Mobility and evolving frontier settlements. The case of Central Roraima State, Brazil

Alexandre M. A. Diniz
Assistant Professor
Department of Geography
UFMG - Brazil
Aldiniz@bhnet.com.br

Abstract

The purpose of this work is to assess the interplay between the evolution of frontiers and the associated geographical mobility/circulation in the Brazilian Amazon at the settlement level. To address this objective, I propose and test the mobility and evolving agriculture frontier settlements framework building on the literature on Amazonian mobility and frontier evolution stage models. The proposed framework breaks up the evolutionary process of individual agriculture settlements in four different phases – pioneer, transitional, consolidated, and urbanized. Data to test the validity of the proposed model is gathered in Central Roraima State, Brazil via survey instrument. Results demonstrate that the path of agriculture frontier settlement does have an impact upon migration selectivity; migrant source regions; migration histories; predominant migration type; migration pull factors; and circulation spatial and temporal pattern. In the end, a schematic view of the entire process is presented, along a description of predominant mobility patterns and behaviors at each level of evolution.

Key words: frontier evolution; human mobility; Amazon region; population geography; Roraima State.

Introduction

Frontier expansion has historically been an integral part of the development strategies of all countries sharing the Amazon basin. It's conquest has been portrayed as the panacea for many social and economic problems, as it serves to redistribute population from densely inhabited areas, provides land and income to the land-less, promotes regional development, and serves countries' geopolitical interests (Mougeot, 1982a; Martine, 1984; Sewastynowicz, 1986; Sternberg, 1987; Findley, 1988; Henriques, 1988; Foresta, 1992; Shrestha et al, 1993). Based on these perspectives, a series of incentive plans for the occupation of the Amazon frontier has been set forth by various governments over recent decades epitomized by incentive packages to boost domestic and foreign capital investment and directed colonization programs.

The exploration of the Brazilian Amazon, however, overwhelms the experiences of other countries sharing the region given the magnitude of centrally planned investments in roads, railroad, industries, mineral resources exploration, agriculture, ranching, and colonization projects. Consequently, the regional economy and population increased many-fold, as thousands of migrants flooded the Amazon in response to State investments and incentives. Nonetheless, the Brazilian government policies have been highly inconsistent, favoring peasants at times and national and multinational corporations at others. This erratic approach has led to widespread conflicts and chronic displacement of settlers, re-migration, and circulation. Moreover, the colonization projects implemented in the region have displayed low migrant retention rates, which in turn has fueled the mobility system. In fact, some scholars argue that the Amazonian frontier no longer constitutes an alternative to the social pressures taking place in rural Brazil, as most of the local resources have already been claimed by the big players (Martins, 1980; Sawyer, 1981; 1984). Nevertheless, the Amazon region continues to be perceived as the peasants' save haven by many and migrants keep arriving. The years to come promise an augmentation of conflicts over the local resources and an intensification of mobility, as the laissez-faire approach adopted by recent administrations have done little to diminish the internal social problems.

The myriad of studies on the Brazilian Amazon display a bias for environmentally related investigations. At this juncture, we know more about the ecological impact of settlements than we know about the evolution of settlements and mobility. The literature on Amazonian mobility, on the other hand, is essentially descriptive and focuses primarily on the characteristics of movers and migration patterns; whereas, the few theoretical works pose sweeping generalizations about the displacement power of development and capitalist relations without much empirical evidence. Similarly, the literature on frontier evolution is impregnated with constructs that postulate that frontier development follows a set of hierarchical stages, moving from pre-capitalist to capitalist oriented forms of production. These scholars suggest that as a given frontier settlement evolves through time, in-migration wanes and earlier settlers are displaced by incoming firms and large scale farmers to more backward parts of the frontier or into nearby cities (Martins, 1975; Foweraker, 1981; Browder and Godfrey, 1990). These models, however, are essentially focused on the economic and urban evolution of frontier settlements, failing to explore the impacts that the changing environment has on mobility.

The primary goal of this study is to fill some of these gaps by assessing the interplay between the evolution of agricultural frontier settlements and the associated geographical mobility/circulation in agriculture settlements of the Brazilian Amazon. Within this broader objective lies a few specific ones, namely to explore the transformations promoted by the evolutionary process upon migration selectivity; migrant source regions; migration histories; predominant migration type; migration pull factors; and circulation spatial and temporal patterns.

While economic development has undoubtedly taken place in the Brazilian Amazon, social development lags behind. Small-scale farmers and land-less peasants are constantly being reshuffled amidst different evolutionary waves. Without intervention, the endless mobility is likely to be perpetuated. This study provides a better understanding of the settlement system and the variegated forms of geographical mobility/circulation embedded in the formation and demise of places. This understanding will contribute to policy debate and discussion regarding the promotion of more stable settlements in the region and enhancement of quality of life among settlers in the Brazilian Amazon.

Frontier evolution

Frontier areas have caught the collective imaginary of many societies with icons of pristine and abundant lands. Nevertheless, the term “frontier” has different meanings depending on who is behind the glasses. For some, it represents an escape valve for societies under social and economic pressure; a get away place where well-to-do and stressed urban dwellers can turn to; and a means to promote individualism, which in turn would lead to political freedom and democracy (Turner, 1920). For the countries sharing the Amazon basin, frontier colonization has been an integral part of their economic development strategies, as it has been portrayed as the solution for many social and economic problems. But before getting any further, it is necessary to discuss the concept of "frontier".

Hennessy, (1978:3) suggests that the term “frontier” is associated with demographic expansion movements over non-occupied or insufficiently occupied land. Mayhew (1997:184) furthers the concept by postulating that “the frontier represents the part of the country which lies on the limit of the settled area”. Therefore, a frontier settlement marks the furthest advance of civilization within a state. Neiva (1949), however, presents a more sophisticated definition, by making a distinction between demographic and economic frontiers. According to this view, the process of occupation of pristine areas is marked by the arrival of the “demographic front” before the “economic one” makes itself present. The “demographic front” is composed of small-scale producers, such as farmers and artisans, who tend to be the pioneer agents at frontier areas. Capitalist enterprises and large-scale producers, on the other hand, represent the “economic front”.

