generation of *caboclos*, the Amazonian backwoodsmen, distinguished from their truly Indian relatives by mixed blood descendancy, limited commercial activity and dispersed settlement pattern. *Caboclos* came to inhabit the same flood-plains from

⁷ This historical analysis of *Caboclos* is taken from Ayres 1992, and Parker 1989.

which their ancestors had been displaced by the Portuguese. In general terms therefore, they have adopted land-use practices appropriate to the riverine ecosystem, while the remaining Indian groups have confined themselves largely to managing inaccessible areas of *terra-firme*.

The Amazonian riverine economy was transformed by the rubber boom of the nineteenth century. Initially, this brought a marked population increase to rural Amazonia as thousands of Northerners were drafted into remote parts of the Amazon to extract rubber. The majority of them left the region following the collapse of the wild rubber market in 1916, but a large number stayed on and became incorporated within the local *caboclo* population through miscegeny. The rubber boom also altered the economic basis of the riverine extractive economy as a new work-relation emerged linking the *caboclo* extractor through debt to river traders. Typically, a trader advanced the necessary food and equipment to the *caboclo* for the extraction of certain forest products. In order to service this debt the *caboclo* was obliged to sell the extracted produce to the same trader, who usually set such unfavourable prices that the *caboclo* was prevented from repaying the original credit. More goods would be advanced on credit for the following season's work and in this way the trader maintained control over the *caboclo's* labour through debt peonage.

Vestiges of this work-relation (known as *aviamento*) still exist in parts of rural Amazonia, but it is seldom as powerful as it once was. Its influence currently appears to be waning along the lower reaches of the Rio Branco and its tributaries. Here, many of the *caboclos* are indebted to their traders, but

declining prices of the principal extracted products make the latter increasingly reluctant to advance further credit. Rubber, which is artificially supported by a government subsidy, does not feature in their account books because the tree from which it is extracted (*Hevea brasiliensis*) is rare in Roraima ⁸. Instead, sorva (the latex of *Couma guianensis*) and Brazil nuts (*Bertholletia excelsa* Humb.) are historically the two most important extracted vegetable products in the state, although small amounts of lianas and copaíba oil are also traded. Other sources of income derive from the production of manioc flour, as well as the sale of salted fish (notably Pirarucú and Tucunaré) and river turtles (*Podocnemis expansa*, *P.unifilis*, and *Peltocephalus dumerilianus*). As the majority of these products are marketed by river traders in Manaus, the *caboclo* economy has traditionally gravitated more towards the state of Amazonas than that of Roraima.

The impacts of the gold rush on Indian and folk management practices in Roraima will be examined in chapter 5. The response of the Macuxi to the new opportunities afforded by the rapidly expanding gold economy will be compared to that of Roraima's *caboclos*. Clearly, the land-uses practised by these two social groups are completely different, as one manages a riverine environment in the forest, while the other manages a savannah plain on *terra-firme* soil. But the significant point is that broad similarities exist in the strategies on which these different management practices are based. In essence, they combine a variety

⁸ Although a related species, *Hevea benthamiana*, does grow in the locality, it is less productive and its latex is not as highly prized (Barros in press).

of activities for subsistence production which is supplemented by a modest cash income derived from production for, and employment in the market economy. It is interesting to look closely at how such strategies are formulated and practised in relation to other activities because they are frequently at the root of land-use practices that exploit the natural ecosystem without destroying it.

1.2 Ranchers.

Amazonian beef producers can be categorised as either traditional rural oligarchies, urban entrepreneurs, capitalised colonist farmers, or corporate entities. The origins of the first group date from the seventeenth century and their domain extends across the most accessible *terra-firme* savannahs of Amapá and Roraima, as well as the inundated grasslands of the Ilha de Marajó and the lower Araguaia. This first wave of ranching was therefore restricted to areas of *cerrado* which covers approximately 30% of Amazonia Legal (Eden 1990). The other categories of ranchers are more recent arrivals, having entered the region from the late 1960s when government road-building programmes and fiscal incentives attracted investments in the Amazonian ranching economy. For the most part they established ranches on the forested areas of *terra firme* and planted artificial pasture for beef production. These more capitalised enterprises expanded rapidly in eastern Pará during the 1970s and in Rondônia during the following decade. Their growth was closely related to the development of speculative land markets along new highways.

This recent expansion of ranching into the forest is a very rapid process. Throughout the 1970s and

1980s, ranching has been the principal cause of deforestation in the Brazilian Amazon. From 1966-75 beef ranching was responsible for 38% of forest loss in Amazonia Legal. Colonist agriculture caused 31% of the deforestation in the same period, road building 27% and forestry 4% (IBDF figures cited by Hall 1991 :145). Livestock production therefore generates a number of adverse environmental impacts. These include the loss of biodiversity, the release of carbon dioxide and other greenhouse gases into the atmosphere and soil degradation. It is therefore not surprising that the conversion of forest to pasture has been identified as the most ecologically destructive of all the principal Amazonian land-use types (Goodland 1980).

Ranching may also have detrimental social repercussions as it provokes land conflict in certain parts of Amazonia. This has largely been restricted to an arc across the southern and eastern Amazon where pastures occupy large areas of Maranhão, Pará, Goiás, Mato Grosso, Rondônia, and Acre. In the Eastern Amazon one cow hand is usually employed for every 250-850 hectares of ranch land (Hecht 1982), whereas the same land under agriculture would typically support one colonist household for every fifty to one hundred hectares. Thus, the expansion of ranching tends to cause conflict if a peasantry is evicted from their holdings in areas where access to land is already impeded. This is exactly what happened in Southern Pará during the 1970s and 1980s; squatters (*posseiros*) were removed from the land by the expansion of corporate ranching in the area and denied access to alternative holdings by the local elite's tight control over the Brazil nut forests known as the 'Poligino das Castanhais' (Hine 1991).

Roraima's first ranches were established by the Portuguese army on the *cerrado* in 1780 and, in the course of the following century, beef production came to replace extractivism as the principal non-indigenous land-use in the state. Thus, the earliest Portuguese settlements such as Fort São Joaquim (1776), were sustained by the beef economy and, to this day, ranching remains an important vehicle for regional occupation. In spite of the *cerrado's* acidic nutrient-poor soils and highly seasonal rainfall, it is very attractive to ranchers. For not only does it represent 440 000 square kilometres (19% of Roraima's land surface) of free grazing, but, perhaps just as importantly, it is inhabited by an attentive indigenous labour force. An extensive ranching system has evolved to exploit this situation profitably, requiring minimum investments in either capital or labour. A local phrase candidly expresses the benefits which accrue to the land owners under these circumstances; 'in Roraima the rancher does not create the beef herd, it is the herd that creates the rancher'.

Extensive beef production therefore lies at the heart of the *cerrado* economy, but ranching is itself often practised in conjunction with informal sector diamond mining. Since 1912 diamonds have been extracted together with small quantities of gold from the alluvial deposits of the principal *cerrado* rivers; the Maú, Cotingó, Saupí and Quinó (see fig 5.2 for a map of this area). A handful of politically-influential extended families have historically dominated both activities ⁹ and the Macuxi Indians have provided them

⁹ The most prominent being the Alves-Reis, Cruz, Brasil, Magalhães, and Mota families. The changing fortunes of this landed oligarchy are examined in chapter 6.

with the necessary labour to do so. As a result, the proceeds of diamond mining have often been invested in ranching, facilitating the expansion of the ranches across the traditional homelands of the Macuxi. Complex interactions have evolved between ranching, mining and indigenous land-uses on the *cerrado*, which are regulated by a peculiar set of social and economic relations between the ranching-cum-mining elite and the Indian population.

Managerial skills are contracted through a system called *sorte* (literally meaning luck), under which the rancher pays the overseer a set percentage of annual livestock production. This is typically one quarter of new born calves, although on some ranches the ratio falls to one fifth ¹⁰. On large ranches, this may amount to a substantial revenue, but from this income the manager is obliged to employ local cow hands, who are usually Macuxi, to undertake daily tasks ¹¹. In contrast, this labour is usually contracted on non-monetary fixed wages, receiving for example a pair of reproductive cows or a horse for each year of service. A manager often works for a rancher until they have gained a sufficiently large herd from the *sorte* system to establish their own independent ranch nearby. By constantly spawning new ranches in this way, the *sorte* system was instrumental in expropriating *cerrado* land from its native inhabitants.

Ranching in the southern part of the state has a very different history. The recent expansion of the activity into this forested area follows a pattern that

¹⁰ The *sorte* system originated in the Northeast of Brazil. Its application in Roraima is described in greater detail by Rivière (1972), and Kelsey (1972).

¹¹ A study of 178 Fazendas on the *cerrado* in 1991 revealed that Macuxi labour accounted for 58% of the total non - familial workforce (CIDR 1992).

is common to Amazonia as a whole and stems from highway developments in the 1970s under the Programme of National Integration (PIN). It is important to understand the motives behind the construction of these roads because they totally transformed the geography and structure of the local economy. The expansion of the highway network embodies a geopolitic which sought to occupy remote parts of Brazil and integrate them within the national economy. A comprehensive survey of the Amazon's natural resources called Projeto RadamBrasil, preceded a massive programme of road building in the region. Having recognised the considerable economic potential of Amazonia's natural resources, the military government was concerned that other countries might lay claim to the region, unless Brazil herself developed it. Roraima merited particular attention because the RadamBrasil survey had identified it as a mineral rich state (DNPM 1975). The study noted the presence of radioactive materials and strategically important minerals such as columbite, tantalite, molybdenum, and ilmenite. Thus, the authorities felt the need to assert Brazilian sovereignty over this remote area in case either Venezuela or Guyana started encroaching upon their neighbour's geological wealth.

To fulfil such objectives, the BR 174 highway was constructed between Manaus and Boa Vista and, shortly after its completion in 1977, work began on the ambitious Northern Perimeter Highway - the BR 210. Both roads were driven into the heavily forested *terra-firme* areas which were the ultimate refuge of Roraima's Indian societies, bringing disastrous consequences to those populations. Attempts by the Waimiri-Atroari to prevent the BR 174 crossing their lands in the early 1970s were countered by military intervention which has

been held primarily responsible for a dramatic decline in the tribes' population. Having boasted over 1000 individuals in the late 1960s, the Waimiri-Atroari numbered only 332 in 1983 (Baines 1991: 75)¹². The BR 210 (*Perimitral Norte*) cut into the lands of the Yanomami in the West and the Wai-Wai in the East, and although neither group suffered the violence inflicted upon the Waimiri-Atroari, they both experienced the introduction of old world diseases to which they had no natural resistance. The painful irony is that this disruption was caused by a 'road to nowhere', as financial constraints prevented the *Perimitral Norte* from running its intended course across the northern Brazilian Amazon from the Atlantic coast to the Colombian border. Its truncated arms do not currently extend beyond Roraima to either Pará in the East or Amazonas in the West.

In 1974, a governmental directive called POLAMAZONIA ('Amazonian ranching and agro-mineral poles') directly linked the expansion of the ranching frontier to the new road developments. Just over half of Roraima was identified as an economic growth pole under this programme, and funds were allocated to stimulate its expansion through the Amazonian development agency SUDAM. Although the programme outlined four principal objectives - to support the construction of the BR 174 and its associated colonisation projects; to develop the ranching sector; to research mineral resources; and to expand trade with Guyana; - only the first of these has been achieved with any degree of success. Twenty years after the

¹² Also see Carvalho for a detailed account of these events, and history of the Waimiri-Atroari's contact.

formulation of POLAMAZONIA, Roraima's ranching sector remains largely decapitalised, mineral resources are poorly mapped and trade with Guyana is minimal (though perhaps likely to expand now that a road between Boa Vista and Georgetown has been completed in 1992).

The government was clearly unsuccessful in attracting capital into the state's ranching economy. Only six of Roraima's largest ranches received SUDAM grants and most of these were already in existence prior to the POLAMAZONIA initiative. Corporate finance was more easily drawn to the south and eastern Amazon where better communications linked the ranching economy to the principal markets. This trend was not reversed by an INCRA directive in 1977 which established a 600 000 hectare ranching district to the North of the western branch of the BR 210 in the municipality of Mucajaí (see fig 1.3). Although 247 plots (each of about 3000 hectares) were delimited, only 34 names were registered as recipients, and of these, only two individuals proceeded to develop modest ranching enterprises. As it turned out its inability to attract larger capital preempted a potential land conflict, because an 8000 hectare section of this ranching district overlapped with the intended Yanomami Reserve (Silveira & Gatti 1988). Instead, many ranchers were attracted to more accessible land available in the margins of the newly constructed BR 174 and BR 210 highways. In this way, numerous smaller ranching enterprises were established on amalgamated holdings which were originally intended for agricultural development. Be that as it may, the salient point here

Fig 1.3 Roraima - Roads Principal Colonisation Projects and Indian Reserves



Source: adapted from Silveira and Gatti (1988) P.51

is that the post-1970 ranching economy in Roraima was never highly capitalised, nor was it underpinned by the intensely speculative land market which emerged in the southern Amazon.

1.3 Smallholder agriculture.

In 1980 agricultural crops covered 49 851 hectares or 5.9% of Amazonia Legal, of which annuals accounted for 5% and perennials the remaining 0.9% (IBGE 1983). Agriculture, like ranching, has been supported by government initiatives since the 1970s, and these two land-uses together with mining and timber extraction form the basis for the occupation and economic development of the region. After ranching, agriculture is the second principal cause of forest destruction in Amazonia. However, it is important to recognise that, unlike cattle raising, agriculture does provide a livelihood for hundreds of thousands of people in the region. So the environmental costs of the activity are to some extent offset by the social benefits that derive from it.

Distributing Amazonian land to landless farmers is an effective mechanism for defusing rural social tensions in other Brazilian states. In the 1970s such pressures were most intense in the Northeast and Centre-South of Brazil ¹³, and migrants flooded into the Amazon from these areas to acquire land in the government's recently established colonisation programmes. Settlement projects now exist along the highways in all of the Amazonian states, the largest

¹³ Throughout this volume the 'Northeast' refers to the states of Maranhão, Piauí, Ceará, Pernambuco, Rio Grande do Norte, Paraíba, Alagoas, Sergipe and Bahia. The 'Centre south' refers to Rio Grande do Sul, Paraná, Santa Catarina, São Paulo and Mato Grosso do Sul,

numbers of farmers residing along the BR 364 in Rondônia, and the Transamazonian Highway in Pará. Migrant families are typically allocated 50-100 hectare plots of forested land on *terra-firme* soils. These plots are connected to the highways by dirt 'feeder' roads. Migrants usually input minimal amounts of capital and grow rice, maize, manioc and a small quantity of beans, among a wide variety of other cultivars such as bananas, black pepper, coffee, and sugar cane.

In Roraima, a small number of colonisation projects established by the state government agricultural secretariat in the 1940s and 1950s predate the more recent expansion of agriculture along the BR 174 and BR 210 (fig.1.3). The first three colonisation projects of Fernando Costa (at the current site of Mucajaí established in 1944), Braz de Aguiar (at Confiança est. 1952) and Coronel Mota (at Taiano est. 1955) were founded on the forest/savannah border in the hinterland of Boa Vista. Here a total of 270 immigrant families were settled on 25 hectare plots of the most readily accessible fertile soils. Notwithstanding these favourable edaphic conditions and the proven agricultural experience of the colonists, poor communications and inadequate health facilities led to a gradual abandonment of virtually all plots by the mid 1960s (Silveira and Gatti 1988). Despite the failures encountered in these early projects, many of the same problems continue to plague more recent colonisation programmes in the state. This reflects a pattern observed not only in the Amazon, but throughout many other parts of the humid tropics as well.

In 1975 the federal government land agency INCRA was established in Roraima to administer both the

colonisation of the BR 174 and BR 210 and the regulation of land titling in the state. INCRA was ceded a 100 kilometre swathe along the new federal highways in which to mark out, distribute and register land holdings for the incoming colonists. The principal differences between INCRA and state government projects relate to their administration and location, and not to the level of infra-structure provided. Location is nonetheless an important determinant of soil quality because fertile 'terra roxa' Alfisols cover only 0.03% of the state, and by 1975 virtually all of the good land had already been allocated under earlier state government settlement schemes. The INCRA projects were for the most part situated on poorer Ultisols and Oxisols, which predominate in Roraima, accounting for the state's limited agricultural potential. The most authoritative land-evaluation survey undertaken in the state concluded that a third of Roraima does not have 'natural conditions that justify agrarian development' and only one half of the land area (47.2%) was considered 'appropriate for mechanised or semi-mechanised agriculture' (SUPLAN 1980; 11).

The composition of migrants in each settlement project is related to the date of the project's initiation. Settlements established before 1980 tend to be dominated by migrants from the Northeast of Brazil, most notably those originating in the state of Maranhão. These include some of the more recent state government programmes like Alto Alegre (1978), Sorocaima (1978) and the earliest INCRA schemes created along the BR 174; Nova Colina, Martins Pereira, and Novo Paraiso, which are all incorporated within the wider settlement project of PAD Anauá (1979). A study of INCRA records showed that 63% of settlers in this

project are from the Northeast, with 41% originating in the state of Maranhão (Silveira & Gatti 1988). An even higher figure is obtained from the project of Alto Alegre established one year earlier, where 75% of current settlers are of Northeastern origin (my fieldwork based on INCRA records 1991). At this stage INCRA colonisation schemes were planned around a comprehensive package of infra-structural support for the arriving migrants who were distributed land in what are known as 'directed settlement projects' (PAD-Projeto de Assentamento Dirigido).

A small percentage of colonists from the Brazilian centre south were settled in these early projects, and although they still represent the minority of colonists in Roraima, their numbers began to increase after 1980. This was due to a process of secondary migration to Roraima by farmers who had been settled in Rondônia's POLONOROESTE project during the 1970s. A study of the only available migration data reveals that migrant households, originating predominantly in the Northeast and Centre South, came to Roraima via Rondônia at the start of the 1980s (Silveira & Gatti 1988). Many of them were allocated land in the project PAR Juaperi (1982) along the eastern branch of the BR 210 which INCRA was settling at that time. A survey of colonists in this area (SUDAM 1984) confirms this, noting that 38% of colonists settled along the BR 210 had previously farmed in Rondônia and, more strikingly, that 62% had moved 3-5 times prior to their arrival in Roraima. Roraima therefore inherited a population of smallholders who had a long history of migration, suggesting that their customary response to difficulties was to move away from them.

It officially contravened INCRA regulations to allocate new land to families that had already abandoned or sold a plot, but the bureaucracy which should have enforced this legislation was poorly applied at that time. This is because INCRA had adopted a new policy of rapid settlement (PAR-Projeto de Assentamento Rapido) as a pragmatic response to the slow land allocation procedure. Regrettably, this objective was achieved at the expense of the migrants, many of whom were settled in projects before the basic infra-structure had been assembled. Two areas were principally affected; PAR Juaperi, which extends along the eastern branch of the BR 210, and includes the colonies of Caroebe, São João de Baliza, São Luiz, and Vila Moderna; and PAR Barauana, situated south-east of Boa Vista covering the projects of Confiança I, II, and III. Even so, the experience of migrants settled in these schemes was probably not dissimilar to those of households obtaining land elsewhere. For people who had been given plots in the more organised projects found that the infra-structure which they were promised was seldom provided in full. In other areas situated outside the official colonisation schemes, a growing number of migrants started laying claim to the land spontaneously, having received no government support at all.

This lack of assistance for colonists undermined the authority's attempt to establish a dynamic rural economy in Roraima. The problems encountered in attracting significant capital into the ranching sector during the late 1970s have already been noted, but this was exacerbated by a contraction in the agricultural economy itself during the early 1980s. Healthcare, education, credit lines, technical advice and transport

facilities were all scarce, reflecting a widely recognised shortfall with Amazonian colonisation (Smith 1982; Moran 1981). In response to low agricultural incomes, smallholders began to supplement their earnings by extracting Brazil nuts from the forest, renting out small pastures for grazing and even migrating seasonally to Rondônia for the rice harvest (SUDAM 1984). Others abandoned or sold their land holdings and moved to informal sector mines or nearby urban areas - particularly Manaus and Boa Vista. Between 1980-1985 a decline in the area devoted to annual crops coincided with the rapid growth of Boa Vista (Abers and Pereira 1992), suggesting that contractions in the rural economy stimulated rural-urban migration.

The government of Roraima encouraged immigration by placing advertisements in the national press (Veja 13 April 1983), but the flood of colonists never acquired the same proportions that were recorded in Rondônia. During the 1970s its population had increased from 111 000 to nearly 500 000 (an average annual growth rate of 15.8%) and then doubled again to approximately one million in 1990 -averaging 7.8% per annum (Fearnside 1989). Roraima's demographic boom is smaller in comparison and occurred about a decade later. The state's population doubled from a modest 40 885 to 79 159 throughout the 1970s with an annual average growth rate of 6.3%. During the 1980s, this increased at a rate of 9.5% to give a population of 215 790 in 1991 (IBGE 1992). The colonisation programme clearly contributed to this population growth, but it was the private sector mineral boom in the latter half of the 1980s which attracted by far the greatest proportion of migrants to Roraima over the decade. On

average 2400 migrants arrived each year during the height of the colonisation program (Silveira & Gatti 1988: 56). In comparison, an estimated 40 000 people were directly involved in the 1987-1990 gold rush, and many more worked in related activities. Thus, a conservative estimate, which recognises that a proportion of this figure was already resident in the state and also accepts that the government census of agricultural migration may not be complete, still suggests that the migratory pull of the gold rush was at least double that of the colonisation programme.

1.4 Summary.

This historical perspective shows that although Roraima experienced similar developments to those occurring throughout Amazonia, recent processes did not reach the same intensity as elsewhere. Roraima's geographical isolation from the principal markets of central and southern Brazil ensured that highway construction in the state was not accompanied by the explosive land speculation and agrarian violence witnessed in Rondônia and Pará. The government's efforts at stimulating the state's rural economy had failed. At the start of the 1990s Roraima still has the lowest land values and population density of any Brazilian state (FUNATURA 1992, IBGE 1992).

The ranching and agricultural developments associated with the highway building of the 1970s were important factors underpinning the subsequent expansion of the Amazonian mining sector. While this is clearly seen in Pará, Rondônia, and Mato Grosso, the spatial proximity of mining to other activities and the simultaneous boom in the local land market present difficulties in deciphering the complex interactions

between mining and other land-uses in these states. In contrast, Roraima offers a clearer perspective because here a marked temporal divide separated the gold rush from other changes in the rural economy precipitated by the road programme. Besides, the mining occurred in the remote Yanomami reserve, removing it spatially from other land-uses in the state. Surprisingly, this historical and geographical distance between the *garimpo* and other developments in the rural economy actually serve to clarify its relationship with them. In effect, the cats-cradle of causal linkages is opened out so that the particular processes under study are highlighted more distinctly against the landscape in which they operate.

This then is the background from which the gold rush of the 1980s emerged. Far from being a new arrival on the Amazonian stage, *garimpagem* has been practiced throughout the region since the eighteenth century. Over this period, it has provided a livelihood for a whole range of social groups, illustrating that there is nothing exceptional in the long mining histories shared by Roraima's Indians and ranchers. Communities of escaped African slaves were Pará's most prolific *garimpeiros* during the last century, as were smallholders and plantation workers in the Gurupí of Maranhão. The point is that *garimpagem* is just as intrinsic to Amazonia and its inhabitants as say rubber tapping or Brazil nut gathering. And the activities' deep roots in the social and economic fabric of the region, must be recognised if more recent events in the Amazonian informal mining sector are to be interpreted accurately.

The following chapter offers an historical account of *garimpagem* in Roraima, in order to expose why the

activity acquired such prominence during the 1980s. An examination of the rush on the homelands of the Yanomami Indians between 1987 and 1990 lies at the centre of the discussion. Not only does this shed light on the mechanics behind a significant episode in the current phase of Amazonian occupation, but it also provides an insight into the internal dynamics of *garimpagem* itself. This is a necessary prerequisite for subsequent analysis, because understanding how the *garimpo* works is the first step towards evaluating its impacts on other Amazonian land-uses.

Chapter 2: The mining history of Roraima with particular attention to the 1987-1990 gold rush.

The myth of El Dorado lured eighteenth century travellers across the *cerrado* plains of the Guyana Shield in search of spectacular mineral wealth. Nonetheless, the geological resources of Roraima remained unexploited until diamonds were discovered in the sediments of the Rio Maú in 1912 (see fig 5.2). Since then, a number of diamond *garimpos* have been established along the rivers of the *cerrado* which drain from Monte Roraima. Small quantities of gold are recovered together with diamonds from all of these mines, but for most of this century the price of the metal has been so low that it was regarded as an insignificant by-product of diamond mining until the 1970s¹. The diamond economy was itself dominated by production from a *garimpo* established on the table mountain Serra de Tepequém in 1938. This *garimpo* expanded throughout the 1940s and 1950s, drawing labour from the more established mining areas along the rivers Maú, Cotingo, and Quinó of northeastern Roraima (fig 5.2). The westerly drift in mining activity from the *cerrado* into the forest continues to the present day. From the late 1950s prospectors filtered up the rivers Uraricoera, Uraricáa and Ericó, establishing a number of small diamond *garimpos* west of Tepequém (see fig 2.3), the most significant of which is Santa Rosa, dating from the mid 1970s.

Notwithstanding this long history of mineral extraction, Roraima's geological resources remain poorly understood. The RadamBrasil natural resource survey provided the first geological maps of the state in the 1970s (DNPM 1975), published at the

¹ Some *garimpeiros* testify that gold was simply discarded as nobody would purchase it until the late 1960s.

reconnaissance scale of 1:1 000 000. Although this level of mapping is insufficiently detailed to provide anything other than a crude indication of the principal deposits, it did suggest that Roraima's subsoil was of considerable economic value. Two principal findings of the RadamBrasil survey are relevant to this study because they have influenced the subsequent development of the state's mining economy (DNPM 1975: 101-107).

Firstly, RadamBrasil noted that the origin of gold and diamonds is associated with the decomposition of the ancient Guinea shield. More specifically, it mapped the geography of the Roraima Conglomerate (a type of greenstone belt) which is the secondary matrix of the original material, representing the mother lode of these two minerals. Its brief to prospectors was that gold and diamonds should be encountered in river sediments which drain outcrops of Roraima Conglomerate. Figure 2.1 illustrates the distribution of these economically-significant geological formations. Not only did this confirm that the older *garimpos* below Monte Roraima and Tepequém were on or draining areas of Roraima Conglomerates, but it also suggested that previously unexplored areas like the Serra de Surucucús, Serra de Aracá, and the confluence of the Parima and Uraricoera rivers showed potential. These western outcrops which straddle the Venezuelan border generated even more interest, as the RadamBrasil survey also noted that the quality of diamonds generally improves the further west the source material lies (DNPM 1975: 103).

The second important discovery was geology favourable to the formation of cassiterite (tin ore) in the same area. A granitic formation around the Serra de Surucucús (henceforth referred to as the

Fig 2.1 Geological formations of economic significance in Roraima, and garimpeiro reserves



Source: IBGE / Gov. do. Ter. Fed. de Roraima (1981) P.12
FAGAR 1992

Surucucús granite) was identified as the source material here, but together with the unexplored areas of the Roraima Conglomerate, it was located in the heart of the Yanomami lands. RadamBrasil itself warned that the presence of the Yanomami, as well as the inaccessibility of the area, demanded careful planning prior to any mining in the region. Nevertheless, it did recommend that prospecting for cassiterite should be concentrated in the headwaters of the Mucajaí, Parima, Catrimani and Demini river basins which are in the heart of the Yanomami lands.

Having whetted the appetites of larger mineral groups with the RadamBrasil findings, the government anticipated that private investment would be ploughed into more detailed geological research under the PoloRoraima program. However, it soon became apparent that few companies were prepared to survey such remote deposits, which lay within Indian land. By law, claims for mining concessions on Indigenous Reserves may be registered by DNPM, but companies can only work in these areas with both the permission of FUNAI and the consent of the relevant Indian group. Notwithstanding the specific issue of Indian lands, geological surveying in remote parts of Amazonia is sufficiently expensive, and risky, to dissuade many companies from investing in it. This system, both in and beyond Indian Reserves, favours the registration of speculative claims by larger companies which are often legally upheld only after *garimpeiros* have discovered economically significant deposits on the site.

Private sector investment in geological surveys within Roraima has been minimal, even though 197 claims to the state's subsoil are registered with the DNPM, covering a total 1 927 831 hectares (Gama de Silva 1991: 282). Most mineral companies preferred to work in Pará and Rondônia where RadamBrasil had

identified more accessible deposits lying outside Indian reserves. This paucity of private investment in Roraima ensured that virtually all of the subsequent geological mapping in the state was undertaken by the government. The Companhia de Pesquisa de Recursos Minerais (CPRM), DNPM's research subsidiary, published three substantial geological surveys between 1975 and 1985 ², but even these failed to stimulate the anticipated flows of private capital into the state's mining sector.

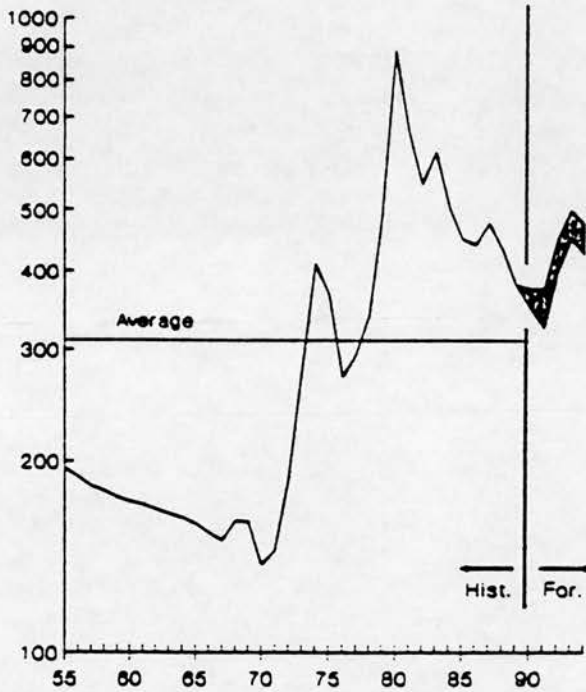
Consequently, Roraima's mineral resources came to be exploited almost entirely by the informal sector and a greater knowledge of the state's subsoil is currently retained in the minds of *garimpeiros* than is available in any published documents. The *garimpeiros* responded immediately to the RadamBrasil findings, establishing a cassiterite *garimpo* on the Serra de Surucucús by 1975. But the *garimpo* was short-lived. In 1986, FUNAI expelled its population of 500 miners arguing that the health and welfare of the Yanomami were prejudiced by the mining. In spite of this incident, there was growing interest in the Surucucús cassiterite deposit. The Companhia do Vale Rio Doce (CVRD), who had a registered claim to the site received permission from FUNAI to research the geology of the area in 1979. The survey published by its technical subsidiary DOCEGO is one of only a handful of geological research projects ever financed by the private sector in Roraima. Not surprisingly, the DOCEGO report confirmed the existence of a 15 000 ton deposit of high grade tin ore (71%) at Surucucús (Fernandes & Portela 1991: 5). But CVRD advised DNPM to declare Surucucús a national mineral reserve on the grounds that the economic benefits of developing the site at that time did not outweigh its

² These were the Projeto Rio Branco (1984) Projeto Molybdenum (1978), and Projeto Catrimani-Uraricoera (1982)

potentially damaging impacts on the Yanomami (CVRD 1980). Responding to the CVRD's apparent disinterest in developing their claim, DNPM transferred part of the Surucucús site into the hands of CODESAIMA, the state government's development company. However, various endeavours to extract tin from Surucucús by both CODESAIMA and *garimpeiros* were thwarted by FUNAI. José Altino, the head of USAGAL, was responsible for one of the most daring attempts to develop the site. In 1985 he was jailed briefly for spearheading an unsuccessful invasion in which 60 *garimpeiros* arrived in 5 aircraft and tried to claim the cassiterite-rich Surucucús plateau by force. Despite the interest in this cassiterite deposit during the early 1980s, it was gold, not tin, that opened up the Yanomami lands. Indeed, following these events, the Surucucús deposit remained virtually untouched until the end of 1987, by which time thousands of *garimpeiros* were already mining gold within the Indian reserve.

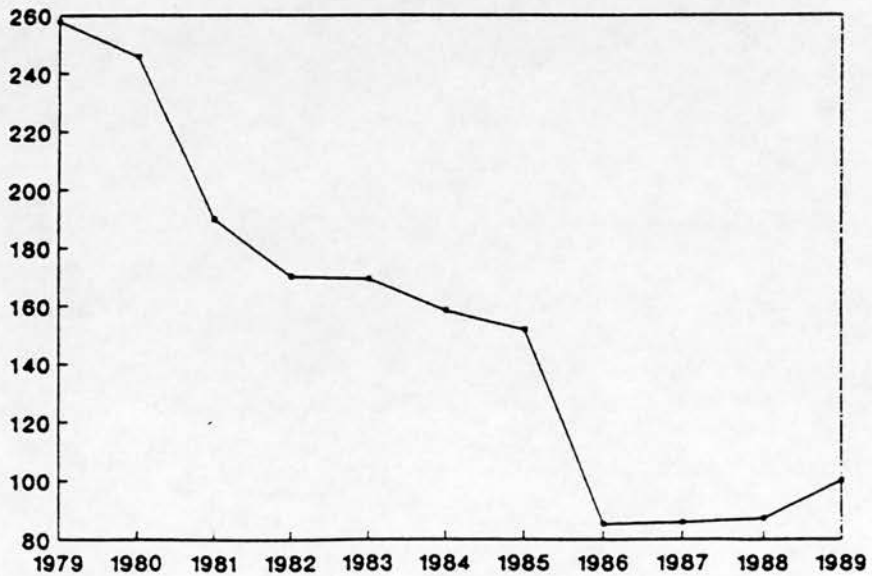
Figure 2.2 The changing price of gold and tin

HISTORICAL & FORECAST GOLD PRICES (1989 US\$/oz)



Tin

REAL PRICES 1979 to 1989
Index Numbers 1989 = 100



Sources: gold data: Mining Journal 1991 p.17
tin data: Crowson 1991 p.278

2.1 Causes of the 1987-1990 gold rush.

The price of gold increased seventeen fold from 1970-1980, before peaking spectacularly at US\$ 850 per troy ounce in 1980 (see fig. 2.2). Roraima's *garimpeiros* responded by placing greater emphasis on gold extraction over diamond mining. This was not a difficult transition to make as many of the sites they exploited yielded both minerals. Accordingly, Roraima's first significant gold production was in the *garimpo* of Santa Rosa, which was the focus of the state's mining industry in the late 1970's. Its location within the proposed Yanomami Reserve made it illegal to mine, but the state government nonetheless supported gold extraction in the area by commissioning its own organisation CODESAIMA to work there (Lobato de Azevedo 1991). Over the decade this conflict between the objectives of federal and state government ensured that few effective attempts were made to reduce the social impacts of gold mining which frequently occurred in close proximity to indigenous communities.

The Maiongong and Xiriana, who reside along the Uraricoera, Uraricáa and Ericó, were probably the first Indian groups of western Roraima to come into contact with *garimpeiros*. Initially, they encountered diamond prospectors who had been venturing up these rivers since the 1950s, and in subsequent years the same people taught them how to extract gold. The Xiriana were not only quick to seize the commercial opportunities offered by gold mining, but they also passed the technology on to other Yanomami communities. In the early 1980s, a party of Xiriana from the Uraricoera basin, visited the Yanomami villages of the Couto de Magalhães, a tributary of the river Mucajái, to teach their relatives how to extract gold manually. The modest quantities of gold

produced by the Indians were traded, often by FUNAI employees, in Boa Vista for hammocks, pans, fishing hooks, knives, and other useful items to which the Yanomami would otherwise have had only limited access³.

While the Yanomami were learning the basics of gold mining, pressure was mounting for the closure of the Santa Rosa *garimpo*, and in March 1982 federal legislation was passed that forbade access to the proposed Yanomami reserve (GM/015 09/03/82). As the authorities clamped down on the mining operations, many of the displaced *garimpeiros* either returned to plots of land that they had previously owned, or acquired land in recently-established colonisation projects such as Apiaú (founded in 1981), Confiança (1982), and PAR Juaperi (1982) which is situated along the Eastern branch of the Perimetral Norte. The mining experience that they had acquired in Santa Rosa equipped them well for mounting prospecting trips during the agriculturally-unproductive summer months. So, from the early 1980s colonist farmers were working small manual *garimpos* along the rivers Catrimani, and Apiaú (most notably along its tributary the Rio Novo), on a seasonal basis. There were approximately 600 *garimpeiros* working in this area during the summer of 1985, some of whom had already come into conflict with local Yanomami villages⁴. By 1986, the influx began to gain momentum following the discovery of a sizeable gold deposit at the *garimpo* of "Cambalacho" in the headwaters of the Apiaú river⁵ (number 73 on figure 2.3).

³ For a detailed account of these events see Lazarin & Vessani (1987), and Ramos, Lazarin & Gomez (1985)

⁴ CCPY 1985, and 1989 p.39

⁵ Events at Cambalacho provide an interesting example of what happens when an individual tries to restrict access to a gold field, a process that is well described by Cleary (1990). A *garimpeiro* called Paranazino is credited with the discovery of the site, but on realising the potential wealth of the deposit, he refused other *garimpeiros* access. Given that he had a few well-armed henchmen, and as there were alternative mines still producing nearby,

Thus, all of the ingredients were present for the start of a mining boom, reflecting many of the processes which had shaped events throughout Amazonia during the early 1980s. The unprecedented rise in gold prices is only one of various factors contributing to the explosive growth of the regional mining economy. The existence of extensive alluvial gold fields, which could be mined with very rudimentary technology, proved to be just as significant. A pivotal role was also played by the road building programme of the previous decade. The highways not only improved access to remote parts of the Amazon, but the migration stimulated by the roads themselves and by the associated colonisation projects also provided the necessary labour for the rush. Furthermore, the political climate was particularly favourable, as the new interest in mining offered a further vehicle with which to fulfil the government's mandate of regional occupation and economic growth. Within this context two factors further boosted gold extraction in Roraima. Declining production in the *garimpos* of Pará (notably Cucá, Tucumã, and the Tapajós) during the mid 1980's encouraged many small miners to look towards other sites for work. Roraima was particularly attractive since its dry season coincides with the wet season elsewhere in Amazonia. Thus, *garimpeiros* from Pará and Rondônia could maintain production throughout the slack months by migrating to the northern Amazon on a seasonal basis. Having discovered the potential of Roraima's gold fields, many of them stayed. *Garimpeiros* with more capital arranged transportation of their mining equipment to Roraima while

Paranazinho managed to hold his claim from the end of 1986 through most of the summer months. However, by March of 1987, those whom he had repulsed were both sufficiently angry and well-armed to kill him, thereby liberating access to the very productive *garimpo* of Cambalacho.

simultaneously negotiating a plot of land on which to work.

The convergence of labour and capital on the fledgling gold fields was fuelled by macro-economic changes in 1986. As figure 2.1 illustrates, the price of gold started to rise again from 1987 which naturally made *garimpagem* a more attractive option. Moreover, it drew further investment into gold mining, mainly from the Amazonian ranching and urban economies, both of which were in decline at that stage. Government incentives for ranching were reduced in the late 1980s and the urban economy also underwent a sharp contraction due to the 'Plano Cruzado' of 1986. This financial strategy was an attempt by the Sarney government to reduce hyper inflation through freezing wages and introducing price controls with the result that labour and capital shifted into the informal sector as the formal economy contracted. Because *garimpagem* pays tax-free incomes which are protected against inflation, and imposes minimal restraints on workforce mobility (Cleary 1990), it is a particularly attractive option in such circumstances.

2.2 The scale of the rush.

An increasing number of people migrated to Roraima from 1987 and the flow had acquired flood-like proportions by the start of 1988. Local newspapers reported that 200 migrants a day were entering Roraima ⁶ and although no precise figure exists, it is estimated that about 40 000 miners were directly employed in the *garimpos* of Roraima during the gold rush (Albert 1992)⁷. As *garimpeiros* spend a proportion of their time (and money) in Boa Vista between mining trips, the numbers engaged in mining

⁶ The Folha de Boa Vista (08/01/1988).

⁷ Although the World Bank 1990 put the figure at around 100 000. see Butler 1990 :2

at any one instant could be as little as 50% of this figure. For each person involved directly in mining, many others were dependent upon the economic opportunities that accompanied the boom so that the employment it generated was extremely far reaching. Almost all population growth was confined to Boa Vista which was the principal logistical base for the rush.

Be that as it may, very little is known about the people who were drawn to this and other mining booms in the region. Perhaps the most comprehensive survey of Amazonian *garimpeiros* is provided by Pereira (1991) who interviewed 168 miners in 6 of Pará's *garimpos*⁸. He observed that although people came from all over Brazil to mine in Amazonia, the regional *garimpo* workforce is dominated by migrants from the Brazilian Northeast; 76% of his sample originated from that region, with 60% coming from the state of Maranhão alone. Roraima's mining workforce appears to follow this pattern closely. In August 1991 I interviewed 66 *garimpeiros* entering a rush (*fofoca*)⁹ in the headwaters of the Jatapú river in the southern part of the state. 53 (78%) of them originated in the Northeast and the majority were from the state of Maranhão (40 respondents or 61% of sample)¹⁰. While it is probable that its exact composition varies slightly between localities, evidence from different parts of the Amazon confirms

⁸ The DNPM undertook a survey of all Brazil's *garimpeiros* in 1990 under the project Ouro-Gemas. However, this data which should have been released in July 1991, remains unpublished in March 1993.

⁹ "*fofoca*" literally means gossip, but is used to describe a rush of *garimpeiros* to a particular site, usually following a substantial strike. So the phrase "the *fofoca* of Jatapú" refers to the initial rush of prospectors to the *garimpo* of Jatapú shortly after its discovery, and represents the mine's heyday

¹⁰ The total breakdown is as follows; (n=66) Maranhão (40) Ceará (6), Paraná (4), Pernambuco (3), Goiás (4), Pará (2), with one representative from each of the states of Paraíba, Minas Gerais, Bahia, Mato Grosso do Norte, Roraima, São Paulo, Rio Grande do Sul, and Santa Catarina.

the dominance of Northeasterners in the *garimpo* workforce (Coy 1991: 4, Cleary 1990).

As 85% of the *garimpeiros* interviewed in the Jatapú survey had worked in the Yanomami reserve, this sample is broadly representative of the earlier influx to Western Roraima¹¹. The Jatapú interviews give some indication of the migratory routes existing in Amazonia's *garimpos*, through which *garimpeiros* arrive in Roraima¹². A small number of the most experienced respondents had worked in the Tapajós in the late 1970s, but they were drawn to Serra Pelada and the other *garimpos* of south-eastern Pará (notably Cucá and Tucumã) in the early 1980s. A large number of migrants were absorbed in the Amazonian mining economy at that time and the majority of the *garimpeiros* interviewed at Jatapú fall into this classification. As the productivity of these gold-fields declined in the mid 1980s, the larger part of the workforce moved to northern Mato Grosso (around Alto Floresta) and the Tapajós. A smaller number went to Rondônia, either extracting gold along the Rio Madeira, or mining cassiterite in Bom Futuro. And a handful scattered across the northern Amazon, working in northern Amapá (on the Oiapoque), and the Cabeça do Cachorro region of Amazonas (Rio Uaupés) (see fig 1.1).