Extending the work of Neiva, Martins (1996) envisions the frontier as an area marked by three well-defined domains: demographic frontier; expansion front; and economic frontier. The demographic frontier represents the limit of the settled area, beyond which lie indigenous populations and pristine areas. The economic frontier, on the other hand, is marked by the extensive and territorial reproduction of capital, epitomized by the conversion of land in merchandise, and Indian and peasants in waged laborers. Between the demographic frontier and the economic frontier lies the expansion front, a transition zone marked by populations yet to be incorporated by the economic frontier. The expansion front represents the movement of civilized population and economic activities, somehow organized by the market. This front encompasses not only agricultural entrepreneurs, businessmen, cities, political and juridical institutions, but also the poor non-Indigenous populations, like *garimpeiros*[1], cattlemen, rubber tapers, and peasants who work on the fringe of the market. Nevertheless, the demographic frontier is also related to the expansion of capital, which cannot be regarded as capitalist given the absence of organized labor and land markets.

This expansion front is characterized by the expansion of commerce and exchange networks, in which money is regularly absent. These exchanges are arbitrated by those who maintain control over resources and the manpower behind the exploitation of such resources, namely Indians and peasants. Market operates based on monopolistic village entrepreneurs, who control not only commerce, but also working relations through peonage, and enslavement by debt. Within the Brazilian context, it is difficult to identify the exact location of the boundary between civilization and pristine lands; nonetheless, the Amazon region is widely recognized as the frontier, incorporating within its limits areas dominated by expansion fronts, and demographic and economic frontiers.

The exploration of frontier areas worldwide have been an important aspect of the evolution of many societies, inspiring the construction of different theoretical proposals aimed at the comprehension of the process of frontier occupation and evolution. Previous theoretical construes can be broadly classified with respect to the scale in which they operate. Regional development frameworks (Neiva,1949; Bylund 1960; Hudson 1968; De Vance,1970; Muller, 1977; Meyer 1980; Lisansky, 1990) are focused on the spatial diffusion and urban hierarchical functions of a set of places across a given area. Such perspectives tend to envision the evolution of entire frontier zones passing through a series of stages, moving from a few isolated settlements, to areas marked by well-defined hierarchy of places. Such perspectives provide interesting ideas on the rise of cities and urban systems, but given the scale in which they were conceptualized, these models are not directly applicable to the present study. The focus here is on the interplay between the evolution of agricultural frontier settlements and mobility.

[1] Informal miners.

Place specific frameworks, on the other hand, are focused on the evolution of particular frontier settlements over time, being conceptualized primarily based on the reality of the Amazon region. Theorists working on this front postulate that frontier settlements evolve through a set of hierarchical stages, moving from a pre-capitalistic type economy, characterized by the lack of labor and land markets, to more capitalist oriented forms of production. These models also tend to emphasize the clashes between different interest groups over frontier resources, which leads to waning in-migration and the displacement of earlier settlers by incoming entrepreneurs. Therefore, mobility is an explicit component; however, it is conceptualized as a mere response to the structural forces of frontier evolution. Moreover, these models consistently overlook the variegated forms of mobility and processes occurring at different stages of the evolutionary spectrum.

Foweraker´s (1981) construe emphasizes the process in which frontier areas become progressively connected to the national economy. The transformation of pristine frontier areas into "productive societies" is understood as going through a three-phase transition: non-capitalist, pre-capitalist and capitalist society stages. The idea of transition implies changes in production relations, and in the markets for goods, land, and labor (Foweraker, 1981: 27). At the non-capitalist stage, the frontier economy based on extraction being remarkably isolated. The sphere of exchange is limited to outside markets for one or two commodities locally produced. This stage is marked by the lack of markets for land or labor; and social relations of production are mainly servile. There is an emerging commodity sector, which will eventually favor the occupation of the region by peasants.

The expansion of the commodity sector generates greater migratory flows into the region and more intensive extractive activity, characterizing the second stage of frontier expansion. Land begins to be bought and sold, but prices represent only what is on the land, rather than the land itself. These changes bring about regular production of commodities and an emerging market for land; nevertheless labor markets are still absent. Social relations of production are established by the growing commodity sector, or are mixed forms of servile and capitalist relations. On the other hand, the final stage of the frontier expansion is identified by an intense migratory flow into the region and established access to the national economy. The economy is no longer based on extraction, but rather on agriculture, becoming increasingly capitalized. Land prices rise and land ownership becomes concentrated. Capitalist relations of production are dominant and a labor market is finally achieved. As the frontier moves into its final stage of evolution, economic activity generally becomes more differentiated, whereas, social division of labor more complex (Foweraker, 1981: 27-39).

Henkel (1982) and Findley (1988) propose similar frontier settlement models focused on the behavior of individuals. They postulate that the evolution of frontier settlements undergoes three incremental stages: pioneering, commercialization, and abandonment/consolidation**.** During the pioneering stage, settlers are concerned primarily with occupying the land and bringing it into production. Colonists rely on their large families and on each other to clear the land. In order to fulfill their cash requirements, colonists engage in wage employment at nearby farms. The commercialization stage is marked by the construction and improvement of transportation linkages, which provide access to markets and stimulate production. The abandonment/consolidation stage is characterized by a bifurcation of land tenure. In the process, earlier arrivals sell their land, motivated by debts, lack of capital or environmentally related reasons, while the better-off consolidators buy the improved land adding to their existing holdings. As large land holdings, usually devoted to livestock or commercial crops, require little year round labor inputs, the population retention potential of the colonization zones is compromised. As colonists who remained in the area still depend on waged labor for their survival, they tend to leave in search of another plot of land. Thus, land concentration leads to extensive population turnover and re-migration, not only among those who sold their plots, but also among those who are willing stay.

Based upon the Brazilian Amazonian experience Browder and Godfrey (1990) developed the "Amazonian landscape change and urban transition" model. This model postulates that Amazonian settlement typically occurs in a progressive sequence, promoted by a gradual incorporation of a dependent peripheral region into the larger national economy. The evolution of the Amazonian frontier is divided in five stages: native subsistence economy, resource-extractive frontier, pioneer agricultural frontier, relict frontier and urban primacy and rural depopulation phases. Despite its more unifying nature, Browder and Godfrey's proposal was engendered primarily based on their experience in Southern Pará, which has its share of peculiarities. Its

relative proximity with the Northeast region, the abundant mineral and vegetal resources, the various large scale federal projects, and the presence of various agents competing for power and resources made Southern Pará the most complex and dynamic sub-region of the Amazon. Thus, at more remote areas of the Amazon, it is possible that settlements do not undergo all five stages as postulated by Browder and Godfrey.

The models of frontier evolution or expansion described above, emphasize different aspects of the transformations taking place at the settlement level. Neiva (1959) and Martins(1996) stress the conflicts taking place along the process, namely the clashes between demographic and economic fronts. Henkel (1982) and Findley (1988) emphasize the strategies adopted by colonists at the various stages of the evolutionary process. Foweraker (1981) discusses primarily the structural aspects of the process, underlining foremost the social and economic relations taking place at the frontier. Browder and Godfrey (1990), on the other hand tackle the issue from a more integrative way, combining many elements that appear isolated in previous models, while highlighting the process of genesis and growth of urban centers.

It is important to stress that at least a brief reference to mobility is present in all models of frontier evolution discussed here. Yet, despite recognizing the presence and importance of human mobility in the region, these models treat the phenomenon as a mere byproduct of the evolutionary process, neglecting to account for different mobility patterns and processes taking place at the various stages of the process. A study that combines such models, while stressing the selectivity, motivations, and strategies adopted by settlers at varying levels of frontier evolution is yet to be advanced. This study attempts to fill this lacuna by working from a composite of the main ideas rooted in the reviewed models, and advancing a series of hypotheses relative to mobility in the ever-changing geography of frontier colonization settlements.

Amazonian mobility

The literature on frontier mobility in Brazil is based on descriptive studies focused on inter-regional and intra-regional migration patterns. Emphasis is placed on the urbanization of the region (Almeida and David, 1981; Martine, 1981; Sawyer, 1981,1982, 1984, 1986, and 1987; Wood and Schmink, 1983; Wood and Wilson, 1984; Santos, 1984; Martine, 1984; Oliveira, 1986; Da Silva, 1986; Bentes, 1986; Lavinas, 1987; Ferreira, 1987; Jardim, 1987; Vasconcelos, 1988; Martine, 1989; Becker, 1985; 1990; Godfrey, 1990; Volbeda, 1996). These studies tend to be grounded on historical/structural perspectives, and like the place specific models of frontier development, utilize as explanations for the massive intra-regional mobility the displacement power of the advance of the capitalist mode of production, development and the inconsistent government policy towards the region. Nonetheless, under these perspectives, mobility is generally treated in an unsystematic fashion, and explanations are given in a non-empirical mode.

Another set of studies focusing on migration in the Brazilian Amazon explores the characteristics of migrants. These studies tend to be based on survey instruments conducted in various areas of the Amazon (Henriques, 1985; 1986 and 1988; Sawyer and Carvalho, 1986; Oliveira, 1986; Da Silva, 1986; Bentes, 1986; Lisansky, 1990; Crócia 1994 and 1995; MacMillan, 1995; Diniz, 1997). Overall, migrants to rural *Amazônia* tend to be young (15 to 35) and predominantly males given the hardship of the local environment. Migrants also display fairly low educational attainment levels, for the most part less than four years of formal education. Rural migrants engage chiefly in peasant agriculture and extractive activities, which tend to be conducted outside the formal wage market. Circulation and occupational mobility are common survival strategies, as they engage in seasonal employment in farms, ranches, and even in urban *Amazônia* in order to meet their cash demands. Rural migrants display a tendency to come from rural areas of the Amazon region or from other Brazilian regions and display long migration histories (large number of moves). On the other hand, a sizable portion of migrants arriving in urban *Amazônia* display different characteristics. On average these better off individuals are better educated and display a more gender-balanced nature. The majority of migrants arriving in urban *Amazônia* is drawn from rural areas of the Amazon region, but also come from other urban places inside and outside the region.

At this juncture, we know that mobility is ubiquitously intense in the Amazon. The literature on Amazonian migration indicates that in-migrants are for the most part negatively selected, displaying intense circulation behavior within the region. The transformations promoted by the frontier evolutionary process, commanded

foremost by the advance of the economic front and the capitalist mode of production are understood as the chief processes behind the regional mobility. Nonetheless, such accounts are impregnated by biased eyes and lack empirical evidence. Moreover, empirical studies tend to be descriptive in nature, lacking a more analytical inclination. Therefore, there is room for a study that empirically explores how the differing levels of frontier evolution engender different forms of migration and circulation at the settlement level.

Anticipated findings

Building on the literature on frontier evolution, and Amazonian mobility, an integrative framework is advanced to study the various mobility patterns and processes taking place along the evolution of agriculture frontier settlements. The proposed framework is based on the assumption that as a given frontier settlement grows and changes through time, profound changes occur in terms of migration selectivity; migrant source regions; migration histories; predominant migration type; migration pull factors; and circulation spatial and temporal patterns.

The interplay between the structural forces underlying the evolution of frontiers and geographical mobility are examined at four different types of settlement: pioneer, transitional, consolidated and urbanized. The characterization of these stages incorporate a series of empirical and theoretical works discussed earlier in this paper, most specially the ones pertaining to the place specific models of frontier evolution. Thus, the definition of each level of evolution represents a condensation of all pertinent ideas set forth by the revised literature on frontier evolution. The portrayal of each phase is followed by a series of hypotheses related to the expected predominant mobility patterns and processes occurring at each evolutionary step.