The Roraima gold rush appears to have drawn its workforce from all of these areas, with the majority coming from the gold fields of northern Mato Grosso and the Tapajós. A smaller, but nonetheless significant fraction came from Rondônia. *Garimpeiros* in Boa Vista note that there was a degree of

¹¹ Although few of them had come directly from the reserve itself. In fact this survey illustrates the power of the *fofoca* as the *garimpeiros* had migrated directly to Jatapú from the following locations; 50 (76%) came from Roraima itself, 4 from Itaituba, 4 from Venezuela, 2 from Maranhão, and one each from Amazonas, Mato Grosso, Goiás, and Ceará

¹² This information derives from life-history interviews conducted with the Jatapú respondents.

segregation between these two groups. In general terms, the Rondônia workforce veered towards the Uraricoera river where mining was principally by equipment mounted on floating rafts (*balsas*), while the Tapajós/Mato Grosso *garimpeiros* dominated the Mucajaí, Apiaú, and Catrimani rivers where land-based mining prevailed. This reflects differences in mining techniques between the *garimpos* of origin, as extraction on the Tapajós tends to be land-based while on the Madeira it is predominantly riverine. But the distribution also suggests that *garimpeiros* prefer to work alongside people they already know. Relocating into a new *garimpo* is an expensive and risky operation particularly if equipment is being transferred. These risks and expenses can be reduced if trusted friends exist in the new *garimpo*; they will lend money and equipment, facilitate the acquisition of a labour force, explain the local geology and help negotiate a plot on which to mine.

At this point the distinction between 'professional' and 'temporary' *garimpeiros* should be recognised. Mining is the principal form of employment for the former. Temporary *garimpeiros* are those whose primary employment lies outside the mining economy, often being in smallholder agriculture, ranching, or employment in the urban informal sector. They tend to be opportunists, spending short periods in the *garimpo* in order to supplement their income from other sources. Although many of the temporary *garimpeiros* may work seasonally in *garimpos* over a number of years, and thereby acquire considerable mining experience, they have not made the same commitment to the activity as their professional counterparts. Professional miners often invest a larger percentage of their revenue back into the activity by purchasing equipment and financing prospecting trips. Even so, no hard and fast rules

can be made, and much of the initial prospecting for the Roraima gold rush was undertaken by experienced temporary *garimpeiros* who had land holdings in the state's colonisation projects ¹³. In broad terms one can think of a core of professional miners who provided much of the air support, mining equipment, and prospecting expertise, being complemented by a large number of temporary *garimpeiros* who probably represented the majority of the labour force.

Production estimates of the Roraima rush are variable, but USAGAL believe that 36 metric tons of gold were extracted in the state between 1988-1990. During this period, the price of gold fluctuated between US\$ 12-18 US\$ per gram, according an approximate value of US\$ 540 million to this quantity of gold (calculated at an average of US\$ 15 per gram). The largest proportion of the metal would have passed through the hands of Boa Vista's numerous gold dealers, of which only 33 are officially registered. Generally, they traded it on to more powerful companies and financial institutions in Rio de Janeiro or São Paulo, from where much of it would probably have left the country. Enormous opportunities for contraband existed¹⁴ and only fifteen metric tons of gold were registered by the government tax office (the 'Receita Federal') between 1988-1990. Even so, this accounts for over 40% of USAGAL's estimated production, which seems very high. It is therefore possible that USAGAL's figure is conservative, and a more realistic estimate might be 49 tons valued at US\$ 735 000 000 ¹⁵.

¹³ This is because the rush itself did not attract the attentions of Amazonia's professional *garimpeiros* until relatively late on.

¹⁴ Attempts to police this contraband were derisory and on one of the very rare occasions that agents of the Receita Federal inspected the cargoes of light planes at Boa Vista's airport, they confiscated 30 kilograms of gold in one day (Folha de Boa Vista 24/11/88).

¹⁵ A closer look at these figures reveals a number of discrepancies; USAGAL estimate a peak production of 14 tons in 1988 of which the Receita Federal registered 1.3 tons (12% of total production). However, the following year USAGAL believes that gold production

2.3 The supportive role of the state.

Following the invasion of Cambalacho (which is marked as point number 73 on fig 2.3), the intensity of mining in the watershed of the Apiaú river increased as smallholders walked the two week long trail from the Apiaú colonisation project to seek out new deposits. By July 1987, Manuel Luiz, a farmer from Alto Alegre, had crossed the watershed and discovered a gold mining operation belonging to the Yanomami, in the middle reaches of the Mucajai basin. Its owners were absent at the time, and so Manuel claimed the site, christening it the *garimpo* of Novo Cruzado. Accounts differ over what happened next. It has been suggested that the Yanomami who returned to the site a few days later came into immediate conflict with the intruders. But some *garimpeiros* argue that a working relationship was established with the Yanomami owners and violence only broke out when this agreement subsequently collapsed. Whatever the case, a clash ensued which left 4 Yanomami and one *garimpeiro* dead (Folha de Boa Vista 12/08/87). The Yanomami had reportedly expelled *garimpeiros* from that area on three previous occasions, (Albert, in press) and relations between the two parties were increasingly violent. But although this was by no means the only incident of its kind, it did prompt both FUNAI and the state governor Getulio Cruz to threaten the closure of these clandestine mines. The first plan to remove the *garimpeiros* (known as

declined to 11 tons, while the Receita Federal processed documentation for the increased amount of 8 tons, representing 72% of total production. The figures for 1990 are 11 tons produced (USAGAL) of which 6 were registered, giving a registration rate of 55%. There is no evidence that the authorities succeeded in cutting down on levels of contraband, and so it is highly unlikely that over half of total gold production was declared to the Receita Federal in these ultimate two years. This suggests that the USAGAL estimate for total production is conservative, and if it is assumed that only 40% of production was officially registered in 1989-1990 then the USAGAL estimate of total production can probably be increased by 13 tons to 49 metric tons with a total value of US\$ 735 000 000 (calculated at an average of US\$ 15 per gram).

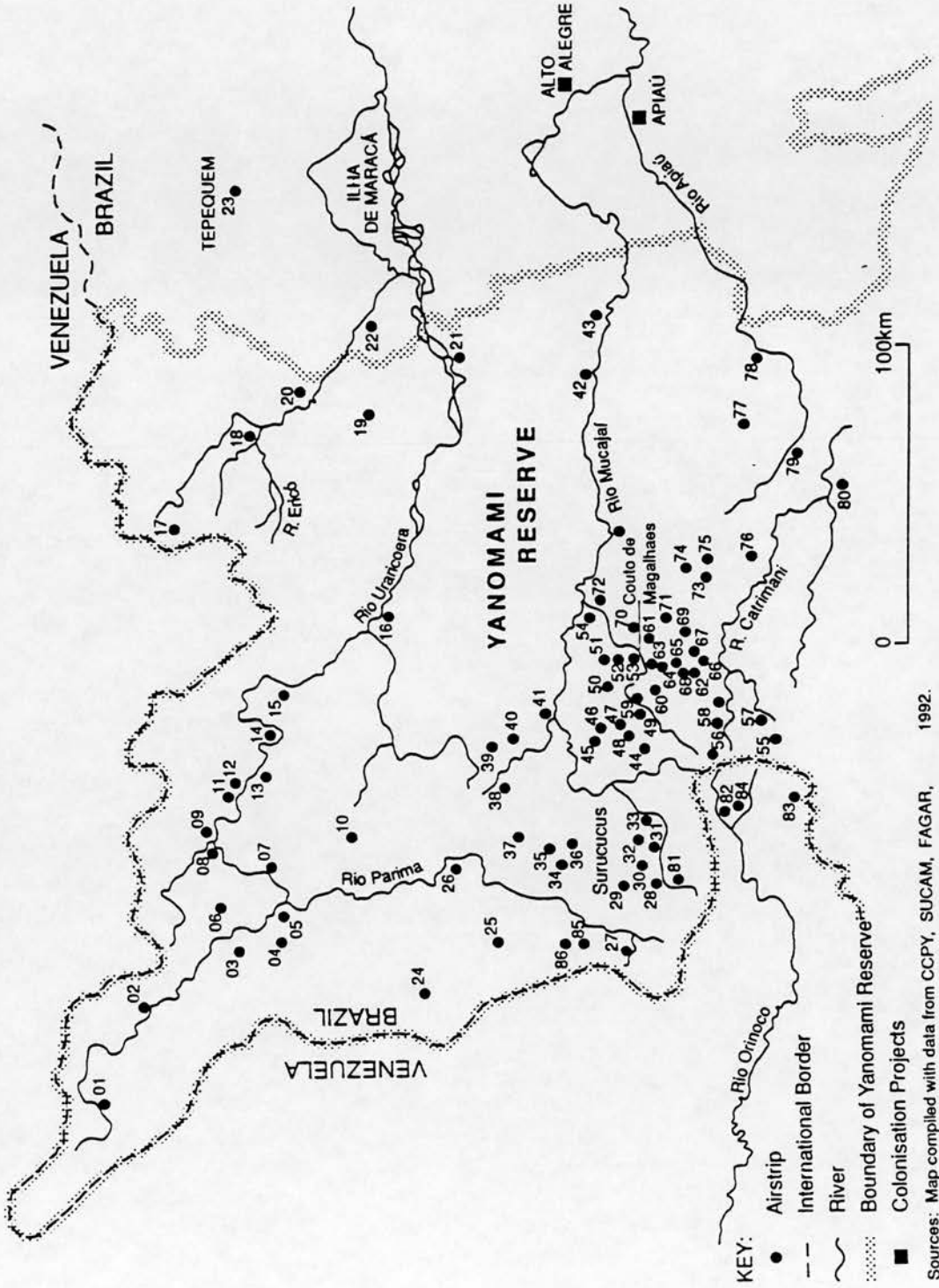
Operação Roraima) was launched in September 1987, but its complete inefficacy simply demonstrated a lack of political will to tackle the problem with conviction. The *garimpeiros* became increasingly aware of the authorities' reluctance to curtail mining activities in the Yanomami reserve.

In fact the government and the armed services were not only loath to intervene in the burgeoning rush, but they actually endorsed it. A military project known as Calha Norte (literally meaning northern trench) provided the infrastructure that greatly facilitated the *garimpeiros'* access to the Yanomami reserve. This project was formulated in 1985 and encompasses all Brazilian territory lying north of the rivers Solimões, and Amazonas (24% of the legally defined Amazon). The initial phase of Calha Norte ran from 1986 to 1990, and it sought to increase the occupation of the northern Amazon by stepping up the military presence in this area. Among other specified objectives, Calha Norte aimed to improve the transport and energy network, to attract new settlers and investment as well as to define an appropriate Indian policy in the area. The most polemic aspect of the Calha Norte project concerns its impact on the Indian groups of the northern Amazon. As one observer has noted;

'The rationale for Calha Norte, as a project for "bringing poles of development into the interior" under military control, revolves around a strategy to reduce Indian territories in order to facilitate the access of large-scale mining companies and placer-mining groups to the deposits located in these lands' (Albert 1992 p.52).

Events at the airstrip of Paapiú provide a candid illustration of this. Paapiú (number 50 on fig 2.3) is located beside the Couto de Magalhães river,

Fig. 2.3 Map of the airstrips used during the 1987-1990 Goldrush in the Yanomami Indigenous Reserve.



Sources: Map compiled with data from CCPY, SUCAM, FAGAR, 1992.

List of the airstrips marked on figure 2.3

The name of airstrip is given first and where the name of the owner is different it is given in brackets afterwards (? = owner not known).

01 Auaris (MEVA -Calha Norte)	55 Nova do R. Nenêm
02 Olomai (MEVA)	56 Bibiano
03 Vitalino	57 R. Nenêm
04 Junior Brefo	58 Bibiano
05 Fazenda Parima (Gaucho Animal & Vivi)	59 Novo Cruzado (Marcelo)
06 Nossa Senhora Aparecida (Roberto)	60 Comunidade (Osmar & Jurema)
07 Jovair	61 Alexandre
08 Paulo Alceu	62 Biano Marcelo II
09 Luiz da Agropecuaria (Luiz & Olimpico)	63 Valmor
10 Chico Jacare	64 Raimundinho (Robertinho)
11 Quincas Bonfim	65 Baiano Marcelo
12 Raimundo Pau Grosso	66 Aroaldes
13 Mucuim (Eloi Viana)	67 Calistro
14 Rangel II	68 Buri
15 Waikas (FUNAI)	69 Nova do Marcelo
16 Palimu (MEVA)	70 Gaucho Animal (Cesar Greigar)
17 Surubai (?)	71 Marcelo
18 Ericó (FUNAI - Calha Norte)	72 Mineração (Antonio Rogério)
19 Osvaldo II	73 Cambalacho (Alex. & Robertino)
20 Nova de Santa Rosa (?)	74 Botinha (Galdino Antonio)
21 Osvaldo	75 Wando Acreano (Chico Ivanísio)
22 Santa Rosa (Gov. of Roraima)	76 Helio
23 Tepequém (Gov. of Roraima)	77 Rio Novo (Gov. of Roraima)
24 Santo Antonio (?)	78 Nova do Apiaú (?)
25 Fogo Bravo (Antonio)	79 Apiaú (Gov do Roraima)
26 Xiriana (Mineração Xiriana)	80 Cristovão
27 Tomé Mestrinho	81 Banana (?)
28 Pedro Jacaranda	82 Constituinte (?)
29 Pupunha	83 Sadam Husein (?)
30 Oliveira	84 Rainha de Inajá (Dicão)
31 Jeremias	85 Atatais (Lauro Texeira)
32 Tarzã (Chico Malária)	86 Parimá (José Altino)
33 Baiano Formiga	
34 Americanos (MEVA -abandoned)	
35 Surucucús (FUNAI - Calha Norte)	
36 Docego (CVRD)	
37 Picão	
38 Mestre Pedro	
39 Gaucho Chapeu Preto	
40 Paulista	
41 Raimundo Nenêm II	
42 Missão de MEVA (FUNAI)	
43 Baixo Mucajaí (FUNAI)	
44 Rubens	
45 Fernando	
46 Chico Ceará	
47 Mestre Pedro	
48 Caveira I (Adão Neguinho)	
49 Caveira II (Adão Neguinho)	
50 Paapiu (FUNAI - Calha Norte)	
51 Jonas Dias (J.D Carneiro)	
52 Dudu	
53 Rangel	
54 Senzala	



which is a tributary of the Mucajai at the centre of the region's gold fields. The airstrip was originally constructed in the early 1970s by protestant missionaries (MEVA) who went to the area on short evangelization trips to catechise the Indians. A permanent presence at Paapiú was not established until 1981 when FUNAI built a post next to the airstrip, which was itself extended in 1986 by the Brazilian airforce (FAB) under the Calha Norte project. Tenente Mota, a military policeman charged with overseeing the airstrip, saw the *garimpos* that the Yanomami were working manually nearby and recognised the considerable mineral wealth of the area. Informing other miners of his discovery, the Tenente organised a group of well-armed *garimpeiros* to fly into Paapiú and invade the airstrip in December 1987. The Airforce, made no attempt to expel the invaders and FUNAI subsequently abandoned its outpost at Paapiú in 1989 leaving the *garimpeiros* with unrestricted use of the airstrip. The strategy paid dividends for Tenente Mota, having negotiated with João Davi Yanomami¹⁶, a local village leader, he established his own *garimpo* in the vicinity.

Following this incident Paapiú became a small settlement in the heart of the Yanomami reserve, servicing some of Roraima's most productive *garimpos*. Within five hours walk of the airstrip, Vando Preto (a smallholder from the Apiaú colonisation project) had discovered a spectacularly rich grotto which

¹⁶ João Davi, Iaduce, and Marcelo Yanomami were three Indians from the Paapiú area who spoke Portuguese and negotiated to varying degrees of success with the *garimpeiros*. João Davi, being head of one of the Yanomami communities at Paapiú, charged the miners a landing fee for use of the airstrip which generated a considerable income until his authority ceased to be respected. In 1989 Marcelo became an outspoken supporter of *garimpagem* and featured in media reports arguing for the continued presence of *garimpeiros* on Yanomami land. Yaduce owned a set of mining pumps and having worked for a number of years in partnership with various *garimpeiros*, he became disillusioned and bitter about his mining experiences, claiming that he had been cheated. He was shot dead near Paapiú during an argument with *garimpeiros* in January 1992.

earned both him and his partner over one hundred kilograms of gold each¹⁷. Between the sites lay the "igarapé da Caveira" which also became a heavily mined area next to which lay the *garimpos* of "Chico Ceará", "Mestre Pedro", "Jonas Dias", "Rangel", and "Dudu" (numbers 46, 38, 51, 53, and 52 on figure 2.3). Thus Paapiú not only yielded access to a strategically important auriferous zone, but its opening-up also defined a new political climate of support for the illegal activities of the *garimpeiros*.

The gold rush enabled the military to fulfil some of the principal objectives enshrined in the Calha Norte project. The strategists were seeking to promote the integration of western Roraima with the rest of Brazil, and the 'living frontier' of *garimpeiros* moving into this area helped them achieve this goal. In supporting the rush the military saw an opportunity to further their own geopolitical agenda, though clearly at considerable cost to the local Indian population:

'They [the military] decided to absorb and attempt to control the dynamic *garimpeiro* frontier in the Yanomami area, in spite of its considerable ecological and social costs, furthering the fundamental objectives of the Calha Norte; the economic and military occupation of northern Amazonian frontier space to the detriment of its Indian populations' (Albert, in press: 43 - my translation).

For this very reason the gold rush gathered momentum under an increasingly sympathetic political climate. Potential objectors to events within the Yanomami reserve, including anthropologists, health teams, and missionaries, were expelled from the area in 1987. This embargo, which lasted until 1990,

¹⁷ Correio de Garimpeiro Dec 1988.

prevented interested third parties from closely monitoring the impacts of the gold rush on local people. The gold rush itself gained further support with the appointment of the two subsequent governors of Roraima, General Klein (12/10/87-16/09/88), and Romero Jucá (16/09/88-01/08/90), both of whom vigorously defended the *garimpeiros'* occupation of Indian lands. In this way, a flagrant breach of the Brazilian constitution was deemed politically acceptable by both the federal and state governments.

2.4 Discovery of the Alto Mucajaí gold fields.

At the end of 1987, the *garimpeiros* were well established in the headwaters of the Apiaú, Catrimani, and Couto de Magalhães rivers. But large areas of the Yanomami reserve still remained to be explored, and considerable sums were being reinvested in prospecting expeditions. The following account shows how the *garimpeiros* undertook this geological research using light aircraft to support prospecting in very remote areas. Although *garimpagem* varies somewhat between different parts of Amazonia, a number of common work relationships nonetheless apply. For this reason, the central characteristics of a *garimpo's* genesis and development, illustrated in the case study below, are broadly representative of *garimpagem* as practised throughout the Brazilian Amazon ¹⁸.

Daniel, the owner of a 1200 hectare ranch along the BR 210, came to Roraima in 1986 when his construction company in Brasília fell victim to the economic contractions induced by the Plano Cruzado. The difficult financial situation facing small

¹⁸ For a more detailed discussion of the internal social and economic relations of *garimpagem*, see Cleary (1990). In Roraima, *garimpagem* most closely follows the model established in the Tapajós and other areas like the Alto Rio Negro, where aircraft provide the only means of access. This account is distilled from a series of interviews conducted in Boa Vista in July 1991.

ranchers prompted him to enter the *garimpo* of Novo Cruzado in October 1987 although he had no previous experience of *garimpagem*. By January 1988 he was working manually in the *fofoca* at the *garimpo* of Vando Preto and within a month he had borrowed a set of two-way radios, pooled his gold earnings together with four partners and organised a prospecting team from Baiana Marcelo's recently constructed airstrip at Novo Cruzado (no 59 on fig 2.3). While Daniel coordinated the expedition from his base at the airstrip, his partners spent two months testing the alluvium of the streams and tributaries along the upper reaches of the river Mucajaí.

After a month they required more supplies and so cleared a patch in the forest with a chainsaw which they carried with them. Passing their rough location over the radio to Daniel, they arranged an airdrop at a set time the following day (e.g. 7.00 a.m. 6 days walk up the left bank of the Mucajaí above the Melo Nunes river). Daniel bought the necessary supplies and chartered a light plane to fly over the area at the designated time, being guided to their location by a column of smoke from a fire which they had lit in a corner of the clearing. Once overhead, Daniel dropped the supplies after checking that their sign of a blue and red hammock laid out in an "L" shape was visible in the clearing below. This precaution ensured that he did not inadvertently supply any of the numerous other prospecting teams working in the area with their provisions.

The team had luck, and like many other finds along the Mucajaí, they were led to a gold rich site by a Yanomami whom they had befriended in the forest¹⁹. Their find was made on Easter Saturday 1988 and

¹⁹ Being unaware of the historical events that introduced mining to the Yanomami communities in the Mucajaí, the *garimpeiros* believed that missionary groups working in the area had taught the Indians to extract gold for the benefit of their religious institutions.

was named the "Grotta de Tarzã" after the nickname of one of its discoverers. Having each invested 800 grams of gold on prospecting, the partners would recover 40 kilograms a head from the site. Two members of the group stayed to start mining the richest deposits manually, whilst the other two made a direct route back to the airstrip at Novo Cruzado. Simultaneously, Daniel, having been informed of the discovery over the radio, borrowed some gold and organised the provision by air of the necessary supplies to the infant *garimpo*.

This behaviour attracted the attentions of other *garimpeiros* at Novo Cruzado, a number of whom accompanied Daniel and his two partners on the eight-day walk back to the "Grotta de Tarzã". Having discovered the site, the partners are automatically recognised as owners (*donos*) of the new *garimpo*. In accordance with this position they allocated plots of land to the incoming *garimpeiros* on which they could mine manually.

Gold mining in alluvial material is very simple. A wooden sluice box is constructed and lined with a sacking. Horizontal wooden bars known as riffles are placed across the sacking, and the gold bearing material is passed over the whole contraption with large quantities of water. This itself will retain a percentage of the gold particles, but rates of recovery are greatly improved by the use of mercury. As mercury amalgamates with gold, its increased weight lodges more effectively in the sacking and behind the riffles of the sluice box²⁰.

Some of the earlier arrivals were engaged by Daniel and his partners in a working relationship known as *meia-praça*. Under *meia-praça* the *dono(s)* of the *garimpo* supply the incoming *garimpeiros* with food

²⁰ The use of mercury and the issue of mercury pollution are discussed in greater detail in chapter 7.

and a plot of land to mine in return for half of the gold extracted by the contracted *garimpeiros*. During the first four months of the "Grotta de Tarzã", 400 *garimpeiros* were working manually in gold extraction, of whom only 30 were engaged in *meia-praça* work relations. The rest mined under a different work relationship literally termed 'at one's own expense' (*por conta própria*). The distinction rests more on the provision of food than anything else, but it does affect the distribution of gold income among the workforce. *Garimpeiros* working 'at their own expense' are responsible for their own catering arrangements, but are nonetheless obliged to give 40% of their gold production to the *donos do garimpo* in payment for the plot of land that they have been allocated. However in remote *garimpos*, such as those of western Roraima, the *donos* have a monopoly over the supply of all foodstuffs which they then sell at considerable prices to the *garimpeiros*²¹. This constituted an important source of revenue for Daniel and his partners, together with the taxes they levied on gold production. From their income, they not only contracted gunmen to police the *garimpo* and extract their dues, but they also had to re supply the site by air at a cost of 200 grams of gold per airdrop.

Once the most easily accessible deposits had been exploited manually, the *donos* ceded their right to construct an airstrip to a mutual friend called "Chico Malária". In August 1987, Chico invested about four kilograms of gold with his partner to finance the construction of the airstrip, which took twenty labourers forty five days to complete. For every plane or helicopter that touched down on the strip, Chico and his partner charged the standard 10 grams

²¹ On the whole, basic foodstuffs in the *garimpos* such as sugar, salt, rice, beans, and manioc flour all cost three to four tenths of a gram of gold per kilogram (US\$4). Luxury items were more expensive; a can of beer was half a gram, while a pack of 6 batteries for a radio, or a packet of cigarettes would each cost 1 gram. (Cruz & Costa 1989)

of gold landing fee and throughout the summer months the *garimpo* regularly received over thirty flights a day²². The completion of the airstrip also acted as a springboard for further prospecting, but even before it had been commissioned, a number of important finds had been made in the vicinity. Groups that had been prospecting near the site at the time of Tarzã's discovery rapidly focused their attentions on the surrounding area. "Baiano Formiga" passed the site four days after its discovery and within the week he had struck gold nearby. The principal *garimpos* of the Alto Mucajaí such as "Jeremias", "Pedro Jacaranda", and "Popunha" were all established in a similar way during this period²³ (nos 31, 28, 29 on fig 2.3)

The construction of an airstrip in a *garimpo* is a mixed blessing to the *garimpeiros*, for while it greatly facilitates the transport of people and provisions, it also heralds the arrival of machinery which may replace a large proportion of the manual workforce. In semi-mechanised *garimpagem*, teams of five to six people (including a cook) are employed operating a set of diesel-fuelled pumps. The jet from one of the pumps is used to blast into the sediments which are then sucked up by a large tube connected to the other pump. The material is then passed over a sluice box to separate out the gold in exactly the same way as in manual extraction. In fact, Daniel had airlifted the first such set of equipment into the "Grotta de Tarzã" by helicopter over a month before work had begun on the airstrip. Even though it cost him over two kilograms of gold to install the machinery in this way, it allowed him to exploit some of the most concentrated deposits before the site was

²² As time passed, the "Grotta de Tarzã" was more frequently referred to as the "Pista de Malaria" (Malaria's airstrip); it is usually only when the *dono* also constructs the airstrip that the *garimpo* retains its original name (e.g. *garimpo* de Raimundo Nenêm).

²³ This region is well described by Monbiot (1992) who visited the area in 1990.

opened up to other more capitalised *garimpeiros*²⁴. On completion of the airstrip the *donos* installed a further seven sets of mining pumps. They also sold off two large patches of land to two wealthy *garimpeiros* called "Bigode de Cavalho" and "Zé Bigode", each of whom managed ten sets of the same equipment on their plots. The *garimpo* therefore employed between 166-196 individuals on 28 sets of machinery, in comparison to the 400 who had worked there manually.

Under the manual regime the *garimpos* often have to close during the wet season when heavy rainfall fills their mining pits, but the seasonal nature of *garimpagem* is reduced once pumping equipment has been installed. *Garimpeiros* often weigh up the benefits of this extended mining calendar against their changing economic prospects. For while employment on the machinery still offers reasonable wages, the best opportunities for striking it rich undoubtedly lie in the very early manual workings at recently discovered sites. Besides, conditions are often healthier before machines are introduced to a site. The incidence of malaria tends to increase following their installation because mechanised mining rapidly expands the area of standing water in the *garimpo*, creating ideal breeding grounds for the anopheles mosquito. For these reasons alone, non-capitalised *garimpeiros* often prefer the harder option of manual work in the earlier stages of a *garimpo's* life to subsequent employment as machine operators.

The changing work relations incurred by the adoption of semi-mechanised production are also an important consideration in this equation. Generally, the individual *garimpeiro* receives a lower fraction

²⁴ In areas where no airstrip has been constructed, machinery can only be transported by helicopter. In such circumstances diesel fuel must be supplied by airdrop. The diesel is usually injected into large gas canisters (which are more commonly used as containers for domestic cooking fuel) to survive the impact.

of the total gold extracted mechanically, but because a far greater volume of material is being processed, wage rates do not necessarily fall. The six person crew operating a set of mining pumps share between them thirty percent of the gold recovered from the operation. The remaining seventy percent accrues to the owner of the equipment (*dono de maquina*), from which the running costs and catering expenses are deducted. A set of the same mining pumps may also be mounted on a raft (*balsa*) to extract gold from river sediments. A team of four divers rotate two hour shifts, sucking up material from the river bed with a vacuum-pumped hose. Their return for undertaking this more dangerous work is a 40 percent share of the gold production, split between them. Again, this leaves the owner (*dono de balsa*) with the remaining larger portion, from which catering and operating expenses are deducted. In both situations, *garimpeiros* are effectively engaged under the *meia-praça* arrangement, in so far as their food and accommodation is supplied by the owner of the machinery.

The salient point emerging from this discussion is that while the *garimpo* workforce receives a reasonable fraction of the gold they extract, a sizeable proportion of total production is concentrated in the hands of the *donos*.

2.5 The drift towards Venezuela, and the expansion of tin production.

Prior to the completion of Chico Malária's airstrip, Amadeus, one of the team that had discovered the "Grotta de Tarzã", resolved to continue prospecting. He was paid his share of the profits from his partners, some of which he invested in a ranch in Pará. Amadeus then undertook a 5 month long prospecting trip along the Venezuelan border around the base of the Surucucús plateau, and along the

Parima river which drains the upper reaches of the Uraricoera basin (see figure 2.3). Although he was not fortunate enough to uncover a second large deposit, his journey is interesting because it traces the path of the developing *garimpos*²⁵. The *garimpeiros* drifted into the headwaters of the principal rivers, searching for the source material of the secondary deposits they were mining. This movement into the watershed brought them into the area which is most densely inhabited by the Yanomami²⁶. But while this itself increased pressure from Indian rights groups for government intervention in the gold rush, the *garimpeiros* gained new political adversaries when they crossed into Venezuela and started to mine in the upper reaches of the Orinoco catchment. As this frontier is not clearly defined, the Venezuelan government reacted aggressively to the construction of various *garimpo* airstrips (notably "Sadam Hussein", "Constituinte", and "Rainha de Inajá" numbers 83, 82, and 84) along the border. Tensions heightened when the Venezuelan National Guard shot down a light plane that was servicing these *garimpos* in January 1992²⁷.

Concern over the activities of Roraima's *garimpeiros* was mounting simultaneously from other quarters. One significant development during the latter part of the gold rush relates to the increased production of cassiterite. Due to its density, tin ore is extracted gravimetrically using the same technology employed in gold mining. In 1987

²⁵ Amadeus' behavior is also interesting as it reflects some *garimpeiros*' ability to turn their back on huge quantities of wealth and reject a comfortable lifestyle for adventure.

²⁶ This movement was observed by technicians from the Brazilian space institute (INPE) working on a FUNAI project to monitor the gold rush using T.M.Landsat images (Liu et al. 1990)

²⁷ The exact line of the frontier was under review in 1991 and this shooting incident, which resulted in the death of two Brazilians, occurred while a bi-national surveying team was mapping the border. Evidently, the high military presence on either side of the frontier, the mineral potential of the soil, the international attention focused on the Yanomami as well as the uncontrolled movement of large numbers of armed *garimpeiros* in the area, formed a tense political backdrop to the boundary survey.

garimpeiros working gold in the Alto Mucajaí usually discarded cassiterite on account of its comparatively low value-to-bulk ratio. Subsequently however, *donos do garimpo* started to buy the mineral at cheap prices from *garimpeiros* (from both manual and mechanised production) and transported it back to Boa Vista whenever space was available in any returning aircraft. By 1989 a number of *garimpeiros* had begun to specialise in cassiterite production working around the Surucucús plateau. Typically the tin ore was dried and stockpiled before being sold to freelance intermediaries who negotiated with larger companies such as "Paranapanema" and "Best Metals and Solders". These middlemen usually arranged road transport of the mineral to Manaus or the South of Brazil.

The high costs of transporting tin ore and the limited number of potential buyers ensured that cassiterite (unlike gold) was handled mainly by *donos do garimpo*, pilots or dealers. Not surprisingly therefore, an oligopoly rapidly emerged over the production of the mineral. According to cassiterite dealers in Boa Vista, two ventures backed by different sources of multinational capital started extracting and transporting large quantities of tin ore from Surucucús towards the end of 1989. The *donos* of these two operations came to dominate tin production in Roraima, airlifting tons of the mineral in DC.3 aircraft from airstrips over a kilometre in length, constructed in the Yanomami reserve. In both cases, they stockpiled the ore on ranches between Alto Alegre and Boa Vista before passing it on to their creditors as repayment for their initial loans.

The increase in cassiterite production was of great concern to the Association of Tin Producing Countries (ATPC). The ATPC aims to maintain a high and stable price for tin on the world market by

encouraging its members to accept production quotas. World tin prices plummeted by sixty percent between 1985 and 1990 (see fig. 2.1)²⁸ following the collapse of the International Tin Cartel (ITC) in October 1985. By the end of the 1980s the ATPC was struggling to restrict production in the face of a contracting world market as the industrialised countries entered recession. Although Brazil is only an observer at the ATPC discussions, she does accept a voluntary production quota and has come under increasing pressure from the Association to control informal sector tin production in Amazonia²⁹. The tin trade was in such a precarious state during the late 1980s that the prospect of high quality Surucucús cassiterite flooding on to international markets is accredited with depressing world tin prices in the second half of 1989 (DNPM 1990). Clearly, it was the larger producers such as the Brazilian national Paranapanema³⁰ who had most at stake and so they too began to lobby the government for the closure of the *garimpos* in western Roraima.

2.6 The impact on indigenous communities.

The direct impact of this gold rush was absorbed by the Yanomami, one of the world's most isolated

²⁸ This slump in world tin prices has been exacerbated by the USA releasing 13 000 tons of strategic reserves on to the market in 1991. These stocks had been built up during the cold war and were sold at a time of economic recession. As the principal steel consuming countries such as Japan and West Germany were simultaneously experiencing reduced economic growth, this action by the USA coincided with decline in world demand for tin.

²⁹ The pressure on Brazil to restrict informal sector tin production is clearly noted in the 'Summary of the Proceedings of the Thirteenth Session of the Executive Committee of Tin Producing Countries' (ATPC Canberra Australia 15-18 Oct 1991). At this meeting Brazil agreed to accept a voluntary production quota of 34 000 tons (metric) in 1992 and to limit her exports to 28 000 tons, she was also encouraged to become a fully participating member of the ATPC. The text emphasises that Brazil will continue to exercise control over the proof of origin of all tin concentrates sold. DNPM legislation which seeks to enforce this has dealt a severe blow to Amazonian cassiterite dealers who act as the middlemen between the *garimpos* and the formal sector companies.

³⁰ Paranapanema is one of the world's largest tin producers, responsible for 13% of global production in 1987 (Andrade 1989).

indigenous groups. The invasion of their lands by *garimpeiros* was accompanied by the introduction of malaria and other diseases, such as leishmaniasis, to which they had no natural resistance. It is particularly disturbing that the Brazilian government denied health teams access to the Yanomami reserve during this critical period. Physical violence between *garimpeiros* and the Yanomami probably accounted for a smaller number of deaths than disease. A lawyer for the Indigenous Council of Roraima (CIR) has specific records on the murders of 14 Yanomami between 1987-1992 (CIDR 1992). But many more incidents probably went unrecorded as it is taboo in Yanomami society to refer to the deceased. The consequences were devastating. Between 1988 and 1990, an estimated 15% of the Yanomami population died (FUNAI/CIMI/INESC/NDI 1991). Medics were not allowed back into the area until the end of 1990, by which time government intervention had considerably slowed the gold rush. A concerted attempt to provide emergency healthcare was made in the following year, although logistical difficulties, inconsistent funding and poor co-ordination reduced the efficacy of the project (known as the 'Yanomami Health Project'). In essence, the provision of health care to the Yanomami in their hour of greatest need can be summarised as 'too little too late'.

The welfare of the Indians was also prejudiced by the environmental degradation accompanying the gold rush. Hunting [notably of tapir (*Tapirus terrestris*), agouti (*Agouti paca*) and peccary (*Tayassu pecari*)] became increasingly difficult in the vicinity of the principal mining centres as game was shot by the *garimpeiros* and was also scared off by the mining activity. Habitat destruction itself should be qualified as *garimpagem* is not directly responsible for widespread deforestation. While

trees are removed to gain access to deposits, the concentration of work in confined sites ensures that the total areas deforested are small, particularly when compared to other land uses in Amazonia. Nevertheless, virtually all the vegetation is stripped from areas of intensive mining and as this is usually along streams, localised water courses are totally transformed³¹. The churning of river sediments not only pollutes the drinking water, but it also disrupts the reproductive cycle of fish which are the principal source of protein in the Yanomami diet.

It is possible that these physical alterations may be ameliorated over a relatively short term following the termination of mining activity. However, mercury contamination of the aquatic ecosystem could continue for decades. The use of mercury is common to all types of gold mining technology employed in the *garimpo*. As well as placing mercury in small reservoirs within the equipment, *garimpeiros* often mix the metal with gold-bearing sediments in the mining pit (*barranco*) itself. The miners periodically stop washing the sediments over the sluice boxes to recover their haul. The riffles are removed, and the gold-mercury amalgam which has lodged in the sack lining of the sluice box is swept down into a metal prospecting dish. Here any excess mercury is carefully separated, and poured back into a storage bottle for future use. A gold-mercury amalgam remains in the bottom of the prospecting dish and this is then heated (usually with a blow torch) so that the mercury vaporises, leaving only the gold. The mercury therefore may

³¹ Dourojeanni & Padua (1992) note that on average, one cubic meter of sediments is processed for every 2 grams of gold recovered under mechanised extraction, but they give no indication of how this calculation has been made. Moreover, geological variations prevent the use of a formula calculated in one area to evaluate mining impacts elsewhere. Nonetheless, it does give some indication of the scale of sedimentation caused by the extraction of tons of gold.

enter the watercourses directly or as rainfall when the vapour is condensed out of the atmosphere. Initially it accumulates in stream and river sediments in an inert metallic state, but it is subsequently transformed into an organic form through a process known as methylation. This process is generally accelerated in acidic waters which have high rates of conductivity (Malm et al 1990). Having undergone this transition, the organic mercury may be absorbed by aquatic biota and accumulates in the food chain, typically attaining highest concentrations in the tissues of predatory fish and caiman.

While mercury vapour may be inhaled directly by *garimpeiros* and gold traders³², surrounding communities are often contaminated by consuming fish from the polluted rivers which drain the mining areas. The symptoms of mercury contamination are in many ways similar to those of malaria, thus complicating its diagnosis. These include trembling of the extremities, headaches, poor vision and, in extreme cases, unconsciousness and death (Silbergeld 1989). Analysis of hair samples from 162 Yanomami in 1990 recorded above-average levels of mercury from villagers living around Paapiú and Surucucús³³. But no samples exceeded the World Health Organisation's (WHO) maximum permissible concentration of 6 μ g of methyl-mercury/g of hair (Castro et al 1991). However, a detailed study is required of Yanomami dietary habits (to provide data on levels of mercury uptake), as well as accurate information on the degree to which the aquatic ecosystem is already

³² Dealers both in the *garimpo* and in urban areas always heat gold with blow torches before weighing it to ensure that all of the mercury has been driven off. When this process occurs within the *garimpo*, the broad hats that *garimpeiros* typically wear may exacerbate the absorption of the toxic vapour as it billows around their faces.

³³ 40% of the population in these areas registered concentrations of mercury greater than 6.0 ppm. These are relatively low levels of contamination compared to those noted in more traditional mining areas such as the Tapajós and Madeira, reflecting the relatively short period of gold mining in Roraima.

contaminated, before the full implications of mercury discharges on the health of the Yanomami can be accurately assessed (pers. comm. Bruce Forsberg 1991).

The changes mentioned above refer to the physical effects of the gold rush on the Yanomami, and can be measured. But its impact on Yanomami social organisation and cosmology will probably never be fully comprehended. The Yanomami, in common with many indigenous peoples, believe that spirits dwell in the natural environment around them. Davi Kopenawa Yanomami explains that the detrimental consequences of the gold rush therefore extend into the spiritual world. 'Xawara', a spirit manifest as a vapour, is released from the subsoil during mining and is responsible for the ill health that afflicts both the Yanomami and the *garimpeiros*. Ultimately, 'Xawara' threatens to undermine the protective spirits 'Hekurabe' which support the sky and preserve the forests. The consequences of continued mining are apocalyptic for both the Indians and *garimpeiros* alike, as the demise of the Hekurabe heralds the end of the world (Ação Pela Cidadania 1990).

2.7 The decline of the gold rush.

Even though domestic and international pressure was mounting for the expulsion of the *garimpeiros* from the Yanomami lands, a series of laws were passed which legitimised their activities within the area. The inter ministerial decree 250/88 of 10/11/1988 reduced the intended continual Yanomami reserve of 8 million hectares to 2.4 million hectares, composed of 19 separate islands. The area surrounding these isolated Indian reserves was designated a national forest within which *garimpeiros* were free to operate. Two subsequent presidential

decrees signed on 25/01/90 and 16/02/90 went one step further by designating three areas specifically for *garimpagem* within the recently established national forest. These were the three *garimpeiro* reserves of Uraricoera, Uraricáa-Santa Rosa, and Catrimani-Couto de Magalhães, which are marked on figure 2.1. Although these were created to appease strong lobbying by *garimpeiros*, the impressive gold fields of the Alto Mucajaí, as well as the tin ore deposits of Surucucús, lay outside these areas. Even so, the *garimpeiros* started to shift their operations into the designated reserves where a number of *donos* made heavy investments in prospecting, constructing airstrips, and installing equipment. Encouraged by the government's legal recognition of their work, they aimed to secure a major share in what appeared to be a promising future.

The situation changed dramatically in March 1990 shortly after Fernando Collor de Melo replaced José Sarney as President of Brazil. He immediately revoked the decrees signed by his predecessor and, under a blaze of publicity, declared his resolve to expel the *garimpeiros* from the whole area that had originally been proposed as a Yanomami reserve (9.4 million hectares). The operation "Selva Livre" ("free forest") was implemented and teams of federal policemen were ordered to destroy the clandestine airstrips and remove all *garimpeiros* from the area. The temporary *garimpeiros* were the first to be squeezed out by this action, mostly returning to their alternative forms of employment. However, a large number of the professional *garimpeiros* stayed on, repairing the damaged airstrips which the police had blown up. Ironically, this intervention actually increased the economic opportunities presented to many of the *garimpeiros*- particularly those who owned sets of pumping equipment (*donos de maquinas*). This

is because the monopoly exerted by the *donos do garimpo* was effectively destroyed when their airstrips were dynamited. *Garimpeiros* who continued working in these areas were therefore no longer obliged to pay fees or buy land off the *donos de garimpo*.

Towards the end of 1990, a more convincing phase of Selva Livre was implemented and federal police forces started to destroy the motors of any mining equipment they encountered in the *garimpos*. This crippled many of the remaining operations, but more significantly, it drained the momentum of the gold rush which had been sustained by a rapid reinvestment of earnings in prospecting and equipment. Some of the more resourceful *garimpeiros* avoided this action by moving further south within the Yanomami reserve to mine around the Pico de Neblina in northern Amazonas³⁴ or by drifting west into Venezuela, although the Venezuelan National Guard were also trying to evict them from that side of the border. Nevertheless, a large number of professionals did leave the reserve, principally heading for the diamond *garimpos* on the *cerrado* of Roraima and Guyana (Monbiot 1992), as well as returning to the gold fields of the Tapajós and Alto Rio Negro.

In spite of its forceful intervention, the government never fully succeeded in halting mining within the Yanomami reserve. Throughout 1992 there were approximately 2000 people working in the area at any one time and this number had risen to an estimated 11 000 by early 1993 (Financial Times 20/02/93). The government's inability to prevent this re-invasion illustrates the power of the socio-economic pressures that fuel *garimpagem* in

³⁴ CCPY 1991 notes a proliferation of *garimpo* activity in the headwaters of the Mapulau, Toototobi, Demini, and Tarau rivers. One of the more prominent *garimpeiros* who moved to the region of Pico de Neblina in 1991 was Marlon Pinheiro of Serra Pelada fame.

contemporary Amazonia. If there are no significant political changes in the immediate future, the number of *garimpeiros* working in western Roraima will probably continue to fluctuate in response to the intensity of police vigilance, the price of gold, the time of year, the cost and availability of fuel, and variations in other sectors of the regional economy.

Roraima's *garimpos* are not exceptional in provoking government intervention. A similar response restricted production in Pará's Serra Pelada in 1983, and in Rondônia's massive cassiterite *garimpo* of Bom Futuro in 1991. In both of these cases, the rights of *garimpeiros* to exploit the deposits were being contested by the formal mining sector. Nor was the Roraima rush a unique event that brought *garimpeiros* into direct conflict with Indians. The Kayapó of Pará, the Waiampi of Amapá and the Tukano of Amazonas have all shared similar experiences to the Yanomami in this respect. Furthermore, it is likely that the invasion of Indian lands throughout the Amazon will continue as more accessible gold deposits are mined out. The significant point is that the Roraima gold rush reflects the salient features common to informal sector mining as practised throughout Amazonia.

The government's inability to stop the Roraima rush convincingly is particularly relevant both to this discussion and to the analysis that follows. It suggests that the very phrase 'gold boom' gives the misleading impression that mining is abandoned when a natural cycle comes to a close. Both historical evidence and contemporary events prove this not to be the case. For example, mining continues to thrive in Roraima's diamond *garimpo* of Tepequém, even though its boom days terminated half a decade ago. There is a tenacity here that is seldom recognised, but which is nonetheless reflected in other activities. Perhaps

the most obvious parallel is to be found in rubber, which continues to be extracted eighty years after the rubber boom ended. Just as significantly, rubber tappers are still visible as a distinct social category on the Amazonian stage. Their history suggests that neither *garimpeiros*, nor their trade, will simply disappear when the heady boom days pass. Far from it, they will continue to fulfil a role, albeit a less conspicuous one, in the diverse social and economic landscape of Amazonia.

The following chapters look in greater detail at how *garimpagem* and its protagonists fit into their regional context. But this is not simply a case of slotting a piece of a jigsaw puzzle neatly into its designated space. Rather, a much more organic scenario arises from the complex social and economic interactions of modern Amazonia. Any hard edges to our jigsaw pieces are rapidly eroded as we witness considerable flux between a wide range of social groups and a diversity of livelihoods. The objective here is not to define and categorise the different actors in the theatre, but to interpret the relationships and interchanges between them that ultimately create the play.

Chapter 3 Just keep on digging away; smallholder agriculture and *garimpagem* in Amazonia

An estimated three million smallholders now live in the Brazilian Amazon (Richards 1992: 2). Many of them were given land along the federal highways in government colonisation projects during the 1970s. This planned agricultural settlement model was developed for the Transamazonian highway in Pará and was subsequently modified in the POLONOROESTE project along the BR 364 in Rondônia, before being extended to other areas. All the states in the Brazilian Amazon possessed government-administered colonisation schemes by the mid 1980s. Throughout the region the number of households settled in directed projects is paralleled by a large population of smallholders who have settled 'spontaneously' without government assistance.

This chapter examines the relationship between smallholder agriculture and informal sector mining in Amazonia, arguing that the two are frequently interlinked. But even before the smallholders arrived, Amazonian agriculture had already been strongly influenced by plans aimed at expanding the mineral sector. Regional economic development was one of the principal rationales behind the construction of the highway network, and potential mineral deposits which had been identified by the geological survey of the RadamBrasil project influenced the course of the planned roads (Fearnside 1984: 47). Some of the colonisation projects established along these highways are therefore close to substantial mineral deposits [e.g. Marabá (PA), Tucumã (PA), Altamira (PA), Alto Floresta (MT), Ariquêmes (RO), Presidente Figueiredo (AM)]

Labour was subsequently drawn out of these settlement areas and employed in mining nearby, but it is hard to argue that this was officially engineered. Although the state saw corporate mining as the principal vehicle for mineral exploitation in Amazonia, its emphasis on capital intensive production ensured that the formal mining sector offered hardly any employment to the local agricultural labour force¹. Instead it was through the informal sector that mining becomes most closely intertwined with the local agricultural economy. There is evidence from all over the Amazon of smallholders engaging in informal sector mining (Cleary 1990, Maennling 1987, Milliken 1991, Filho 1984, Hecht 1987). Indeed, Pereira (1990) has gone so far as to argue that the agricultural frontier of the 1970s has given way to a mineral frontier, which has shaped the occupation of Amazonia throughout the 1980s. Although other authors might be reluctant to conceptualise such developments in terms of frontier processes², there is a significant dynamic operating between the two activities which merits detailed research.

The life-histories of *garimpeiros* recorded throughout the Amazon reveals that a large proportion of them have previous agricultural experience. The data presented in table 3.1 is taken from three surveys of the socio-economic backgrounds of *garimpeiros* from three different Amazonian states over the past decade.

¹ For a detailed analysis of formal sector mining in the Amazon see Hall (1989)

² see Cleary in press

Table 3.1 The agricultural experience of *garimpeiros* in the Brazilian Amazon ³.

	state	sample size	have agric. experience	no agric. experience
CLEARY (1990)	MA.	100	53 (53%)	47 (47%)
PEREIRA (1990)	PA	168	135 (80%)	33 (20%)
MACMILLAN	RR	66	54 (82%)	12 (18%)
TOTAL		<u>334</u>	<u>242 (72%)</u>	<u>92 (28%)</u>

There is a considerable degree of overlap between the two activities. Half of the *garimpeiros* interviewed in each survey had previous experience in agriculture, and two thirds (72%) of the aggregated sample (334 people) have agricultural backgrounds⁴. This suggests that at least half of the workforce employed in the *garimpos* of Amazonia is drawn from the agricultural sector.

Even so, this gives no indication of the considerable seasonal movement between mining and agriculture. Pereira (1990) has collected most information on this topic. A third (32%) of the 168 *garimpeiros* he interviewed said that they returned to agricultural work during the rainy season. Another third (35%) continue mining (usually in other parts of Amazonia or Brazil) all year round and can therefore be considered professional *garimpeiros*, while the

³ All three studies are based on life history interviews in which *garimpeiros* were asked about their previous forms of employment. My survey was applied in Entre Rios to *garimpeiros* entering the *garimpo* of Jatapú in 1991; respondents were classified as having agricultural experience if they had worked in agriculture for at least one year. To avoid bias in interviewing *garimpeiros* working near a colonisation project area, *garimpeiros* who came from within 100 kilometres of Jatapú were excluded from the survey. As those excluded numbered 11 people, it can be estimated that local smallholders represented approximately 15% of the Jatapú *garimpo* during its early days.

⁴ The remaining 28% come predominately from cities, the majority having had employment in the informal sector of the urban economy.

remainder tend to gravitate towards the urban economy when not mining.

Thus, evidence from a range of different sources suggests that there is considerable interaction between mining and agriculture throughout the Brazilian Amazon. But the exact dynamics of this relationship remain virtually unknown. Even so, this is a relevant subject which is central to ongoing debates about the livelihood strategies and migratory behaviour of the Amazonian peasantry. As a contribution to these discussions the remainder of this chapter looks in detail at why smallholders go mining.

3.1 The fieldwork survey of colonist farmers.

A survey was undertaken to assess the involvement of Roraima's smallholders in the gold *garimpos* of western Roraima between 1986 and 1990. 288 colonist households were interviewed from February to September 1991 in the four government colonisation projects of Alto Alegre, Apiaú, PAD Anauá and Caroebe (see fig 1.3). Although questions were directed at both male and female members of the household, most women were very reluctant to respond either when alone or when accompanied by men. They often said that it was not their duty to discuss such matters and suggested that it was more appropriate to converse with the male head of the household. Consequently most of the information was provided by men, although women were often present and sometimes participated in discussions.

The four colonisation projects were selected for analysis because they were considered to be representative of Roraima's settlement programme as a whole. All of them are located on Ultisols (predominately red-yellow podsols), which are common to

Amazonia. They also display the herringbone pattern characteristic of Amazonian colonisation schemes, with farmsteads established every 200 to 300 metres along both the spinal access road and along the feeder roads which transect it perpendicularly at five kilometre intervals. In the case of PAD Anauá and Caroebe the spinal access road is a federal highway. Although there are some differences in the infrastructure of each colonisation project, the single most important variant to the smallholder is probably distance from the principal market of Boa Vista. Projects nearest Boa Vista, like Alto Alegre and Apiaú, are serviced by a government lorry which transports colonists' produce to the weekly urban market⁵. More distant settlement schemes, like PAD Anauá and Caroebe, lie beyond the catchment area of this free lorry service and farmers in these schemes often have to accept disadvantageous prices set by private merchants who have a monopoly on transport. Although farmers from these two southerly projects were better placed to sell produce in Manaus, the mining economy had made Boa Vista a more favourable market during the latter part of the 1980s and early 1990s, and so much of their agricultural output was trucked north.

The four colonisation projects, like others in both Roraima and elsewhere, are dominated by migrants from the Brazilian Northeast. In Alto Alegre, 85% of holdings were originally allocated (in 1978) to northeastern households (INCRA records; Boa Vista). Subsequent land sales had reduced this figure to 75% in 1991. PAD Anauá was initiated by the federal government

⁵ This transportation service was initiated in 1985, but received only limited support from the various state governors, and was abandoned for the best part of the gold-rush until 1991 when Ottomar de Souza Pinto took office and resuscitated the scheme. Roraima's smallholders are exceptionally fortunate in Amazonian terms in benefitting from this transportation service.

in the same year, but has a slightly lower proportion of Northeasterners (63%). Apiaú and Caroebe were established in 1981 and 1983 respectively, and although they too are dominated by Northeasterners (63% in the case of Caroebe according to SUDAM 1984), they contain a larger percentage of families who originate in the Centre-South of Brazil. Their occupation coincided with the second wave of colonisation from Rondônia identified in chapter 1. As INCRA cannot say with accuracy how many households currently reside within the colonisation project areas, this prevented a sample stratification on the basis of migratory origin. Even so, the sample taken appears to broadly represent the origins of smallholders in the state as a whole. Of the 288 households interviewed 199 (66%) originated from the Northeast, 42 (15%) from the Centre-South, and 55 (19%) came from other states.

Sampling in colonisation project areas is far from straight-forward because out migration and land sales ensure that colonist lots are often unoccupied, though rarely disowned. Silveira and Gatti (1988) estimate that 23% of those initially settled in PAD Anauá had abandoned the project by 1986; similarly, a survey (SUDAM 1984) of agricultural settlement along the eastern section of the BR 210 (which included the project of Caroebe) noted that 16% of the holdings had been sold within four years of the road's construction⁶. The trend is for an initially even distribution of households in colonisation projects to become less populous along feeder roads as producers with greater capital amalgamate several holdings and establish small ranches of 200-500 hectares in these

⁶ Even so these are far lower than rates of colonist attrition recorded in Rondônia and along the Transamazonian highway (which vary between 13-67% according to Hecht 1987)

areas (Coy 1987 :260 reports a similar trend in Rondônia). Because differences in the wealth of smallholders may acquire a spatial manifestation in this way, it was important to stratify the sample to avoid bias. Approximately half (46%) of the households interviewed were resident along the central axis road of the colonisation project, and the remaining 54% were situated along the less accessible feeder roads.

Another distortion comes from the tendency for migrants from a particular state to cluster along certain feeder roads. Land holdings along one feeder road may be dominated by a tight group of migrants who all flocked to the area on the advice of a relative or friend from their original community. It therefore becomes important to gain a detailed knowledge of the settlement process of any colonisation project before identifying the areas from which respondents are to be selected. In theory, random sampling of all feeder roads in any one colonisation project should be undertaken to avoid these problems, but in practice such a strategy may be prohibitively time consuming, particularly if the research is undertaken on foot. For not only does it entail travelling long distances to interview a handful of people on each feeder road, it is also likely that many of the land holdings randomly selected are either permanently abandoned, temporarily vacant, or annexed to another farmer's land.

Instead of using random sampling, a stratified systematic approach was adopted for this study in response to the problems outlined above. Familiarisation with the colonisation project was gained by spending a few days in its infrastructural centre talking to extension workers, INCRA administrators, and colonists. In this way, feeder

roads and a segment of the trunk road were identified along which interviews would be conducted. The familiarisation process afforded an opportunity to explain the nature of the research and to gain necessary introductions and offers of accommodation in the relevant areas of the colonisation project. This gave access to localised social networks which greatly facilitated interviewing. Instead of appearing unannounced on a smallholder's doorstep, the researcher is introduced by a neighbour, and is informed of the times and places at which it would be most convenient to meet respondents. This is particularly useful because many of the farmers who reside in the project's administrative centre travel daily to work on their holdings. Perhaps more importantly, this method permits the continual cross-checking of an individual's responses against discussions with their neighbours and relatives, a procedure which is not possible under random sampling.

Information on previous employment in the *garimpo*, migratory experiences, and the origin of households was collected through life history interviews. This was the only data that was systematically gathered from households who had no *garimpo* experiences in the Apiaú and Caroebe projects. But in the projects of Alto Alegre and PAD Anauá more data on land tenure and off-farm income formation was recorded from all the households interviewed (n=98). Further information was gathered in all of the colonisation projects from households that did have a member participating in *garimpagem*. The quality of this information was variable; in some cases people were reluctant to discuss the matter, and in others the relevant individual was away and poor quality data was provided

by other members of the family. Having discarded any problematic responses, 94 accounts of smallholders' experiences in the gold rush remained, giving details of 184 journeys made to the gold mines of western Roraima between 1986-1990. These accounts included information on the *garimpos* visited, the time spent on each trip, gold earnings recovered, diseases contracted, and subsequent investments (or disinvestments) made.

3.2 Smallholder farming and migration to the *garimpos*.

Agriculture in Roraima is a highly seasonal activity. This is because most smallholders concentrate on the production of only four annual crops; rice, manioc, maize, and to a lesser extent beans. In common with colonist agriculture throughout Amazonia, rice is by far the most important of these crops, typically accounting for half of the area devoted to them, and representing approximately 60% of their total harvest value (IBGE 1990). Except for a growing number of farmers who plant bananas in response to favourable prices, the use of perennial crops is very restricted, even though the extension service ASTER encourages their cultivation.

It is particularly important to understand the seasonality of the agricultural year because it determines the ease with which mining can be integrated with farming. Smallholders typically practise annual slash and burn cycles, clearing a patch of 2-4 hectares of either forest or regrowth between January and February. The prepared area (*roça*) is fired once it is sufficiently dry and is planted at the onset of the first rains in March/April. Farmers frequently sow grass seed among their annual crops so that a pasture

is established on the site after the harvest. This practice is adopted even by the considerable number of smallholders who do not own cows, because it increases the value of their land holdings. The crops are tended throughout the wet season until harvesting, which is in July for maize, and August/September for rice and beans. Manioc is usually left for 15-18 months before harvesting and does not follow any defined cycle. The demand for labour fluctuates in accordance with the seasonality of the agricultural year so that extra labour is often contracted at peak times of clearing and harvesting. In contrast, householders may be under employed on the land holding during the dry season (October to January in Roraima), which is the most productive mining season.

The gold rush, therefore presented an excellent opportunity for farmers to supplement their agricultural incomes during the slack summer months. In 49% of the 288 households interviewed, an individual who was previously employed on the smallholding went to work in the gold *garimpos* between 1987 and 1990 (see table 3.2). An even higher proportion of households had contact with the gold economy via relatives employed in other activities, but since these individuals had not moved directly from agriculture into the *garimpos*, they were not recorded in this survey.

Table 3.2 Rates at which Roraima's colonist households participated in the 1987-1990 gold rush. Households are classified by origin; Northeast (NE), Centre-south (CS), and Others.

Colonisation Project	Respon-dents	No. of households who participated in the gold rush *			No. of households who did not go to the gold rush			TOTAL rates of participation	
		NE	CS	Others	NE	CS	Others	Went	Did not go
Alto Alegre	98	44	3	4	31	14	2	51	47
Apiáú	92	32	4	2	32	9	13	38	54
PAD Anauá	59	26	-	8	19	5	1	34	25
Caroebe	39	4	2	11	3	5	14	17	22
Total	288	106	9	25	85	33	30	140	148
Percentage	100							49 %	51 %

* If any member of the household left agricultural employment to go and work in the gold *garimpos* of western Roraima between 1987-1990, then that household was recorded as participating in the gold rush.

Note that in the sample taken, 106 out of a total of 191 (55%) Northeastern households had at least one member who went to the *garimpos*, compared to 9 out of a total of 42 (21%) colonists from the Centre-south and 25 out of a total of 55 (46%) households who originated from other states.

In most households the male head was usually the only person to go mining (86%), although in 15% of households it was younger men who went (usually sons of the household head)⁷. Both the father and son migrated to the *garimpos* together in only two households and female participation was equally rare⁸.

The degree of smallholder participation in *garimpagem* is closely related to individual's state of origin. Northeasterners are more likely to go mining than migrants who originate in the Brazilian Centre-South⁹. The colonists themselves use cultural distinctions to explain this disparity, arguing that *garimpagem* is in the blood of the Northeasterner. Certainly the Brazilian Northeast does have a much longer history of mineral extraction than the Centre-south, but these culturally-defined assertions are questionable. The proportion of Centre-southerners that did participate is not insignificant and evidence from other parts of Amazonia (notably Mato Grosso and Rondônia) also notes that they may be equally enthusiastic miners¹⁰.

A more likely explanation is to be found in the different agricultural practices of migrants from the Northeast and Centre-south (Fearnside 1980 :117). The suggestion is that migrant farmers from central and southern Brazil tend to make higher capital investments in their land holdings than their northeastern

⁷ The apparently small percentage of sons registered by the survey as working in the *garimpo* reflects a tendency for young men to leave the landholding at an early age.

⁸ In both cases the women went to work as cooks, one of them was single and went alone on the invitation of a friend who was a *dono de maquina*, the other was a widowed head of household who entered the *garimpo* with her two sons.

⁹ 55% of the 191 northeastern households interviewed had a member who went to the *garimpos*, compared with 21% of those from the Centresouth (n=42), and 46% of those originating in other states (n=55)

¹⁰ pers. comm. Antonio Feijão 1991, though centre-southerners tend to be more capitalised *donos* according to Cleary pers. comm. 1992

colleagues. In many cases they arrive in the Amazon with more capital at their disposal, having sold land in the South. The detailed analysis of the Alto Alegre and PAD Anauá projects is confirmatory; 95% of the Centre-southerners had actually bought their land holdings in these projects, whereas the majority (63%) of migrants from other states (including the Northeast) had acquired their land free (mostly from the original government distribution of holdings). Half of the Centre-southerners also had alternative sources of off-farm earnings, which is a primary determinant of disposable income. This suggests that they were wealthier than most of the northeastern farmers and that they had incomes to see them through the agriculturally unproductive summer months. For this reason the opportunity cost of a trip to the *garimpo* is probably higher to Centre-southerners than it is to Northeasterners.

The survey also raises an interesting question over the spatial patterns of smallholder migration to the *garimpo*. Although Apiaú and Alto Alegre are the colonisation projects closest to the *garimpos*, rates of smallholder migration from these areas were actually lower than from the more distant projects¹¹. It seems surprising that a higher percentage of farmers left the remote projects to go mining but, interestingly enough, exactly the same observation has been made of colonist behaviour on the other side of the Brazilian Amazon:

'With the discovery of *garimpos* in Rondônia numerous colonists have abandoned at least temporarily their agricultural plots within settlement areas...According to local informants many of those that

¹¹ 52% of smallholders in Caroebe and PAD Anauá went to the *garimpos*, compared to 48% from Alto Alegre and Apiaú.

rapidly migrated to the garimpo [at Rio Massagana] were members of colonist households from distant settlement areas'
(Milliken 1991 p.124 - my emphasis)

Rates of smallholder participation in *garimpagem* therefore do not decline sharply with distance. Perhaps this is because the *garimpo* is such an attractive prospect to smallholders that the concept of 'distance-friction' scarcely applies to their migratory behaviour. But this is only part of the explanation as the *garimpos'* effect on the structure of local markets is also relevant. Cleary (1990) has noted in Maranhão that the *garimpeiros'* demand for foodstuffs may boost the local agricultural market, creating favourable prices for smallholders nearby. It is therefore improbable that the farmers who benefit from this locally-improved market will sacrifice such favourable economic circumstances to go mining. Instead, they are likely to enter the local market either as agricultural producers or providers of services (notably entertainments), secure in the knowledge that a considerable demand exists for their products *in situ*. This option is clearly not available to smallholders situated in more distant colonisation projects, and for them migration to the *garimpos* is probably the most obvious strategy for increasing income in the short term.

The *garimpo* therefore creates the rare conditions that place producers in direct contact with a buoyant rural market, denying rural-urban traders their privileged position in local commerce. The nature and extent of this local market is closely related to events in the *garimpo* and is highly dependent upon lines of access to it. For example, the trunk road at Apiaú was the principal route into all of the Roraima

gold *garimpos* during the early stages of the rush. At that time many of the smallholders residing there were able to sell produce (notably rice, beans, poultry, beef, and manioc flour) on their doorsteps at favourable prices to *garimpeiros*. But subsequently, airstrips were constructed in the *garimpos* and access to them was by air. Even though a new airstrip was built at the end of the Apiaú trunk road to service the mines, most pilots preferred to operate from Boa Vista or Alto Alegre, so the interaction between Apiaú and the mining economy declined. Alto Alegre, on the other hand, which had not previously been an important through-route to the mines, benefited greatly from the shift towards air traffic. The subsequent proliferation of bars, restaurants, and grocery stalls testify that local smallholders were quick to capitalise on the new demand for foodstuffs and entertainments in the town.

It is important not to allow these more specific observations to eclipse the overall picture. From the outset, the mines drew virtually all the casual workforce (mainly formed by sharecroppers) from the colonisation projects, leading to a rapid contraction of agricultural labour. A number of the landed smallholders also left for the *garimpos* in these early stages particularly single men, or those with previous mining experience. But the exodus from the colonisation projects gathered pace following the unusually wet summer of 1988/89. The heavy rainfall prevented many of the smallholders from burning their clearings (*roças*) successfully, encouraging them to turn to mining instead¹². By this stage diesel pumps were installed in

¹² The subject of burning is complex and difficult to substantiate in the absence of the necessary rainfall data. It appears that few of the colonists from the Caroebe and PAD Anauá in the south of the state acquired satisfactory burns on their clearings over the two dry seasons 1988/89 and 1989/90. The increased area of planted manioc relative to the overall decrease in areas planted

many of the *garimpos*, permitting the activity to continue throughout the wet season. As the rush swelled there were few clear distinctions between the people who were drawn into the mines.

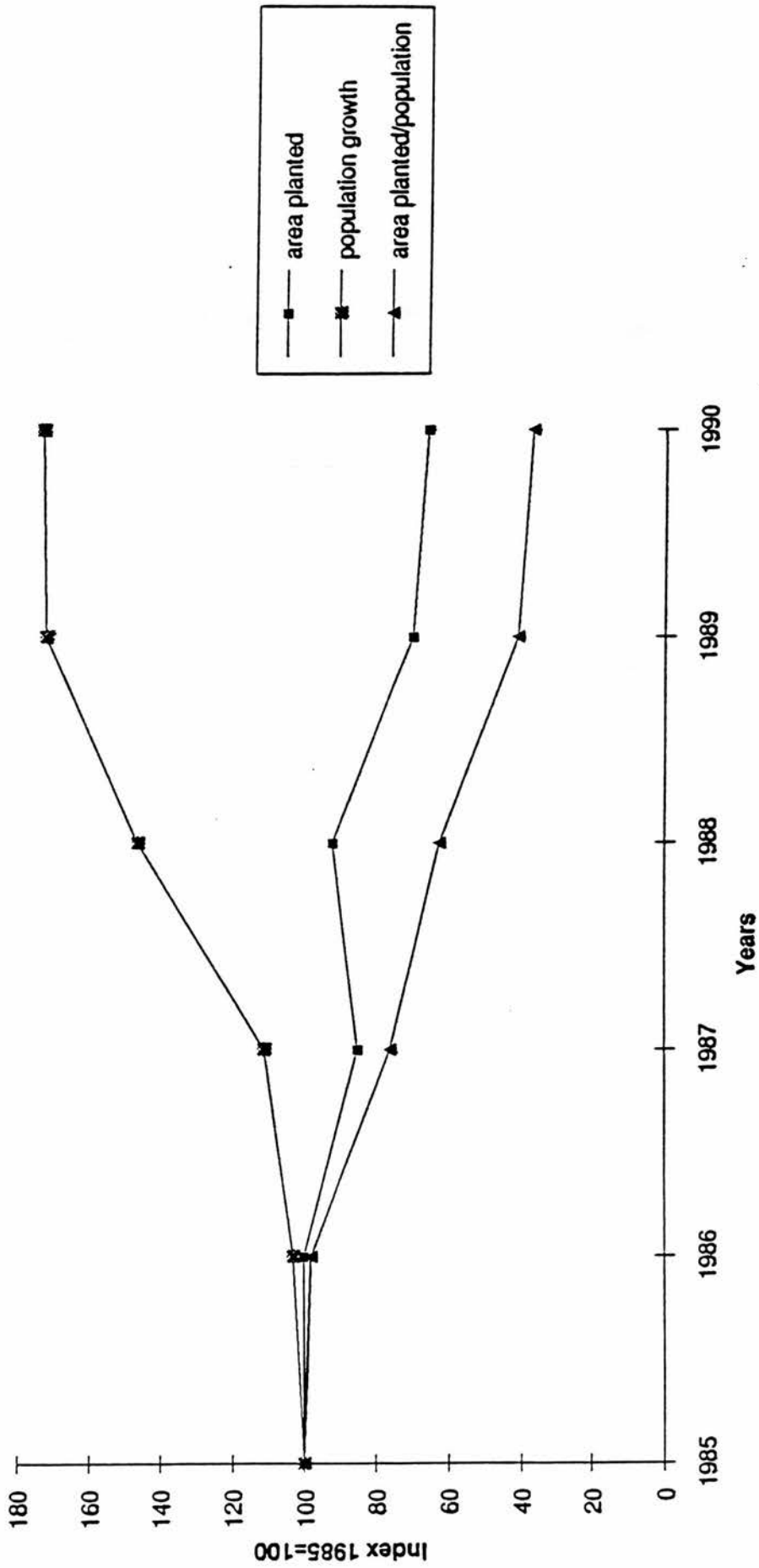
It is surprising that security of land tenure does little to slow out migration to the *garimpos*. One of the stated aims of Amazonian colonisation is to 'fix people to the land' and giving landowners secure title to their holdings is usually regarded as the most effective means of achieving this. But the evidence here suggests that this is not the case because even those colonists who did have registered land titles (*Titulos Definitivos*) migrated to the *garimpo* at the same rate as those smallholders who had no legal claim to their land¹³. Presumably those without security of tenure are less keen to leave their holdings for the *garimpos* as they run the risk of returning to find somebody has taken their land.

The sudden movement of labour from agriculture into mining led to a dramatic decline in the amount of land devoted to food production. Figure 3.3 illustrates that the area under cultivation with the four principal crops (bananas, rice, maize and manioc) fell by 34% between 1985-1990. Yet over the same period, the state's population expanded by 73% so that the ratio of cultivated land per head of population diminished by 63% in the interim.

under annual crops is indicative, as manioc, unlike rice and maize still produces reasonable yields on unburnt land (see appendix to fig 3.3). The effect of the heavy rain was less dramatic further north, and it is clear that many of the colonists who remained on their lots in Alto Alegre and Apiaú managed to get good burns, whilst those who had been in the *garimpos* failed to do so, having not returned sufficiently early to prepare their land for burning.

¹³ The only complete data on registered land titles was from the Alto Alegre project where 44% of colonists held *Titulos Definitivos* to their holdings.

Figure 3.3 Area planted under principal food crops, and population growth in Roralma (1985=100)



Appendix to fig 3.3. Table comparing the area planted under annual crops with population in Roraima 1985-1990.

CROP TYPE	AREA PLANTED UNDER ANNUAL CROPS (HA) 1985-1990					
	1985	1986	1987	1988	1989	1990
banana	500	2419	2504	3005	1859	1989
dry rice	9124	8238	5546	5728	3855	3000
irrigated rice	602	1200	1341	1490	2775	3025
maize	8665	6044	6753	6952	3807	3318
manioc	1537	2583	1177	1567	1974	2132
total	20448	20484	17321	18752	14271	13439
1985=100	100	100	85	92	70	66
=====	=====	=====	=====	=====	=====	=====
POPULATION	159600	163571	177693	233422	275082	276322
1985=100	100	103	111	146	172	173
=====	=====	=====	=====	=====	=====	=====
PLANTED AREA/POP	0.128	0.125	0.097	0.08	0.052	0.048
1985=100	100	98	76	62.5	41	37

Source: Secretaria de Agricultura and SUCAM Boa Vista

Ironically, local farmers met only a small proportion of the huge demand for foodstuffs that accompanied the gold rush. Most of the *garimpeiros* found it more convenient (and reliable) to supply their mining operations with provisions purchased in the supermarkets of Boa Vista. These retailers were themselves freighting goods directly from the south of Brazil. Thus, the state's most dynamic phase of economic expansion was matched by a growing dependence on imported agricultural produce.

Poor local transport prevented smallholders from competing effectively with these corporate retailers for a share of the booming urban economy. It was only in the immediate hinterland of Boa Vista that the favourable economic climate of the rush was felt. The only noticeable demand-led land-use change occurred in this zone as a number of capitalised smallholders moved into horticultural production. They provided the salads and fruits to meet the increasing demand for restaurant food in Boa Vista. Although this was restricted to a small number of producers, it proved to be a highly profitable venture for those involved, with incomes sometimes exceeding US\$ 150 per week during the peak dry season.

3.3 Gold mining and smallholder economics.

Smallholders planned their trips to the *garimpos* with care and usually restricted their absences from their holdings to periods of about three months. It is hard to evaluate the degree to which women participated in the formulation of such decisions. On the whole, proposed mining ventures were initially discussed among groups of male farmers who knew one another, and their

suggestions were only subsequently aired to the remainder of their households. The outcome was that bands of farmers co-ordinated their migration to the *garimpos* and entered the mines together. Within such groups novices were introduced to *garimpagem* by their more experienced colleagues and wealthier farmers often advanced money to other members of the group for the costs of the journey. Even though women were seldom the first to be consulted over the matter it is wrong to assume they accepted the situation passively. Matriarchal figures appear to dominate a number of households and it is clear that they would not have allowed such significant migratory decisions to be made without voicing their concerns.

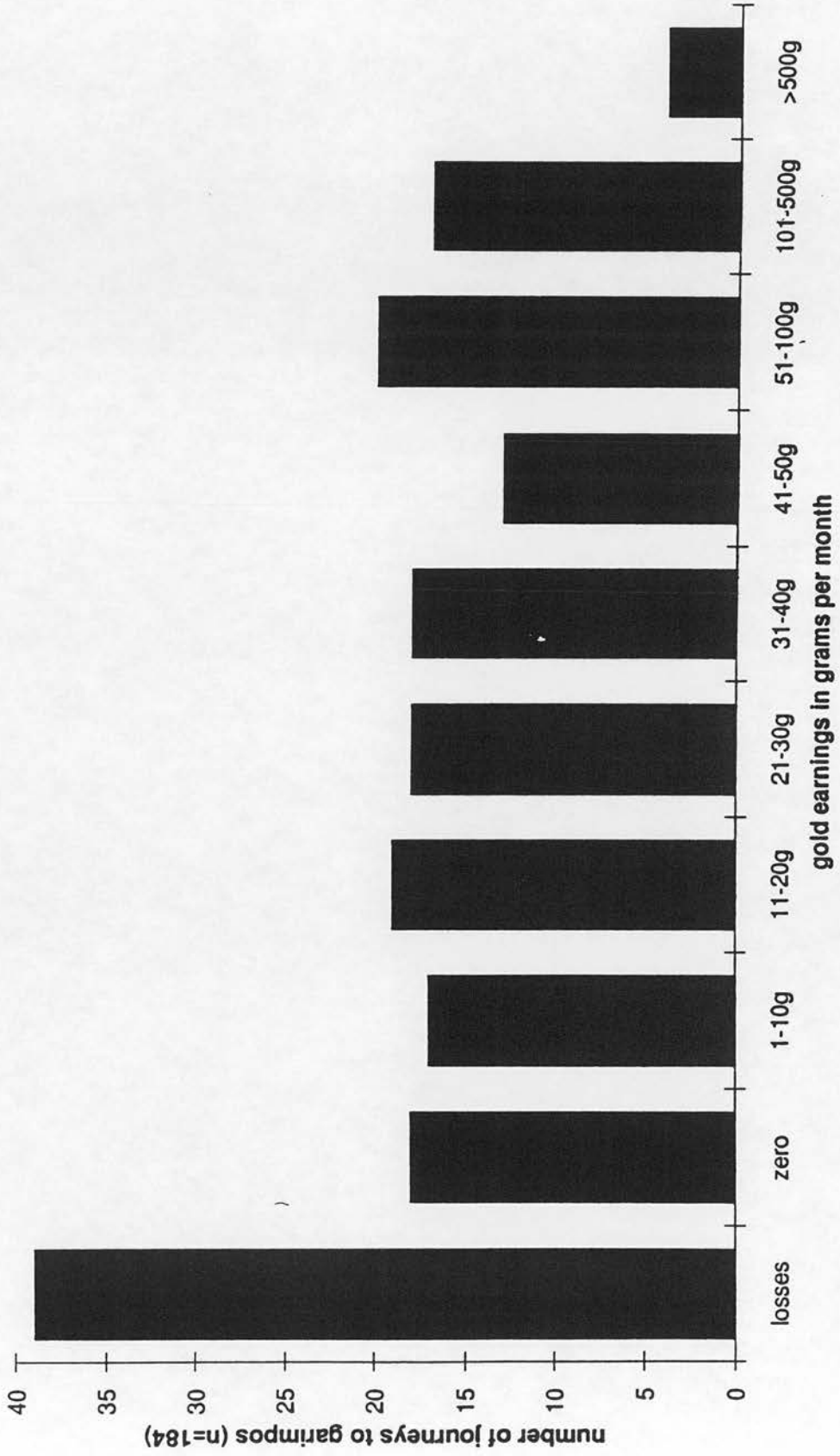
A trip to the *garimpos* is not cheap. Although costs vary according to the transport used, an excursion may demand a substantial outlay relative to the income of most smallholders. Before 1987, access was either on foot or, in fewer cases, by boat. Smallholders would need to provide all of the necessary food, medicine and equipment (including fishing tackle, hunting gear and prospecting materials) for the fortnight-long trip. Farmers interviewed at Entre Rios (near Caroebe) typically spent between US\$ 50-100 to equip themselves for a walk of similar length into the *garimpo* at Jatapú. Following the construction of the first airstrips, most people entered by light aircraft. But expenses usually doubled as a result with a return trip typically costing 15 grams of gold (approximately US\$ 225, although usually only ten grams were paid in advance). In some cases flights were paid by *donos*, especially if the colonists had agreed to work for them on arrival. In the majority of cases though, it was the smallholders themselves who provided this capital,

which was often raised by selling livestock, grain, bicycles or occasionally land. As the value of a cow was roughly equivalent to ten grams of gold or the cost of a flight into the *garimpos*, smallholders with livestock often sold a cow to finance a mining trip with the objective of purchasing more on their return.

These outlays only acquire a significance when compared to the returns from gold mining. Figure 3.4 illustrates the quantities of gold brought back to the household by 94 colonist farmers who made a total of 184 trips to the gold *garimpos* between 1986 and 1990.

It is important to realise that the data does not represent *garimpeiro* incomes directly as it includes net costs to the colonist, such as air flights and other expenses within the *garimpo*. Real *garimpeiro* earnings are at least 5 grams per month higher, given that a return flight costs 15 grams and a three month stay is the average length of time spent between flights. Even so, real wages can not be directly extrapolated from the gold earnings brought back to the colonists' household, because different individuals may spend varying amounts of gold on entertainments in the gold fields. Travelling salesmen, prostitutes, drug dealers, bar owners, and photographers are all kept in employment within the *garimpos*. It is difficult to make general rules about an individual's expenditure, but it is probably fair to say that colonists tend to be more conservative than professional *garimpeiros* in their spending habits, particularly as many of the former entered the *garimpo* with the specific intention of bringing cash back to the household.

Fig. 3.4 Quantities of gold brought back to colonist lots. The data is from 94 colonists who made a total of 184 trips into the garimpos of western Roraima from 1987 to 1990.



The data presented in figure 3.4 provides an understanding of the distribution of gold earnings and illustrates the levels of income which are subsequently incorporated into household economics. But before starting to interpret these findings, there are two points which merit consideration. Firstly, a distinction is drawn between journeys that did not produce sufficient gold to cover expenses (termed "losses"), and trips in which gold earnings were sufficient to break even but resulted in no net gains to the colonist (termed "zero"). Secondly, land sales in the colonisation projects are likely to overemphasise somewhat the proportion of smallholders who earned higher levels of income in the *garimpo*. This is because some colonists who ended up broke (*blefado*) in the *garimpos* sold their lots to wealthier *garimpeiros*, and often moved to unclaimed land (*terras devolutas*) on the fringes of the colonisation projects areas where they cleared new holdings. Conversely, colonists who recovered substantial amounts of gold in the *garimpos* rarely sold their lots even if they did invest a proportion of their wealth elsewhere¹⁴.

Garimpagem is a risky business as figure 3.4 shows. In 31% of the journeys made, smallholders failed to bring any gold back to their homesteads. Of these unsuccessful journeys only one third (32%) yielded sufficient gold to cover the overheads of the trip, the remainder (68%) resulted in a net loss to the smallholder. These unsuccessful trips must be evaluated against the large number of lucrative journeys made. Half of the trips made by smallholders yielded earnings of over 20 grams a month. Furthermore, in a very small

¹⁴ Throughout the whole survey, (288 respondents) only one incident was recorded of a colonist selling his lot having struck it rich.

number of cases incomes were considerable. 3% of the mining ventures recorded here produced over half a kilogram of gold per month. This proves that although *garimpagem* is undoubtedly a risky option, the majority of trips yield a respectable income and the potential gains may be very high.

All of the smallholders who were interviewed initially went to the *garimpos* either to work manually or as machine-hands for others. Six of them later became owners of their own sets of *garimpo* equipment (*donos de maquina*). It is usually only those colonists reinvesting their gold earnings back into the *garimpo* who become *donos de maquinas*. One of the most common ways of doing so is to finance prospecting trips, but this is probably the riskiest activity in the mining economy. Here previous experience is advantageous but, it is not determinant as the occasional discovery of large deposits by inexperienced prospectors testifies. Besides, the unpredictable distribution of gold among the sediments of Western Roraima ensures that pure luck is never excluded from the equation¹⁵. It is hard for an individual to insure against unstable mining incomes by seeking alternative forms of employment in the *garimpo*. Even though a number of jobs are remunerated by fixed wages (cooking, constructing rafts [*balsas*] on which to mount equipment, carrying out mechanical repairs and building airstrips), they represent only a small fraction of total *garimpo* employment. Consequently, colonists rationalise their excursions in terms of the highly variable nature of *garimpo* incomes. They accept

¹⁵ In this respect Roraima differs from Southeastern Pará, where (according to the *garimpeiros*) the gold was more uniformly distributed in the subsoil. The *garimpeiro* rationalise this by saying that gold shifts around under the ground and only makes itself available to those who deserve it. Hence a site which was mined unsuccessfully by one person can be reworked at a later date and yield gold to somebody else.

with resignation unsuccessful trips, recognising that all of their previous losses may be recuperated from only one lucky visit to the *garimpo*.

The opportunity cost of any one excursion relates to the profitability of an individual's agricultural enterprise, as well as the timing of their absence in relation to the farming year. Most smallholders go mining during the summer months, and they usually transfer their reduced workload at this time onto other members of the household. Thus, although farm income may diminish, it is rarely altogether lost. Rough calculations made during the relatively productive year of 1991 suggest that a smallholder tending 2 hectares of rice, maize and manioc, with one further hectare of bananas, could expect a monthly cash income equivalent to 29 grams of gold (CR\$ 134 800 or US\$ 337)¹⁶. This is taken to be the best case situation for smallholders in Roraima, who are neither capitalised horticultural producers nor small ranchers. The higher value of gold on world markets during the principal years of the gold rush (1987-89), coupled with the very bleak outlook for Roraima's agriculture at that time, suggest that an excursion to the *garimpo* which yielded 20 grams a month or more was probably recompensatory.

Employing the same standard to interpret figure 3.4 indicates that exactly half of the trips made generate favourable returns. But these calculations do not consider the financial implications of contracting a disease in the *garimpos*, where ill health is rife. Half (49%) of the smallholders that went mining contracted an illness (predominantly malaria) on at

¹⁶ This is cash income only from sold produce, and does not include the considerable value of familial consumption. In fact, it is rare for colonists to plant as much as a hectare with bananas, which explains the relatively high income that this farmer earned. The calculations here are made at a rate of US\$ 12 = 1 gram of gold, which applied during 1991.

least one of their journeys, with 29% of excursions resulting in sickness. A bout of malaria is in fact easy to cure if the strain of plasmodium is identified by microscope early in the development of the disease. However, the necessary equipment and trained personnel are rarely present in the *garimpo* where treatment is not only inadequate but often leads to the development of resistant strains. Most *garimpeiros* take a limited pharmacy with them, but its efficacy is compromised by their inability to identify the specific type of malaria contracted. A *garimpeiro* with malaria has three main options; they can attempt to treat it in the *garimpo* (which normally costs over 30 grams of gold ¹⁷), they can fly out (which costs between 5 to 10 grams and will obviously put a stop to their *garimpo* income), or they can choose to continue working, albeit at a lower rate of productivity. A dose of malaria may therefore incur significant costs, and colonists often have to spend a large percentage of their mining incomes on treating the disease. This not only drains gold earnings, but also influences the farmer's subsequent productivity on the smallholding. A number of colonists mentioned that on returning from the *garimpos* with malaria, they were too weak to prepare a sizeable area for cultivation the following year.

Notwithstanding the costs to the individual concerned, the movement to and from the *garimpos* can increase disease transmission within the colonisation projects where women and children often sustain themselves on poor diets in the absence of their men folk. A gradual decline in the incidence of malaria in Roraima since 1983 was temporarily reversed during the

¹⁷ Within the *garimpo* a daily dose of quinine costs one gram of gold, and each intravenous serum pack is four to five grams

gold rush years. This problem is compounded because the incorrect administration of anti-malarial drugs in the *garimpo* creates strains of malaria that are increasingly resistant to chloroquine-based treatment. In 1989, the incidence of malaria in Roraima rose to 79.7 positive cases per thousand population (SUDAM 1991). This is significant as the expansion of land for agricultural production, which is usually associated with increases in malaria, had slowed in the state since 1986, with only one small colonisation project being established during this period (Trairão near Tepequém).