Pioneer frontiers are marked by lack of markets for land and labor, rapid population growth via migration, wide availability of land, poor transportation networks, predominantly rural populations, low levels of deforestation, and economies based on extraction and peasant agriculture. Such places match Martin's (1975) demographic frontier, and Foweraker's (1981) and Browder and Godfrey's (1990) early development stages. Here, settlers are concerned primarily with occupying the land and bringing it into production (Henkel, 1982; Findley, 1988). Due to lack of capital and labor markets, settlers rely on each other during this labor-intensive phase. Many settlers also seek off-farm employment at more developed portions of the frontier to meet their cash needs.

Expected mobility

It is expected that due to the remoteness and the uncertainty associated with these frontiers, migration chains will dominate the system, constituting the primary migration type, linking ***pioneer frontiers*** with very specific rural origins in the Northeast and the Amazon region. Given the incipient nature of these frontiers, the lack of market for land and labor, and the physical stamina involved in settling and surviving in the harsh equatorial forest, colonists are expected to be poorly educated, young and predominantly male (Henriques, 1986; Findley, 1988). As transportation networks are poor at this stage, circulation is expected to be spatially and temporally restrained, as individuals should travel for brief periods of time within short distances, primarily due to shifting agriculture and seasonal employment in farms and ranches in neighboring more developed portions of the region.

Transitional frontiers are characterized by economies based on increasing commercial agriculture, and some extractive activities. Land begins to be bought and sold, and an incipient labor market arise (Foweraker, 1981). Transportation and communication links are improved, easing the movement of crops to local and regional markets and migration into the region. With the escalation of migration, land becomes scarce, and the number of land-less peasants working as sharecroppers and land invaders increase (Martins, 1975; Browder and Godfrey, 1990). The new roads also make land more valuable, attracting capitalized entrepreneurs, marking the arrival or intensification of Martin's (1975) "economic" frontier. Land values skyrocket and become increasingly concentrated, as the rate of deforestation progresses. Earlier settlers begin out-migrating in response to debt, legal battles over land ownership, lack of capital, inability to market their surpluses given the presence of mass producers, and changes in the productive systems introduced by livestock and

commercial crop (Henkel, 1982; Findley, 1988). This phase is analogous to Hudson's (1969) competition phase, described as the struggle of individuals to maintain their domains and/or increase their land holdings. Parallel to land consolidation, embryonic urban areas within the settlement and nearby areas start to grow.

Expected mobility
Individuals moving into such places should rely on migration chains, but not to the same degree *as pioneer settlers*, given the improvements in transportation and communication networks. These improvements should also contribute to the arrival of a significant numbers of re-migrants or displaced peasants from various places within the Amazon region, broadening the geographic scope of settlers' origin places (Mougeot, 1982; 1983; 1986; Oliveira, 1986). Thus, repeat migration is expected to be the predominant migration type. Settlers during this stage should still be primarily male, uneducated, and young due to the harshness of the area; however, given the incipient land market, migrants might bring some financial resources. Given the presence of improved transportation linkages, and the increasing need for cash introduced by the encroaching capitalist mode of production, settlers are expected to circulate among a vast array of places, engaging in temporary employment in various places in order to boost incomes and warrant subsistence (Becker, 1990).

Consolidated frontiers are marked by economies based on agriculture, costly land prices, land concentration, presence of large-scale agricultural and ranching enterprises, predominantly capitalist relations of production, and waged labor (Foweraker, 1981). Artificial pastures replace a large proportion of the properties, and the natural vegetation is confined to the back of the rural properties. Land now serves large speculative holdings and capital-intensive agribusiness. Consolidated frontiers are also characterized by sparse populations, as a large portion of earlier settlers have already left for other areas. The remaining ones were converted into wage laborers at farms and ranches, or struggle to maintain their plots. Such places also rely on year-round transportation facilities and regular transport lines (Browder and Godfrey; 1990).

Expected mobility
Unlike landowners at other stages of evolution, consolidated ones should live outside the agriculture settlement. Instead, farm and ranch employees should comprise the dwellers of such areas. These settlers should be composed of former peasants, and late arriving migrants. However, owing to the nature of life and work at consolidated frontier areas, these settlers should still display low levels of education, training, and young age. Given the age of settlement, higher infrastructure levels, and better connections with other areas, settlers should have been drawn from a variety of places, ranging from nearby settlements to various parts of the country. As such individuals hold formal or informal jobs at large agricultural establishments, circulation is expected to be negligible, as they have year-around work and stable incomes.

Urbanized frontiers are understood as the outcome of the embryonic urban nuclei created at the heart of colonization and settlement projects[2]. The growth of urbanized frontiers is a natural outcome of the process of frontier evolution at surrounding areas, thus becoming inseparable entities from the agricultural projects from which they originated. As these areas progress in the evolutionary spectrum, rural-to-urban migration flows intensify, augmenting the urban nuclei[3]. Such urbanized frontiers may in fact grow enough to become município4 seats, materializing the claims of Becker (1990) and Godfrey (1992), who envision such places as concentration and redistribution centers for displaced peasants[5]. On the other hand, these areas also attract a pool of better-off migrants pulled by the installation of various governmental offices, military bases, and service and commerce businesses (Sawyer and Carvalho, 1986; Da Silva, 1986; Diniz, 1997).

2 Article number 64 of the Land Statute states that parcels of land in colonization areas may be of two types: urban and rural. Rural parcels are destined to agricultural work, where peasant families may also dwell. Urban plots are located at the center of the community, where administrative, cooperative, commercial, artesian, public service and industrial activities congregate. Here peasant-families may also reside if they please. In this dichotomy lies the foundation of many urban nuclei in the Amazon. Such embryonic urban centers become the major reference point for settlers within colonization and settlement projects.
3 Truth is that in most cases, such urban places receive the same names of the originating colonization projects. Most municípios seats in Roraima State, for instance, appeared in this fashion (Cantá, Mucajaí, São Luiz da Baliza and São João Anauá).
4 Brazilian sub-state political units.
5 For a detailed description of the evolutionary process of frontier towns see Volbeda (1996).

Expected mobility

Urbanized frontiers have good communication links with their hinterlands and with the rest of the country and are expected to draw migrants from a much broader pool of rural and urban origins (Bentes, 1986). It is also expected that such places should attract a variety of migrants, ranging from displaced peasants to better-off urban migrants, who reach the settlement in search of formal tertiary jobs. Thus, the selectivity process is more complex, as in-migrants can display low levels of human capital, and long migration histories on one hand; and higher educational levels, training and short migration histories on another.

Circulation is expected to be intense at this evolutionary level, being facilitated by well-developed transportation networks, tight urban job markets. Nonetheless, circulation patterns are expected to be bifurcated, as negatively selected individuals, due their low skill levels and the demands imposed by the urban life, are expected to circulate on a regular basis in search of urban and rural odd-jobs. On the other hand, job-seeking circulation is expected to be negligible among better-off migrants, as they hold formal and decently paying jobs. Instead, circulation among these individuals should be conducted primarily leisure motivated.

Methods

The advanced set of hypotheses was designed to explore the reality of frontier communities in the Brazilian Amazon, which have evolved from spontaneous or official agricultural settlements, in which small-scale producers predominated at pioneering stages. Nonetheless, it would be an insurmountable task to test the validity of the set of hypotheses in the entire Brazilian Amazon. Instead, evidence to test these anticipated results was gathered at the colonization areas of Central Roraima State.

Roraima constitutes a prime study area for exploring the interplay between frontier evolution and mobility (Figure 1). The State is one of the nine units of the Brazilian Amazon, located in the northernmost portion of the country. The state encompasses 225,116,1 Km², having most of its land lying in the Northern Hemisphere. Despite its remoteness, the state was the fastest growing area of Brazil during the 1980's and early 1990's, constituting the latest booming area in the Brazilian Amazon. Despite this tremendous population growth, little is known of Roraima and most studies dealing with the Brazilian Amazon scarcely contain any reference to the state (IBGE, 1992; MacMillan, 1995). Moreover, Roraima mirrors many current and past features and problems of other Amazonian areas as it has experienced fast development, massive road building, colonization programs, competition for land, destruction of natural vegetation, conflicts between indigenous groups and settlers, and a rampant urbanization process (Furley and Mougeot, 1994).

As secondary data are unavailable at the settlement level, information to test the set of proposed hypotheses had to be gathered via survey instruments. The selection of respondents proved to be a Herculean task, as the colonization projects of Central Roraima had to be first classified in terms of their stage of evolution, before an appropriate sampling design could be developed. With the composite four-stage frontier evolutionary path in mind, information necessary for the classification of colonies was gauged via conversations with local dwellers, personnel of land-granting agencies[6], and thorough field observation. The discriminating factors used in the classification of agricultural settlements were age of the colony/project, land concentration status, evolution of land and labor markets, population density, deforestation rates, and implanted infrastructure. It is important to stress that this qualitative approach was utilized given the lack of reliable data on the local demographics, as well as on land and labor markets. Once the classification phase was complete, colonies representative of each phase of the evolutionary path were sampled via multi-stage cluster sampling (Marconi and Lakatos, 1996; and Hy, Feig and Regoli, 1983). In the process, three colonies (clusters) were randomly selected among each evolutionary phase group.

[6] INCRA and ITERAIMA.

Figure 1

Once clusters were selected, survey respondents (household heads) were sampled, based on a systematic approach of household units within each pre-selected settlement (Blalock, 1979). Colonization areas can be quite large, blazed with kilometers of secondary roads, along which, lots are found. Thus, fieldwork attempted to minimize, as much as possible, physical dislocation by working from carefully designed interview routes. Along these routes, household heads were interviewed in accordance with the pre-established sampling interval (every fifth plot along the way, for instance). Table 1 presents a list of all selected survey sites, along with a description of their location and stage of evolution. Fieldwork took place during the dry season, between November/97 and March/98, when roads are more reliable and most peasants are busy preparing their plots for plantation. The survey was based on a semi-structured instrument, which sought to explore various aspects of peasants' social-economic conditions, as well as their past and present mobility behaviors.

Table 1
Selected agricultural settlements

Project name	**Município**	**Stage of evolution**	**# of interviews**
Alto Alegre	Alto Alegre	Urbanized	30
Vila Iracema	Vila Iracema	Urbanized	30
Cantá	Cantá	Urbanized	30
Alto Alegre	Alto Alegre	Consolidated	30
Confiança I	Cantá	Consolidated	30
Vila Iracema	Iracema	Consolidated	30
São Francisco	Bonfim	Transitional	30
Confiança II	Cantá	Transitional	30
Roxinho	Iracema	Transitional	30
Confiança III	Cantá	Pioneer	30
Maranhão	Iracema	Pioneer	30
Sumaúma	Mucajaí	Pioneer	30
		Total	360

*Estimates of INCRA and ITERAIMA officials

Settlers' socioeconomic profile

Corroborating the results of earlier studies (Henriques, 1985; 1986 and 1988; Sawyer ad Carvalho, 1986; Lisansky, 1990; Crócia 1994; MacMillan, 1995 and Diniz, 1997), survey results demonstrate that settlers of Central Roraima are for the most part negatively selected. Nevertheless, the process of frontier evolution is selective of certain socioeconomic traits, revealing a significant degree of heterogeneity among surveyed subjects. It was detected that the vast majority of Central Roraima households are led by males (91.1%) (Table 2); nevertheless, female-headed households tend to be more prevalent at urbanized frontier areas. This phenomenon can be partially explained by a survival strategy adopted by a sizable number of Central Roraima settlers, in which women and younger children settle at urbanized frontiers, where amenities, services, and odd jobs are generally available; while men and older children take care of rural plots. As part of the scheme, women living at urbanized frontiers supplement family incomes by performing service-type jobs such as sowing, washing, ironing, and cleaning for better-off families. Nonetheless, during the key phases of the agriculture cycle, women and younger children leave the urbanized realm to help men and older children performing certain labor-intensive tasks such as harvesting and planting at rural areas.