The provision of public health care in the *garimpos* could have done much to reduce the spread of malaria in the state. But while this would have been beneficial to both the *garimpeiros* and the Yanomami, it was a politically unacceptable option. The presence of government health workers in the *garimpos* would not only serve to legitimise the illegal invasion of the Yanomami reserve, but it would also have made gold mining even more attractive option to smallholders by removing one of the most significant outlays from their operating costs.

The gold rush therefore had a considerable impact on the geography of disease transmission in Roraima. Clearly, any economic evaluation of either *garimpeiros'* incomes or *garimpagem* as an activity must take into account the very real costs of disease.

3.4 Colonist farmer's decision-making and risk-evaluation

In view of these findings, it might seem surprising that so many colonists go mining. Half of

the journeys that they make are not profitable and many of them actually incur expenses which need to be met from very limited incomes. Add debilitating diseases and extortionate hospital bills to the equation and it seems that mining may not be such an attractive option after all. So why do large numbers of smallholders migrate to the *garimpos*, especially when it is widely believed that risk aversion strategies lie at the heart of peasant economics?

Some of the answers lie in the way that smallholders make their decisions. Firstly, as the consequences of their economic strategies are unequally shared throughout the household, a gender bias is incorporated within the decision-making process. There are clearly exceptions to this observation. But in general terms, women and children tend not to dominate the formulation of decisions, even though they are usually obliged to undertake an increased workload if men from their household migrate to the *garimpos*. In the absence of their menfolk, some women continued to work in agriculture, while others moved to the towns and engaged in petty trading to take advantage of the booming urban economy. In both cases women became responsible for the provision of household income, fulfilling a crucial role that permitted the temporary exodus of male labour from the smallholding. For the men, a trip to the *garimpo* is undoubtedly hard work, but it is nevertheless an adventure, and it does represent a welcome break from the monotony of agricultural work. Besides, during these trips away, farmers enjoyed a financial and social independence that they rarely experienced on the smallholding. It is therefore not surprising that in a few cases their responsibility towards family welfare waned on entering

the predominantly male working environment of the gold fields.

Secondly, colonists seldom appraise either *garimpo* incomes or the health risks of mining in a realistic fashion. In part this stems from ignorance, as the majority of farmers interviewed had no previous mining experience prior to the rush. But even those smallholders who mine regularly tend not to evaluate these points accurately. Contrary to the findings of the malarial agency SUCAM, smallholders argue that there is an equal chance of contracting malaria in both mining and agriculture. In this way disease is effectively discounted as a relevant factor in weighing up the two options. Similarly, the possibility of making a big strike is often exaggerated by smallholders, who are drawn to the *garimpo* not only by the modest wages they are likely to receive, but by the faint possibility that they might hit the jackpot (*bamburrar*). Every colonisation project has a smallholder who hit the big time in the *garimpos*. Their large house and sizeable herd of cows stand as a continual reminder to other colonists that the *garimpo* can deliver the goods to whoever is prepared to take the risk. The really important point is that this is a possibility which simply does not exist in agriculture. Although farming offers greater security, is less disease ridden, and provides a subsistence living, it offers absolutely no prospects for getting seriously rich.

But smallholder migration to the *garimpos* can only be interpreted with accuracy if it is considered in its context as a livelihood strategy. Colonists are constantly on the look out for sources of off-farm income and here the *garimpo* is only one of various

alternatives available to them. In Roraima, these include the extraction of forest products (SUDAM 1984), urban employment (Abers & Pereira, 1992), public sector positions, and waged work in other agricultural enterprises. The detailed analysis of off-farm income formation in the Alto Alegre and PAD Anauá projects showed that only 15% of the 157 colonist households interviewed depended upon agriculture for their sole source of income. Of the remainder, 31% had non-agricultural incomes and did not participate in the *garimpos*, 16% had non-agricultural incomes but also went mining, while 38% had no source of off-farm income other than *garimpagem* ¹⁸. This suggests that although farming does offer a subsistence livelihood, most smallholders regard agriculture on its own as being a pretty unsatisfactory means of making a living.

This is why colonists are often very reluctant to invest the limited capital that they gain from other sources back into farming. Of the 94 colonist *garimpeiros* interviewed, only 19 (20%) said that they had invested a proportion of their gold earnings on their land holdings ¹⁹. For the most part, the colonists regarded their *garimpo* incomes as a windfall profit, permitting the purchase of substantial items which they seldom had the resources to buy. So other than a proportion being spent on entertainments (particularly by single men), a considerable amount was invested in consumer durables (refrigerators, radios, gas stoves, beds, T.V.s), as well as being used to pay off outstanding debts, buying means of transport, or

¹⁸ This data is based on the economic activities of colonists over the three year period 1986-1990; their engagement in off-farm activities was usually seasonal.

¹⁹ This may be conservative for smallholders tended to note only tangible items when discussing the expenditure of their *garimpo* earnings. They seldom assessed the often considerable outlays made in employing casual labour, until prompted.

financing specialised hospital treatment for ill members of the family. Thus, even though it has been argued that a lack of financial resources is often a principal constraint on colonist agriculture (Fearnside 1980), smallholders are often more interested in investing the limited capital that is available to them, elsewhere.

Furthermore, colonists were given no advice on how their gold could be invested so as to yield agricultural incomes over the longer term. In this respect extension workers missed a rare opportunity to encourage smallholders to adopt perennial cropping systems that are more closely tuned to local ecology. Thus, most (15 out of 19) smallholders who did invest gold in their holdings purchased cows, some of which were sold shortly afterwards. Livestock tends to increase in value gradually relative to inflation, is easily transported and is readily sold at any time of the year²⁰. But above all, as cattle-raising places minimal demands on household labour, it does not prevent smallholders from pursuing alternative economic strategies. Indeed, owning livestock may actually enhance their ability to take risks. Buying and selling cows, relative to high-risk ventures like *garimpagem*, is an effective way of riding out the large fluctuations in income which characterise such gambles. The latter point receives greater consideration in the following chapter, but at this stage it is worth noting that smallholders' agricultural management is often shaped by their desire to keep alternative options open. This offers an insight into why colonist farmers

²⁰ For a more detailed review of the reasons why smallholders like buying cows see Fearnside 1989.

might be reluctant to adopt longer-term cropping systems²¹.

3.5 Can *garimpo* migration be managed through appropriate agricultural policy?

All of these findings illustrate that *garimpagem* makes good economic sense to smallholders throughout the Amazon. Unfortunately this suggests that the pressure on mineral rich Indian lands is likely to continue for the foreseeable future. This is problematic. In attempting to police such areas the government is battling to restrain hoards of rural and urban poor from pursuing what is one of the few economically viable options open to them. It is hardly surprising that the authorities have been unable to prevent *garimpeiros* entering Indian reserves as they are essentially addressing the effects, and not the root causes, of the problem. A long-term solution can only be found if policy is directed at the underlying socio-economic forces that currently fuel the invasion of Indian lands.

Having examined the motives behind smallholder participation in the gold rush, and having recognised that farmers account for over half of the Amazon's *garimpeiros*, it is interesting to explore whether *garimpo* migration can be regulated through changes in agricultural policy. Perhaps the key question here concerns the relationship between landlessness and migration to the *garimpos*. It is well known that an increasingly inequitable distribution of land in the Brazilian Northeast has been primarily responsible for

²¹ For the difficulties of promoting tree cultivation in Amazonian settlement schemes see Milliken's evaluation of perennial crops in Rondônia's POLONOROESTE project. Milliken (1991)

fuelling migration into the Amazon, and many of these landless migrants have subsequently joined the *garimpo* workforce. But although this is certainly true, it is wrong to infer from this, as some people have (de Silva et al. 1986: 25, Butler 1990 : 5), that *garimpeiros* are for the most part landless rural workers.

Table 3.5 presents data on the land tenure status of 234 *garimpeiros* interviewed in Pará and Roraima:

	state	n=	are land owners	parents have land	completely landless
PEREIRA (1990)	PA	168	81 (48%)	54 (32%)	33 (20%)
MACMILLAN	RR	66	20 (30%)	15 (23%)	31 (47%)
TOTAL		234	101 (43%)	69 (29%)	64 (27%)

In both studies *garimpeiros* were classified either as land owners (irrespective of whether or not they have land titles), the offspring of landed parents (but not owning land in their own right), or as completely landless (neither respondent nor parent possessing land). The key observation is that over half of the respondents in both surveys either have their own land, or have access to the land via their parents' holdings. If the data from both studies is aggregated, then 43% of respondents are landed, and only 27% can be considered truly landless.

It is likely that many of the migrants who flooded into the Amazon, having been squeezed off their holdings in the Northeast, subsequently acquired land whilst moving throughout the basin with the 1980s gold rush. Although strong pressures on land in south-eastern Pará and Rondônia probably afforded few opportunities for landless *garimpeiros* to acquire

holdings in these areas, there is an abundance of relatively accessible land around other mining centres such as the Tapajós and Roraima. Indeed the *garimpeiros* union in the Tapajós actually co-ordinates the distribution of agricultural land to landless *garimpeiros* in the area (Alberto E.C. da Paixão [SEICON] pers. comm. Jan. 1992).

But there is more to this story. We have already seen that for every person working in the *garimpo* itself even more people are employed in related activities in urban areas. Abers' research in Boa Vista (Abers 1992- which is discussed in greater depth in chapter 5) shows that many of the people currently employed in this informal urban economy were originally rural producers from the Northeast. They moved to the cities, having been pushed off the land either violently or by unfavourable economics, and now form part of a transient labour force which moves from city to city as new opportunities arise. Thus, the largest proportion of landless migrants who moved into the Amazon during the last two decades probably ended up, not in the *garimpos* themselves, but, in the informal sector of the gold boom cities. This explains why the concentration of land in the Northeast, which clearly fuels migration into the Amazon, is not reflected in a higher proportion of landless *garimpeiros*.

Before proceeding it is important to recognise that the following discussion is based on the results of only 234 interviews. While this does allow for some new interpretations of the migratory processes related to *garimpagem*, it is clearly not a sufficient basis on which to formulate policy. Here these findings are analysed, but perhaps the most important point is to

recognise the need for greater data collection on this subject.

Ironically, while many of the people currently involved in the Amazonian informal mining economy have at some stage been shoved off land in the Northeast, it is questionable whether land reform will do much to slow down migration to the *garimpos*. The real issue here is not that people have no land but that they are not using the land which they have as their only form of employment. The evidence from Roraima suggests that, while agriculture does provide a subsistence livelihood, farmers will seize any opportunity to invest their labour and, albeit limited, capital outside the agricultural economy if favourable opportunities arise. Witnessing large numbers of landed farmers, including those with land titles, going to the *garimpos* indicates quite clearly that Amazonian agriculture, as it is currently practised, does little to 'fix people to the land'.

The crux is whether appropriate agricultural policy can prevent those farmers who already own land from migrating to the *garimpos*. Certainly, the desperately low agricultural incomes and lack of infrastructural support for Amazonian smallholders suggest that there is scope to make the agricultural option more favourable. Furthermore providing smallholders with accurate information on average *garimpo* incomes, and encouraging them to consider the true costs of malaria when appraising the economics of mining, might somewhat reduce their enthusiasm for *garimpagem*. But none of this will have much impact in slowing rates of *garimpo* migration unless an agricultural system is developed which absorbs more labour in the dry season. Reducing the seasonality of

agriculture in the Amazon is one of the first steps required to make it a viable livelihood that need not be supported by other forms of income.

Such measures are aimed at reducing the need for impoverished farmers to survive by exploiting mineral resources illegally. But even so it is by no means clear if policies aimed at addressing rural poverty will necessarily slow down rates of migration to the *garimpos*. The Dantéesque images of *garimpeiros* toiling away in pits of mud gives the false impression that they mine because it is the only livelihood available to them. As we have seen the relatively small fraction of professional *garimpeiros* are the only ones in the pit who depend entirely upon that form of employment. Everybody else is there as a means to supplement their other forms of income, whether they are farmers, builders, street sellers, rubber-tappers or even ranchers. The point is that deterministic forces may not play as much of a role here as is often believed, and for this very reason reducing poverty will not necessarily be reflected in smaller numbers of *garimpeiros*. Even if fewer people need to go mining to survive, it can equally well be argued that more of them will chance their luck in the gold mines once their alternative incomes become more secure. No doubt migration to the *garimpos* will continue as long as gold mining offers the slim possibility of striking it rich.

3.6 Conclusions.

1. Contrary to some conceptions, *garimpeiros* are not necessarily landless peasants. Indeed a high proportion are either landowners or have access to land and see the *garimpo* as an opportunity to supplement

their income. Thus, it is misguided to assume either that land ownership prevents migration, or that a redistribution of land is the key to reducing Amazonian *garimpo* populations.

2. *Garimpo* earnings represent an important source of off-farm income for Amazonian smallholders. Their land management strategies, as Hecht (1988) notes, often reflect the wider socio-economic context in which they operate.

3. *Garimpo* earnings are highly variable. But even so, half of the trips made by Roraima's smallholders into the *garimpos* of the Yanomami reserve exceeded normal agricultural incomes.

4. Making small farmers aware of the reality of *garimpo* life, health risks and the true nature of gold earnings would allow them to assess their migration to Amazonia's *garimpos* on a well informed basis. Documentary film work and radio programmes made accessible to small farmers in the Northeast and Amazonia, could do much to enhance their understanding of the realities of *garimpo* life. (pers. comm. B. Forsberg, May 1991).

5. A stronger emphasis on the planting and marketing of perennial crops may enhance smallholder security by preventing the drastic falls in income associated with an unusually heavy rains during the 'dry season'. Such climatic events have swollen *garimpeiro* populations not only in Roraima, but also in Araguaia, Pará (Filho 1984), and Madre de Dios, Perú (Maennling 1986).

6. A lack of imaginative agricultural extension work ensured that an opportunity was lost for colonists to invest their gold earnings in longer-term silvicultural or agroforestry projects which might

reduce risk and are more closely tuned to natural nutrient cycling systems. The small percentage of *garimpo* earnings that was invested in the land was banked via the purchase of cattle.

7. The provision of health care in the *garimpos* would increase gold earnings brought back to the lot by small farmers as well as reducing the transmission of malaria further afield. Although the government may be reluctant to set up health posts within the *garimpos*, malaria might be reduced by distributing mosquito nets to embarking *garimpeiros* and using radio broadcasts to outline preventative healthcare.

Chapter 4. The Golden Cow ? Ranching and *Garimpagem* in Amazonia.

Having examined the migration provoked by *garimpagem*, we now turn our attentions to the exchanges of capital associated with informal sector mining. The focus is on the relationship between ranching and *garimpagem* in Amazonia, and the synergy that exists between these two activities is illustrated in the context of Roraima. But, before examining how ranchers responded to the gold rush, it is first necessary to take a closer look at the differences between ranching practices on the *cerrado* and in the forest. As was mentioned in the introduction, the centre of gravity of the state's ranching economy has been shifting gradually from the *cerrado* into forest areas since the 1970s.

4.1 Current Ranching Practices in Roraima:

The limited availability of nutrients is one of the principal constraints on livestock production on the *cerrado*. Not only are the soils themselves highly weathered, acidic and very infertile, but the grasses that they sustain are similarly poor. The *cerrado* bunch grasses, such as *Trachypogon pulmosus*, are characterised by extreme phosphorous deficiency and are usually low in calcium, potassium and cobalt (Eden 1990 :138). These edaphic constraints, and the highly seasonal rainfall of the *cerrado*, have been overcome traditionally by allowing the cattle to roam freely over large areas in search of more palatable grasses and available water. Consequently, an extensive ranching system is practised on large land holdings

which are rarely less than 1500 hectares in size and occasionally exceed 10 000 hectares.

These physical limitations have been ameliorated somewhat by the provision of mineral supplements to the livestock and by the construction of small dams on the *cerrado*. Furthermore, cross-breeding with more hardy Guzerat and Nellore cattle, has improved the original Criollo stock, and many of the diseases which affected the herd, such as brucellosis, rabies and foot and mouth, are now being controlled by widespread vaccination programmes. In spite of these post-war improvements, stocking rates on the *cerrado* remain extremely low (7-10 hectares per animal unit) and productivity is minimal (6 kilograms per hectare per annum Gianluppi 1991 :1). For the most part, ranchers have been slow to adopt more progressive management practices, such as selective breeding, artificial insemination, (the standard herd reproduction rate is still only 40%), and pasture improvement. Of 178 ranches studied in a recent survey, only 26% had planted pasture, and 33% had no type of enclosure in which the livestock could be herded (CIR 1992).

This reflects the long tradition of ranch management practices based on minimal capital inputs. The '*sorte*' system allowed Roraima's ranchers to expand their land holdings over the *cerrado*, without obliging them to make substantial investments in their ventures. As more labour and land were taken into production, Roraima's herds became sufficiently large to supply both Boa Vista and Manaus with beef. It was the previous occupants of the *cerrado*, the Macuxi and Wapixana Indians, who fuelled this growth by supplying the '*sorte*' system with its primary inputs of land and labour at minimal cost. Yet, although indigenous labour

still accounts for over half of the non familial workforce employed on the *cerrado* ranches (CIR 1991), there is increasing animosity between the Indians and ranchers over land rights. Tension between the two parties has been growing for decades and has caused violent clashes in recent years. FUNAI is legally obliged to establish an indigenous reserve for the Macuxi on the *cerrado* before November 1993, and since the mid 1980s it has been engaged in a seemingly continuous appraisal of the situation. This drawn-out and ill-defined demarcation procedure is largely responsible for the current escalation in land conflict on the *cerrado* as both parties see the opportunity to influence the size of the proposed reserve by actively reasserting their claims to the land.

The outcome of this contest is of great significance to the state's ranching sector because it will determine the future availability of land and labour on the savannah. There are two main areas of the *cerrado* which are currently registered as proposed Indian reserves for the Macuxi together with a smaller number of Wapixana, Ingarikó and Taurepang. The first is entitled São Marcos, which covers 707 459 hectares, and was originally established as an Indian Colony (Colônia Indígena). This area should automatically become an Indian reserve by law in 1993. A more contentious issue concerns the demarcation of the proposed Raposa/Serra do Sol reserve, (covering 1 347 810 hectares). Within this area there are 178 ranches, many of which have been in existence for over half a century, it also includes virtually all of the states' productive diamond *garimpos*. The two areas together represent about half of the *cerrado* and their demarcation is being strongly opposed by ranchers,

garimpeiros, and local politicians who argue that it will cripple the state economy. The Indigenous Council of Roraima (CIR), with the backing of the Catholic Church, are defending the demarcations on legal grounds. They counter the economic arguments of their adversaries by arguing that livestock and diamond production on the *cerrado* will be maintained by the Macuxi. FUNAI are legally obliged to demarcate this area by November 1993, but, following a substantial cut in their budget, it is questionable whether the resources will be available for this demarcation, even if the political will exists.

Ranching in the forested area of the state does not at present provoke land conflict. But it does have much higher environmental costs than cattle raising on the *cerrado*. A study of the edaphic impacts of clearing forest for ranching, carried out near the Ilha de Maracá in Roraima (Eden & McGregor in press), drew similar conclusions to Hecht (Hecht 1982 :667). In general terms, the soil receives a short term flush of nutrients following the felling and burning of the forest, with increases in pH, calcium, magnesium, phosphorous, and potassium. However, once the trees have been removed the soil nutrient status typically declines, so that over the long term soil fertility is compromised. Both studies noted greater soil compaction and an increased susceptibility to erosion following forest clearing, impeding the regeneration of forest on the cleared areas. The Roraima study went so far as to suggest that "the savannah [*cerrado*] may represent an analogue for the outcome of long-term degradation of land converted to permanent pasture" (Eden & McGregor in press :18).

The ranches established in the forested zone are smaller than those of the *cerrado*, typically comprising 500-2000 hectare holdings, though only a proportion of the total area owned is actually grazed. Artificial pastures of 'Quicúio da Amazônia' (*Brachiaria humidicola*) and 'Colônião' (*Panicum maximum*) are usually stocked at rates of 1 animal unit per hectare. Cattle raising in forest areas is therefore more intensive than on the *cerrado* and it is not constrained by seasonal water stress to the same degree. Even so, the considerably higher rates of productivity that ranches in the forest obtain (60-90 kg of beef per hectare per year) have to be weighed up against the much higher investments per hectare that this type of ranching demands. Forest clearing alone costs approximately US\$ 250 per hectare¹, to which the price of grass seed and fertiliser must also be added. The greater amount of capital invested in these ranches is however, partly offset by the sale of timber to local sawmills, as well as by gradual increases in the value of these roadside properties over the long term.

The social composition of ranchers in the forested area differs markedly from the handful of politically influential extended families who dominate the *cerrado* economy. We have already seen that road building was the catalyst for the expansion of ranching into the forested southern part of the state since the 1970s. But the road building programme was accompanied by considerable public sector investment in the urban economy as the administrative agencies charged with overseeing the economic expansion of Roraima were founded in Boa Vista. This effectively created a new class of urban professionals, entrepreneurs, and

¹ See Hecht's data from Pará 1982 p.164.

retailers in the late 1970s. As they became richer, they channelled profits from the urban economy into small ranches along the recently constructed BR 174 and BR 210². In subsequent years, relatively wealthy colonist farmers have emerged to form a second and increasingly significant group of ranchers in the forested zone. While the majority of colonists have very limited access to capital, the previous chapter illustrated that the small percentage that do manage to accumulate some money, either from sources of salaried income (often in the municipal government) or through the *garimpo*, frequently invest in ranching. Typically, these capitalised smallholders graze 30-100 head of cattle on 1 to 5 amalgamated lots (100-500 hectares) and tend to sell beef locally through informal outlets in colonisation project towns.

Thus, there are three principal types of ranch in Roraima; the large (usually 3000-10 000 ha.) low intensity holdings of the *cerrado* which are owned by a few wealthy families, the medium-sized units in the forest (500-2000 ha.) which are market oriented and receive most investment, and the small ranches (less than 500 ha.) formed out of amalgamated lots in the roadside colonisation projects (which are also in the forested area of the state).

4.2 Rancher behaviour and capital flows:

Notwithstanding the considerable differences in ranching on the *cerrado* and in the forest, certain observations can be made about ranchers and their

² This concurs with research findings from Rondônia. Of 100 public employees interviewed by Torres (1988) in the urban area of Machadinho only one respondent did not own land or demonstrate interest in purchasing a holding (noted in Milliken 1991 p.134).

behaviour irrespective of the ecosystem in which they operate. Perhaps the most obvious concern is the prestige that land ownership still commands throughout Brazil. Owning land frequently underlies political authority, particularly in rural areas. A large proportion of Amazonian politicians are landowners. The rancher's union UDR claimed to have seventy five deputies and twelve senators among its membership for the northern region³. In Amazonia, the rancher is also considered to be a frontier pioneer, furthering a national goal by bringing new areas into production. For these, among other reasons, Amazonian ranching continues to receive government subsidies in spite of the social and environmental costs of the activity.

The corporate tax incentives administered by SUDAM, giving tax credits of up to 75% of investment to approved projects, have been the most contentious source of subsidised capital for Amazonian ranching since the 1970s. They were eventually withdrawn in 1989 (Mahar 1989 :15), but cheap loans, typically at 5-8% above the rate of inflation, are still available to private ranchers from alternative sources of rural credit. The most notable of these is a regional development fund called the FNO (Fundo Constitucional do Norte) which is administered by the Amazonian bank BASA. In Roraima only six ranching projects were approved by SUDAM (who had a total of 631 projects in Amazonia Legal by 1985), and credit lines like the FNO represent a more significant source of capital for the state's ranchers. Although agricultural and urban development also fall within the mandate of the FNO, it is the ranching sector that receives the lion's share

³ Folha de Boa Vista 30/08/87. In national terms, the 'northern region' (região norte) covers all the states whose land surface falls entirely within Amazonia Legal.

of the available budget, 75% of which was allocated to the beef ranching sector in 1991/92 (BASA pers. comm. 1992).

Rural credit is an important item in balancing the books of some ranches, but it is seldom the only source of capital available to ranchers. Many of Roraima's ranchers have alternative business interests, often in the urban economy or the *garimpos*. 70 (53%) of the 137 ranchers with properties in the proposed Raposa/Serra do Sol Indian reserve had sources of income other than ranching⁴. Indeed, in many instances the ranch represents little more than a mechanism to bank the capital derived from these other ventures, as well as a device to capture cheap loans from rural credit programmes such as the FNO. Even though personal connections are an important influence on the distribution of rural credit, the agencies that provide this capital rarely check to see how it is being utilised, so that ranchers often allocate these funds to other faster growing sectors of the local economy (pers. comm. agriculture secretariat 1991)⁵.

So, just as smallholders transfer their labour into other activities when agriculture is in decline, ranchers tend to shift capital into alternative ventures as new investment opportunities arise. This is clearly illustrated in the behaviour of Roraima's ranchers during the gold rush. Throughout the 1980s, the local price of beef rose considerably due to demand from the rapidly increasing migrant population. In such

⁴ 28 (40%) of the 70 ranchers that had other business interests had investments in the *garimpo*, 15 (22%) in commerce, 10 (14%) held jobs as civil servants, 3 (4%) were doctors, 3 (4%) served in the armed forces and 2 (3%) were politicians. The remaining 9 included two restaurateurs, two garage owners, a lawyer, a businessman, a tourist agent and an independent freight merchant.

⁵ This process has also been observed by Wesche and Bruneau (1990 p.51) in Itacoatiara, Amazonas.

circumstances, one might expect ranchers to meet this demand and respond to the favourable market for beef by reinvesting a large proportion of the newly-raised capital back into livestock production. But while the first half of the equation holds true, most ranchers preferred to reinvest the capital they had raised from carcass sales into other rapidly expanding sectors of the economy, most notably the *garimpo* or the urban retail and service sectors. In fact, some ranchers were so eager to take advantage of this favourable economic climate that they embarked upon an indiscriminate slaughter of their herds, killing productive heifers along with infertile beasts, in order to raise capital at short notice (Gianluppi 1991) ⁶. The net result was a 40% decline in Roraima's beef herd from 360 000 to 220 000 between 1980-1989, accompanied by impaired productivity in the aftermath of poor management practices (SUDAM/OEA/PROVAM 1991: 38) ⁷. Within a decade, the state had changed from being an exporter of livestock to an importer of beef.

It is likely that the growing pressure to demarcate the indigenous reserves for the Macuxi exacerbated this trend as the uncertain future of this area discouraged the reinvestment of capital in *cerrado* ranching. By 1990, ranchers with holdings inside these proposed reserves were barred from receiving rural credit, and a number of them were looking to reduce their herds and reinvest elsewhere. Even so, some of those ranchers who had properties outside these

⁶ The percentage of clandestine slaughters also rose dramatically during the gold rush. Articles in the "Folha de Boa Vista" estimate that 40% of all livestock was illegally slaughtered in the state in 29/07/87, which then rose to 70% in 18/07/87. On 17/06/88 it was reported that the government abattoir had not butchered a single beast for 30 days due to the lack of supply caused by unofficial slaughterings..

⁷ However, even this estimate is probably conservative, records held by the state secretariat for agriculture suggest that the total herd was already less than 180 000 strong by 1986.

proposed reserves were slaughtering their herds at unprecedented rates. This suggests that the rapid growth of alternative economic opportunities, offering considerable returns on short term investment, was the overriding factor which drew capital out of the state's ranching sector. Whatever the dominant process, the economic changes associated with the gold rush led to a rapid contraction of the state's beef herd.

4.3 The relationship between the *garimpo* and the ranch.

While the *garimpo* presented new investment opportunities for the ranchers, some of the more powerful *garimpeiros* sought to transfer capital into ranching. Purchasing land is an attractive proposition to wealthy *garimpeiros* because owning a ranch can complement mining activities in three principal ways. First, as was briefly mentioned in the previous chapter, *garimpeiros* can ride out the large fluctuations in mining incomes by buying and selling livestock relative to their *garimpo* operations. In effect, they are able to reduce risk across their total portfolio by transferring capital from high-risk investments into the more secure ranching economy.

Second, *garimpeiros* may purchase land with the specific intention of getting access to mineral deposits. Even though land ownership does not give title to subsoil wealth under Brazilian law, such claims are normally respected in the informal mining sector. This means that the land owner is usually recognised as the owner of any *garimpos* established on his or her property. Consequently, *garimpeiros* may try to buy land which they believe contains minerals, and although there are a few examples of this happening in

Roraima⁸, it tends to be most marked in areas where agricultural and ranching activities are more closely juxtaposed with mining. Indeed, in areas where this does occur, such as in the Tapajós and south-eastern Pará (Butler 1985), land prices may come to reflect the mineral, not the agricultural, potential of the soil.

Finally, as is illustrated below, a roadside land holding represents an ideal base from which to coordinate mining operations. Food, mining equipment and bulky minerals like cassiterite can all be stockpiled on the ranch and may be transported by light plane directly from the ranch's airstrip into the *garimpos*. In the latter stages of the Roraima gold rush, ranches situated within a 50 kilometre radius of Boa Vista were of strategic importance in maintaining access to the *garimpos*. They enabled *garimpeiros* to evade federal police action which sought to control air traffic from the city's airport⁹. The following account presents a more detailed analysis of the relationship between ranching and the *garimpo* and gives a clear indication of how *garimpeiros* manage their ranches in relation to their mining activities¹⁰.

Robertino is a pilot who left his home state of Minas Gerais in 1978 to work in Pará. Following a year's employment flying light aircraft for ranchers, he became increasingly

⁸ One such example is however provided by the sale of an area of land along the banks of the Rio Maú in 1990. Although the land was sold as a ranch ('Fazenda Capim'), this holding was bought at a considerable price by *garimpeiros*, who were interested in its subsoil wealth.

⁹ José Altino's invasion of Surucucus in 1985 provides probably the best illustration of this. Altino coordinated this operation which involved over thirty *garimpeiros*, from a fazenda located 30 kilometres east of Boa Vista. He continued to make use of the same ranch, which belonged to a prominent local politician, Lourdes Pinheiro, throughout the gold rush as a support base for cassiterite extraction.

¹⁰ This account is distilled from an interview recorded on 7/02/1992 in Boa Vista.

attracted by the opportunities available in the *garimpos* and worked for one year around Redenção and Itaituba before moving to Roraima in 1981. Impressed by the state's mineral potential, Robertino was one of the key figures to provide capital in the early stages of the gold rush and was responsible, together with his partner Alexandre, for constructing the first airstrip at Cambalacho in December 1986.

Unlike many less experienced ranchers, he directly supervised his ventures in the *garimpos*, and estimates that his air-taxi company and mining operations earned him approximately 120 kilograms of gold from 1986-1990 (US\$ 1.8 million @ US\$ 15 per gram). He re-ploughed about 65% of this revenue in the state's *garimpos*. The remaining 42 kilograms were principally invested in buying a new light aircraft for his air taxi company, and purchasing two ranches which had already been established: one of 1000 hectares near Apiaú and a second of 1800 hectares near Mucajaí (the latter was sold with 120 head of cattle on it and cost him approximately 6 kilograms of gold in 1988).

During the gold rush, Robertino used the Mucajaí property, which is located 50 kilometres south of Boa Vista along the state's only paved road, as a support base for his *garimpo* operations. He installed workshops to service both his aircraft and mining equipment and supplied his *garimpo* workforce with beef slaughtered on the *fazenda*. As his returns increased, he improved the ranch infrastructure

and expanded the size of his beef herd which reached a peak of 250 head in early 1990.

Robertino channelled considerable investments into the three *garimpeiro* reserves that were established within the intended Yanomami Indian area. To him, these legalised mining zones appeared to offer a secure future for his ventures. He commissioned another airstrip, sponsored further prospecting missions, and expanded both the capital and labour that were employed in the extractive process itself. As gold had been borrowed from other *garimpeiros* to finance these investments, the subsequent closure of the *garimpos* left Robertino heavily indebted. Obligated to repay his creditors at short notice, Robertino sold off mining equipment, lorries, a car, his ranch at Apiaú with 200 cows, and all but 15 head of his beef herd at Mucajái.

The example clearly illustrates that land-management practices on the ranch may be closely related to the co-ordination of *garimpo* operations. Stocking rates and investment decisions on Robertino's *fazenda* all varied in response to changing external economic and political factors. Thus, the land management practices he employed were totally divorced from the economics of long term livestock production. It is therefore important to place Robertino's management strategy in its wider context, for if it represents that of many other Amazonian ranchers, then the processes noted here have widespread ramifications for land-use throughout the region. Here the key lies in evaluating the scale of capital flows from the

garimpo to ranches throughout Amazonia. The extent of such management practices are directly related to the number of *garimpeiros* owning ranches.

Robertino himself was one of a select few (probably less than ten individuals), who recovered more than 100 kilograms of gold from the Roraima's *garimpos*. And although a modest Amazonian ranch (something in the region of 1000 hectares) could probably be purchased for 4-5 kilograms of gold (US\$ 50-75 000), only a small percentage of *garimpeiros* accumulate enough capital to do this. We now enter the very uncertain world of pinning numbers to the informal mining sector and it should be appreciated that the following estimates represent little more than informed guesses. Within the *garimpo* economy it is really only those people who are either *donos do garimpo*, *donos de maquinas* (including *balsas* and *dragas*), owners of light aircraft, owners of airstrips, or partners in gold trading companies who are in a position to accumulate, if lucky, five kilograms of gold (the price of a ranch). A very rough estimate suggests that in the Roraima gold rush there were possibly 100 *garimpos*, between 300-500 *maquinas* (including *balsas* and *dragas*), 25 registered gold dealers (though about the same number were operating illegally), approximately 300 light planes, and about 80 airstrips (many of which were jointly owned). These calculations suggest that at the very maximum, possibly 1000 individuals or 2.5% of the total workforce, would have had the potential to accumulate 5 kilograms of gold or more. But this number can probably be cut by half or even further reduced if it is considered: first, that many of the *garimpos*, airstrips, planes, *maquinas* and gold trading shops belonged to the same people; and secondly, that the

risks of mining, coupled with police intervention, prevented a large proportion of these entrepreneurs from obtaining five kilograms of gold. Even if we accept that about 400 individuals, representing 1% of the total workforce, obtained 5 kilograms or more, a sizeable proportion of them will have chosen not to invest their gold earnings in ranching.

Nonetheless, these rough calculations make the crucial point that because the gold mining economy employs so many people, even the very small percentage of Roraima's *garimpeiros* who bought ranches with their gold earnings can be counted in the hundreds. Besides, this process is not restricted to Roraima alone. USAGAL estimates that even during the peak years of the late 1980s, Roraima's *garimpos* were responsible for only 10% of Amazonian informal sector gold production and employed the same percentage of the total Amazonian *garimpeiro* workforce (Feijão & Pinto 1990). There is plenty of evidence that successful *garimpeiros* in other parts of Amazonia invest their gold in ranching¹¹. So, on a regional level, the scale of investments from mining into ranching may be ten times that observed in Roraima. This then provides a broad understanding of the size of capital flows into the ranching economy from gold mining. But as we are interested in the extent to which ranching management practices are influenced by the mining sector, we must not neglect from our calculations those ranchers who invested in mining. It should be recalled that a large number of ranchers, who had already established their properties with other sources of capital, subsequently transferred resources into the mining sector. Once again this is extremely difficult to quantify, but it does

¹¹ See Uhl 1992.

nonetheless point to a significant relationship between ranching and the *garimpo* which may have widespread impacts on land-use and land management throughout Amazonia.

4.4 Gold, ranching and deforestation.

In assessing the social and environmental impacts of capital transfers from mining into ranching, it is necessary to identify the areas in which *garimpeiros* were buying ranches. However, as USAGAL have no details of the land tenure status of their members and INCRA have no records of landholders' occupations, it is impossible to collect this data directly from official sources. Nevertheless, some relevant information, which is expressed cartographically in figures 4.1 and 4.2, was provided by four influential *garimpeiros* in Boa Vista who proved to be reliable and co-operative respondents ¹². Each person was interviewed in their own house between January and February 1992 and was asked to give details of their colleagues who had purchased ranches in Amazonian states with gold extracted from the *garimpos* of western Roraima during the 1987-1990 rush.

Altogether 62 different *garimpeiros* were mentioned, with details of the municipalities in which their ranches were located. Data on the size of holdings was less reliable, but the respondents suggested that most of the properties would be between 800 and 2500 hectares in size. This was confirmed by cross-checking the data given on 29 ranches (out of the total of 62 mentioned) which were situated in Roraima,

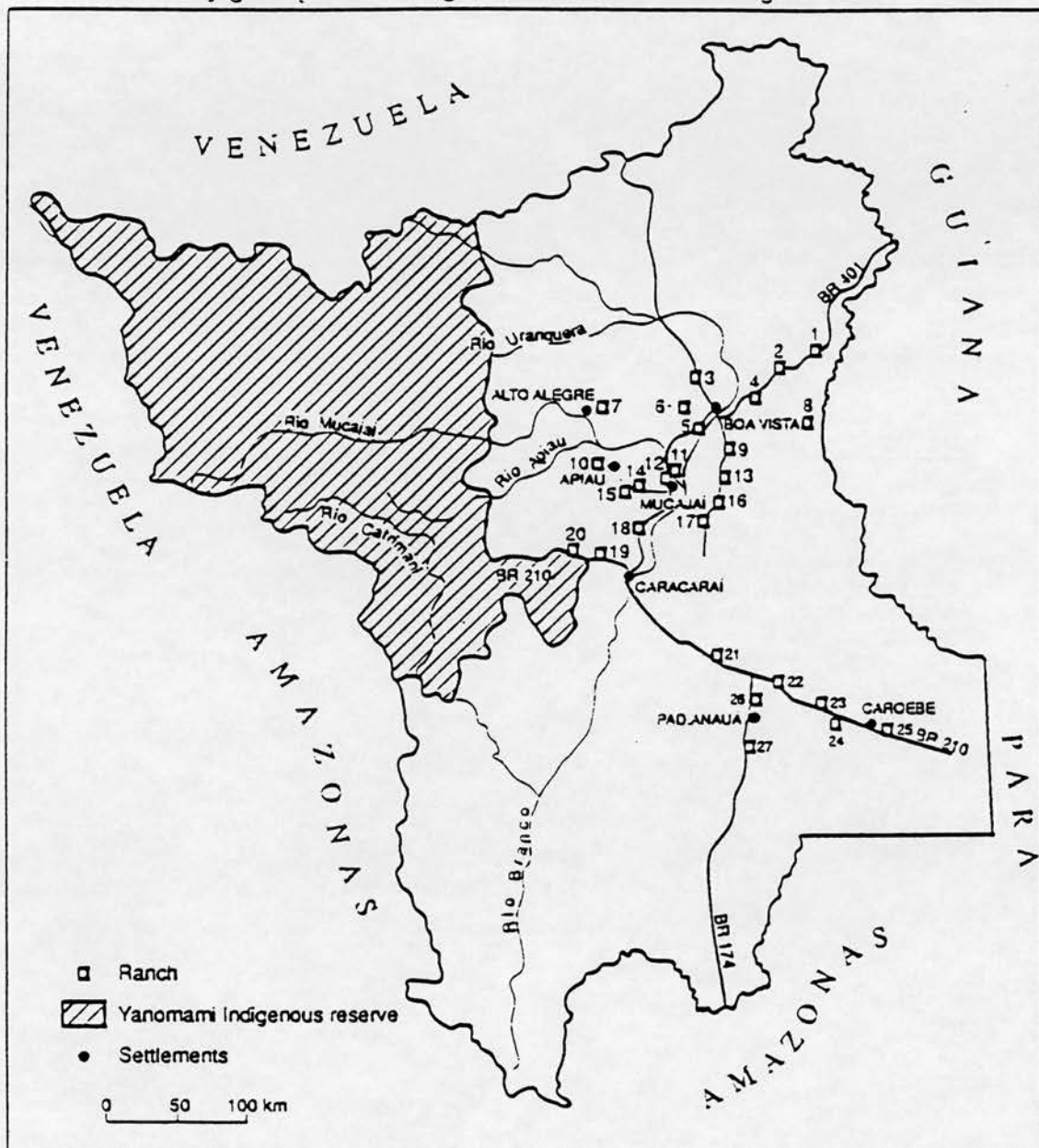
¹² The four respondents were: one owner of an air taxi company who also traded in cassiterite, one *dono do garimpo* who also owned an airstrip, one mineral dealer; and one owner of an air taxi company who was also *dono do garimpo* and owner of two airstrips. All of the respondents, except for the mineral dealer, were also *donos de maquinas* and all of them were land owners.

against the INCRA records held in Boa Vista. Although only 24 of these properties were officially registered under the names given, INCRA employees who were familiar with the land tenure situation in the state confirmed the details of three other properties which had recently passed into the hands of *garimpeiros* but had not yet been registered. The INCRA office was unable to provide any information on two of the 29 properties that had been mentioned by the respondents, and so these were omitted. Consequently, the details and precise location of a total of 27 have been confirmed and are plotted on figure 4.1.

This same exercise could not be undertaken for the remaining 33 properties located in the other Amazonian states. Even so, it may be assumed that the information relating to land purchases in other states is probably of similar accuracy to the data relating to Roraima.

Figure 4.1 illustrates that only a small number of the ranches which were purchased by *garimpeiros* in Roraima, are situated on the *cerrado*. As we have noted, *cerrado* properties tend to be much larger than forested holdings, probably making them less appealing to potential *garimpeiro* purchasers. But pressure to demarcate the Macuxi reserve on the *cerrado* was probably the most important factor in dissuading any potential investors from buying land in this area. This meant that most of the capital that flowed from mining into ranching was channelled into holdings located in the forested part of the state.

Figure 4.1 Map of Roraima showing the distribution of ranches purchased by garimpeiros, with gold from the 1987 - 1990 gold rush.



Garimpeiros with Ranches marked on Figure 4.1

<u>Number of Ranch</u>	<u>Name of <i>garimpeiro</i></u>
1.	Chico Malária
2.	Quincas Bonfim
3.	Antonio Gomes
4	Kão
5.	Vando Acreano
6.	Vando Preto
7.	Alcides Figueiredo (now dead)
8.	Moraes
9.	Funai
10	Paulo & Gonzago
11	Robertino
12	Manuelzinho
13.	Oricado Branco
14.	Jeremias
15.	João Pau Preto
16.	Luizão
17.	Geraldo
18.	Boca Rica
19.	Manuel Martins
20.	Botinha
21.	João Neto
22.	Daniel Souza
23.	Lourino
24.	Lazo Perninho
25.	Chimarão
26.	Domingo Preto
27.	Zezão

Ranchers in forested areas of Amazonia clear areas of natural vegetation to plant pasture. Having observed that a proportion of the gold from Roraima's *garimpos* was invested in ranching in the forested part of the state it is interesting to evaluate the impact of these capital flows on deforestation. The removal of forest cover will be examined in three different ways; First we will look at the total area deforested, then the rate at which forest is being cleared, before finally considering the spatial distribution of deforestation.