Table 2
Household head gender by stage of evolution

	Urbanized	Consolidated	Transitional	Pioneer	Total
Male	71 (78.9)	87 (96.7)	83 (92.2)	87 (96.7)	328 (91.1)
Female	19 (21.1)	3 (3.3)	7 (7.8)	3 (3.3)	32 (8.9)
Total	90 (100)	90 (100)	90 (100)	90 (100)	360(100)

Chi2 = 23.598 (0.0001) Tau B = 0.099 Eta = 0.256

Survey data also reveal that the majority of frontier migrants are formally or informally married (65.8%); while, single individuals represent 26,7% of the researched universe (Table 3). When marital status at the time of the survey is considered, there is no statistical difference among the stages of evolution, as the proportion of married, single, divorced and widowed individuals are evenly distributed among the stages. Still, Table 3 shows a trend toward the concentration of married individuals at the pioneer stage. Such trend can be explained by the fact that it is virtually impossible to overcome the harshness of such places, and the strenuous work involved in traditional agriculture without the help of an established family, preferably with numerous children.

Table 3
Marital status during survey by stage of frontier evolution

Marital Status	Urbanized	Consolidated	Transitional	Pioneer	Total
Single	24(26.7)	24(26.7)	27(30)	21(23.3)	96(26.7)
Married*	59(65.5)	60(66.7)	51(56.7)	67(74.4)	237(65.8)
Other	7(7.8)	6(6.7)	12(13.3)	2(2.2)	27(7.5)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

Chi^2 = 10.442 (0.107) Tau B = .019 Eta = 0.030

Besides congregating a larger number of females, urbanized frontiers also display the largest households of Central Roraima (Table 4). Notice how the average size of households at urbanized frontiers (4.96), is significantly higher than the ones found in the remaining stages of frontier evolution. Conversely, pioneer and consolidated areas are marked by the smaller households. Infrastructure levels, amenities, and the nature of economic opportunities present at the more evolved frontier settings foster a different type of human occupation, favoring the concentration of women and numerous children. Anova test confirms the difference; while, Scheffe´s test (not shown) demonstrates that the statistical discrepancy lies exactly between the urbanized frontiers and all the others stages (Table 4).

Table 4
Household size by stage of frontier evolution

Stage of frontier evolution	Mean	St. Dev.	CV	N
Urbanized	4.96	2.34	0.47	90
Consolidated	3.60	2.61	0.72	90
Transitional	3.84	2.69	0.70	90
Pioneer	3.79	2.39	0.63	90
Total	4.05	2.56	0.63	90

F=5.391 (0.001)

Frontier migrants arrived in the agricultural settlements of Central Roraima with an average age of 33.81 (Table 5). Survey results, however, frustrate the expectations of the proposed model, as the frontier evolution process is not selective of migrants' age as indicated by the statistical results presented in Table 5. Notice that there is a slight, but not statistically significant, gradation among the stages of frontier evolution, with pioneer settlers being the oldest group (average 35.52), followed by transitional (35.17), consolidated (33.33) and urbanized (31.20) ones. Thus, despite the physical stamina demanded by the lifestyle at the least evolved areas of the frontier - which should theoretically lower the mean age - one may be witnessing in Central Roraima the materialization of a much broader migration trend. Namely, the fact that the migratory venture tends to be dominated by young-adults.

Table 5
Age of household head during arrival at current destination
by stage of frontier evolution

Stage of evolution	Mean	St. Dev.	CV	N
Urbanized	31.20	15.01	0.48	90
Consolidated	33.33	13.39	0.40	90
Transitional	35.17	12.38	0.35	90
Pioneer	35.52	11.25	0.31	90
Total	33.81	13.14	0.38	90

F= 2.067 (0.104)

On the other hand, survey results corroborate the expectations embedded in the proposed model, attesting the existence of an explicit relationship between the evolution of frontier settlements and settlers' education. Over 75% of all subjects have less than 5 years of formal education; while, 36.1% are illiterate (Table 6). However, better-educated individuals congregate at the more advanced stages; while, the least advanced stages are dominated by uneducated settlers. Notice that at the urbanized and consolidated frontiers, an expressive portion of in-migrants has more than 5 years of education (50%); whereas, at pioneer and transitional areas, well-over 70% of migrants display less than 5 years of formal education. However, these data also demonstrate the duality of urbanized frontiers, which attract and hold a sizable number of poorly educated individuals and a host of better-off settlers, as anticipated.

Table 6
Years of schooling of the household head by stage of evolution

Schooling	Urbanized	Consolidated	Transitional	Pioneer	Total
Illiterate	16 (17.8)	44(48.9)	27(30)	43(47.8)	130(36.1)
1 – 4	29 (32.2)	27(30)	45(50)	40(44.4)	141(39.2)
5 – 8	21(23.3)	17(18.9)	11(12.2)	6(6.7)	55(15.3)
≥ 9	24(26.7)	2(2.2)	7(7.8)	1(1.1)	34(9.4)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

Chi^2 = 72.772 (0.0001) Tau B = 0.80 Eta = 0.397

Survey results also show that most migrants living in rural Roraima own the plots of land they currently occupy (61.5%) (Table 7). Nevertheless, the proportion of individuals dwelling in their own plots diminishes with increasing levels of evolution. Note that 88.9% of migrants at pioneer frontiers own the land where they live, contrasting with 54.4% of migrants in transitional frontiers and 41.1% in consolidated frontiers.

Therefore, these numbers confirm the expectations embedded in the models of frontier evolution (Henkel, 1982; Findley, 1988; Foweraker, 1981; and Browder and Godfrey, 1990) demonstrating an increasing presence of land markets throughout the evolutionary process. One could dispute the claim that the absence of landowners dwelling at the more evolved frontier areas is an indicator of the presence of land markets. After all, original landowners could prosper enough to hire workers on a permanent basis, while dwelling at other areas. Nevertheless, the reality of Central Roraima severely hampers the economic prosperity of peasants due to a group of ecological, infrastructure and socioeconomic reasons. Within such context, absent landowners in active rural properties, without fail, means that the property has exchanged owners. In fact, data presented by Table 7 indicate that the path of evolution turns settlements once dominated by peasants and small-scale farmers into areas marked by absent owners and large properties, which are occupied by waged workers.

Table 7
Land ownership status by stage of frontier evolution

	Consolidated	Transitional	Pioneer	Total
Land Owner	37(41.1)	49(54.4)	80(88.9)	166(61.5)
Worker	53(58.9)	41(45.6)	10(11.1)	104(38.5)
Total	90(100)	90(100)	90(100)	270(100)

Chi^2 = 46.1990 (0.00001) Tau B = 0.14220 Eta = 0.41365

Another evidence of the increasing presence of land markets has to do with the land acquisition process[7]. Consolidated frontier settlers are more likely to have purchased the land they currently occupy (67.6%), than migrants living at any other evolutionary phase, testifying the presence of a more developed land market in such areas (Table 8). Transitional settlements display an intermediary position, with an equivalent proportion of peasants that have purchased and invaded/claimed their plots. Similarly, a larger portion of peasants at pioneer frontiers have acquired the plots they currently occupy through invasions/claims (41.3%); while, the number of those who have formally purchased the plots (49.4%) is also expressive. These numbers challenge the expectations embedded in the models of frontier evolution, indicating the presence of an incipient land market at pioneer frontiers. In fact, it was observed at pioneer frontiers the buying and selling of land claims much before the implementation of infrastructure by the land-granting institutions. However, given the uncertainties associated with the legal aspect of such properties and the lack of access roads, land prices are generally low[8].

Table 8
Land acquisition process by stage of frontier evolution

	Consolidated	Transitional	Pioneer	Total
Purchased	25(67.6)	25(51)	32(40)	82(49.4)
Donated by the land granting institutions	9(24.3)	5(10.2)	15(18.8)	29(17.5)
Invasion/Claim	3(8.1)	19(38.8)	33(41.3)	55(33.1)
Total	37(100)	49(100)	80(100)	166(100)

Chi^2 = 15.535 (0.004) Tau B = 0.055 Eta = 0.249

[7] The questions regarding the status of land and production systems were made only to landowners, which total 166. Thus, in this portion of the analysis urban dwellers and land-less rural workers are not contemplated.
[8] A 50 ha land claim could be purchased in an invaded area during the fieldwork for US$ 150.00.

Migration[9]

Overall, the bulk of surveyed settlers originated in the North (Amazon) region (84.7%), most notably from within the state of Roraima, which alone accounted for 72,2% of all interviewed in-migrants (Tables 9 and 10). This finding is symptomatic of difficulties associated with the establishment of stable livelihoods in Roraima, besides denouncing the rampant intra-state mobility. In the process, migrants are drawn from various states of the union, and after settling at any given portion of Roraima, are forced to re-migrate. On the other hand, Northeast Brazil is the second most important migrant source region, being responsible for almost 12% of all settlers. Within the Northeast, Maranhão State plays a prominent role given its historical links with Roraima State. Most *Maranhenses*[10] originated in the northwestern portions of the state, an area where frontier-like movements were prevalent during the 1950's and 1960's. During this period, Western Maranhão attracted thousands of land-less peasants of Northeast Brazil, who reached the region in response to the vast and pristine still-available lands covered with transitional forests. Thus, in a process analogous to the one occurring in present day Roraima and other parts of the Amazon, land became increasingly concentrated in western Maranhão. Incoming farmers and ranchers claimed and fenced large tracts of land, in spite the fact that thousands of peasants had been cultivating and living in those areas for decades. Consequently, numerous peasants were turned into sharecroppers, being forced to devote ½ of whatever they produced to the new landowners. Others engaged in the babaçu nut collection and processing; while, some ventured in the garimpos[11] of the nearby Pará State, or sought land in Roraima and other areas of the Amazon.

Despite the predominance of Roraima and Maranhão state in-migrants, the evolutionary path of frontier settlements dramatically influences the way migration linkages are forged between settlements and various source areas. As hypothesized, pioneer frontiers do draw migrants from a limited number of locations in the Amazon region (98.9%), especially from within Roraima State. Nonetheless, data presented in Table 9 demonstrate that transitional frontiers also draw migrants primarily from the North (86.6) and Northeast (12.2) regions, with the states of Roraima and Maranhão representing the chief source states. Conversely, consolidated and urbanized frontiers attract migrants from a much broader range of origin areas, also confirming the expectations of the proposed model. Notice how the relative participation of other Brazilian regions is much larger among the more advanced stages of frontier, where better communications networks and complex job markets prevail (Figure 2).

Another evidence of the massive intra-regional migration is the discrepancy between migrants' region of birth and last region of residence (Table 10). While a sizable portion of migrants were born in Northeast Brazil (67.2); only 11.9% of surveyed settlers reached Central Roraima coming directly from their birthplaces. Conversely, 24.7% of frontier colonists were born in the Amazon region; while, expressive 84.7% moved into Roraima from within the Amazon. Embedded in these numbers is the regional repeat-migration process, in which individuals born in Northeast Brazil, settle somewhere in the Amazon region, before arriving at surveyed sites. This phenomenon, again, is emblematic of the great difficulties endured by negatively selected settlers in establishing stable residences in the Amazon region.

9 Any change of residence with a length of stay of more than one month in any given destination is regarded as a migratory event, regardless of the distance crossed.
[10] Natives of Maranhão State.
[11] [11] Informal mining camps.