Contrary to popular images, over 85% of the forest cover in the Brazilian Amazon is still standing. Over the past two decades, most of the clearing has occurred in the southern part of the basin, notably in Rondônia, Mato Grosso do Norte and south-eastern Pará which have been the foci of regional economic development. To date, development has not proceeded at nearly the same pace in the northern Brazilian Amazon (the states of Roraima, Amapá and Amazonas) where over 95% of the forest cover is still standing. The case of Roraima is illustrative. By 1990 only 2% (3 800 Km²) of her natural forest cover (totalling 180 000 Km²) had been cleared (Fearnside et al. 1990).

The issue is not that the Amazon has been destroyed, but that it is in the process of being so. And for this reason it is the rate of deforestation, not the total area cleared, that demands closest attention. Here the picture looks less rosy as the rate of deforestation has accelerated sharply in recent years. In the decade preceding the gold rush (January 1978-April 1988) 2 600 Km² of Roraima's forests were removed, giving an average annual deforestation rate of 260 km² per annum. In comparison, 1 100 Km² of

Roraima's forests were cleared over the 16 month period spanning the height of the gold rush (April 1988-August 1990) (Fearnside 1991a). The point is that during the gold rush, the average rate of deforestation in Roraima increased markedly (by 184%) over that of the previous decade. The opposite is true for states in the southern Amazon (Pará, Rondônia, and Acre) where the average rate of forest clearance between 1988-1990 actually slowed relative to that of the previous decade. Indeed, as the same calculations made for Mato Grosso and Amazonas indicate that their average rate of deforestation in 1988-1990 was more or less unchanged over that of 1978-88, it is only in Amapá and Roraima that a marked increase is observed. Interestingly enough, *garimpagem* has been the principal agent of development in both states during the late 1980s.

Observing that new fronts of gold mining are associated with increased rates of deforestation suggests that the movements of capital and labour associated with the *garimpos* do exacerbate forest clearance in their hinterland. But in order to understand the nature of this, we need to look at where the deforestation is located in relation to the mining. The spatial distribution of deforestation in Roraima was examined from LANDSAT TM images after the gold rush (in 1991) ¹³ and was compared to the pattern of forest removal as recorded by the government environmental protection agency three years before the rush had started (IBDF 1984). The study confirmed that in the *garimpos* themselves only relatively small areas had been cleared for mining operations and airstrips. Most of the increase in deforestation was concentrated in

¹³ Five LANDSAT TM images held by the IBGE in Rio de Janeiro, were studied: 31/07/89 233x058, 31/12/89 232x059, 22/09/90 231x059, 22/09/90 231x060, 15/10/90 232x058.

and around the colonisation projects and along the roadsides. The only new front of forest clearance is to the west of Alto Alegre near the edge of the Yanomami reserve. Here, some ranches had been established along the Apiaú and Mucajaí rivers, and squatters (*posseiros*) had simultaneously opened up an area along a forest trail between the same two rivers. Interviews (in 1991) with the *posseiros* revealed that many of them had been involved in the gold rush before claiming land in this area. The migration and capital flows associated with *garimpagem* therefore may be responsible for opening up new areas of the forest for agriculture and ranching. But, as most of the newly cleared land (observed in this study) was along the pre-existing road networks, it appears that unless the *garimpo* actually stimulates the development of new roads there may be little change in the overall pattern of deforestation. The point to recognise is that the *garimpo* can fuel forest clearance even though it may not be responsible for opening up large new areas. This is because (as figure 4.1 illustrates) much of the investment of gold earnings into ranching (and to a lesser extent smallholder agriculture) is not channelled into the establishment of new holdings, but, into roadside properties that already exist.

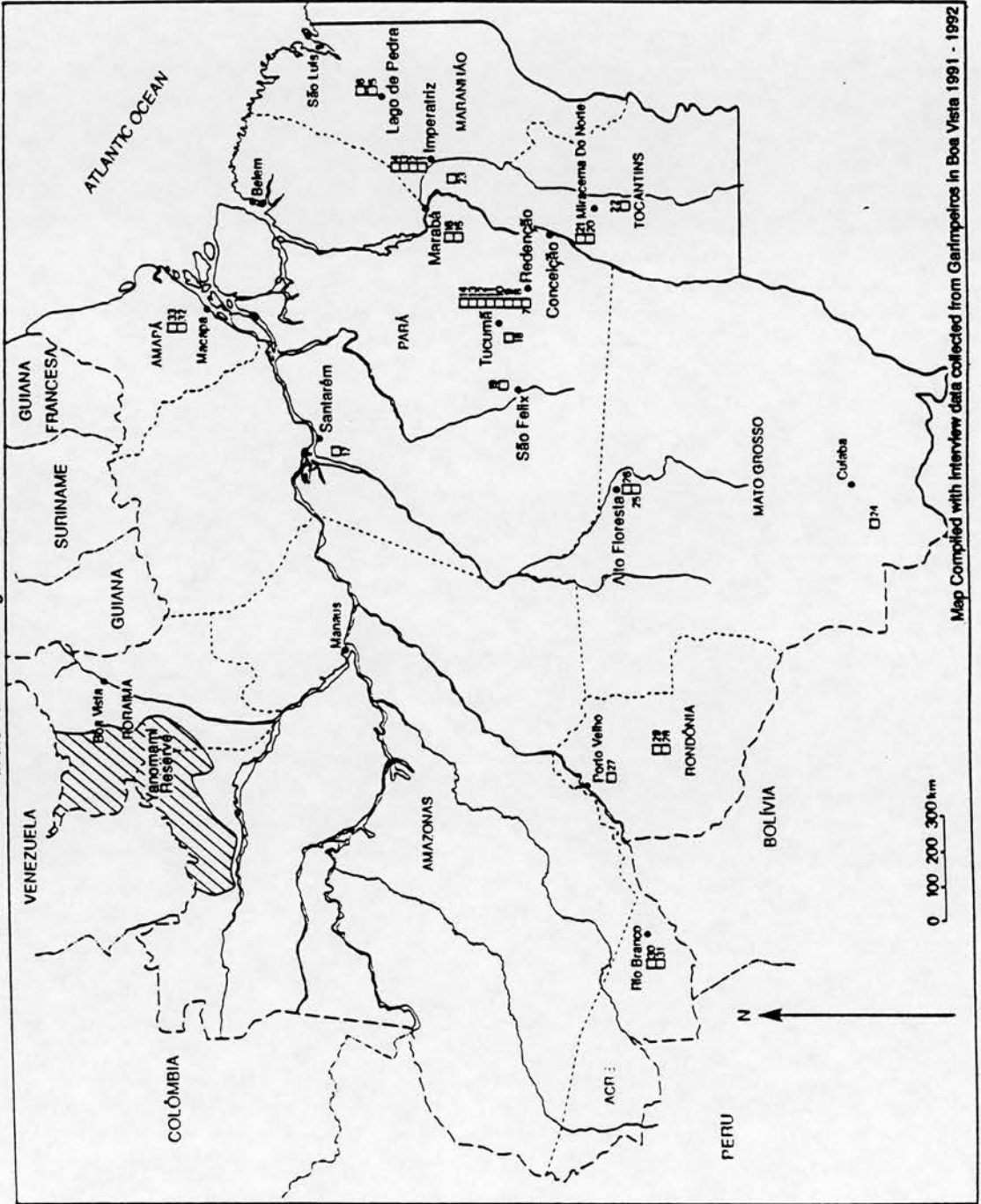
Even though land values in Roraima are still the cheapest in Amazonia, the *garimpeiros* probably invested even greater sums in ranches situated outside the state where more favourable conditions prevail in the ranching economy. Only a small proportion of the total gold extracted from the Roraima rush remained in the state, illustrating that capital flight often affects development in economically peripheral areas. Figure 4.2 shows just some of the properties that Roraima's

garimpeiros purchased in other Amazonian states, making no mention of holdings which were also bought with *garimpo* incomes beyond Amazonia, in areas like the Northeast ¹⁴. The distribution of these ranches mirrors a swathe of agricultural development which curves like an arc across the southern Amazon.

This band, stretching from Maranhão in the East to Acre in the West, is widely referred to as Amazonia's agricultural and ranching frontier during the 1980s. Throughout the decade, improved road access and urban infrastructure, have not only served to link these newly occupied lands to growing markets, but have also fuelled rapid increases in land values, making ranching an attractive investment opportunity in these areas. Not surprisingly, the most rapid rates of Amazonian deforestation are concentrated within this zone as areas of forest are brought into agricultural production (Fearnside 1989 :14). The data presented in map 4.2 suggests that the *garimpo* economy is one source of capital that is contributing to this deforestation and has probably become increasingly significant, relative to public sector funds, as government subsidies for Amazonian ranching have diminished during the late 1980s.

¹⁴ An example of this is provided by the *garimpeiro* 'Luizinho da Agropécuaría', who had been mining in Roraima and Venezuela since 1973. By the late 1980s, he had become one of Roraima's wealthiest *garimpeiros*, owning ranches both in the state and in his native Ceará, where he farmed 5000 head of cattle on his 7500 hectare ranch at Inhamuns. He was a particularly influential figure in the early stages of the gold rush, owning 1 helicopter, 2 light aircraft, and 14 *balsas* on the Rio Uraricoera, and employing 200 people in the *garimpos* (Correio do Garimpo Nov. 1988).

Fig 4.2 Map of Ranches purchased in Amazonia Legal by garimpeiros working in the Yanomami Indigenous Reserve 1987-90



Map Compiled with interview data collected from Garimpeiros in Boa Vista 1991 - 1992

Garimpeiros with ranches marked on Figure 4.2

<u>Number of ranch</u>	<u>Name of garimpeiro</u>
1.	Zé Amaral
2.	Minerinho
3.	Raimundo Nenêm
4.	Quincas Bonfim
5.	Rubens
6.	Baiano Formiga
7.	Amadeus
8.	Tarzã
9.	Antonio Louro
10.	Zé Garopa
11.	Angelo Nadai
12.	Rolando Kohl Freitag
13.	Gelicio
14.	Zé Anofre Robeiro
15.	Pé na Cova
16.	José Martins de Fonseca
17.	Antonio Picão Neto
18.	Luiz Vilarinho
19.	Zé Flavio
20.	Zé Bigode
21.	Alouizo
22.	Roberto Carlos
23.	Miguel & Cristovão Moletto
24.	Lauro Texeira
25.	Jovair
26.	Arnaldo José de Oliveira
27.	Rubens
28.	Klaus Schultz
29.	Pedrinho
30.	Adaiar Ruiz
31.	Santos Dumont
32.	José de Macapá
33.	João Neto

4.5 *Garimpagem* and land conflict.

Altering the pre-existing pattern of land tenure is perhaps the most significant impact that the mining sector can have upon the rural economy over the long term. Changing land ownership not only affects the management of any given piece of land, but more importantly it may alter the size of the productive units. Unfortunately, the IBGE agricultural census which would have been a useful source of data on this subject was not undertaken in Roraima in 1990, as planned. It is therefore difficult to assess whether the overall trend during the period under study is towards an increasingly concentrated, or fragmented, distribution of land. The only alternative is to evaluate the impact of the *garimpo* economy on land tenure by examining the dynamics of the land market during the gold rush.

In Roraima, the land market accelerated during the late 1980s as both the supply and demand for land expanded simultaneously¹⁵. Land holdings came on to the market at an increased rate both from large land owners who wanted to capitalise on the rising land values, and from other owners who were obliged to sell land for economic reasons, often to pay off debts incurred in the *garimpos*. Meanwhile, the demand for land increased as successful *garimpeiros* looked to invest newly accumulated capital in property, inflating the local land market. As Figure 4.1 illustrates, *garimpeiros* were particularly interested in properties on the outskirts of Boa Vista, where ranches fulfilled

¹⁵ This discussion is based on an interview with a rural estate agent in Boa Vista in September 1991. However, neither his records, nor the available INCRA registers, permitted a quantitative analysis of changes in the land market

a strategic role in maintaining the flow of air traffic between the city and the *garimpos*. Land values also rose to the south and west of Boa Vista, notably in the municipalities of Alto Alegre and Mucajaí, because these areas offered relatively cheap land serviced by comparatively good roads. However, as the mining boom had buoyed up the value of rural property, land prices in certain areas reflected the strategic value of a site more closely than its agricultural potential. It is therefore not surprising that the bottom fell out of this artificial market following the closure of the *garimpos* ¹⁶.

Although the rush only brought a temporary change to the state's land market, it nonetheless had a considerable impact on land tenure in this short space of time. This was not only due to the accelerated rate at which land changed hands, but it was also related to changes in the pre-existing hierarchy of buyers and sellers in the local land market. Prior to the mining boom, public sector employees and urban entrepreneurs (mainly retailers) were virtually the only members of society with sufficient income to purchase land, and so land holdings which came up for sale often passed into their hands. The *garimpos* effectively broke this oligarchy, because mining incomes offered previously impecunious *garimpeiros* the chance to enter the land market as buyers. The ranches mapped in figure 4.1 represent only the most spectacular examples of this process. At the other end of the scale were numerous *garimpeiros* who bought smallholdings with their gold earnings.

¹⁶ At the average value of US\$ 21 per hectare, land in Roraima is still considerably cheaper than in any other Amazonian state (Funatura 1992 p.17)

This is an important point as it indicates that *garimpo* incomes were financing land purchases at all levels of the rural property market. It therefore becomes difficult to assert that the *garimpo* necessarily exacerbates the amalgamation of land holdings in its immediate hinterland. Roraima is illustrative; a glance at figure 4.1 indicates that some successful *garimpeiros* were purchasing large blocks of land along roadside locations. Indeed, many of these ranches were bought in the very colonisation projects in which land was set aside for smallholder agriculture. But on the strength of these observations, it is wrong to argue that capital from the *garimpo* necessarily leads to the amalgamation of colonist plots into larger properties. For although some large holdings were undoubtedly created in this way, many of the ranches that the *garimpeiros* purchased had probably been established by other land owners in the years preceding the gold rush. While a proportion of these were no doubt large holdings from the start, others would have resulted from the gradual amalgamation of smallholdings, financed by alternative sources of capital. As we have already observed, Roraima's colonisation projects have been steadily depopulated since their inception. Therefore, in the years preceding the gold rush, more capitalised landowners had been taking advantage of this out-migration to buy colonist holdings and merge them into small ranches. The overriding impression is that this process of land concentration was already well developed before gold mining appeared on the scene. Many of the ranches which passed into the hands of wealthy *garimpeiros* had already been established by the time the gold rush started.

This is supported by evidence collected from the colonisation projects of Alto Alegre and Villa do INCRA, as part of the field survey described in the previous chapter. Of the 38 multiple lot owners who were interviewed, only 17 (44%) had been to the *garimpos*, and most of them (9 out of 17) had in fact expanded their land holdings with other sources of off-farm income prior to the rush. Only 8 (21%) of the 38 multiple lot owners interviewed had actually expanded their land holdings with proceeds from the *garimpos*.

Here it should be recalled that capital from the *garimpos* was not only providing some landless *garimpeiros* with enough money to buy their own land holdings, but it was also enabling numerous other smallholders to resist the economic pressures which traditionally lead to the abandonment of homesteads. Thus, it may well be that the dominant processes driving the accumulation of land holdings in settlement areas up to 1985 were actually reversed during the gold rush. It is therefore wrong to assume that the *garimpo* necessarily leads to a *de facto* increase in the concentration of land holdings in its hinterland.

This is not to negate that people are displaced from their land holdings as a result of the *garimpo* economy. Indeed, we have already noted that a number of landowners, particularly the less capitalised smallholders, were forced to sell their properties to pay off debts incurred in the *garimpos*. Furthermore, while it may not be as strong a process as certain authors have argued (Filho 1984), it is nonetheless true that some landholders do use capital from the *garimpo* to expand the total size of their properties. In Roraima, there are still large areas of unclaimed lands (*terras devolutas*) so that landless people can

simply move into the forest and stake out a claim to a new patch. Although there are no official records, the rate of spontaneous settlement in Roraima appeared to be gathering momentum during the late 1980's. Initially, these squatters (*posseiros*) were displaced farmers and incoming migrants, but following the closure of the *garimpos* in 1990, large numbers of the expelled *garimpeiros* swelled their ranks¹⁷. The *posseiros* laid claim to land on the periphery of official colonisation projects and established their homesteads at regular intervals along trails which they had cut through the forest. In replicating the geometric layout of the official settlement schemes, the squatters believed that the eventual titling of their lands would be facilitated. By the early 1990s the *posseiros* were responsible for bringing significant areas of new land into cultivation and the government agencies like INCRA, DNER, and SUDAM were following in their wake, issuing land titles, constructing feeder roads and spraying the homesteads with insecticide to reduce malaria. In this way, the colonisation projects of Apiaú and Confiança expanded rapidly. It was during this time that the land area between the Mucajaí and Apiaú rivers (which was noted in the study of deforestation above) was also being settled by *posseiros*. But, due to its inaccessibility it did not receive the same level of infrastructural support from government agencies.

The availability of land and the government's support for the *posseiros* probably helped defuse any social tensions that may have arisen from processes of

¹⁷ This return to agricultural production was encouraged by the state government which made large areas of land available in the colonisation projects in the immediate aftermath of the rush. The reasons for this are discussed in greater depth in chapter 6.

land concentration and from the closure of the *garimpos*. Apart from the direct clashes between the *garimpeiros* and the Indian populations on whose land they were mining, there was virtually no evidence of the gold rush causing land conflicts in the state. As other Amazonian states typically have higher pressures on rural land, the lack of violence witnessed in Roraima is perhaps the exception rather than the rule for Amazonia as a whole. Throughout the 1980s, land tenure changes in Rondônia, northern Mato Grosso and especially south-eastern Pará generated vicious agrarian conflicts, as smallholders defended their land claims from more powerful interests (Schmink & Wood 1992, and Hine 1991). Furthermore, because these areas of rural violence are all in close proximity to *garimpos*, a connection has sometimes been drawn between the informal sector mining economy and agrarian conflict. Even though it has been argued above that the links between the *garimpo* and land concentration are sufficiently complex to defy such a general assertion, the subject does merit closer attention.

Figure 4.2 illustrates a clustering of ranches bought by Roraima's *garimpeiros* in south-eastern Pará and along the state's eastern border with Maranhão and Tocantins - an area which is renowned for its rural violence. Here social conflict stems from the eviction of a rural peasantry by more capitalised ranchers, a process which had been fuelled by government incentives to the ranching economy since the 1970s (Hine 1991). However, even though the SUDAM administered tax concessions for corporate ranches were withdrawn in 1990, there is little sign that rural violence in the area has diminished. Indeed, data collected by the Pastoral Land Commission (CPT) notes that Pará hosted

more rural violence than any other Brazilian state in 1991, two years after the SUDAM incentives to the ranching sector had been withdrawn. Thus, the pressure on land is as strong as ever, suggesting that, in spite of diminished access to public sector capital, ranches continue to expand to the detriment of smallholders.

The data presented in figure 4.2 shows that gold from the *garimpos* of Roraima was one source of capital being channelled into ranching in this area during the late 1980s. Roraima's *garimpeiros* presumably saw the ranching economy of Pará and Maranhão as an attractive option due to its integrated road network and proximity to the major urban markets of Belém and Brasília. But their desire to purchase land in these states was probably amplified by their previous knowledge of this area. It was noted in chapter 2 that many of the *garimpeiros* who worked in Roraima originated from Maranhão and a large proportion had spent time in south-eastern Pará during the early 1980s. Given that people usually buy land in areas with which they are already familiar, the geography of gold investments in ranching is undoubtedly related to the migratory patterns of the Amazonian *garimpo* workforce. Incomes generated from resource exploitation in northern Amazonia are being repatriated to the fringes of the eastern Amazon, from which many of the migrants originated.

On the strength of the data presented in fig. 4.2, it is virtually impossible to assess the real scale, let alone the consequences, of capital flows from Amazonia's *garimpos* into the ranching economy of Maranhão and south-eastern Pará. A couple of relevant points can nonetheless be made concerning the nature of this process.

First, it has to be recalled that Roraima represents only 10% of the Amazonian mining economy. If *garimpo* revenues from the other mining areas throughout Amazonia are also being channelled into the ranching economy of the south-eastern Amazon, then the capital flows under study are clearly not insignificant.

Secondly, attention should be given to the size of ranch that *garimpeiros* are likely to own. It is probable that their holdings are much smaller in size than the large corporate ranches which received the lion's share of SUDAM investments during the 1980s. So that although beef ranching in the area may still be expanding, the macro picture probably masks a shift in capital from larger to smaller ranchers. Clearly, further research is required before the true extent of this link between the mineral and ranching sectors of the Amazonian economy can be understood.

4.6 Discussion and conclusions:

Capital is a prerequisite for economic development, yet although public sector funds are often closely monitored in Amazonia, scant attention is currently paid to the sources and flows of private capital in the regional economy. This is nonetheless a relevant focus for contemporary research. As public investment in development decreases, private capital is likely to attain an increasingly important role in shaping regional development processes. Most of this capital is generated within the informal sector, not only from the *garimpo*, but increasingly in the Brazilian Amazon from the cocaine trade. Furthermore, as this money is often banked in rural and urban properties, rather than in financial institutions, a large proportion of it never passes into the formal

sector of the economy. In these circumstances, the state's ability to define the pattern of regional development is severely compromised.

If we are to obtain a realistic understanding of the forces shaping land-use, greater attention must be paid to the geography of capital flows between the *garimpo* and other activities in the rural economy. In this chapter we have seen that this relationship may have a profound effect on the management practices of rural producers. However, even though this is an important process which shapes the extent of the *garimpo*'s impact on the region's rural economy, it is rarely considered in contemporary evaluations of Amazonian development. A need exists for planners to expand the remit of current environmental and social impact assessments so that the consequences of capital flows from one activity to another are no longer ignored. For example, if the financial returns from mining ventures (or logging operations) are invested directly into ill-managed ranching, this information should be incorporated into any analysis of the total non-economic costs associated with the initial development.

Finally, here we see ranchers tailoring their management practices more closely to external economic and political changes than to the internal productive economics of cattle raising. This observation is of particular concern to agronomists who are working towards a more widespread adoption of long-term land-use strategies in the region. Agroforestry and silvicultural systems are being developed on the basis of their sustained yields and are promoted in accordance with the income that they generate over the long term. But while such initiatives represent

laudable attempts to reduce the environmental degradation that accompanies current Amazonian farming practices, they are poorly suited to the priorities expressed by many of the region's land owners. In crude terms, these concerns relate to protecting savings from erosion by inflation and to the flexibility with which capital can be either injected or withdrawn from the system at short notice. Perhaps the largest challenge for those concerned with the environmental impacts of current Amazonian land-uses is to find an appropriate alternative to cattle raising which fulfils these objectives.

Summary:

1. There is evidence from all over the Amazon that ranches are often used as vehicles for banking capital.

2. There were clear links between the mining and ranching economies of Roraima during the gold rush. Ranchers invested in the *garimpos* and *garimpeiros* purchased ranches. This relationship is not exclusive to the state in which the mining occurred.

3. The Roraima rush therefore came to influence the management practices of ranchers throughout Amazonia, which were often more closely related to external socio-economic changes than to the longer term productive economics of cattle raising.

4. Capital flows between the mining and ranching economies have ramifications for the structure of land tenure, and the rate of deforestation throughout rural Amazonia. The extent and strength of these processes is related to the precise geography of these capital flows.

5. If the current trend of diminished public sector investment in Amazonia is sustained, the *garimpo*

and other sources of private capital are likely to become increasingly important determinants of regional development processes.

Chapter 5: Caboclos, Indians and garimpagem:

In the previous two chapters we have seen how smallholders and ranchers were drawn into the gold rush for predominantly economic reasons. Other groups were not so quick to get involved and it is important to understand why this is the case. The extent to which different groups participate in *garimpagem* influences the distribution of its impacts among the local people and environment. It is therefore relevant to ask why some social groups get involved and others do not. In this chapter we see how the *caboclo* population of the lower Rio Branco and the Macuxi Indians of the *cerrado* reacted to the Roraima gold rush. Even though they behaved in quite different ways, it becomes apparent that some common elements shaped their responses to the various opportunities arising from the rush.

5.1 Caboclos and the garimpo:

Government directives throughout the 1980s have considerably altered the lifestyles of the *caboclos* who inhabit the lower Rio Branco and its tributaries. At the start of the decade, a similar agricultural model to that which had been developed for colonisation projects along the federal highways was applied in these riverine areas. Traditionally, the *caboclos* resided in houses that were dispersed along the river banks- a settlement pattern which was adapted to the demands of extractivism. However, in the early 1980s the state government (notably the Secretary of Agriculture) encouraged them to move into planned communities on the grounds that it facilitated the provision of healthcare and education in these remote areas.

Fig 5.1 Riverine Settlements of the Lower Rio Branco

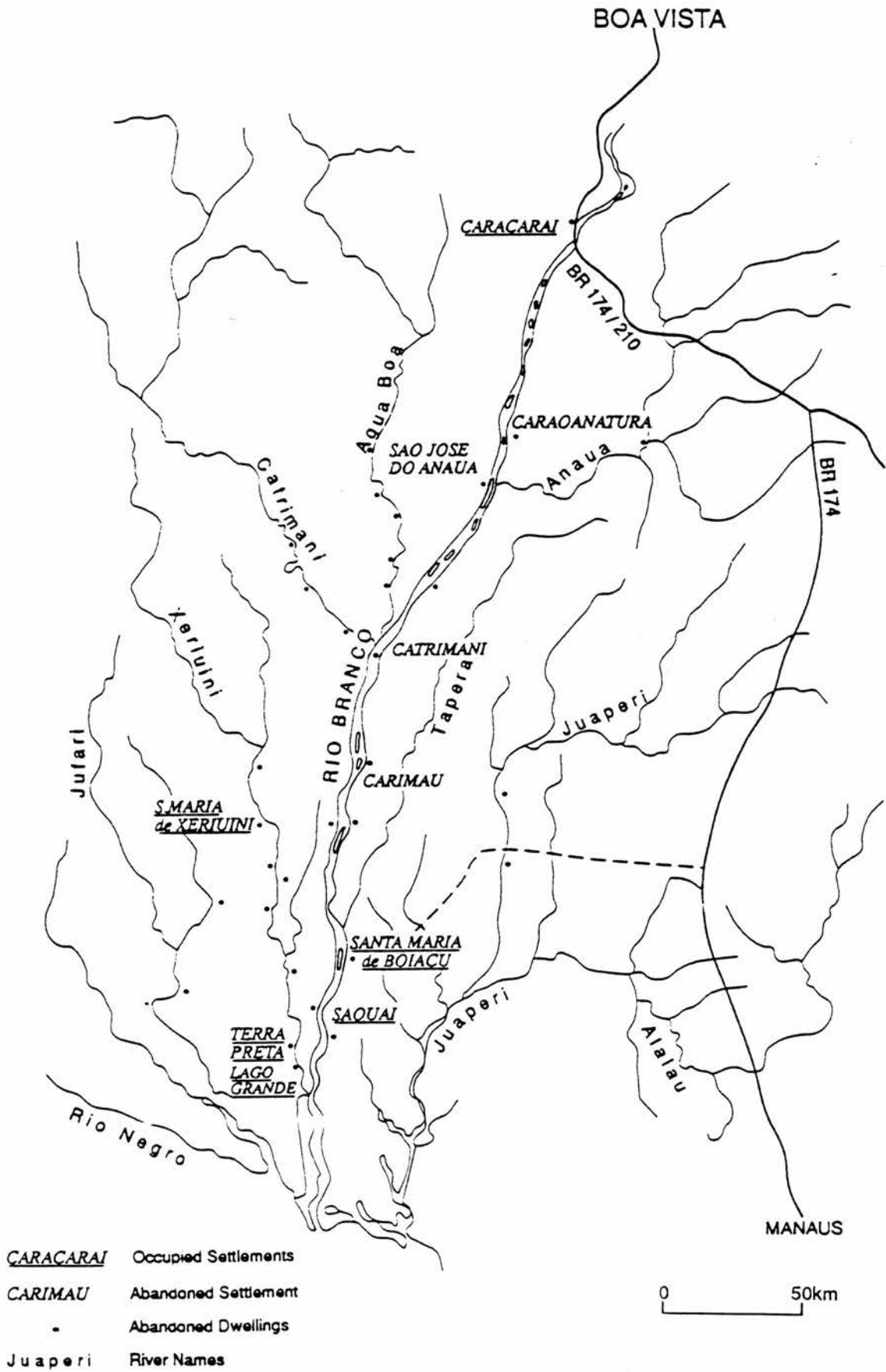


Figure 5.1 illustrates the distribution of current and abandoned settlements along the lower Rio Branco and its tributaries. Typically, communities were established on sites which already had a cluster of houses, although in two cases totally uninhabited areas were selected. The *caboclos* were given materials with which to construct new houses in a grid pattern and were allocated a plot of land nearby (usually 100 hectares) to cultivate. In the largest of these communities, Santa Maria de Boiaçu, migrant families were also settled in the same way and the small town was entitled an agricultural colony ¹. Diesel-powered electricity generators and tractors were provided for each of the new settlements, but by the end of the decade few of them still worked. Extension workers from the agricultural secretariat encouraged the *caboclos* to devote less time to fishing and hunting, and to concentrate on agricultural production.

During the mid 1980s, the *caboclos* experienced a fate similar to that of the colonist farmers discussed in chapter 3. Political changes in the state government left these recently established communities virtually abandoned and the transport of agricultural produce to the principal markets of Boa Vista and Manaus became extremely precarious. While the majority of *caboclos* switched back to extractivism, new legislation by the environmental protection agency IBAMA served to classify many of their traditional hunting and fishing practices as illegal. The sale of turtles and bush meat, which represented an important source of income for the *caboclos*, was prohibited. By the end of the 1980s, IBAMA was enforcing these laws, as well as more

¹ It was anticipated that a 130 Kilometre road would link Santa Maria de Boiaçu to the BR 174, but although this connection had been planned in 1980, it was still incomplete in 1991.

rigid fishing regulations (particularly those relating to the *pirarucú* [*Arapaima* sp.]), with a vigour that the *caboclos* resented.

The financial difficulties faced by the *caboclos* were exacerbated by a simultaneous decline in the value of sorva (*Couma* sp.) which is historically the most important non-timber vegetable product extracted in Roraima. At the start of the 1980s, its production measured in tons was typically tenfold that of Brazil nuts, the second main product (IBGE 1980-1984). However, by 1988 the price of sorva latex had dropped to such a low that the traders no longer purchased it. This is particularly significant as the unique link that some of the more remote communities had with the urban market was effectively severed when the trading boats stopped venturing up the tributaries of the Rio Branco. As was noted in the introduction, true rubber (*Hevea brasiliensis*) is scarce in the area, and so the livelihoods of Roraima's *caboclos* were not protected by government price subsidies for the extraction of this product. Furthermore, the collection of Brazil nuts, which subsequently became the principal extracted vegetable product, is subject to large annual fluctuations in supply, generating variable rates of income from year to year.

These combined pressures encouraged *caboclos* to look for alternative sources of income and a large number of families moved away from the lower Rio Branco to seek urban employment. This reflects a pattern that has been observed throughout rural Amazonia since the 1970s (Ayres 1992, Torres & Martine 1991). In the case of Roraima, the rates of outmigration from *caboclo* communities during the 1980s peaked between 1987 and 1990. Settlements that had existed on the banks of the

Rio Branco in 1980 were abandoned by the end of the decade, notably Caranoanatura, São José, Catrimani, and Carimaú (see fig 5.1). In the absence of a relevant census, a rough estimate calculated from conversations with local residents suggests that the riverine population of the lower Rio Branco and its tributaries declined by at least 60% from 1980 to 1991.

The families that remained along the river banks (approximately 100 households in 1991) continued to live off the production of manioc flour (*farinha*), hunting and fishing. In order to avoid being fined by IBAMA, the *caboclos* developed more subtle techniques for catching turtles, which, along with dried fish, still provided a modest income in the summer months. Although river traders were reluctant to purchase turtles, the *caboclos* were able to continue selling them, albeit in reduced numbers, to the crews of barges which regularly ply along the Rio Branco transporting fuel and construction materials between Manaus and Boa Vista. A few young men from the lower Rio Branco also migrated seasonally to the rivers Jaú and Uniní (both tributaries of the Rio Negro) to extract rubber in the rainy season. Otherwise most households received a cash income from the annual Brazil nut harvest and the occasional sale of manioc flour and dried fish, although a handful of people were employed as nurses, teachers, radio operators, or in one case as an agricultural technician, and so received government salaries.

It is interesting that virtually none of the *caboclos* sought work in the *garimpos* in response to the deteriorating economic situation along the river banks. Only one person from a total of 71 *caboclo* families who live in the communities of Santa Maria de Xeriuni

(7), Terra Preta (13), Lago Grande (14), Saquai (18), and Caracarái (19) went to the *garimpos* during the gold rush (Interviews in November 1991). Moreover, informal conversations amongst residents of the riverine agricultural community of Santa Maria de Boiaçu (estimated population of 280) indicated that only 4 inhabitants of that village participated in the gold rush. Two of them were northeastern colonist farmers settled there at the start of the 1980s. Thus, if we consider all of the residents inhabiting the banks of the Rio Branco and its tributaries in 1991, as well as the 19 families that had migrated from this area to Caracarái in the late 1980s, it is apparent that less than 1% of them participated in the 1987-1990 gold rush.

This is all the more surprising as evidence from other parts of Amazonia notes riverine peoples behaving in a totally different way. During the 1960s, *caboclos* provided much of the initial labour in the original placer mines of the Tapajós (Gaspar 1990). Similarly, contemporary studies note that members of *caboclo* households near Altamira on the Rio Xingú (Clara da Silva 1991) work in local *garimpos*. Clearly, there is nothing intrinsic about the lifestyle of the Amazonian *caboclo* which makes them averse to mining. The situation in Roraima is therefore unusual, particularly when the geography of the situation is considered. For although the principal mining areas were not right next to the *caboclos'* houses (as is the case along the Rio Madeira in Rondônia where *caboclos* work in the *garimpos* - Cleary pers. comm.), they were not so distant from the areas the *caboclos* worked in. One centre of *garimpo* activity was in the headwaters of the Rio Catrimani which is one of the main sorva producing rivers

(although it is now permanently inhabited only by the Yanomami) and *garimpeiros* had also been prospecting along other rivers. The Rio Xeriuini had attracted their interest and local *caboclos* had helped *garimpeiros* mount a couple of prospecting trips into its headwaters, but these ventures were unsuccessful.

It is therefore surprising that a greater proportion of *caboclos* did not turn to the *garimpos* as a solution to their economic difficulties. They mentioned that the violence and disease associated with mining dissuaded them from entering the *garimpos*. Unlike the colonists, who tended to justify their decision not to go mining on economic terms, the *caboclos* were quite prepared to admit that they were scared. Others mentioned a reluctance to leave their families and noted that a long absence would jeopardise other activities such as the production of manioc flour or the collection of Brazil nuts. A lack of experience in mining, the expense of entering the *garimpos*, the inherent risks, the illegality of the practice and the threat of Indian attack were among the more pragmatic responses given.

However, while the *caboclos* often explained their minimal participation in the gold rush on ethical grounds (inferring that it was wrong to interfere with the Indians, leave the family, or indulge in a violent and illegal practice), it is misleading to assume that their (perhaps inflated) morality was the only obstacle standing between them and the mines. Notwithstanding their geographic proximity to the *garimpos*, other factors actually served to constrain their entry into the mines. In the manual phase of the *garimpos*, mining is restricted to the dry season. As this coincides with the Brazil nut harvest and the peak fishing season, the

caboclos of the lower Rio Branco are unlikely to have left for the *garimpos* during what is their most productive time of year. Even if some of them did want to enter the *garimpos* at this early stage, they would probably have required external help in discovering the correct access routes to the mining areas. As the gold rush developed (post 1986), air transport from Boa Vista eroded the seasonality and inaccessibility of mining. But, flights into the *garimpos* were not only very expensive, they were also dominated by urban merchants whom the *caboclos* did not know. Unlike smallholders, the *caboclos* rarely possess anything as valuable as cows which they could sell at short notice to pay for the flight. In order to enter the mines therefore, most of them would be obliged to accept an air fare into the *garimpos* on credit (ten grams of gold), and subsequently repay the owner of the air taxi company with some of the proceeds of their *garimpo* earnings.

Under such an arrangement the *caboclos* are immediately disadvantaged on two counts. Firstly, having such minimal involvement in both the *garimpos* and the urban economy of Boa Vista, they knew very few people who would advance them an air fare. *Garimpo* entrepreneurs/ patrons who did offer passages in this way would usually distribute them only to people that they knew or to individuals recommended to them by friends. Secondly, the characteristic trading relations of the riverine economy make *caboclos* reluctant to become indebted to strangers. The economic influence of patrons and river merchants typically extends along lines of kinship, and fictive kinship, so that virtually all transactions along the riverbank are underpinned by personal bonds. In many ways, the

disadvantageous economic terms that *caboclos* usually accept under debt bondage (*aviamento*) are offset to some extent by the security inherent in establishing a social tie through trade with an influential patron (Hugh-Jones 1992). However, a *caboclo* entering the *garimpo* is obliged to accept a debt which is not underwritten by any social relationship with his creditor and is, in this way, denied some degree of insurance against the contract. Even though the large number of gold dealers ensure that *garimpeiros* are never exposed to the same monopolistic prices characteristic of the riverine economy when entering the *garimpo*, the *caboclo* is nonetheless making a commitment to the unknown on terms that appear to be highly unfavourable.

It is illustrative that the only resident of the Rio Xeriuini who participated in the gold rush was personally invited to do so by a local politician who befriended him. He was advanced the air fare and repaid it from the income he gained constructing timber rafts (*balsas*) in the *garimpos* on the Uraricoera. In this way, he generated sufficient capital to purchase a fishing boat and outboard motor and became a fisherman in the port of Caracarái. His success in the *garimpos* encouraged others to try and enter, but they were effectively thwarted because they did not have similar contacts among suitably influential people. His cousin also went to Boa Vista attempting to secure an airfare to the *garimpos*, but he was unsuccessful. He neither knew, nor obtained an introduction to, any of the *garimpo* gatekeepers ². It therefore appears that

² As he himself explained: 'I reckon that there are a lot of people who are interested [in going to the *garimpos*], but the difficulty comes when you arrive in Boa Vista.. it's really hard, you've got to know a *garimpeiro* patron and I just don't know anybody like that, so I never got anywhere.' (interview recorded 7/11/91 Santa Maria de Xeriuini).

caboclos find the material benefits of gold mining just as attractive as other rural producers do. Their low rate of participation not only demonstrates their reservations about the dangers or the ethics of mining (and this is what many of them would stress), but it also reflects the geographical, economic, and social constraints which stand between them and the *garimpos*.

Indeed, the lack of social relations between the extractive and *garimpo* economies was probably the key factor which prevented larger scale *caboclo* involvement in Roraima's *garimpos*. This differs considerably from early developments in the Tapajós gold fields where traders such as Nelson Pinheiro formed a powerful link between the two sectors of the rural economy. He recruited many of the original *garimpeiros* from the rubber estates along the tributaries of the Tapajós, and employed them along similar work relations to those existing in the extractive economy (Gaspar 1990 :42/43). Miller's subsequent analysis of the local élites in Itaituba reveals that a number of influential rubber patrons also diversified into *garimpagem*, in response to the post war decline in rubber prices, presumably facilitating the transfer of labour from extractive to mining activities in the area (Miller 1985) ³.

Despite living nearby, Roraima's *caboclos* could not easily reach the *garimpos* on their own (as is the case on the Rio Madeira), nor were the relevant social bridges available to facilitate access (as in the case of the Tapajós). Consequently, they turned to the other options available through their network of kinship and

³ It would be interesting therefore to learn in greater detail about the specific social relations that underpin the involvement of *caboclos* from the Rio Xingú in the *garimpos* around Altamira (Clara da Silva 1991: 29).

fictive-kin ties, and migrated to urban areas. The movement of Manuel Candido, the Rio Branco's most influential patron, to the fishing port of Caracarái in 1987 was particularly significant in shaping the behaviour of the *caboclos* at this time. In response to the falling price of extracted products (notably Sorva), Manuel Candido stopped trading along the Rio Branco and instead purchased an ice making plant and a small fleet of fishing boats in Caracarái. He was capitalising on a rapidly expanding market precipitated by growing urban demand for fish (principally in Boa Vista) during the gold rush years. Although many of the *caboclo* families along the lower Rio Branco already had strong ties with Caracarái, Manuel Candido's new investment greatly accelerated their migration to the town. As is illustrated below, Manuel came to employ many of the *caboclo* families with whom he had previously traded in his new fishing enterprise. It is interesting to speculate that *caboclos* might equally easily have been drawn into the *garimpos* if he had instead chosen to invest his capital directly in the mining economy.

5.2 Urban growth and rural-urban migration:

Urban centres have mushroomed in the wake of the Amazon gold rush. The cities of Marabá, Itaítuba, Redenção, Imperatriz and Alto Floresta all testify to this process. Roraima is no exception, rates of urbanisation have increased from 43% in 1970, to 64.6% in 1990 (IBGE 1992 census). An alternative source of data, extrapolated from the number of residences, estimates that in the first half of 1991, 72% of the state's inhabitants were residing in urban areas (SUCAM

1991) ⁴. The real figure probably lies somewhere between the two, but the important point is that in Roraima, as in Amazonia as a whole, more people now live in cities than in rural areas (Bogue and Butts 1989 :55).

Boa Vista was the administrative centre of the gold rush and absorbed the greater part of these changes. By 1991 it was twenty three times the size of either Caracarái or Mucajái, which vied for the title of the state's second largest city (each have a population of about 5150, IBGE 1992). Business boomed. The state secretariat for industry and commerce (SEICOM) registered 3779 new enterprises in the formal economy alone between 1987 and 1989; these were principally in the service sector and retail trade. This compares with a total of only 602 commercial establishments in Roraima as a whole in 1980 (IBGE 1983 quoted in Abers and Pereira 1992). Interestingly enough, the larger proportion of migrants were not employed directly in the gold mining economy itself, but in other informal sector activities. A survey of 410 households in Boa Vista conducted in February 1991 by Abers and Pereira (1992) notes that 46% of the 852 workers interviewed were employed in the informal sector. Only 13% of the total sample were directly associated with the *garimpo*. From this Abers and Pereira draw the important conclusion that 'While the *garimpo* is significant for urban growth, activities

⁴ There are problems with both sets of data; the IBGE figures affect the budget of local government and are heavily influenced by politics. They are collected from questionnaire surveys which are often inconsistently applied. The SUCAM data was collected by malarial spraying teams who do more continual fieldwork, but as they extrapolate population from residences, they have a tendency to double-count in areas where people may have more than one home.

related only indirectly to the gold rush are responsible for most of the urban economy's dynamism'⁵.

Abers' work (Abers 1992) suggests that the majority of people who came to Boa Vista during the gold boom years had migrated from other urban areas. But before coming part of the urban labour force, large numbers of people had initially lived in rural areas. Having migrated from the countryside into the city, they then formed part of a large urban workforce which tends to move from city to city as new economic opportunities arise:

'While about half of the migrant household heads [interviewed in Boa Vista in 1991] were born in rural areas, the majority had significant experiences living in cities before moving to Boa Vista. While rural to urban migration plays an important role in their migration patterns, rural out-migration represents only the first step in a long history of otherwise largely urban migration experience.' (Abers 1992 :49).

Given that the initial transition from countryside to city may initiate a lifetime on the road, it is worth having a closer look at the rural-urban migration generated by the gold rush. But while rural-urban migration has significant repercussions on people's subsequent migratory behaviour, it is seldom a clearly defined process. The experience of Roraima's *caboclos* illustrates that people may move between the rural and urban economies for many years without necessarily becoming permanently incorporated within the urban labour force.

⁵ This also indicates the scale of the multiplier-effect associated with the *garimpo* economy.

The following discussion is based on interviews with nineteen households who had moved to Caracarái from the Rio Xeriuini at this time ⁶. Of these 19 households, 15 (79%) had migrated from the Xeriuini to Caracarái between 1988 and 1991, 3 had moved since 1986, and only 1 household had resided in the city for over 5 years. The *caboclos* themselves estimate that a total of 58 households lived on the Xeriuini in 1985; therefore in a period of five years, one third of the river's population migrated to Caracarái. This not only brought considerable changes to the three small communities that the migrants moved away from (Santa Maria de Xeriuini, Terra Preta, and Lago Grande), but also altered the urban morphology of Caracarái. These households are linked by strong kinship ties ⁷, and they built their houses together, creating a new suburb which is known locally as the 'Bairro de Xeriuini'.

The forces that drive rural-urban migration can be illustrated by a simple comparison of household economics on the Xeriuini and in Caracarái. The main sources of employment for the 19 migrant *caboclo* families are commercial fishing (10 of the households have somebody employed as a fisherman) and manual docking work - unloading barges which bring fuel, construction materials and some foodstuffs up from Manaus to Boa Vista. There is only one head of household employed exclusively as a docker because it is common for individuals to substitute fishing for docking on a seasonal basis. The barges can only get to

⁶ Fieldwork was in two phases; The first (in November 1991) was a survey of the communities along the Lower Rio Branco and its tributaries to evaluate the scale and causes of outmigration which is presented in section 5.1. On discovering the rapid population flux to Caracarái, a further period of research (January 1992) focused on the current situation of *caboclo* migrants in the town, from which the economic data presented in this chapter was derived.

⁷ For example, one respondent had a blood relative in all but one of the other 18 households who had moved to Caracarái.

the port when the river is full, which is also the period of maximum fishing restrictions (April-September). Principal sources of income for the remaining families include public sector salaries (5), petty commerce (1), boat building (1) and construction (1), though it should be understood that most families have members employed in a variety of informal sector activities simultaneously.

A *caboclo* household in Caracarái (two adults and six children) calculates that monthly groceries cost US\$ 150 (this does not include transport, rent, bills, or entertainment expenses), which is roughly double that of their rural counterparts. But, these greater outlays are offset by urban wages which are considerably higher. During the 5 month long fishing season, a fisherman possessing his own boat and motor may receive a maximum revenue of US\$ 640 per month, although a proportion of this has to cover boat maintenance and the overheads of the trip ⁸. Fishermen who are permanently employed on the boats of others can earn between US\$ 270-400 per month over the same period, depending on their position of responsibility within the crew⁹. Dockers estimate that they earn US\$ 250 per month for 5 months of the busy wet season, but this is reduced to US\$ 30 per month or less during the dry season ¹⁰. Government employees such as gardeners, primary school teachers and nurses typically receive US\$ 50-70 per month, but during the early 1990s their

⁸ Only 1 head of household interviewed possessed their own boat and he was the one mentioned earlier who had been to the *garimpo*, having obtained it with the money he earned in the mines.

⁹ This data is underpinned by an expanding market for fish, resulting from the considerable demand generated by Boa Vista's rapid growth.

¹⁰ A dockers' union had been established lobbying the principal employers to provide members with a minimum wage of US\$ 30 during the dry season. The union also aimed to prevent fishermen from transferring so easily into docking during the wet season as the resulting abundance of labour depressed wage rates.

income was decreasing in real terms as public sector wages failed to keep pace with inflation.

It is however virtually impossible to calculate total family income from this data. Most households seek to maximise revenue by spreading available labour across different sectors of the urban economy in response to seasonal and political fluctuations. Again, the extent of an individual's social networks is of key importance in determining the ease of movement between jobs. The salient point is that during the gold rush, urban wages were considerably higher than incomes from the riverine economy. The following example of a *caboclo* household's balance-sheet on the Rio Xeriuini is intended to illustrate the disparity between urban and rural incomes. The data presented in this example was derived from one particular household and fits within the broad limits of production recognised both by the *caboclos* themselves and by other studies of the Amazonian extractive economy (Ayres 1991, L'Escure pers. comm., Wagley 1967, Sizer 1991). Nonetheless, the limitations of this data should be recognised. The production of manioc flour and Brazil nuts fluctuates considerably and none of these figures have been confirmed with real measurements of household production over a long period of time.

A household of 2 adults and 4 children on the Rio Xeriuini estimates that it can produce up to 100 sacks of manioc flour (one sack is 50 kilograms or 77 litres) and 100 *barricas* of Brazil nuts in a good year (one *barrica* weighs 72-78 kilograms when fresh, and 60 kilograms when dry). Normal production is estimated at 60 sacks of manioc flour and 50-80 *barricas* of Brazil nuts, of which 30 sacks and 50-80 *barricas* are typically sold. At 1992 prices paid by traders on the

riverbank (US\$ 7 per *barrica* of Brazil nuts, and US\$ 15 per sack of manioc flour), this yields an average monthly income of US\$ 66-84 (although it should be recalled that income is not evenly distributed throughout the year). This may be supplemented by the sale of salted fish and turtles during the dry season, but the market for these products is quite limited ¹¹. On the Xeriuini, commodity prices are typically 20-50% higher than in Caracarái, but the riverine household consumes much less marketed produce than the urban one. The household under study estimates that its monthly grocery bill is in the region of US\$ 50 and includes salt, sugar, matches, biscuits, powdered milk, coffee, cooking oil, soap and radio batteries.

These calculations suggest that the household generates a monthly surplus income of US\$ 16-34, most of which is spent on items like fuel, tools, alcohol, tobacco, shooting and fishing equipment, as well as some medicines. However, it is quite likely that in many cases riverine producers will not hold any of this modest income in their hands. Direct barter still accounts for a large proportion of riverbank transactions, and traders often reduce payment by 15% if the producers demand cash payment for the sale of their goods. Besides, as many *caboclos* still purchase goods on credit from river traders, their incomes are significantly eroded by usurious rates of interest, which in some cases exceed 40% per month. Therefore, even though this comparison illustrates that annual household incomes in Caracarái are about 4-6 times those of the Rio Xeriuini, rural dwellers are unlikely

¹¹ A person wishing to sell such goods usually has to transport them to one of the villages on the Rio Branco itself, which may be prohibitively time consuming or expensive. If a lift is arranged on a powered boat, payment is usually demanded.

to see a fraction of the cash income that their urban counterparts receive.

This then gives some understanding of why the *caboclos* were so keen to move to Caracaraí during the gold rush. But the key question here is are they likely to stay in the city and become part of the transient urban labour force identified by Abers? Or will they move back to the predominantly subsistence livelihood of the Rio Xeriuini when the urban economy contracts? It might even be more appropriate to ask not will they, but can they, go back? The crux here lies in whether their subsistence option has been foreclosed by their initial migration to the city, or to use Marxist terms, whether rural-urban migration is synonymous with proletarianisation. In certain parts of Brazil, the pressure on land is so great that once the peasantry is either forced off or moves off it, they have little alternative but to embrace an urban livelihood. Smallholders in the northeast and south of Brazil, squatters in south-eastern Pará, and some rubber tappers in Acre, all provide appropriate examples.

But in other areas, particularly in the northern and western Amazon, the struggle for land is not as intense. Riverine peoples around Belém (Nugent 1992) and along the middle reaches of the Solimões (Ayres 1992) move frequently between the urban and rural economies. Clearly, there is nothing exceptional about the behaviour of Roraima's *caboclos*, cities are just as much a part of their economic domain as riverbanks are. But perhaps more importantly, this suggests that many of them will probably leave Caracaraí as the urban economy declines. This option is not foreclosed to them, as relatives had been defending their usufruct rights to the land on the Xeriuini during their

absence. Indeed, three of the five *caboclo* migrants who had become public sector employees in Caracarái complained that their incomes were insufficient to meet the expenses of urban life. On the eve of the 1992 Brazil nut season, they were contemplating a return to the Xeriuini to work in the harvest. Clearly, rural-urban migration in this context suggests that they are moving between the subsistence and exchange spheres, characteristic of peasant economics, in response to changing circumstances. Having said that, it is just as likely that a proportion will stay on in the city, and certainly some of the wealthier household heads declared that to be their intention. This is the fraction that will probably become permanently incorporated within the urban labour force.

The point to be drawn from all this is that only a proportion of the households who moved into the cities during the gold rush actually made the crucial first step noted above. It is therefore wrong to assume that the sudden growth of the urban population directly reflects the process of proletarianisation. Clearly there is a fragment who do undergo this transformation and it would be interesting to go back to Caracarái in ten years time and find out what that proportion is. But whatever the figure, the gold rush itself can only be held partly responsible. The forces which serve to push peasants off the land are probably much more significant players in this game than those which attract them to the city. Here, a highly inequitable distribution of land, rural violence, drought and declining agricultural prices have been taking their toll for over twenty years (most notably in the northeast). The urban population of Amazonia had been swelling long before the gold rush took off. It is

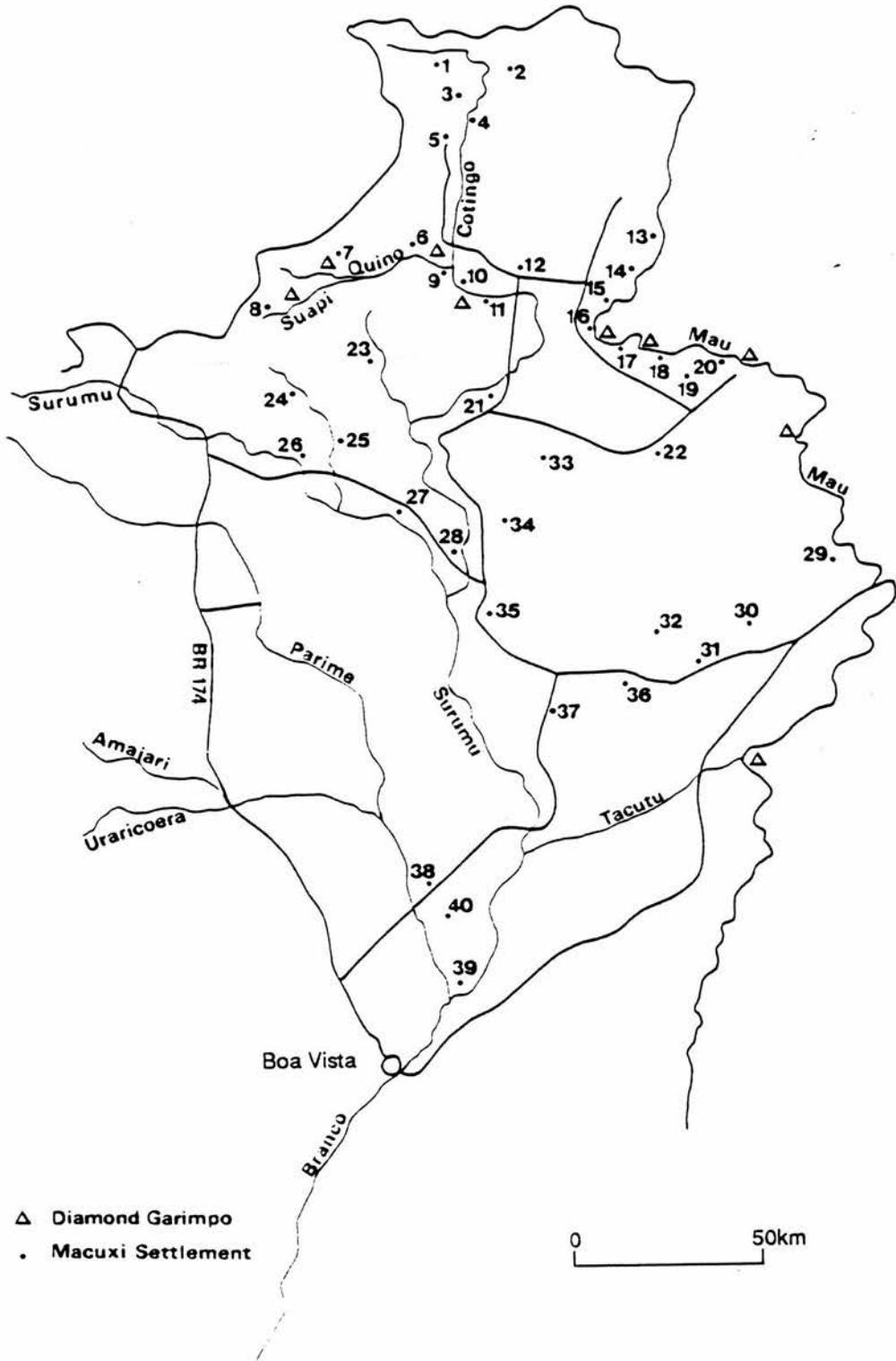
therefore not surprising that the largest proportion of the migrants who flooded into Roraima during the gold rush did not come from rural areas at all, but from other cities. They had already been shoved-off the land years ago.

5.3 Involvement of the Macuxi Indians in the *garimpos*.

Comparing the behaviour of the Macuxi Indians with that of the *caboclos* offers an insight into how two different social groups react to similar socio-economic changes. Like the *caboclos*, the Macuxi produce for both subsistence and exchange. They participate in a local economy that is dominated by extensive kinship and fictive kinship ties, and exhibit multifaceted livelihood strategies. These include hunting, fishing, agriculture, diamond mining, urban employment and working as cowhands on the *cerrado* ranches. Hunting and fishing is for domestic use only, as is the largest share of agricultural production. Therefore, other than the limited sale of manioc flour, it is the diamond *garimpos*, ranches and urban employment which provide the Macuxi with virtually all of their cash income.

The Macuxi have worked in the diamond *garimpos* of the *cerrado* for over 70 years and have participated in all stages of the mines' development from the early workings in the 1920s, through the introduction of rudimentary diving equipment in the 1950s, to the more recent period of semi-mechanised mining in the 1980s. By 1991 the Macuxi accounted for 20% of the total workforce of the *cerrado* diamond *garimpos* (Porantins 1991 :7), even though there was a dramatic influx of non-Indian *garimpeiros* to this area following the closure of the gold fields in the Yanomami reserve.

Fig 5. 2 The diamond garimpos and Macuxi settlements of the Cerrado.



Macuxi Villages marked on figure 5.2.

In all there are about 50 Macuxi villages on the cerrado and this list is not exhaustive. However, it does include the principal Macuxi settlements situated within the proposed Raposa/Serra do Sol reserve.

Name of Vilage:	Population in 1991
1. Serra do Sol	132
2. Manalaí	58
3. Mapaé	176
4. Sauparú	66
5. Pedra Preta	200
6. Maloquina	155
7. Piolho	125
8. Suapi	115
9. Waramodã	65
10. Caraparú II	156
11. Caraparú I	227
12. Caracanã	103
13. Canawapai	39
14. Canã	79
15. Willimon	138
16. Uiramutã	123
17. Camararém	96
18. Tabatinga	16
19. Matarucã	410
20. Central	10
21. Pedra Branca	162
22. Maracanã	141
23. Cumanã	171
24. Miang	34
25. de Barro	80
26. Surumú	-
27. Taxi	180
28. Limão	75
29. Santa Cruz	227
30. Bismark	72
31. Guariba	263
32. Napoleão	308
33. Cachoerizinha	286
34. Aracá	180
35. Canta Galo	120
36. Raposa	452
37. Olho d'Água	94
38. Campo Alegre	125
39. São Marcos	-
40. Vista Alegre	360

Population data from CIR archives 1991

At that time, 773 *garimpeiros* (including the Macuxi contingent of the workforce) were working on 119 sets of mining equipment (*maquinas, balsas* and one *draga*) along the rivers Maú, Quinó, and Cotingo (see fig 5.2). Five of these sets of mining equipment were owned exclusively by the Macuxi and they provided the workforce from the villages nearby; 19 Macuxi settlements containing a total population of 2216 Indians are situated within 2 hours walk of these *garimpos*. Therefore, both the physical proximity of their villages to the mines, and the historical development of diamond mining on the *cerrado*, have equipped the Macuxi with a comprehensive knowledge of *garimpagem*.

In spite of this considerable involvement in diamond mining, the Macuxi did not flock to the gold fields of western Roraima during the 1987-1990 rush. A questionnaire was addressed to Macuxi village heads at two Indian meetings in January and March 1991. The survey aimed to assess both their personal mining history as well as that of their village over the previous 3 years. 34 (64%) of the village heads had worked in the *garimpos* at some stage in their lives and the same number (64%) responded that members of their village have been working in the *garimpos* over the last 3 years (1987-1990). The most notable point is that virtually all of this mining had taken place in the diamond *garimpos* of the *cerrado* and only 3 of the 53 respondents mentioned that either they, or members of their village, had been to the gold fields of the Yanomami reserve. Two of them had worked in Santa Rosa, which was a mixed gold and diamond *garimpo*, and the

third in Paapiú, which was at the heart of the gold fields ¹².

Roraima diamond *garimpos* are markedly different from the gold placer mines, which partly accounts for the Macuxi's striking discrimination between the two activities. The two types of mining differ most obviously in accessibility. The Macuxi can walk or ride (either by horse or more commonly by bicycle) to the diamond mines and face none of the expenses or difficulties that a trip to the gold *garimpos* would incur. This ease of access also facilitates the policing of the diamond *garimpos* which are considerably less violent than the more isolated gold mining areas. Comparatively stable communities with permanent houses have been established in the diamond *garimpos*, and there are many more women and children in these areas than are ever encountered in the gold mines. Overall, the tension and aggression of the gold mines is generally absent from the diamond *garimpos*, and as a result, mining on the *cerrado* tends to be a much more relaxed affair.

But this also reflects considerable economic differences in the two types of mining. The diamond *garimpos* are much older than the gold fields and are usually much less productive. Therefore, even though the overheads associated with diamond mining are minimal, and the same work relations apply in both types of *garimpo*, the earnings from diamond mining are on the whole substantially lower than gold incomes. For the Macuxi, the modest income gained from a fortnight's manual work in the diamond *garimpos* provides them with

¹² It should be noted here that this data only refers to rural Macuxi communities and does not consider the large numbers of Macuxi who reside in Boa Vista (see Ferri 1990) ; it is likely that a larger percentage of this urban Macuxi population were more directly involved in the gold rush.

goods which they would otherwise have difficulty in obtaining. They usually spend their mining incomes on basic household items like salt, soap, oil, coffee, aluminium pots, hammocks, clothes, or even bicycles. It is very rare for the Macuxi to invest income from the *garimpo* in either livestock or consumer goods (other than radio/cassette recorders). In short, *garimpo* earnings represent a small cash income to complement their predominantly subsistence agriculture.

The Macuxi, unlike the *caboclos*, do have contact with politically influential *fazendeiros* and *donos do garimpo* on the *cerrado* who could provide them with access to the gold *garimpos*. But even so, they use similar arguments to the *caboclos* when explaining their lack of involvement in the gold rush. In particular, they note the difficulties and expense of entering the gold fields while also acknowledging the risks of disease and violence. The costs and distances involved necessitate a longer stay in the gold *garimpos* than many were prepared to tolerate, prejudicing both their family lives and their agriculture. A few respondents mentioned their reluctance to participate in an illegal activity that was detrimental to the welfare of their perceived relatives, the Yanomami. Therefore, in spite of having the contacts that could give them access to the gold fields, most of the Macuxi did not regard gold mining as attractive employment.

But perhaps there is more to this story. And here it is worth recognising the strong social relationships that characterise diamond mining on the *cerrado*. For while an excursion to the diamond mines provides the Macuxi with a break from village life, it also offers them an opportunity to visit relatives and friends in more distant areas. Typically, a small group of men

(usually 4 to 6 people) will leave their village and mine autonomously (*por conta própria*) for a two or three week period in the summer. It is not uncommon for them to work alongside friends and relatives from other villages. Social events planned in nearby villages may even influence the timing and location of their mining venture. This suggests that to the Macuxi, social objectives may be just as important as economic considerations when planning a trip to the diamond *garimpos*.

But the diamond *garimpos* also offer them a chance to extend their social network beyond their own community ¹³. Mining diamonds and working on the local ranches brings them into contact with locally influential people. This may be particularly important to adolescent Macuxi who often look for waged employment outside their villages. For them, a spell in the diamond *garimpos* is frequently the first step towards economic independence. *Donos* who spot diligent young men in the *garimpos* may subsequently offer them employment either on their ranches or more significantly in Boa Vista. In short, gaining recognition in the diamond *garimpos* may prove to be an adolescent Macuxi's most valuable passport to life outside the village.

The point is that on the *cerrado*, the Macuxi mine with a considerable degree of autonomy in a very familiar social and physical landscape. Although the economic returns from gold mining are undoubtedly higher, it does involve working in a totally different social context. A trip to the gold fields does not involve the same interaction between familiar people

¹³ This discussion derives from a conversation with Paulo Santilli, an anthropologist who has worked extensively with the Macuxi.

and places that the Macuxi value. Thus, from their perspective, the economic benefits of gold mining probably do not compensate for the sacrifices it entails. Consequently, they find it surprising that other people are prepared to commit themselves to the gold rush in a way that few of them would. To one Macuxi this indicated a fundamental difference between Indian and non-Indian values:

'..People come from Maranhão, getting hungry, without any money, hitch-hiking to get to the *garimpos*.. if for example they opened a *garimpo* in Maranhão no Indian is going to leave here getting hungry, hitch-hiking without money to get there, as they come from there to here. I do not think that the Indian has such a strong desire for the *garimpo*' ¹⁴

Perhaps it is this outlook that enables the Macuxi to balance mining against their other activities. They seldom allow their excursions into the diamond *garimpos* to prejudice agricultural production. Individuals tend to go mining only when they are satisfied that everything is under control in their gardens (*roça*). Even so, the questionnaire responses indicate that their trips to the *garimpos* are brief, rarely exceeding three weeks in duration. As part of the same survey, leaders of the 34 villages that participated in *garimpagem* were asked if the activity caused a large, small, or negligible scarcity of labour in the community. 23 (68%) stated that labour shortages were negligible, 9 (26.%) noted a small shortage, and only 2 said that they were large. A number of village heads claimed to have the authority to restrict migration to the *garimpo* but in practice these powers were rarely

¹⁴ Interview recorded in the Maloca of Boqueirão, April 1991

exercised. In fact, it is usually social pressure exerted by other members of the village that prevents an exodus of labour during critical periods. Clearly this may create tensions as is illustrated by the following quote. Here one Macuxi is speaking about his colleagues who leave the village to go mining:

" Their attitude differs from ours, they are practically divorced from communal activities, and when they go to the *garimpos* they have a different way of thinking.. they reckon that if they go mining they will make something, but they are not producing (agriculturally) here, and there (in the *garimpos*) they obtain nothing ".

This social regulation of outmigration tends to prevent Macuxi villages from becoming too dependent on the mining economy. They appear to strike a balance between agriculture and mining that often eludes migrant society. They are certainly not alone in this respect. Gray (1986 :39) has made a similar observation concerning the Amarakaeri in the Madre de Dios of Peru. However, recent events have threatened to upset this equilibrium as thousands of *garimpeiros* moved on to Macuxi lands both in Brazil and Guyana, following the closure of western Roraima's gold fields.

5.4 *Garimpos* and the invasion of Indian lands.

Mineral deposits of economic value exist on Indian lands throughout Amazonia. A detailed survey of DNPM archives notes that 2245 mineral claims have been registered for 33.5% of the total Indian land area in Amazonia Legal¹⁵. Claims had been formally registered in

¹⁵ This figure includes 560 mineral research permits (alvaras de autorização de pesquisa), and 1685 claims (requerimentos incidentes) (CEDI/ CONAGE 1988 :4).

a quarter of the 302 Indian lands examined, but as mining companies rarely obtain the necessary permission to exploit them legally, many of these areas are mined illegally by *garimpeiros*. During the 1980s, all of the indigenous groups in Roraima had their lands invaded by *garimpeiros*. Although strict laws exist to prevent such trespassing, they are rarely enforced. The expulsion of *garimpeiros* from the Yanomami reserve was quite exceptional in this respect. But far from offering a long term solution to the issue of mineral extraction on Indian land, it simply transferred the related problems from one Indian group to another.

As *garimpeiros* were squeezed out of the Yanomami reserve, many of them moved eastwards to the diamond *garimpos* of the *cerrado*. With the unique exception of Tepequém, all of these diamond fields are situated on the proposed Macuxi reserve called Raposa/Serra do Sol. In 1991, the Indigenous Council of Roraima (CIR) claimed that as many as 13 000 people had invaded this area (Porantins 1991 :7). A proportion of these were ranchers (as was mentioned in the last chapter), but the overwhelming majority were *garimpeiros*.

Mining is never without its costs. Traditionally the Macuxi have accepted them as being the inevitable consequences of a generally useful activity. But in this instance their tolerance was surpassed. The influx of *garimpeiros* was accompanied by a malarial epidemic which killed 21 Macuxi and affected over 400 between 1990 and 1991 (Porantins 1991 :7). The rivers which provided them with drinking water and fish became increasingly polluted ¹⁶. Not surprisingly, tensions

¹⁶ Although mercury is used in the *garimpos* of the *cerrado* to separate the small quantities of gold from other sediments, it is not used as extensively in these diamond mining areas as it is in the gold fields.

between *garimpeiros* and Indians rose, most notably in the villages closest to the principal mining areas. At least four Macuxi were killed in fights with *garimpeiros* between 1990 and 1991 (CIR 1992). Conflict was heightened by the uncertain nature of the Macuxi's legal rights to the land and the unwillingness of the federal police to intervene. As the proposed Raposa/Serra do Sol reserve had not been officially demarcated, the *garimpeiros* did not regard their presence in the area as being illegal. Indeed they presumed that the lack of a police presence actually legitimised their occupation of the area. In addition, local politicians were defending the invasion to ensure the continued growth of the state's mining economy. Thus, even though it contravened both the Brazilian constitution and Guyanese immigration laws, only derisory attempts were ever made to regulate the situation.

Although the authorities would not intervene decisively, the Macuxi themselves vigorously resisted this invasion. CIR stepped up its campaign for the expulsion of the intruders and the demarcation of the Raposa/Serra do Sol reserve. In May 1992, the Macuxi established road blocks on the access routes to the *garimpos* along the Rio Maú. Their objective was not so much to close down the mining on their lands, but more to gain control over the activity. Like the Yanomami (Ramos et al. 1985), Mundurukú (Burkhalter & Murphy 1989) and Amarakaeri (Gray 1986), the Macuxi appreciate the benefits of mineral extraction when it is practised on their terms. But in spite of having a powerful ally in the form of the Roman Catholic Church, they face many difficulties in achieving this goal. In order to

assess their prospects, it is worth having a brief look at how other Indian groups confronted the same issue.

The Kayapó have probably been the most successful of Brazil's Indians in controlling gold mining on their lands. Between 1981 and 1985, different Kayapó leaders made a series of arrangements with *garimpeiros* who were working in different parts of their homelands. In all cases, the Kayapó policed the mining areas and kept the *garimpos* open in exchange for a negotiated fee which varied from 1-10 percent of total gold production. But it was one such agreement struck over the *garimpo* of Maria Bonita that merits attention, for it became the vehicle through which the Kayapó achieved the demarcation of their lands. They closed down Maria Bonita in 1985 after a contract expired which had provided them with 1 percent of the mining tax. Together with the Brazilian airforce, they expelled 5000 *garimpeiros* from the site. By insisting that Maria Bonita would only be reopened if FUNAI agreed to demarcate their reserve, the Kayapó waged a successful campaign for the preservation of their land rights. In May of the same year, chief Paiakan, the group's main negotiator, signed an agreement establishing a three million hectare reserve for them. He subsequently agreed to reopen Maria Bonita on condition that the Kayapó received 5% of the mining royalties.

This is exceptional and few other Indian groups have been able to manage *garimpagem* on their lands so successfully. The Yanomami, for example, consistently failed to strike any kind of deal with the gold miners of western Roraima. So what is it that determines the balance of power between Indians and *garimpeiros* in such circumstances? The history and social organisation of the indigenous group itself are perhaps as relevant

as anything else. Here the Kayapó who are well versed in dealing with Brazilian society have an obvious advantage over the Yanomami. Nevertheless, even the most acculturated Indian groups will still have difficulties in handling *garimpeiros* if they are unable to present and defend a united policy over mining on their lands. The groups' internal social and political organisation therefore become crucial in the struggle over mineral deposits. The real strength of the Kayapó lay in masking internal conflicts so that all of their five villages presented a united bargaining front to the *garimpeiros*. This was bolstered by spectacular demonstrations of power and skilful use of the media. It would be hard to find a greater contrast with the highly dispersed settlements of the Yanomami, who are renowned for their feuding.

If these two groups represent the extremes of a spectrum, then the Macuxi probably sit somewhere between the two. They, like the Kayapó, are experienced in dealing with outsiders and do have regular village meetings to formulate appropriate strategies. But while the Kayapó have enough difficulties reaching a consensus among a population of 1500 people dispersed throughout five villages, the Macuxi have to play the same diplomatic game with ten times as many people and settlements (see fig 5.2). It is therefore hardly surprising that considerable internal rifts have emerged in their campaign. The majority of villages (particularly those which are nearest the mining areas) still defend CIR's proposal to expel all the ranchers and *garimpeiros* from the reserve. But a number of settlements (particularly those which receive government investment) argue against this, claiming that a contraction in the *cerrado* economy will be

detrimental. These conflicts are exploited fully by the politically influential ranchers and *garimpeiros* who are threatened with eviction. So, even though the Macuxi have learnt from the Kayapó and are using the *garimpeiro* invasion to focus attention on their land claims, one can only speculate whether they will be as successful.

5.5 Summary:

It is interesting that neither the *caboclos* nor the Macuxi participated more actively in the Roraima gold rush. As we have seen, they responded to the changes going on around them quite differently. But even so, there are similarities in the way each society evaluates the options available to them. It would appear that social considerations are probably just as significant in shaping their behaviour as economic factors. In this respect, they seem to differ from many of the colonist farmers and ranchers discussed in the two previous chapters.

In spite of their very limited involvement in gold mining itself, both societies were still influenced by the gold rush. In economic terms, they experienced the spillover effects of mining. This is not simply a social issue, for in reshaping people's livelihoods, the gold rush also had a whole series of impacts upon the physical environment. In effect, it altered the relationship between different people and the environment that they inhabit. The Yanomami, who discovered the considerable economic value of an inert metal for which they previously had no use, is only the most obvious example. The declining extraction of non-timber forest products along the lower Rio Branco in response to the *caboclos'* new urban lifestyle is just

as relevant. So too is the changing use of the *cerrado* by the Macuxi. During the late 1980s, the Catholic Church and FUNAI encouraged them to raise herds of cattle in order to assert their claim over the contested grasslands. For the first time, the Macuxi, who have no history of autonomous animal husbandry, became independent pastoralists. The overall impression is that, throughout the decade, Roraima's folk and Indian groups were adapting their livelihood strategies in response to the changing social, economic and political circumstances brought by the gold rush.

Chapter 6 : The politics of gold mining in Amazonia.

Land-use changes in Amazonia are highly sensitive to alterations in the political climate and state policy has been one of the principal factors behind the occupation and settlement of the region since colonial times. In Roraima, the ruins of fort São Joaquim (1776) constructed in the wake of the Directorate, provides a lasting reminder of the historically important role played by the state. In more recent years road building, colonisation programmes, the Calha Norte project and rural credit schemes all provide clear examples of government directives influencing the nature of Roraima's rural economy. This chapter illustrates how the rapid exploitation of Amazonian mineral resources during the 1980s has shaped the region's political climate and how this in turn has affected rural development policy. On a local scale, consideration will be given to the effect that gold mining has on the socio-political composition of state governments. The wider consequences of these local changes are then assessed by analysing the dynamic relationship between the state and federal governments. As we shall see, the nature of this relationship not only determines the *garimpeiros'* access to mineral resources, but also shapes other land developments in rural Amazonia over the longer term. Therefore, we start with a brief look at political changes in the Brazilian Amazon since the 1930s and pay particular attention to the changing roles of the state and the federal government within this context.

6.1 The changing relationship between state and federal governments:

A small number of land-owning groups have been disproportionately influential in shaping the development of the Amazonian rural economy. The power of these regional élites rested not so much on the extent of their land-holdings, but more significantly on the resources which were contained therein. The result was that local oligarchies dominated the extraction of rubber in Acre, the collection of Brazil nuts in the south-east of Pará and the rearing of livestock on the grasslands of the Ilha de Marajó, Amapá and Roraima. Historically, these rural élites have been important players on the local political stage, commanding influence through clientelistic networks associated with the economic activities they dominate.

Even though the occupation of Amazonia has been a national goal since colonial days, the current drive for regional growth is rooted in the expansionist philosophy of the Vargas administration (1930-45). The development ideology articulated at that time (known in Portuguese as *desenvolvimentismo*) viewed public infrastructure as a vehicle for the occupation and economic development of peripheral areas. Over the past fifty years, successive governments have sought to extend their influence in Amazonia with these objectives in mind. In broad terms they have achieved this by subdividing the regional political structure so that more administrative units are created, stepping up the presence of the armed services in the region, investing heavily in the transport and energy

infrastructure and placing large swathes of land under the administration of central government organisations.

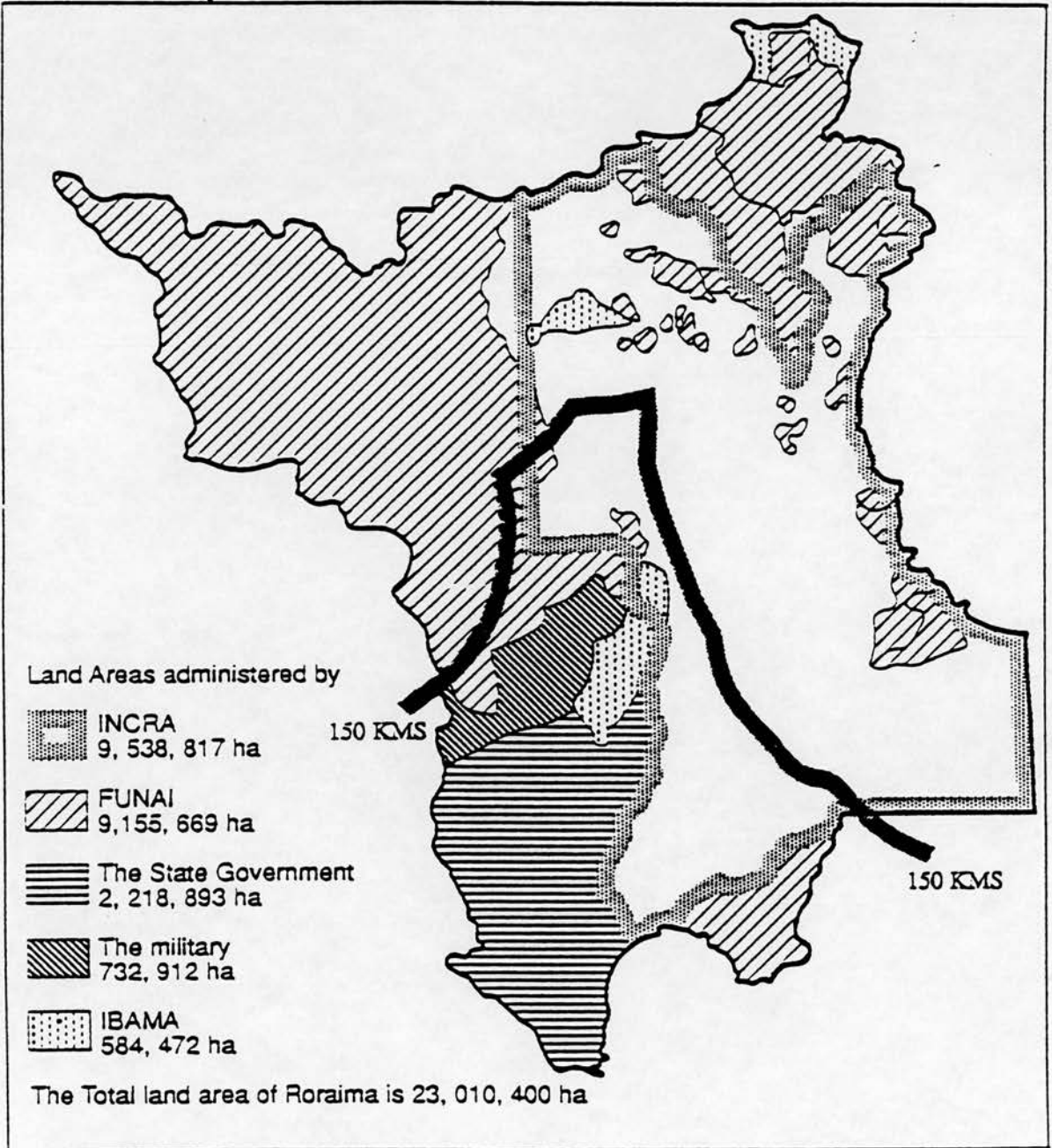
The federal government initially asserted its authority in the Amazon by implementing administrative reforms. One key piece of legislation was the 1937 constitution which for reasons of national security, permitted the Union to establish Federal Territories in frontier areas. At that date Acre, which had been annexed from Bolivia in 1903, was the only existing federal territory in Amazonia, but in 1943 it was joined by the newly created Rondônia, Amapá and Roraima. Even though the Federal Territories were to be developed by channelling capital through government agencies, they received only a small proportion of the funds disbursed by the regional development organisation SPVEA and its successor SUDAM. Indeed, by 1985, less than 10% of the total funds administered by SUDAM had been allocated to the territories¹. The net effect was that these early reforms were predominantly bureaucratic and did little to alter the structure of the rural economies on which the influence of local élites rested. Hence a potential cause for conflict between powerful landowners and the federal government was effectively preempted and Vargas' 'Estado Novo', as it came to be known, did not impinge on the local élites' control of land which remained their principal vehicle for the political control of rural areas. Agrarian oligarchies continued to dominate local politics either as appointed administrators of the Federal Territories or as elected politicians in the states which were democratically governed (Amazonas, Pará, Maranhão, Mato Grosso).

¹ Until January 1985 Acre had received 1.6% of total SUDAM funding, Amapá 2.25%, Rondônia 4%, and Roraima only 0.65%. (Freitas 1991 :55).

However, there has been growing animosity between the local and federal governments since the 1960's. The military dictatorship (established in 1964) centralised power even further and wrested greater control over the administration of land from local government, although not without some considerable trade-offs with the larger land-owning class (Hine pers. comm.). Administration of the federal territories was delegated to the navy in the case of Amapá, the army for Rondônia and the air force in the case of Roraima. More significantly, a series of laws, which were justified on the grounds of national security, annexed huge tracts of land and placed them under the administration of federal agencies in the early 1970s. INCRA was by far the most significant of these agencies, which under decree law 1164 of 1971, was made responsible for the management of a 100 kilometre swathe of land along all federal highways. This legislation (which was subsequently revoked in 1988) enabled the federal government to extend its control over the development of Amazonian resources through the construction of new highways.

Roraima, being a frontier state of strategic interest, was a prominent target for this transfer of land from state to federal government administration. Figure 6.1 illustrates that 62.5% of Roraima's lands were under federal government administration in 1992 (Roraima 1992). INCRA exerts control over the largest area of 9 538 817 hectares (41.5%), situated within 150 kilometres of the frontier, and a wide band along federal highways, while FUNAI, IBAMA and the army administer a further 4 917 360 hectares (21.4%).

Fig 6.1 The Public Administration of Land in Roraima



Source: Government of Roraima 1992

In fact, only 37% of the state's total land surface lies outside federal government control and, more significantly, only 9.6% (2 218 893 ha.) of Roraima is under the sole authority of the state government. Most of this land is concentrated in the inaccessible lower reaches of the Rio Branco basin². Thus, on an administrative level at least, the local government has only a limited say in the exploitation of state resources. This is especially true of minerals as virtually all of Roraima's *garimpos*, with the unique exception of Tepequém, lie on land administered by FUNAI. The efficacy with which the federal government polices these areas is therefore a crucial factor in regulating state mineral production.

The new roads posed a considerable threat to the interests of the local agrarian élites. This was not simply due to the transfer of land away from state government administration, but also because the restructuring of the rural economy precipitated by the highway developments served to marginalise the productive activities that the élites controlled. The difficulties facing Amazonia's agrarian oligarchies at this time were further compounded by the migration which the road building programme generated. This was certainly the case for the Mutran family of south-eastern Pará whose domination of the local Brazil nut trade has been undermined by the activities of squatters since the completion of the PA 150 in the early 1970s. The squatters challenged the Mutran's ownership of the land and also began to erode their economic base by clearing the Brazil nut forests on the family's estate for agriculture (Hine 1991). In short,

² Pará provides a similar example of how these laws placed large areas of Amazonia under federal government administration. See Schmink and Wood (1992 :108).

the pre-existing social and economic landscape on which the authority of local oligarchies rested, underwent a rapid transformation following the road constructions of the 1970s. As a result the landed families were increasingly challenged over their domination of the local political stage by actors associated with the newly expanding sectors of the Amazonian economy. These were most notably land speculators, timber merchants, urban retailers, government administrators and, as we shall see below, *garimpeiros*.

However, these internal dynamics of state politics did little to reconcile the continuing struggle between local and federal governments over the control of Amazonian resources. Surprisingly, the outcome of this contest has been increasingly shaped by economic, and not political factors. Throughout the 1980s, the federal government experienced growing difficulties in maintaining the physical and administrative infrastructure which it had so vigorously assembled in Amazonia during the previous decade. To use a sporting metaphor:

'On the one hand, in constructing the highway network and directly encouraging external investment in Amazonia, it [the state] marked out the playing field for the region's future development. On the other, the state proved to be so incapable of controlling the consequences that it now has difficulties in putting a team on the pitch.' Cleary (in press p. 20).

While the inability to control regional development processes is most obviously a manifestation of the Brazilian economic crisis of the 1980s, it also reflects the impotence of the bureaucratic federal agencies in applying government policy (see Bunker 1985). Their chances of fulfilling such directives are

now further compromised by the tax reforms incorporated within the 1988 constitution, which bestowed greater financial autonomy on municipal and state governments, augmenting their share of tax revenues from 50 to 66 percent (Amparo in press). As the influence of federal government wanes therefore, local interests once again assume an increasingly important role in Amazonian resource exploitation.

Even so, it is wrong to believe that the fragmentation of federal government control is the unique cause of this emerging local political force, for factors intrinsic to Amazonia have done much to enhance this transition. Indeed, by examining the political dynamics associated with the *garimpo*, it can be argued that the region's mineral boom actually strengthened the hand of Amazonian state governments over that of the Union. In purely economic terms, the rapid growth of the Amazonian mineral sector gave the region and its politicians a new significance in domestic and even international politics. But an equally significant point is that the growth of the gold mining sector presented local interests with an opportunity to extend their political and economic influence in a sphere which could not be penetrated by federal government intervention. By its very definition, informal sector mining occurs outside the domain of government authority and, being denied direct control, Brasília can only influence the Amazonian mineral sector through clumsy external interventions. Thus, in complete contrast to the history of Amazonian land administration over the previous two decades, the federal government was unable to wrest control of the regional mining economy from local interests during the 1980s.

But what exactly were the political opportunities that arose from the 1980s Amazonian mineral boom, and how successfully were they exploited? Answering these questions offers an insight into how the Amazonian mining lobby emerged as such a powerful force on both the regional and the national stage. The following two sections of this chapter address this issue by looking at the principal channels through which *garimpeiros* gained power in Amazonia during the 1980s. Then the local situation will be placed once again in its national political context to evaluate the significance of these events for the exploitation of Amazonian mineral resources.

6.2 Roraima, Serra Pelada and the *garimpeiro* vote:

The intense migration that accompanies gold mining often leads to a rapid transformation of the local electoral base. In Roraima, this was unusually significant as it occurred on the eve of the state's first democratic elections in 1990 which marked the transition from federal territory to statehood. Four distinct groups of voters existed before the rush: colonist farmers, Indians, urban professional classes (principally public sector employees) and urban working classes (mainly employed in the informal sector). The arrival of 40 000 *garimpeiros* and an even greater number of urban immigrants linked to the mining economy, created a new clearly-defined segment of the electorate which was numerically superior to any of the four groups noted above. Whoever succeeded in harnessing this vote would be guaranteed considerable political influence in both state and national affairs.

There was a rapid proliferation of the local media in the form of three radio stations, six newspapers,

and one state television channel, all mouthpieces for an array of political parties which competed for the *garimpeiro* vote. Even though virtually all of the candidates promised to support the interests of the *garimpeiros*, there were two principal figures who championed their cause. The first was Romero Jucá, ex-president of FUNAI (1986-1988), who, having been dismissed from that office, was subsequently appointed governor of Roraima. Although not directly involved in mining, Jucá had overtly sanctioned the *garimpeiros'* invasion of the Yanomami lands during his governorship (1988-1990), and had campaigned vigorously for the reduction of the single indigenous area into the 19 separate islands which were briefly established by inter-ministerial decree 250/88 (as discussed in chapter 2). While Jucá contested the seat of governor, José Altino Machado, head of the Union of Amazonian Garimpeiros, USAGAL, ran for senator. José Altino is one of Roraima's most influential *garimpeiros* who has fought for the extraction of mineral resources within the Yanomami Reserve since the early 1980s. This is manifest not only in the unsuccessful invasion of Surucucús in 1985 which he coordinated (see chapter 2), but also in his skilled lobbying for the creation of three *garimpeiro* reserves within the Yanomami park which were established under presidential decree 25/01/90 and 16/02/90, before being revoked later in the same year (see fig. 2.1).

On polling day however, the *garimpeiro* lobby failed to vote either candidate into office. Jucá was ousted by Brigadier Ottomar de Souza Pinto, a previous governor, whose marginal victory rested on considerable support from smallholders. José Altino was similarly unsuccessful. Two of the three government posts he

contested were won by established local land-owners and the third by Marluce Pinto, Ottomar's wife. Thus, in spite of a considerable electoral base and substantial financial resources, the two principal figures of the mining lobby failed to secure key positions in the elections.

There are a number of reasons for this unexpected result, one of which is the contraction of the local mining economy in the run up to the elections. But, while outmigration might have somewhat diminished the electoral support of Jucá and Altino, there were still sufficiently large numbers of *garimpeiros* within Roraima to have swept them into office had their campaigns been more effective. The electoral results therefore reflect their inability to translate the large number of potential *garimpeiro* supporters into a sufficiently powerful vote. Here the odds were stacked against them, and against anybody else seeking to use gold mining as an electoral platform, on two counts.

Firstly, even though voting is compulsory, it is likely that a substantial proportion of the potential *garimpeiro* vote is never expressed. The transience of miners may discourage them from registration in states which they are only passing through, especially if they are working in inaccessible areas which are a great distance from the nearest ballot box. Electoral registration is no doubt further impeded by the *garimpeiros'* aversion to official documentation, particularly in areas like western Roraima where mining is practised illegally.

A second, and perhaps more fundamental obstacle is the limited extent to which *garimpeiros* identify themselves as a professional class with common political objectives. Any one *garimpo* contains

smallholders, ranchers, tradesmen and merchants who are united not so much in their mutual love of mining, but in their displacement from other sectors of the economy. Furthermore, the flexible nature of work relations in the *garimpos*, and the autonomy which this generates, may serve to erode notions of both a professional identity and a common struggle amongst the workforce. A large section of the *garimpo* workforce is therefore likely to prioritise political and economic support for other activities over that of the *garimpo*, particularly if they perceive a trade-off between the two. Indeed, it is possibly only the smaller group of professional *garimpeiros* who place the future of informal sector mining at the centre of their political agendas.

In spite of the similar circumstances in which each campaign was fought, the Roraima result differs markedly from the outcome of the Marabá municipal election in 1982 (the *garimpo* of Serra Pelada lies within the municipality of Marabá). In both cases, *garimpeiros* whose access to mineral deposits was under threat, accounted for the majority of the electorate. But this is probably the limit of any valid comparison, for Serra Pelada was unique in having mining densely concentrated in a very confined area which facilitated state intervention in the organisation of the *garimpo*. Indeed, the federal government trouble-shooter who implemented the state directives, Major Curió, succeeded in harnessing the *garimpeiro* vote. Having dramatically improved the working conditions at Serra Pelada, Curió capitalised on the popularity this engendered by making electoral registration a necessary pre-condition for access to the *garimpo*. The plan

worked, and on polling day, a wave of populist support swept him into office as a congressman.

Curió's successful exploitation of the *garimpeiro* vote was exceptional. Even so, it provides a good illustration of the *garimpo*'s potential to influence politics up to the level of central government and furthermore, it challenges the suggestion that *garimpeiros* lack political cohesion. In searching for the root of Curió's success, it is worth recognising that his victory rested as much on the support he received from the federal government as it did on the *garimpeiro* vote. Without the former it is doubtful whether he would have obtained the latter. Indeed, by placing him in Serra Pelada and providing the funds to reform the *garimpo*, the military government was actively seeking to empower Curió as a political ally. They saw in him an opportunity to displace the dominant Mutran family from office and to bolster support for the ruling party in congress. The concentration of mining activity in Serra Pelada and the threatened take-over of the *garimpo* by the Companhia de Vale Rio Doce (CVRD) were two key factors that played in Curió's favour. And he was particularly adept at cultivating the opportunities they presented. Through daily addresses to the workforce he carved out a powerful electoral platform.

In contrast, the dispersed clandestine mining of Roraima did not allow *garimpeiro* leaders such as Jucá and Altino to consolidate political support. The different responses of the two work forces when faced with the prospect of expulsion illustrates the extent to which they acted as politically cohesive units. Serra Pelada's *garimpeiros* formed an formidable political force. In October 1983, a contingent of them

went to Brasília to lobby for their right to continue working at the site. This was only one element in an efficient and ultimately successful campaign to keep the mine in the informal sector. By June 1984, protests were less restrained: several thousand *garimpeiros* blocked the Belém-Brasilia highway and other more minor roads, disarmed the police, and burnt down the CVRD buildings at Parauapebas. In contrast, Roraima's *garimpeiros* displayed little coordinated political activism. Other than a handful of demonstrations in the central square of Boa Vista between July and September 1990, one of which culminated in an attack on the Bishop's residence, the workforce dispersed with remarkable passivity. Unlike the Serra Pelada workforce, which had been transformed into a politically influential mass by Curió, Roraima's *garimpeiros* appeared to be little more than a disorganised rabble.

The rapid influx of *garimpeiros* into a particular area does alter the electoral base, but this is not necessarily mirrored by sudden alterations in the local political climate. Indeed, while the demographic changes that accompany mineral rushes undoubtedly present new political opportunities, these are seldom realised by candidates who do not already enjoy considerable political support in governmental circles. This is precisely because electoral success in Brazil, as in many other democracies, is still largely a function of the resources which a candidate has at his or her disposal. The backing that Curió received to improve conditions in Serra Pelada provided the foundation on which both his support and subsequent victory rested. As a result, aspiring politicians must extend their access to resources through political

alliances if they are to turn an electoral base into a campaign success. For this reason, numerical superiority alone is rarely sufficient to equip *garimpeiros* with a clear voice in Brazilian politics.

6.3 The *garimpo* and the formation of an élite class:

The specific nature of the Roraima rush, coupled with the inability of institutions and individuals to exploit the situation effectively, ensured that the *garimpeiro* lobby gained only limited power through direct elections. Nonetheless, the explosive growth of the informal mining sector still influenced the tone of state politics in two distinct ways. Firstly, members of the already established local élite invested in mining and came to defend those interests on the political stage. Secondly, the opportunities for social advancement presented by the rush enabled recently arrived *garimpeiros* to enter the local élite and gain political influence. Certainly in Roraima, it was through the personal involvement of powerful individuals in *garimpagem*, and not via the formal mechanics of the democratic system, that the *garimpo* lobby acquired greatest influence in state politics.

Local politicians are well placed to make investments in the *garimpos* not simply because they have access to the necessary sums of capital, but also because they are linked into extensive social networks in both urban and rural areas. Furthermore, as the mineral resources on Indian lands are widely perceived to be common property, few politicians regard investing in the *garimpos* as being incompatible with their public responsibilities. In addition, involvement in the gold rush actually offers them an opportunity to strengthen

their electoral position. Contacts may be forged with economically powerful *donos* who might provide financial backing for future election campaigns and support can be engendered among the electorally significant *garimpeiro* workforce. More specifically, politicians who invest in mining demonstrate a personal commitment to the progress and development of Amazonia which is often perceived to be threatened by external political pressures.

A number of public figures therefore seized the opportunity to invest in gold mining in the Yanomami reserve. In the 1991 Ottomar administration, at least four state deputies, one senator and one federal deputy had financed mining operations in this area between 1987 and 1990³. A number of senior civil servants also invested in the gold rush; these included the chief of the state police force, the transport secretary, and ironically, the Secretary of State for the Environment, Interior and Justice. When interviewed, one of these politicians presented a candid explanation of why he and his colleagues decided to invest in the *garimpos*:

'GJM: Why did you decide to invest in the *garimpos* when you had both a public position and rural property. What was it that attracted you to the *garimpo* ?

P: Right listen closely, the *garimpo* arrived here like a fever that passed through the heads of everybody who lived here. At that time it was almost impossible to meet anybody who was not affected by that wave of *garimpo* wealth which spread across the whole city [Boa Vista]. Look then at what happened to me as a politician. My political colleagues began to invest in the *garimpo* and they invited me to enter as a partner. That was how it was. Anybody who had a little bit of money on the

³ This data is collected from newspaper reports and interviews with local politicians.

side took it and invested in the *garimpo* in that illusion of El Dorado.

GJM: So how did you manage your investment there. Did you contract an overseer ?

P: Yes we had a manager, a person of confidence whom we knew - do you understand ? Our investment was like this...I bought the equipment in partnership with another friend of mine who was also a politician. We calculated all of the costs and split them fifty-fifty for everything we needed; a set of machinery, food, fuel, the transport flights, and then we put the work team in to start production.' 27/12/91

This quote illustrates the ease with which investments can be made in the *garimpo*, providing local entrepreneurs with an opportunity to diversify their economic base into mining. This is particularly important when assessing processes of elite formation, for it ensures that people who already carry some economic and political weight are not excluded from this rapidly expanding sector of the local economy. The pre-gold rush elite in Roraima consisted of the well established ranching families of the *cerrado* as well as an urban professional class. The latter was dominated by civil servants, but also included a small group of retailers and a handful of diamond traders. Other than this, a few officers in the air force such as Brigadier Ottomar de Souza Pinto, remained influential having come into power while the state was a Federal Territory. Most state and municipal politicians had interests in at least one of these fields, and virtually all of them owned land. The structure of their portfolios at the start of the gold rush typically shaped their response to the various opportunities that it presented. For example, those who already had investments in urban commerce were well placed to expand their activities in the booming retail and entertainments sectors. Similarly, diamond traders

expanded into gold purchasing, whilst anybody in possession of a light aircraft employed it in servicing the *garimpos*. Others, particularly those whose only concern was ranching or diamond mining, were less able to penetrate the lucrative and stable urban-based service sector and often chose to invest in the gold extraction process itself. The case of the extended families who have traditionally dominated the *cerrado* ranching economy is illustrative. As we saw in chapter 4, they were keen to transfer capital from ranching into mining because the FUNAI proposal to establish the Raposa/Serra do Sol reserve threatened to displace them from the *cerrado*.

In effect, these ranchers took a gamble and backed the wrong horse. For although mineral extraction may be a lucrative venture, it tends to be a much more risky investment than the service sector of the *garimpo* economy. Furthermore, it demands a level of vigilance which few of the ranchers were prepared to give and consequently a number of them were swindled by untrustworthy managers whom they had employed to supervise their mining operations. In spite of all of these problems, it was probably the sudden closure of the *garimpos* that dealt the hardest financial blow to these ranchers, particularly to those who had over-committed themselves to mining due to the uncertain future of *cerrado* ranching. They, like other investors, suffered considerable financial losses when, in 1991, the federal police began destroying all the mining equipment they encountered within the Yanomami reserve.

While these alterations in the financial affairs of Roraima's élite provide some understanding of subsequent political changes in the state, the relationship between economic power and political

influence is slightly more complex. For although secure financial backing is undoubtedly a prerequisite for any successful campaign, strong electoral support is an equally important ingredient; marrying the two is, as Curió demonstrated, the skill of the politician. Under rapidly changing socio-economic circumstances, Amazonian politicians have been forced to re-articulate both their electoral platform as well as their economic interests in order to maintain their influence. The speed and flexibility with which they respond to such a challenge is beginning to emerge as one of the most striking characteristics of Amazonian élites. The ability of the Mutran family to reclaim the mayor ship of Marabá in the 1989 elections, only seven years after Curió ousted them from office, is one of the most spectacular, but by no means the only, example. Miller provides further evidence of this resilience by demonstrating that some of the figureheads who traditionally dominated the extractive economy around Santarém (Pará), were able to maintain their local influence by diversifying into informal sector mining from the 1960s onwards (Miller 1985).

As we have seen, Roraima follows a similar pattern. Rather than experiencing the total replacement of an old élite with a new class of miners, there was a merging of the two groups into a new political class. Firstly, members of the pre-gold rush élite were quick to invest in mining and to extend their political appeal to the electorally significant *garimpo* workforce. The failed campaigns of Altino and Jucá testify the skill with which the old hands, like Ottomar, adapted to changing circumstances and maintained their grip on power. Even so, the rush was not without its political victims the most obvious of

whom were the *cerrado* ranchers. By investing in the gold extraction process itself and not the more secure service economy, their economic weight was eclipsed by the urban based professional and commercial classes. Of course there are exceptions to this rule. Some ranchers, like Zélio Mota, were able to make this transition. Zélio's success lay in extending his previous diamond trading concern into the new gold trade. But the experience of others, like José Augusto Macaggi head of the Roraima's landowners union the UDR (Rural Democratic Union), is more representative; despite personally managing his own *balsa* on the rio Uraricoera over a sixteen month period, José generated about the same income that he had earned previously as an agricultural consultant and ranch owner. Less astute members of the *cerrado* ranching fraternity, like Junior Magalhães and Petita Brasil, lost considerable sums of money by investing the proceeds of land and livestock sales in the *garimpo*. In general terms therefore, the *cerrado* ranchers were economically and politically marginalised by events at the end of the 1980s. They suffered both the financial impact of their unprofitable experiences in the *garimpo* and declining political authority as their control of the *cerrado* economy was gradually undermined by FUNAI policy.

Secondly, just as members of the old *élite* moved into mining, the new class of *garimpeiro* entrepreneurs simultaneously penetrated the economic domain of Roraima's establishment. We have already seen that members of the local *élite* whose interests were confined exclusively to the rural sector tended to lose ground to an increasingly powerful urban class, but the composition of this urban fraction also changed as new *garimpeiros* entered. These new arrivals were typically

entrepreneurs who came to Boa Vista to ride out the mineral boom. The retailing of *garimpo* equipment, mineral extraction, gold trading and the provision of air transport, were often at the centre of their portfolios, but they also invested in rented accommodation, car sales, taxi companies and the ubiquitous entertainments sector. Even so, the speed with which these entrepreneurs entered Roraima was in many cases matched only by the swiftness of their return to Porto Velho, Marabá, Santarém or other towns from which they originated. In the aftermath of the rush therefore only a small proportion of this rich *garimpeiro* class remained to become part of the socio-political fabric of Roraima.

These newcomers were able to use their considerable economic wealth to gain political influence. Making an investment in ranching is perhaps the first step for entrepreneurs seeking an entry into local politics (see the discussion in chapter 4). Having gained a social position in this way, they are well placed to extend their influence further by using their accumulated wealth as a tool for political negotiation on the local stage. The 1990 elections which marked Roraima's transition to statehood were particularly significant in this respect as numerous candidates were searching for campaign funds. Competition was heightened because the transition would bestow a greater degree of political autonomy than ever before. The elected government was also charged with the formulation of a state constitution. More significantly perhaps, the inconsistent approach of the federal government towards the Yanomami question in the run up to the elections suggested that local politicians would enjoy greater influence over the

exploitation of local mineral deposits than eventually proved to be the case.

The resultant clamour for power gave politically inexperienced *garimpeiros* an opportunity to gain influential positions in state government through the backing of election campaigns. This therefore represents a direct channel through which the mining lobby acquires a political voice. Indeed, Roraima's *garimpeiros* were more effective in articulating their interests in this way than by their unsuccessful attempts at gaining office through the formal electoral system. It is important to understand the exact mechanics through which the newcomers entered local politics without getting elected themselves. The following detailed case study presents a clear illustration of how powerful *garimpeiros* can acquire positions of considerable local influence through backing electoral campaigns.

Originating in the South of Brazil, Elton Ronhelt came into contact with the Amazonian élites through informal sector mining. In 1983 he established the company 'Edgar Ronhelt Mineração Limitada' in partnership with his brother Luz and the Mestrinho brothers Thomé and Gilberto⁴. The company had mining operations throughout the *garimpos* of Amazonia, but came to concentrate their activities in the region known as the 'Cabeça do Cachorro' in northwest Amazonas. In 1985, FUNAI and DNPM granted them permission to mine two out of the three mineral concessions that the company held on the Alto Rio Negro indigenous reserve⁵. Simultaneously, Paranapanema, the

4 Gilberto Mestrinho is the long-standing governor of Amazonas state. He has strong political connections with Roraima, where he was elected a federal deputy in the 1970s

5 The details of these concessions are published in CEDI/CONAGE 1988 : 21-22, and are illustrated cartographically in Wright 1990 p.40.

large state mining corporation, was given permission to mine a different site in the same reserve. Wright (1990) notes that the two companies worked together under the protection of the police force of the state of Amazonas. Mineral dealers in Boa Vista explained that having received permission to mine the concession, 'Edgar Ronhelt Mineração Limitada' invited Paranapanema to provide the financial and technical resources to develop the site, in return for a percentage of the profits.

The partners restructured their business interests in 1986; Gilberto Mestrinho sold out of the company and dedicated himself to his political career; Thomé Mestrinho established a new mining company called 'Mineração Montes Roraima Limitada' ⁶, and the Ronhelt brothers kept the company operating under the new name of 'GoldAmazon'. Both Monte Roraima and GoldAmazon had operations in the Yanomami indigenous reserve during the Roraima gold rush, although neither were spectacularly successful. Nonetheless, GoldAmazon did attract the attention of the press on two occasions during this period. Elton himself had the misfortune of being caught in flagrante at Boa Vista airport in a light plane containing an assortment of machine guns and semi-automatic weapons ⁷, but was released without charge. A month later he became the sole owner of the company when his brother Luz died in a plane crash while commuting to the *garimpo* ⁸. With two helicopters, a number of light aircraft, and two DC3 transport planes, Elton owned one of the largest airfleets in Roraima. A high proportion of his revenue came from

⁶ Gama de Silva 1990 :282, the same text also notes that Thomé Mestrinho owned a further company called 'Mineração Thomé Medeiros Recursos Naturais Limitada'

⁷ O Journal de Boa Vista 12/08/88.

⁸ Folha de Boa Vista 21/09/88

providing prospecting and transport services in the *garimpos*, but this was also supplemented by mining and the trading of tin ore which was sold mainly to Paranapanema.

Elton Ronhelt and Thomé Mestrinho stood as candidates in the 1990 Roraima elections, but neither of them obtained sufficient votes to qualify for the second round of the two-tier electoral system. On receiving the results, Elton placed the GoldAmazon air fleet at the disposal of Brigadier Ottomar de Souza Pinto who used it successfully to whip up support among colonists in remote rural areas and so clinch his victory against Romero Jucá. On taking office, Brigadier Ottomar appointed Elton Ronhelt head of the department of mining and hydro-electric projects in the state development corporation CODESAIMA. His daughter Denise Ronhelt, who owns a registered gold-trading company in Boa Vista, was appointed State Secretary for Tourism. As no DNPM office exists in Roraima, Elton effectively became the most senior government figure concerned with mineral development in the state.

There are many other examples of *garimpeiros* achieving political influence in similar ways throughout Amazonia. Again, in Roraima, Antonio Dias an entrepreneur who became wealthy retailing *garimpo* equipment during the gold rush, was appointed Vice Governor by Ottomar. At the time of his appointment, Antonio had resided for more than five years in the state and had no previous political experience. Similarly, Rubens da Silva, another successful *garimpeiro*, was appointed head of the Roads Department DETRAN in exchange for the support he lent to Ottomar's campaign. In Pará, Senhor Wilson, the owner of 'Agropeças' in Tucumã, and João Kai-Kai, owner of

'Pioneiro dos Motores', provide two well known examples of *garimpo* retailers extending their economic influence into the political sphere by supporting electoral candidates. Furthermore, as is well illustrated by the relationship between Ronhelt and Paranapanema, larger interests may also use this same avenue to influence local politics ⁹. One well-publicised, recent example was the significant contribution that Mercedes Benz made to Curió's unsuccessful 1990 election campaign in Marabá ¹⁰.

The point to recognise is that once *garimpeiros* gain political influence they may use it to support the interests of large mining companies over the informal mining sector. Elton Ronhelt's appointment forged a strong link between Paranapanema and the government of Roraima. This is well illustrated by an interview that Ottomar, Elton Ronhelt, and Lacombe (the director of Paranapanema) gave to the national newspaper Folha de São Paulo in July 1991. Having appealed to the *garimpeiro* vote during his election campaign, Ottomar's statement on this occasion favoured the participation of formal sector companies in any future development of the state's mineral resources, representing a distinct change in policy ¹¹

The political opportunities that wealth offers ensure that the *garimpo* is a significant force

⁹ Other candidates in the same elections also appeared to have the support of larger interests. According to local cassiterite dealers, the mineral company 'Companhia Industrial Amazonense' (CIA), which is joint owned by Brascan (95%) and Best Metals and Solders (5%) (DNPM 1982 : 868) provided José Altino and João Fagundes with vehicles to help canvas the electorate. João Fagundes was elected as a federal deputy, leaving the less fortunate Altino with a political ally who can represent his interests in government; presumably the same privilege is extended to CIA.

¹⁰ This event came to light amongst evidence presented at the hearings over the impeachment of the President (Veja 22/07/1992 :18-26). Schmink and Wood (1992 :128) give details of a similar deal made in Pará in the 1970s, in which a logging contract was awarded to the pension fund CAPEMI in return for their financial support of a political campaign .

¹¹ Folha de São Paulo 11/07/91.

affecting the composition of Amazonian élites. Nonetheless, this discussion suggests that even though certain *garimpeiros* may become more influential, the entrepreneurial class which the *garimpo* empowers seldom comes to replace a local élite entirely. Rather, the facility with which the established class can diversify into mining and re-articulate their political and economic influence through dealing with powerful *garimpeiros* favours a fusion of the old élite group with the new. It is precisely through merging different interest groups that the *garimpo* has had significant political repercussions. In general terms a common support for the mining economy is stimulated as previously established politicians invest in *garimpagem* and powerful *garimpeiros* enter local politics. This then was how the mining lobby became an important force in Amazonia.

6.4 The emergence of a regional political identity and the struggle over mineral resources:

Once *garimpeiros* gain office in state governments they can alter the course of local development in three main ways. Firstly, they may come to determine the allocation of regional development funds, such as the FNO, which are an important source of capital to local investors (notably ranchers). Secondly, they can influence state policy, as was the case when Roraima's constitution was being drawn up in 1991. Finally, they may also sway decisions concerning the development of the local infrastructure such as the construction of roads and hydro-electric projects. As head of the Mining and Energy Department of the state development company, CODESAIMA, Elton Ronhelt over-ruled previous

plans and commissioned the construction of Roraima's first hydro-electric project on the River Jatapú at the easternmost tip of the *Perimital Norte* highway¹². By 1992, the initial works were being undertaken by Paranapanema, the very company with which Ronhelt had been most closely associated in the *garimpos*.

However, it is the relationship between the state and federal governments which determines the precise extent to which locally-influential *garimpeiros* can shape the course of Amazonian development. As local interests tend to dominate when the influence of federal government slips, the state's control over land development is directly proportional to the impotence of the Union. This was certainly the situation in Roraima during the gold rush itself. For various reasons, neither FUNAI nor the military were able to prevent the *garimpeiros* from entering the Yanomami reserve. Local interests seized this as an excellent opportunity to pursue their own agenda - the central item of which was, and still remains, the exploitation of the state's subsoil wealth.

They were probably surprised to see the explosive growth of the mining economy being matched in scale by the media coverage and international concern that it generated. Non Governmental Organisations (NGOs) such as the Commission for the Creation of a Yanomami Park (CCPY), the Environmental Defence Fund (EDF), Cultural Survival (CS), and Survival International (SI), were particularly active in lobbying the Brazilian government to address the fate of the Yanomami. The

¹² The site for the hydro-electric plant is just downstream from the *garimpo* on the river Jatapú which is discussed in chapter 7. Elton Ronhelt gave precedence to the Jatapú site over two others which had been favoured by previous state governments. Work had already begun on one of them at Paredão on the Rio Mucajaí, funded by a loan from the Midland Bank plc. The second site, which had also been surveyed by the time Elton came to office, was on the Rio Cotingo.

real muscle of their campaign lay in mobilising western electorates and governments to pressurise Brasília over the issue. But, although this strategy ultimately proved decisive, their demands were resisted by the Sarney administration while it remained in office. Sarney continued to favour the *garimpeiro* lobby, signing the inter-ministerial decree 250/88 which carved the proposed Yanomami territory into 19 separate islands, thereby permitting *garimpeiros* to work in the intervening national forest (see chapter 2).

It took a change of government before the international pressure applied to Brasília had anything other than a superficial impact on the situation in Roraima. But when change came, it was swift. Within the first month of his presidency, Fernando Collor de Melo had revoked the controversial decree 250/88, had visited the Yanomami reserve, and had ordered the removal of the *garimpeiros*. In spite of this dramatic change of policy it was immediately apparent that the federal government lacked the necessary infrastructure in Roraima to realise these goals. In attempting to address this problem, the federal government set about empowering its agencies in the state. Considerable human and financial resources were channelled into the appropriate agencies through three specific projects. The federal police force was bolstered via 'Operation Free Forest', the National Health Foundation (FNS) through the Yanomami Health Project, and FUNAI was strengthened subsequently by the demarcation programme.

These measures dealt a severe blow to the aspirations of the now politically-influential mining lobby in Roraima. The local magnates employed every available strategy to disrupt the federal government's programme. But the federal government was not prepared

to allow the interests of a peripheral élite to tarnish its international reputation. By this stage, the plight of the Yanomami had become something of a showcase for Brazilian environmental policy on the eve of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992. As one Washington-based NGO noted:

'No other single issue is more indicative of the Brazilian government's political will to defend the Amazon and its inhabitants than the fate of the Yanomami territory' (EDF 1992 : 2).

Brasília was sensitive to such remarks because they had potentially damaging financial repercussions on the domestic economy. The EDF had already demonstrated its ability to hamper Brazil's access to foreign credit having successfully lobbied the World Bank to suspend funding of the POLONOROESTE project in 1985 until certain social and environmental conditions of the loan were fulfilled. The Yanomami situation was somewhat different in that it was never directly incorporated as a condition for any specific loan. But even though they may not have been formalised in a written contract, the concerns expressed by overseas observers, such as the UN who wrote to Collor on the subject on 12/02/91, may nonetheless have affected Brazilian liquidity. Here it is worth recalling that the Collor administration had been involved in protracted loan negotiations with the IMF since it came into office. After two years of discussion, a deal was eventually clinched in January 1992 providing US\$ 2.7 billion to aid debt repayments and to facilitate domestic economic reforms geared towards reducing inflation. Although this sum is small in relation to

her external debt, which exceeded US\$ 118 billion at that time, the loan did make Brazil credit-worthy in the eyes of the international banking community. This is not to argue that the demarcation of the Yanomami reserve in November 1991 was a principal factor in securing this loan, merely to note that, among other criteria, Brazil's environmental policies probably had some influence on the final decision taken by the IMF.

Therefore, on the eve of UNCED, Brasília was under considerable political and economic pressure to remove the *garimpeiros* from the Yanomami reserve. Naturally, there were voices other than those of the indigenous movement lobbying for the same ends, not least of which was that of the ATPC who wanted to restrict the production of Surucucús cassiterite. But the point is that a locally powerful *garimpo* lobby which had previously been able to withstand Brasília, could no longer dictate the course of mineral development in Roraima. This was an exceptional situation; nowhere else had the federal government intervened so decisively in the informal mining sector and usurped local interests. This is just as true for the numerous concessions made by Sarney to Roraima's *garimpeiros* as for the eventual decision to leave Serra Pelada in the hands of the informal mining sector. As it turned out, the international pressure, which had forced the federal government to intervene in Roraima, waned in the aftermath of the UNCED conference and *garimpeiros* once again started to move back into the Yanomami reserve.

Nevertheless, local élites were swift to equate increasing external pressure on the central government with their diminishing control over the exploitation of the subsoil. Responding to these adverse political

circumstances, they aimed to reassert their influence over the region and its resources by using a nationalistic rhetoric. In Roraima this was clearly articulated by 'The Movement Against the Internationalisation of Amazonia', which united *garimpeiro* leaders such as José Altino with influential ranchers like José Augusto Soares Macaggi. They lobbied for reductions in the size of Indian reserves, argued for the continued presence of *garimpeiros* and ranchers within them, and condemned the activities of bodies such as the Roman Catholic Church and CCPY for preventing Brazil from realising its mineral potential.

Although this movement arose from the specific situation in Roraima, its emergence coincided with growing debate over Amazonian sovereignty at a regional level. The relevance of this discourse lay in providing a catalyst to consolidate an increasingly cohesive political identity. In effect, it helped bring together local politicians around an Amazonian issue and in so doing, it furthered the development of a regional political agenda. The Inter-parliamentary Commission on the Internationalisation of Amazonia, which united various local politicians to investigate the activities of foreigners in the region during 1992, provides one such example ¹³. But the same rhetoric, emphasising local sovereignty and challenging existing indigenous policy, underlay other expressions of regional political thought. A statement from the Governors of Western Amazonian states (Amazonas, Roraima, Rondônia and Acre) signed in Manaus on 14/11/92 provides a good

¹³ Romero Jucá's wife, Teresa, who was then a state deputy in Roraima, took part in this commission. She subsequently headed another special commission charged with reformulating indigenous legislation through amendments to the Indian Statute (CPI 1992). Like her husband, she staunchly defended mining on Indian lands. She was elected mayoress of Boa Vista in January 1993.

example. Having noted that "the socio-economic development of the Amazon constitutes a legitimate, unquestionable, non transferable and inviolable right of the Region's inhabitants", this text proceeds to argue that 'Indian areas should be adequately demarcated within reasonable limits which should not exceed 200 hectares per Indian family of whatever ethnic group' (Roraima 1991: 5). Both this document, and the unsuccessful *Código Amazônico* which was signed by all of the Governors of Amazonia Legal in 1991, sought to place greater authority over the demarcation of Indian reserves and the management of natural resources in the hands of the regional political élite.

The Internationalisation debate has been aired since the 1960s, and for this reason its origins predate the contemporary developments in the informal mining sector discussed here. Nonetheless, its current resurgence, and more significantly the political changes which this precipitated, cannot be divorced from more recent socio-economic changes in the region. By raising questions of Amazonian sovereignty, the local élite was not only able to challenge the actions of the federal government, but they were also provided with a convenient issue around which to strengthen a regional political identity ¹⁴.

There were two principal mechanisms through which informal sector mining increased regional political cohesion. Firstly, it eroded the influence of local agrarian oligarchies whose interests were as diverse as the geographical variations on which their influence rested. In forcing them to redefine their economic foundations along more common lines, and by partially

¹⁴ This development of a regional political debate structured around Amazonian sovereignty has also been noted and discussed by Amparo (in press).

replacing the old guard with a new entrepreneurial class, the *garimpo* helped forge a regional élite that shared a political interest in resource development. As is noted above, there was an assimilation of divergent economic and political interests as members of the existing establishment invested in the *garimpo* while at the same time powerful *garimpeiros* acquired local political influence. In this respect, the 1980s gold rush helped smooth out the disparate concerns of rural oligarchies and prepared the way for a new regional élite to seek increasingly common political objectives.

The second point is that the same rush enhanced the subsequent development of this regional political identity by strengthening the intra-regional links operating between state governments. The widespread involvement of politicians in the informal mining economy helped construct an intricate social network among the Amazonian political élite. The case study of Elton Ronhelt provides an insight into how these links develop. Through the *garimpo* he forged strong ties with the government of Amazonas. Likewise, Antonio Dias, another member of Ottomar's State Cabinet has strong connections with politicians in Pará following his mining experiences in that region. While not negating the importance of other factors in this context, it should be noted that the *garimpo* often provides a common denominator that links politicians in one part of the Amazon to colleagues in neighbouring states, thereby facilitating intra-regional political networking.

In conclusion, the recent political and economic history of Amazonia suggests that local interests are becoming increasingly influential on both the regional and national stages. This has very real implications

for the future pattern of resource development and land-use in Amazonia, particularly as political changes on a national level have meant that the federal government's already limited control over regional planning appears to be slipping even further. The precarious state blockade of the Yanomami reserve collapsed in the wake of the UNCED conference and by the start of 1993, over 12 000 *garimpeiros* had resumed their work inside the area. FUNAI was hardly in a position to act, having had its already meagre budget slashed by over 80% in the financial year 1992-93 ¹⁵. At the same time, the newly appointed secretary for the environment, Coutinho Jorge, was laying foundations to decentralise many of IBAMA's responsibilities¹⁶, thereby giving state governments greater control over local environmental planning¹⁷. Clearly, if this trend continues (and here it should not be forgotten that Brazilian politics is notoriously unpredictable) then environmental and social policy in Amazonia will be increasingly determined by those who exploit the region's natural and human resources most successfully.

¹⁵ The Financial Times 20/02/93.

¹⁶ Address given by Coutinho Jorge to the University of Glasgow Institute of Latin American Studies, 05/03/1993.

¹⁷ Sawyer (1990 :18) notes "this is not necessarily a positive trend..decentralisation may be disastrous for the environment and vulnerable groups such as Indians and traditional extractors."

Chapter 7 The *garimpo* as a catalyst for land-use change in Amazonia

Having examined the specific relationships between the *garimpo*, politics and individual land-uses, it is now appropriate to synthesise these observations and focus on the whole picture. Here, the salient points from the previous chapters are distilled and organised into an analytical framework, illustrating the ways in which informal sector mining affects the course of Amazonian development. This is achieved by looking at the social and environmental repercussions of mining. Summarising the various impacts of the activity in this way enables us to identify the aspects of *garimpagem* which are least known and to outline appropriate ways of researching them. Attention then focuses on why certain groups go mining more than others. This analysis of rates of participation not only offers an insight into how the costs and benefits of *garimpagem* are distributed, but it also permits the identification of some of the theoretical problems inherent in researching the informal sector.

Thus, the chapter aims to show why the *garimpo* can be considered as a catalyst for land-use change in Amazonia and in so doing it identifies some of the problems and priorities of researching the subject. To set the context for this discussion, a short account of a *garimpo*'s development is presented, offering an overview of the processes operating between it and its hinterland.

7.1 The gold rush on the Rio Jatapú.

Figure 2.1 illustrates that geological intrusions, similar to those found in the Yanomami reserve, exist

along the Guyanese border in south-eastern Roraima. A number of prospecting teams were commissioned by ranchers and influential *garimpeiros* to survey this area following the closure of the *garimpos* on the Yanomami reserve and in June 1992 a strike was made in the headwaters of the Rio Jatapú. It provoked an immediate influx of *garimpeiros* to the small agricultural community of Entre Rios (see fig. 1.3). They congregated in the village situated at the eastern end of the *Perimetral Norte* highway before embarking upon the fortnight long walk into the newly-established *garimpo*. Within two months, the strike had attracted over four hundred people the majority of whom came from Boa Vista, but others had travelled directly from Venezuela, Maranhão, Itaituba and the Cabeça do Cachorro, all on the strength of a poorly founded rumour¹.

The villagers of Entre Rios were quick to take advantage of the opportunities presented by the influx. Residents opened up their homesteads as guest houses, farmers sold agricultural produce for gold and the village lorry driver made a tidy sum charging for rides. The Jatapú strike boosted what was a previously stagnant rural economy by increasing the demand for food, accommodation and transport. From the outset of the rush, *garimpeiros* were the most welcome visitors ever to have set foot in the sleepy village of Entre Rios. However, as the *garimpo* evolved its influence on the local economy changed and eventually its spin-offs for the locality were not as substantial as they might have been.

¹ See footnote 10 of chapter 2 for the states of origin of 66 *garimpeiros* interviewed entering the *garimpo* at Jatapú.

The initial strikes were made along a small depression in which a limited amount of gold was concentrated. But beyond this restricted area the mineral was thinly spread over higher ground, necessitating the use of pumps for its extraction. Under manual operations the *garimpo* could not generate sufficient quantities of gold to maintain itself. As we have seen, the *dono* receives dues of between forty and fifty percent of the total gold produced, from which air drops of food and equipment are commissioned. The goods are then either distributed or sold to the workforce in accordance with the work relationship adhered to². But this system broke down in the early days of the Jatapú *garimpo* because the influx was out of all proportion to the size of gold deposit discovered³. A desperate food shortage prevailed, which could only be remedied by the immediate construction of an airstrip. This would not only increase gold production by permitting the installation of the appropriate machinery, but would also strengthen communications, thereby facilitating the re-supply of the *garimpo*.

The confused politics of the situation gave an extra impetus to the airstrip's rapid construction. The deposit had actually been discovered by a *garimpeiro* named Goiano, who was prospecting on behalf of Zézé, one of Roraima's few female miners (*garimpeiras*). The standard arrangement is for the prospector and patron

² Under *meia-praça*, the *garimpeiros* pay 50% of their gold earnings and receive free food; under *conta própria*, they typically pay 40% of their gold produce, but have to pay for their food.

³ Apparently these chaotic events are commonplace during a *fofoca* (rush). Some of the *garimpeiros* leaving the Jatapú *garimpo* compared it to similar circumstances that prevailed during the *fofoca* of Novo Cruzado which became one of Roraima's most productive mines. In both situations there was a dispute over ownership which was resolved violently and the considerable food shortages caused by the rushes allegedly claimed a small number of lives in each case.

to share any profits that accrue from such research, but in this case Goiano failed to inform Zézé of his strike in the Jatapú, attempting to establish himself as the sole *dono do garimpo*. Zézé recognised Goiano's deception the instant that rumours of his find broke in Boa Vista and resolved to challenge him. She entered the *garimpo* on foot accompanied by a handful of gunmen and a large group of *garimpeiros*. After a showdown which left two dead and a third seriously wounded, Zézé impressed her legitimate authority upon the *garimpo*⁴. Like many other *donos*, she had been left seriously indebted to other miners by their expulsion from the Yanomami reserve, so her immediate concern was to open an airstrip at Jatapú and invite her creditors to install their mining equipment. As a fortnight-long walk back out of the *garimpo* was the only alternative option available to the famished workforce, they set to the task of building the airstrip. On the sixth of August, less than two months after the initial strike was made, the airstrip was completed. Thus, the introduction of pumping equipment to Jatapú was not preceded by an extended period of manual extraction which characterises the evolution of many other *garimpos*.

These internal dynamics had a profound effect on the economic changes brought to the surrounding area. Before the airstrip was built, all of the *garimpo* traffic had passed through Entre Rios and the commerce of this remote agricultural settlement had benefited accordingly. But this situation altered dramatically as soon as the first aircraft touched down on the *garimpo's* new airstrip. It now became more convenient

⁴ Both Zézé and Goiano divided the considerable expense of commissioning a helicopter to transport the injured person to a hospital in Boa Vista.

to service the site by air direct from Boa Vista and the village of Entre Rios experienced a sharp deflation of its previously expanding economy. Soon there were few hints that a gold mine existed nearby, save the drone of a passing aircraft or the occasional arrival of *garimpeiros* who could not afford to fly into the mine. Nonetheless, the rush was probably the most significant event in the history of Entre Rios since its inception in 1983, and, in spite of being a short term phenomenon, it did leave some longer term legacies. At least one *garimpeiro* bought land nearby from a smallholder entrepreneur and a number of others stayed on in the area to join the local agricultural labour force.

7.2 The social and environmental impacts of *garimpagem* in Amazonia.

This account demonstrates that there are many different influences at work in the formation of any *garimpo* and as a result no two *garimpos* are quite the same. Recognising what is happening in the *garimpo* itself is therefore the first step in assessing its impact on what is going on around it. The switch to air transport at Jatapú provides one good example, but other less obvious factors which distinguish one *garimpo* from another may be just as significant. For example, in riverine *garimpos*, like those of the Rio Uraricoera, the workforce gets paid a higher percentage of the gold produced than in land-based mining operations. This is because diving work is much more dangerous than employment on land. These technological differences often come to affect the composition of the workforce itself; since diving is a relatively skilled

job, it tends to be the more experienced professional *garimpeiros* who undertake it. Both observations are relevant to this discussion because they affect the flows of capital and labour between the *garimpo* and other sectors of the Amazonian economy.

Despite these variations in individual mines, certain principles and widely-acknowledged work relations underlie *garimpagem* throughout Amazonia and so it is still possible to evaluate the impacts of the activity in a systematic fashion. Table 7.1 presents a résumé of the environmental and social impacts of *garimpagem*. Essentially it summarises the principal points raised in the previous chapters.

The table makes a distinction between the direct and indirect impacts of *garimpagem*. Direct impacts are those sustained in the immediate vicinity of the mining operation itself and are restricted to places and people that come into contact with the *garimpo*, whether willingly or otherwise. The indirect impacts extend further afield. In effect, they are relayed via a series of ecological, political, economic, and social processes that link more distant people and places to the gold mines. To give one illustration, a household in Entre Rios which is not involved in mining nonetheless feels its influence when demand from the nearby *garimpo* pushes up the price of manioc flour in the locality.

Figure 7.1 The Direct and Indirect Impacts of Garimpagem

Direct or Primary impacts

Environmental:

Vegetation disturbance

Disruption and sedimentation of watercourses

Pollution of ecosystem with mercury

Depletion of fauna and ichtofauna

Creation of new breeding grounds for disease vectors like the anopheles mosquito

Socio-Economic:

Impact on the resident population including disease, social conflict and culture shock

Rapid urban expansion and economic growth in the garimpo's hinterland

Alterations in the transport network for mining purposes

Changes in the transmission of disease due to migration to the garimpos

Indirect or Secondary impacts

Downstream effects of direct environmental impacts, including mercury contamination of riverine communities, damage to fisheries, & siltation of HEP reservoirs.

Deforestation due to the investment of gold earnings in other land-uses like ranching

local urban growth sparks greater rural-urban and urban-urban migration

Demand led changes in land use stimulated by urban expansion and price increases

Provision of infrastructure and allocation of state government funds affected by changing political situation

Socio-economic changes in the source areas of garimpo migration, including associated alterations in land-use strategies and new gender divisions of labour

7.2(a) The direct environmental impacts of *garimpagem*

The left hand column of fig. 7.1 lists the direct impacts of *garimpagem*. In environmental terms these include the removal of vegetation to get at the gold itself and for the construction of airstrips. The analysis of deforestation in chapter 4 showed that the areas cleared for mining are small, particularly when compared to other Amazonian land-uses. But as this deforestation and the mining itself is concentrated along the watercourses, *garimpagem* does have a disproportionately large impact on the riverine ecosystem. Some authors (e.g. Douroujeanni and Padua 1992 :103) have argued that sedimentation of watercourses is the most significant of all the environmental costs attributable to *garimpagem*. They estimate that 2 cubic metres of sediments enter the watercourses for every gram of gold extracted in the *garimpos*. Although geological variations throughout Amazonia ensure that this proportion will change between different *garimpos*, it does indicate that the sedimentation caused by mining in the region may be measured in billions of tons. This not only interferes with the reproduction of fish, which is an important source of protein in the region, but it may also accelerate the rate at which the reservoirs of hydroelectric projects silt up (Uhl 1992).

Other authors (Cleary 1990, Butler 1990) are more concerned with mercury pollution, particularly as this may have has serious health consequences for the local population. Mercury use is common to all forms of gold mining equipment in the *garimpos* because its affinity for gold aids gravimetric recuperation. Consequently, it is not pure gold, but a gold-mercury amalgam that is the product of the mining exercise itself. The *dono* of

the operation is usually responsible for heating this amalgam so that the mercury is driven-off as a white vapour leaving only the gold. Mineral traders in nearby urban areas will subsequently perform the same ritual when purchasing gold (as this ensures that they are not inadvertently buying mercury as well), but even though they may burn more gold than the *donos* in the *garimpos* they are typically exposed to smaller amounts of mercury vapour. This is because the *donos* will have burnt almost all of the toxic metal from the gold at the site of production before taking it to the gold dealer in the city. The results of a collaborative research project between Imperial College London and the Federal University of Rio de Janeiro confirm this⁵. By analysing the blood and urine of people either living in or next to the Tapajós gold fields, the study showed that gold burners in the *garimpos* tend to have higher levels of mercury in their urine than gold traders in the cities. This suggests that while mercury contamination through inhalation may well affect the health of individuals in the *garimpo*, it is unlikely to pose a serious threat to the welfare of the Amazon's large urban population.

When inhaled, mercury passes in an inorganic form through the mucus membranes of the nose and lungs into the body. While undoubtedly toxic, mercury in this inorganic form may be flushed out of the body and discharged with urine. Consequently, people who are contaminated by mercury vapour can be treated quite effectively by removing them from the source of pollution. In extreme cases drugs may be administered

⁵ The results of this research are presented in an unpublished report entitled: Mercury contamination in the Brazilian Amazon: a report for the European Commission DG1/Environment (Brussels 1991).

which increase the rate at which mercury is discharged through urine.

A second channel of mercury contamination, via the consumption of polluted fish, poses a more serious health problem. Some of the mercury which is placed behind the riffles in the *garimpeiros'* sluice-boxes is washed by the constant flow of water and sediments down the sluice into local watercourses. It settles amongst the sediments of the riverbeds where it is joined by mercury that has been vaporised (through the burning process described above) before being condensed out of the atmosphere and into the streams by rainfall. Ground-feeding fish and other organisms absorb the mercury and they in turn are eaten by carnivorous fish. In the course of these events the mercury is transformed from an inorganic to an extremely toxic organic state (called methyl-mercury) through a process known as methylation.

Methyl-mercury, unlike the inorganic mercury, is not easily discharged from the body and so it accumulates in the tissues of organisms at the higher end of the food chain (like large carnivorous fish, caiman, and eventually people). The above mentioned Imperial College- University of Rio de Janeiro study found that riverine communities in close proximity to the *garimpos* are at greatest risk from mercury contamination through fish consumption. As the limnology and biochemical processes operating in Amazonian rivers are poorly understood, it is difficult to know what time-lapses are involved in these processes. There is little that can be done other than to inform riverine dwellers of the issue, to introduce new technologies such as portable mercury condensers (known as *retentors*) and sluice attachments that reduce

mercury discharges into the ecosystem, and to monitor the situation in detail.

Current research on mercury pollution is focused on the Tapajós and Madeira rivers, where *garimpagem* has been practised intensely since the 1960s. Clearly, it makes sense to collect data from these areas where mercury use has been most profligate. But even so, there is still a need to gather basic information on the subject from the less accessible parts of Amazonia where gold mining also occurs. Virtually nothing is known about the extent and likely consequences of mercury contamination in Roraima, the Cabeça do Cachorro (Amazonas) and Amapá. For although less mercury has been discharged into the watercourses of these more recently mined areas, hydrological differences and variations in diet mean that the health implications of mercury pollution in one part of Amazonia cannot be directly extrapolated from data gathered elsewhere. It would therefore be appropriate to extend the monitoring of mercury pollution from the Madeira and Tapajós rivers to other parts of the Amazon, and to integrate this with appropriate data on the dietary habits of exposed populations.

7.2 (b) The direct social costs of *garimpagem*

It is particularly unfortunate that the geology of the region encourages prospectors to enter the very watersheds which provide the ultimate refuge for some of the world's last isolated Indian communities. The arrival of *garimpeiros* on the lands of groups like the Yanomami tends to be particularly destructive because the Indians have minimal resistance to 'Old World' diseases and their livelihoods are closely dependent on the healthy functioning of the ecosystem. Thus, they

typically bear the full brunt of the environmental problems noted above, whilst simultaneously being smitten by disease. All of this occurs within a social and economic context which is profoundly disorientating and is often compounded by violent conflict with the invading *garimpeiros*. Many of the problems stem not so much from the mineral extraction process itself, but from the way in which it is organised and controlled. As we have seen, there are plenty of examples of Indian groups benefiting from *garimpagem* when it is practised on their terms (chapter 5). The problem is that this beneficial situation is extremely hard to achieve and is even more elusive when the deposits are of considerable value. Even the Kayapó, who were exceptional in regulating mining activity on their lands, were obliged to make some trade-offs with the *garimpeiros*. For these reasons, its impacts on the welfare of indigenous peoples probably tops any evaluation of the direct social costs associated with *garimpagem*. Here, there is no obvious alternative to rigorous government intervention in order to prevent *garimpeiros* invading Indian lands.

In contrast, many of Amazonia's non-indigenous populations argue that the benefits of *garimpagem* outweigh the social and environmental costs that it inflicts. This reflects in part a widespread ignorance of the consequences of mercury pollution and a tendency to dissociate the changing pattern of disease transmission from mining itself. But it does nonetheless point to the significance of an activity that brings economic growth to remote parts of the region. The spin-offs for rural areas may be considerable, especially if the *garimpo* leads to improvements in transport such as the construction of

the 'Transgarimpeira highway' in the Tapajós. Here a road built to gain access to the regions' gold fields has stimulated agriculture, ranching, and timber extraction in the locality⁶.

Even so, the infra-structural changes associated with *garimpagem* are minimal in comparison to those made by the formal mining sector. For example, in the mid 1980s the CVRD constructed a 900 kilometre railway to transport iron ore from the Serra do Carajás to a deep water port at São Luis. Likewise Paranapanema has built roads into the Waimiri-Atroari reserve to gain access to the Pitinga cassiterite mine. But while *garimpeiros* are not responsible for such large scale developments, their impact on the regional economy and local society is probably much greater than that of the formal mining sector. The capital-intensive nature of corporate mining and the removal of their profits from the region means that they bring only limited benefits to Amazonia. In contrast, *garimpeiros* receive a respectable proportion of the income they generate and, more significantly, they spend it locally in all sectors of the Amazonian economy. Thus the *garimpo* has a much higher 'multiplier effect' than the formal mining sector and the considerable demand for goods, services, and land that this generates often brings radical transformations to the local and regional economy.

Nowhere is this more clearly visible than in the rapid expansion of cities like Santarém, Marabá, Porto Velho and Boa Vista. While this is clear evidence of the economic benefits that *garimpagem* brings to urban areas, such sudden urban growth is not without its

⁶ Road networks are especially sensitive to mining because the economic viability of developing any mineral deposit hinges on its accessibility.

social costs. Drug use, prostitution and violent crime have all become part of life in the Amazonian boom cities. There are two ways in which the mining economy stimulates the demand for drugs and prostitution in its hinterland. Firstly, men who migrate large distances to work in the *garimpos* for extended periods may abandon their households after a period of time and experience isolation (although some cope with that by running dual households). Secondly, having created desires in this way, miners are one of the very few social groups in the Amazon whose needs are translated into real economic demand. In this way informal sector gold mining supports two thriving rackets which are often characterised by exploitation and violence.

The prostitution trade is illustrative. Research in the *garimpos* of Pará (Dimenstein 1992, SEICOM 1993) points to an extensive network of Amazonian prostitution in which girls are sometimes kept in conditions of slavery. Women interviewed in the brothels of Cuiu-Cuiu, one of the most established *garimpos* of the Tapajós, explained that they were lured into prostitution under false pretences and were violently threatened unless they worked⁷. Like many of the prostitutes in Roraima, they were recruited from the same poverty-stricken areas of Maranhão and Pará that most of the *garimpeiros* originate from. Given that intense regional migration places such a strain on personal relationships, it is plausible that many of them are female heads of households seeking an income having been deserted by their partners. Others are significantly younger and child prostitution is not

⁷ Following a series of articles published by Dimenstein in the *Folha de São Paulo* in February 1992, the brothels of Cuiu-Cuiu were raided by the police. They released 74 prostitutes who had been held against their will and arrested 10 brothel owners, 20 of the girls who were released were minors. (Sutton in press).

uncommon in a region where great status is placed on virginity (Sutton in press). In most cases women are transported to the brothels of the gold camps by intermediaries. They arrive owing the middlemen the cost of their passage and are obliged to repay it from their earnings. Clearly it is in the brothel keeper's interest to charge the girls high prices for food, clothing and keep, so that they are barely able to repay their debts.

The large, isolated, yet stable, *garimpos* of the Tapajós lend themselves to these forms of debt-bondage. But in more fragmented, volatile mining areas (like those of western Roraima) prostitution is not centralised to the same extent as it is more difficult for one person to exert the same degree of control. Here, there are few actual brothels like those which exist in Cuiu-Cuiu and as a result prostitutes tend to have greater autonomy. Women are typically employed in the gold mines as cooks and earn extra income by working as prostitutes for the crews that they cater for. As they have often acquired their job through being a friend of the *dono de maquina* or *dono de garimpo*, they may enjoy a relatively privileged position in the mine.

While there is undoubtedly exploitation in many of the Amazon's brothels, prostitutes working in the urban areas are probably better able to escape from tyrannous employers and gain other work. Even so, conditions are far from ideal. In Boa Vista the brothels are clustered along the banks of the Rio Branco in a violent part of town that floods seasonally. Most of the girls come from Maranhão, Pará and Goiás, though a number are local Macuxi girls seeking independence in the city. Men buy the key to the girl's room from the barman and

the girls subsequently receive a percentage of the trade they generate once the brothel keeper has deducted costs for 'overheads'. Condoms are usually available on request with the key, but they are seldom requested as miners often see them as an affront to their virility. Clearly this favours the spread of sexually transmitted diseases. Gonorrhoea is common, and although no official statistics exist, it is likely that AIDS is rife.

7.3 The indirect impacts of *garimpagem*.

The full extent of the *garimpos*' influence can only be truly appreciated if we look beyond the immediate confines of the *garimpo* itself and consider the indirect impacts of *garimpagem* which are listed in the right hand column of figure 7.1. It is easy to understand how natural processes are responsible for transporting mercury pollution and sedimentation to communities who live downstream of the *garimpos*, but all of the other indirect impacts are transmitted by the social, economic and political changes that *garimpagem* causes. Even though they have provided a specific focus for this work, these socio-economic and political processes are still poorly understood and are often overlooked. More specifically very little is known about the exchanges of capital and labour between the *garimpo* and other land-uses. For this reason they remain an appropriate subject for future research and it is worth considering how we might improve our knowledge of them.

Chapter 3 suggests that smallholder migration into the *garimpos* is a widespread phenomenon that has important social and environmental repercussions. But even though there is now a well established literature

on population movements from the Northeast into the Amazon in search of land, virtually nothing is known about the patterns of migration associated with *garimpagem*. Research could focus on the precise links between the smallholder population of north-western Maranhão and the *garimpos* of Amazonia. Do smallholders just go into the Amazon looking for land and enter the *garimpos* if they cannot obtain it, or is the pull of the *garimpos* sufficiently powerful to stimulate migration in its own right? It would be illuminating to undertake a detailed survey of the migratory strategies employed by smallholders in the municipalities of Lago de Pedra, Pinheiro and Imperatriz, from where many of Amazonia's *garimpeiros* originate (Pereira 1990). It is quite probable that these factors influence the agricultural strategies adopted by farmers in the area, the division of household labour along gender lines and the transmission of disease in the locality. Perhaps the most relevant issue lies in addressing the following question; do the opportunities available in the Amazonian informal mining sector encourage farmers from the Northeast to sell their smallholdings and migrate to the region permanently, or do temporary excursions to the *garimpos* provide these smallholders with sufficient income to resist the pre-existing economic and social pressures that have traditionally fuelled Amazonian migration?

The flows of capital from the *garimpos* into other activities also determines how the indirect impacts of *garimpagem* are distributed. Here the relationship between ranching and mining which is discussed in chapter 4 merits further attention. Evidence that gold from Roraima was being invested in the *fazendas* of south-eastern Pará suggests that it would be

interesting to focus attention on the area between Marabá, Redenção and Imperatriz. It is unclear what continues to drive the beef economy in this area now that many of the government subsidies for ranching have been withdrawn. Therefore, it would be particularly interesting, though far from straightforward, to evaluate the significance of capital flows between the *garimpo* and the ranching sector in this context. Clearly, *garimpagem* is only one of a range of activities from which income is tapped and channelled into ranching. But the considerable wealth generated by mining, together with its tendency towards spatial and social concentration, could make for significant financial exchanges between the mineral and ranching sectors in certain parts of the region. A well-planned research project could examine the complex interactions between the *garimpo*, deforestation, land tenure and agrarian violence. The overriding difficulty lies in undertaking such work, not least because ranchers are unlikely to disclose their sources of income to a stranger. Therefore, rather than seek precise data on personal finances, it would perhaps more appropriate to collect detailed life-histories on a wide range of ranchers who hold properties of varying sizes in the study area. Not only would this provide useful information on the various economic practices and investment strategies adopted by Amazonian ranchers, but it would also yield a valuable insight into the processes of élite formation.

Thus migration to, and remittances from, the *garimpo* have a variety of far-reaching social and environmental impacts which are often ignored. Surprisingly enough, many of the most significant transformations occur not when the *garimpo* is

expanding, but when it contracts. Roraima's agricultural production was boosted in 1991 when thousands of *garimpeiros* who were expelled from the Yanomami reserve either returned to their holdings, or laid claim to new plots. Similarly, it was only when the *garimpos* began to contract that ranchers like Robertino (who is mentioned in chapter 4) were obliged to adopt the most dramatic management practices. This shows that these, and other indirect impacts of *garimpagem* (like those associated with the political changes discussed in chapter 6) have a role in shaping the lives of people who may live hundreds of miles away from the *garimpo* itself.

7.4 Motives for participation in *garimpagem*

This discussion shows that the impacts of informal sector mining are spatially concentrated in certain places and are inequitably distributed amongst different groups of people. To understand exactly how *garimpagem* fuels an uneven development model we need to look in greater detail at why some people prefer to go mining more than others. Here we look at the factors that influence rates of participation in *garimpagem*. For in determining who gets involved in different parts of the mining economy these processes influence the way that the costs and benefits of the activity are distributed.

On one level, mining unites a diversity of social groups in the quest for material wealth. However, this common interest eclipses a whole range of non-economic factors that also draw people into the *garimpos*. Many of the smallholders (especially single men) are attracted to the adventure of the *garimpos*, but groups

like the Macuxi appear to be looking for something completely different. To them one of the most valuable returns from mining may be gaining prestige and identity among a different society. Politicians perhaps see *garimpagem* as a vehicle to strengthen their political support and maintain their local hegemony. For thousands of others, most notably the professional *garimpeiros*, it is purely a means of surviving economically.

Because it means different things to different people, there are few straight-forward rules as to why some groups go mining more than others. Nevertheless, certain statements can be made. The distance between one group of people and the *garimpo* appears not to be a dominant factor in shaping their behaviour. City dwellers and smallholders travelled thousands of miles from the Northeast to extract gold in Roraima, while *caboclos* did not even venture into the headwaters of the very rivers that they lived along to go mining. Similarly, while people who have previous experience of *garimpagem* are able to make more informed migratory decisions, it is hard to predict their likely response to a mineral rush purely on the basis of their life histories. As has been noted, the Macuxi are amongst Roraima's most experienced *garimpeiros*, yet only a minority of them left their villages to join the gold rush.

A more relevant consideration is the ease with which mining can be integrated other activities. The seasonal nature of *garimpagem* ensures that timing is all important for those seeking to combine it with alternative forms of employment. While this seldom poses a problem for urban dwellers, it is fundamental to rural people whose livelihood strategies usually

vary markedly throughout the year. The case of the Macuxi is illustrative; for them, the peak gold mining period clashes with the best time for hunting, fishing and diamond mining on the *cerrado*. Many of the Macuxi obviously felt that gold mining was not an attractive proposition, but at the same time other groups of rural producers, most notably smallholders, were flocking to the *garimpos*. As there is virtually no demand for labour on colonist holdings during the summer months, *garimpagem* dovetails neatly with agriculture. The salient point is that the seasonality of different activities dictates the opportunity costs of gold mining. In this respect, it is clear that a trip to the *garimpos* does not entail the same trade-offs for the smallholders as it does for the Macuxi.

The social networks that underpin different livelihoods also influence the ways in which groups respond to the opportunities presented to them. Although anybody can enter and leave *garimpos* as they wish, social networks do nonetheless shape the movement of labour and capital within the informal mining economy. This is particularly the case in remote areas like western Roraima and the Tapajós where access to the gold fields is usually by plane and transport to the *garimpos* is often monopolised or 'closed'. Under these circumstances, air-taxi operators and the '*donos do garimpo*' may fulfil a role as gatekeepers to the mining areas. Numerous people in these positions are competing with one another on a commercial basis and for this reason, there is no group control over access. But even so, these more powerful individuals may still represent an obstacle which prevents certain people from reaching the *garimpo*. Members of the Amazonian peasantry are generally wary of working in an alien

environment precisely because their only insurance against economic exploitation is rooted in social networks. It is probably true that such a philosophy is more deeply ingrained among residents of tighter and more remote communities than it is among urban dwellers, colonist farmers or ranchers. However, when trying to understand why certain people are more willing to go mining than others, the extent of their social contacts merit attention. The *caboclos'* restricted involvement can be related to their extremely limited interaction with *garimpeiro* society. In contrast, smallholders and ranchers who were frequently engaged in trading and urban employment had greater links with *garimpeiros*. This undoubtedly reflects the predominantly urban basis of the *garimpo* economy, but even so it is wrong to assume that contact with *garimpeiro* society is denied those groups who have little interaction with the city. A glance at the diamond mines of the *cerrado* for instance reveals that many of the Macuxi Indians knew *garimpeiros* in an entirely rural context.

The seasonality of an individual's employment and the extent of their social networks determine the ease with which gold mining can be tailored to other jobs. In this way, an individual's involvement in mining can only be truly understood if it is evaluated in relation to their other activities. Indeed, if *garimpagem* is considered to be one element in a range of possibilities that constitute a living, then decisions made in this sphere are probably influenced by wider livelihood strategies. Involvement in mining may, for example, reflect risk-management behaviour on a higher level. The standard argument is that the peasantry spreads risk by engaging in a wide variety of economic

activities⁸. But while this suggests that people might be on the look out for new options, it is strange that they should embrace a high-risk venture like *garimpagem* so enthusiastically. Cleary (in press) advances an alternative thesis, arguing that Amazonians might actively seek out high risk-activities in order to keep pace with high inflation. From this perspective, the short term gamble like *garimpagem* makes greater economic sense than the gradual accumulation of capital over a long period. Obviously such a strategy only becomes feasible once an individual has other options, like agriculture, to fall back on. The behaviour of colonist farmers is illustrative. The *garimpo* is attractive to them precisely because they are able to underwrite the inherent risks of mining against the security of their smallholdings.

A point common to both theories is that economic success is closely related to the efficiency with which different activities can be complemented. It is here that social networks provide the crucial lubrication; knowing the right people in the right places becomes important when moving between various sectors of the economy. Thus, social networks acquire a clearly defined economic significance. For example, a mining trip is most appealing to those whose absence threatens no other aspect of their livelihood and who know *garimpeiros* willing to keep an eye on them, offer them tips and maybe even arrange employment for them. At the other end of the spectrum, the same venture is probably least attractive to those who have no contacts in the mining world, have no previous experience in the activity, and whose absence from alternative enterprises incurs high opportunity costs. Obviously,

⁸ Sawyer 1990: 14

these factors are weighed up against a whole range of other considerations when evaluating the option presented by the *garimpo*. But the point to recognise is that social networks come to fulfil a central role in this decision-making process because they actually reduce the risks of *garimpagem*.

It is possible to evaluate the ease with which mining may be incorporated within the livelihood practices of different social groups. In broad terms, it probably fits conveniently into the portfolios of city dwellers, colonist farmers and ranchers as these are the groups who usually have the necessary contacts and are sufficiently footloose to enter the *garimpos* whenever an opportunity arises. Interestingly enough, as urban employees are often obliged to quit a job with no guarantee of future employment, *garimpagem* could represent a greater gamble for them than for rural producers who always have their land to return to. At the other end of the spectrum are people with insecure land rights who derive a large proportion of their income over the summer months and who have little contact with *garimpeiros*. Even though none of the groups in Roraima fulfilled all of these criteria it was the Macuxi and *caboclos* who came closest. In this particular situation, gold mining represented an unattractive option for them, but examples both from within Roraima and from further afield prove that there is no intrinsic obstacle preventing either *caboclos* or Indians from being committed *garimpeiros* under different circumstances. This is not to argue that certain groups will always respond in predictable ways to changing events, but rather that common elements can be observed shaping their diverse reactions. Above all,

social networks are commonly seen to define the parameters within which economic decisions are taken.

7.5 Theoretical issues with the analysis of informal sector mining:

From this perspective we see that *garimpeiros* are not only gold miners but also smallholders or even ranchers as well. However, even though individuals may have various forms of employment they are classified according to only one of their professions. This is problematic as it accords a false impression of occupational stability to what is a highly mobile peasantry. Amazonians are so economically mobile that any one person may be labelled according to various terms at different points in his or her life. Further, they may even identify themselves with an occupation other than that in which they are involved at any one particular instant. For example, it was not uncommon for people working in the *garimpos* to deny they were miners.

This is more than just a question of semantics as it influences the way in which research is undertaken. The language defines social groups according to the activities that they practise; *fazendeiro*, farmer, *garimpeiro*, yet there is considerable fusion between different economic sectors and different societies. As social groups are constantly adapting their occupational strategies to changing economic circumstances it is wrong to equate a specific land-use directly with a particular social group. But this is the sort of mechanistic interpretation that the vocabulary being used actually engenders. This is not to argue that the solution lies in formulating an

alternative vocabulary. Even though it may be beneficial to introduce new terms like 'professional *garimpeiro*', ignoring that which is a product of the region only serves to further distance observers from the reality of Amazonia. Rather, the flexibility with which this vocabulary is used in its local context must be recognised, and researchers should appreciate that such classifications are neither definitive nor mutually exclusive. Above all, the compartmentalisation inherent within these terms should not be allowed to structure research objectives in such a way that the fluidity of Amazonian life is overlooked.

A second problem relates to the quantification of the activity. By now it should be clear that informal sector mining plays an important role in shaping Amazonian development. But it is often hard to convince people of this. For although the *garimpo* has a number of wide-reaching impacts some of these are hard to recognise and all of them are difficult to quantify. This is most notably the case with the flows of capital and labour which have been a central focus of this research. Even though these exchanges determine how the costs and benefits of *garimpagem* are distributed, it is virtually impossible to make anything other than rough guesses at their scale and geography. In the *garimpo* itself, employment contracts and incomes are agreed by verbal exchanges, and outside only a fraction of the mineral output is ever registered. Further, *garimpeiros* often work illegally, shying away from official-looking documentation. The governmental agencies charged with collecting the relevant data rarely have the resources or the necessary enthusiasm to enter the mines and do their job. The net result is that no reliable figures

exist either for the number of people engaged in *garimpagem*, or the amount of minerals extracted.

Even if a concerted attempt was made to quantify the Amazonian informal mining economy, it is doubtful whether such a dynamic and complex activity could be measured in a meaningful way. The basic issue of defining a *garimpeiro* is itself problematic. Do only those engaged in mineral extraction qualify, or should anybody in the *garimpo* at any particular moment such as traders, carpenters, mechanics, cooks and prostitutes, be included? And what about that percentage of miners who are taking a break from the *garimpo* for a couple of weeks to spend their earnings in the city? Or for that matter, the investors who provide the capital but never set foot in the *garimpo* - are they *garimpeiros* too? The overriding impression is that even if more accurate statistical data did exist, it would only be of limited value. The real questions here are not simply how much gold is produced, or how many people are employed, but who are *garimpeiros*? where do they come from, why do they go mining, and how is mining incorporated within Amazonian livelihoods? In addressing these issues, it is perhaps qualitative, not statistical approaches that will yield the deeper insights.

All of this makes *garimpagem* a difficult subject to research, but there is perhaps another reason why *garimpeiros* have not received the attention that they probably merit. Once again this is related to the way in which research is usually undertaken. As *garimpagem* is usually practised as an aside to other activities, it affects large numbers of people but few depend on it for their main source of income. As a result it is often falsely assumed that *garimpagem* is a marginal activity in the regional economy. This is symptomatic

of a tendency for researchers to focus on one specific society or activity, when it is often the interrelationships between them that is perhaps more relevant. It is illustrative that the significant role that *garimpagem* plays in its regional context can only be recognised by stepping out of the *garimpo* and looking at the interactions between it and other aspects of Amazonian life.

For these reasons people were slow to appreciate the ways in which *garimpagem* was shaping Amazonian development during the 1980s. But, by the start of the 1990s this picture was beginning to change. The influence of the *garimpo* on urbanisation (Abers 1992), élite formation (Miller 1985), and local development processes (Coy 1989, Schmink and Wood 1992), is now receiving attention. Indeed, a recent essay argues that the Amazonian informal sector is central force driving current changes in the region's political economy (Cleary in press). All of these studies, together with the evidence from Roraima, suggest that informal sector mining remains an important catalyst for land-use change in contemporary Amazonia.

Chapter 8. Informal sector mining in perspective.

So far we have taken the Roraima gold rush and looked at the various ways in which it affected people and their use of the land both in the state and beyond. These empirical findings illustrated the environmental and social impacts of *garimpagem*, enabling us to recognise the extent of its influence. From this analysis it was concluded that informal sector mining plays a central role in shaping contemporary land development processes throughout the Brazilian Amazon. Now its time to stand back a bit and ask- so what? It would after all be fairly myopic to spend so long researching this subject without stopping to consider the significance of our findings. In this final chapter we will look what relevance this has in the Amazonian context before evaluating its global significance.

8.1 The Amazonian context.

It is precisely because the *garimpo* is such a powerful agent of Amazonian change, that the trends observed in this analysis of informal sector mining have a significance for the region as a whole. Thus, by drawing out the themes that recur throughout this work, we are able to glimpse the principal socio-economic developments in contemporary Amazonia. Perhaps one of the most striking observations made in this research concerns the fluidity, if not instability, of Amazonian life. Migrants cover thousands of miles on the strength of poorly founded rumours, cities mushroom in a few months as new opportunities arise, people switch jobs and move

between rural and urban areas at the drop of a hat, and capital jumps from one speculative venture to another. In short, settlement processes in the Brazilian Amazon appear to be far from settled.

This is the product of both social and economic processes. Firstly, migration, both inter- and intra-regional, is intense. Throughout the 1980s inter-urban population movements have become increasingly important relative to rural-urban migration. This has been fuelled perhaps more than anything else by the periodic boosts that informal sector mining has given the urban economy. Even though over half of Amazonians now live in cities their livelihoods are not guaranteed by a stable and diversified urban economy. As rapid urban growth is founded upon the short term exploitation of mineral resources it offers no long term security of employment. People have to move frequently either between jobs or between cities in order to survive. Transience prevails. Simultaneously, the population influx from other regions of Brazil appears to be slowing so that internal movement accounts for an increasing proportion of total migration. But, as the employment prospects for the region's poor are likely to remain insecure there is little evidence that the Amazonian population will become any less mobile in the immediate future. An authoritative forecast of demographic change in the region suggests that intense population mobility will continue at least until 2010 (Sawyer 1990 :19).

Secondly, the movement of capital appears to be equally volatile. Investments are typically short term, and capital is withdrawn from productive activities in one sphere the instant that more

attractive opportunities have arisen elsewhere. Although not easily quantified, it is likely that an increasing proportion of the capital invested in Amazonia is being generated within the region itself. This is because the gold rush increased local wealth whilst economic stagnation at a national level, coupled with fiscal changes, simultaneously reduced the incentives for external producers to channel corporate funds into the region. The net result is that, in common with the dynamics of the labour market, Amazonian capital flows are increasingly defined by intrinsic and not external factors. Again, there are few indications that this situation will change over the short term, particularly as an increasingly impotent federal government can no longer provide either the infrastructure or incentives that are usually required to entice capital into the region. Even massively subsidised projects like the Grande Carajás Programme may not provide satisfactory returns to potential investors, as is demonstrated by the withdrawal of a consortium of Japanese aluminium producers from the ALUNORTE project at Bararena near Belém in 1987 (Hall 1989 :56).

On the other side of the equation new investment opportunities which fall neatly into the hands of the local entrepreneurial class are emerging to supersede the gold rush, which is itself already showing signs of slowing up. Timber production has grown during the early 1990s particularly in Pará and Rondônia, and the market is set to continue expanding as the supply of hardwoods from South East Asia and Western Africa diminishes due to poor forest management (Johnson & Cabarle 1993). As these areas have commanded the

attention of the international trade for so long, the Amazonian timber industry has been left mainly in the hands of domestic companies many of which are owned by regional entrepreneurs. Even so, they are likely to face growing competition from larger concerns seeking to make an entrance in Amazonian timber production.

Given that inflation shows no sign of abating it is likely that investors will continue to hunt out short-term high-risk ventures in Amazonia. Here the expanding cocaine industry looks set to generate similar investment opportunities to those offered by both the speculative land markets of the late 1970s and the gold economy of the 1980s. The Brazilian Amazon is acquiring a new significance in the Latin American drugs economy as government intervention clamps down on Colombian and Bolivian production. Gold mining has undoubtedly contributed to the expansion of the regional cocaine industry throughout the 1980s. Mining operations offer a convenient front for the processing, laundering and most notably transport of cocaine¹. A glance at a map of Amazonia reveals that Brazil's *garimpeiros* inadvertently established a network of airstrips along international frontiers which are of strategic importance to the drugs trade. The *garimpos* of Rondônia, the Cabeça do Cachorro, and Roraima are all located between the main cocaine producing areas (of Bolivia and Colombia) and export routes (notably along the Caribbean coast), suggesting that 'the western Brazilian Amazon ...will become more deeply

¹ Cocaine producers prefer to sell their produce for gold because, unlike dollar bills, it cannot be traced.

involved in the international drugs trade as time goes on' (Cleary in press: 18).

This impermanence of both labour and capital in productive activities has important repercussions for the use of land. Not surprisingly, labourers and investors are reluctant to commit themselves to any particular venture under such circumstances, and so short term management is usually the order of the day. But this tendency to keep one eye on the job in hand while the other continually appraises alternative options ensures that any one sector of the economy always remains particularly sensitive to changes elsewhere. For this very reason land management practices are highly responsive to external socio-economic stimuli. Indeed it is easy to get the impression that land-use decisions are more often a response to changes in other sectors of the economy than they are to the productive economics of the land-use itself. For example, it is fluctuations in price of gold, not rice, that frequently determines the labour investments made by smallholders on their plots. Exactly the same process is at work when ranchers are observed slaughtering productive heifers to raise short term venture capital for mining investments. Clearly, it is only by understanding the rationale behind such decision-making that we begin to recognise the true forces that dictate the use of Amazonian land.

These insights have all been gained by looking at how different social groups, managing different ecosystems, respond to changing socio-economic circumstances. And this is where we can make a contribution to a wider global debate on conservation and development. The point is that none of the

processes that have been scrutinised here are exclusively Amazonian. All over the world different societies are constantly adapting to macro-level changes defined by forces completely beyond their control. This work simply takes one such stimuli- a sudden increase in the price of gold -and illustrates how it comes to have such far-reaching social and environmental consequences. Perhaps one of the most disturbing aspects of the global economy is that the true costs of changing commodity values, in both human and ecological terms, are seldom recognised and certainly never accounted for.

8.2 Looking beyond Brazil

Brazil is only one part of this puzzle. The rising price of gold at the start of the 1980s sparked rushes throughout Latin America, most notably in Colombia, Peru, Venezuela and the Dominican Republic, but also in Chile, Ecuador, Argentina, Guyana, Mexico and Nicaragua (Green 1981). Further afield Papua New Guinea, Zimbabwe, the Philippines and Ghana have all emerged as important gold producers during the decade with much of their output coming from the informal sector. In numerous other countries, particularly those in the southern hemisphere, the rural poor kindled a new interest in gold mining. Clearly, in all of these states, many of which have extensive areas of natural forest, mineral exploration will have influenced patterns of land-use and settlement in much the same way as is witnessed in Amazonia.

Given that many areas of the humid tropics show considerable geological potential, fluctuations in

the international mineral markets will continue to shape the occupation and development of these areas. This is certainly true for Papua New Guinea, Malaysia, parts of west Africa (notably The Ivory Coast, Ghana, and Zaire), and above all Amazonia. Thus, changing mineral prices will continue to play a key role in determining the fate of the world's last remaining rain forests and their indigenous inhabitants. The Amazon's northern watershed, which still boasts vast tracts of natural forest and is home to many of the region's Indian groups, is a case in point. The recent surge of *garimpagem* in this remote area is perhaps only the first step in a more protracted process of occupation that is principally driven by the quest for mineral wealth. One has to remember that the *garimpeiros* themselves were only working the most accessible secondary deposits and these alone are by no means exhausted. As any metals analyst will vouch, the geological potential of northern Amazonia is certainly not being overlooked by the world's mining industry:

'Countries in Central and Southern America have recently attracted more mining producers and exploration work is being done in Venezuela and Argentina by both senior and junior companies. A large precambrian greenstone belt which extends from French Guyana in the east, through Surinam, Guyana, Venezuela, Northern Brazil and into Colombia in the west, offers very good mineral potential and is the focus of most exploration in the region' (RBC Dominion Securities 1993 :49)

In evaluating the development pressures faced by parts of the humid tropics, specialists could do worse than deepen their understanding of international mineral markets and relate that

knowledge to local geology. The price of most base metals can be forecast with some degree of accuracy because they are defined by changing patterns of supply and demand (for use), like any other commodity. Speculation on the metals markets may cause some unpredictable fluctuations in the short term, but medium and long term trends are relatively easy to decipher because they are shaped by structural processes.

Gold is the notable exception because it is priced not just as a commodity but it also has what is known as a 'currency value'. In essence, gold is a bastion of global economics providing a yardstick against which currencies can be valued. The gold standard, which was introduced in the wake of the Napoleonic wars and maintained in various forms right up to 1971 (albeit with a brief interlude during the first world war), fixed the value of paper money and coins in circulation to gold reserves held in banks. Since the collapse of the gold standard in 1971, currencies tend not to be directly linked to the metal and are more often pegged against one another. But people, and particularly governments, are unwilling to shake-off their confidence in gold and simply value it as a commodity. Thus, central banks continue to hold vast gold reserves (35 000 tons in 1992)², there is still a tendency for investors to look to gold as a security in difficult times, and the metal maintains its currency value as a result.

Whilst analysts can predict trends in the commodity value of gold with some degree of

² Ironically these vast reserves means that the economy of the developed world, which actually produces only a limited amount of gold, benefits tremendously from any increases in the price of the metal.

confidence, they have considerable difficulty forecasting its changing currency value. This is because it is often, but not always, sensitive to events which cause economic insecurity on a global scale. For example, even though the gold price had been rising sharply throughout the mid 1970s due to free trading in the wake of the defunct gold exchange standard (which had held the gold price artificially low at US\$ 15 an ounce), its value was further boosted by two political events at the very end of the decade. America's decision to freeze Iran's assets and Russia's invasion of Afghanistan were primarily responsible for pushing gold to its peak value of US\$ 850 on 21 January 1980 (Green 1981 :2). Of equal significance is that a decade later Iraq's invasion of Kuwait and the ensuing gulf war had virtually no impact on the price of the metal. This led some analysts to suggest that gold no longer maintains its currency value, but others who base their opinion on the metals' 6000 year-old economic history are not so sure (Nesbitt 1993 :1). Even though the relatively stable price of gold during the early 1990s suggests that its commodity value dominates at the moment, its currency value has not disappeared and may well rise suddenly (as it has done in the past) in response to unpredictable events which threaten global economic security. The surprising thing is that this inherent volatility does nothing to diminish gold's role as economic bedrock. On the contrary, investors confidence in gold is confirmed every time they rush to it when other ventures look shaky. Thus investors and gold have a strange relationship in which instability appears to breed security.

As a rule the global mineral markets set the mining agenda, but it is not always clear how different producers will react. Generally speaking, mineral companies tend to be more sensitive to price changes than informal sector miners are. During the late 1980s and early 1990s larger producers have been struggling to restrict output as the price of gold has fallen. North American gold mining companies have turned to Latin America in search of low cost mines as well as to dodge stiff environmental legislation in Canada and the U.S.A.³. Expanding operations in the tropics provides them with an opportunity to reduce productive overheads and diversify out of gold into other metals. They should be well placed to benefit from the gentle rise in the price of gold which analysts have predicted for the mid 1990s (see figure 2.2) ⁴.

But *garimpeiros* tend to behave differently. For many of them, gold mining is not their only source of income, but is simply a means of supplementing other forms of employment. In having other options, one might assume that they will be more responsive to price fluctuations as they are well placed to substitute gold mining for another activity such as agriculture when the gold price declines. But, the reverse often seems to be the case as the Roraima rush demonstrated. *Garimpeiros* working in the Yanomami reserve actually increased the production of tin and gold during 1988 and 1989 while the prices of

³ The share of total exploration funds spent in the U.S.A. has declined from 71% in 1989 to 63% in 1992 while Latin America's share has risen from 6-15% over the same period (The Gold Institute 1993:1)

⁴ There is some evidence that this is already underway, as a couple of powerful investors (George Soros and Sir James Goldsmith) were able to turn a bear gold market bullish, in April 1993. Once they had moved into gold many others followed suit and in the space of six weeks the price of the metal rose from US\$ 327 to 380 per ounce. (The Sunday Times 23/05/93)

these metals fell. This is exactly the opposite to what happened in the formal sector. The point is that as incomes from other activities are so low, informal sector mining can still make good economic sense even when the price of minerals is in decline. Thus, while the behaviour of formal sector mineral companies is essentially demand led, informal sector production is driven by other, more immediate concerns. Here forecasting is not so difficult. Poverty and people's struggle against it have a permanence that guarantees informal sector mining a continued role in the resource struggles of the humid tropics.

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APPENDIX

**Questionnaire addressed to the heads of Macuxi Villages at
an Indian meeting in the Maloca of Surumú 8-11 January 1990.**

**Entrevistas Para os Tuxauas Congregados Na
Assembleia de Tuxauas 8-11 Janeiro 1990 Surumú**

i). Informação Da Maloca:

1. Nome da maloca.....Região.....
2. Nome do Tuxaua.....
3. Grupos na maloca: Macuxi/Wapixana/Taurepang/Ingarikó
4. Numero das pessoas na maloca:....No das famílias.....
5. A maloca tem: Quantas roças communal?...individual?...
Quantas cabeças de gado communal?...individual?.....
6. Quais são os produtos mais importantes na maloca?
produtos agrícolas.....
outros produtos.....

ii). Informação Pessoal

7. O senhor/a senhora trabalhou nos garimpos? sim/não....
 - 7.1 Quais garimpos.....
 - 7.2 Em que ano?.....Por quanto tempo? meses:.....
 - 7.3 Que foi sua renda mensal no garimpo mais ou menos?
grammas de ouro p.m.....quilates de diamantes p.m.....
 - 7.3 Que tipo de trabalho era?.....

iii). A relação entre a maloca e os garimpos:

8. Quantas pessoas da maloca trabalhavam nos garimpos nos
ultimos 3 anos ? No dos homens.....No das mulheres.....
9. Que trabalho eles faziam na maloca antes de garimpar?
.....
e depois?.....
10. Eles foram para quais garimpos?.....
.....
11. Geralmente por quanto tempo? meses.....semanas.....
12. São: donos de garimpo/donos de maquinas/diaristas
porcentistas/outros.....
13. Que é a renda mensal deles no garimpo ?.....
grammas de ouro p.m.....quilates p.m.....
14. O senhor/a senhora acha que esta renda garimpeira é
importante para a maloca ? sim/não
porque?.....
15. A maloca falta a mão de obra por causa da migração aos
garimpos? falta muito/ falta um pouco/ não falta
16. Quais são os efeitos desta migração na produção da
comida
na maloca?.....
17. Como as familias se-abastecem quando os homens estão nos
garimpos.....
18. O senhor/ A senhora acha que o envolvimento da sua
maloca nos garimpos vai diminuir/ continuar/ aumentar no
futuro?
porque?.....