Table 9
Household heads' last state of residence by stage of evolution *

State/Regions	Urbanized	Consolidated	Transitional	Pioneer	Total
Acre	-	-	-	-	-
Amapá	1(1.1)	-	-	-	1(0.3)
Amazonas	3(3.3)	-	2(2.2)	1(1.1)	6(1.7)
Pará	11(12.2)	8(8.9)	3(3.3)	11(12.2)	33(9.2)
Rondônia	2(2.2)	1(1.1)	-	-	3(0.8)
Roraima	45(50)	66(73.3)	73(81.1)	76(84.4)	260(72.2)
Tocantins	-	1(1.1)	-	1(1.1)	2(0.6)
North	**62(68.8)**	**76(84.4)**	**78(86.6)**	**89(98.9)**	**305 (84.7)**
Alagoas	-	-	-	-	-
Bahia	-	-	-	-	-
Ceara	3(3.3)	-	-	-	3(0.8)
Maranhão	20(22.2)	7(7.8)	11(12.2)	1(1.1)	39(10.8)
Paraíba	-	-	-	-	-
Piauí	1(1.1)	-	-	-	1(0.3)
Pernambuco	-	-	-	-	-
R.G. Norte	-	-	-	-	-
Sergipe	-	-	-	-	-
Northeast	**24(26.6)**	**7(7.8)**	**11(12.2)**	**1(1.1)**	**43(11.9)**
Distrito Federal	-	-	-	-	-
Goiás	-	2 (2.2)	-	-	2(0.6)
Mato Grosso	1(1.1)	-	-	-	1(0.3)
Mato Grosso do Sul	-	-	-	-	-
Mid-West	**1(1.1)**	**2 (2.2)**	**-**	**-**	**3(0.8)**
Espirito Santo	1 (1.1)	-	-	-	1(0.3)
Minas Gerais	-	-	-	-	-
Rio de Janeiro	-	-	-	-	-
São Paulo	-	-	-	-	-
Southeast	**1(1.1)**	**-**	**-**	**-**	**1(0.3)**
Paraná	1 (1.1)	2(2.2)	-	-	3(0.8)
Santa Catarina	-	-	-	-	-
R.G. Sul	1 (1.1)	-	-	-	1(0.3)
South	**2 (2.2)**	**2(2.2)**	**-**	**-**	**4(1.1)**
Foreign	-	3(3.3)	1(1.1)	-	4(1.1)
Total	**90(100)**	**90(100)**	**90(100)**	**90(100)**	**360(100)**

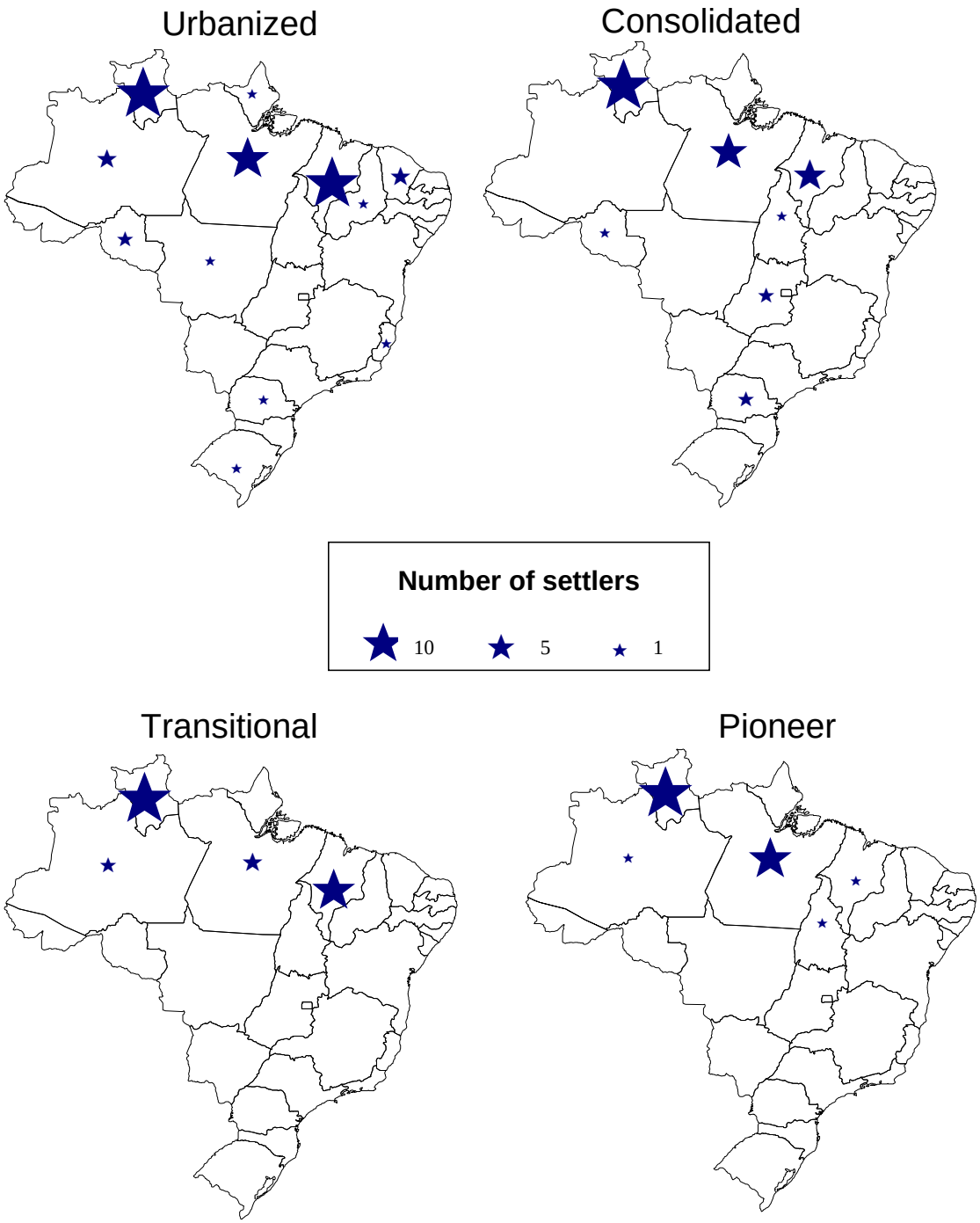
* Values in parenthesis represent percentages

Table 10
Migrant household head source regions

Regions	Region of Birth	Region of last residence
North	89 (24.7)	305 (84.7)
Northeast	242(67.2)	43(11.9)
Mid-West	5(1.4)	3(0.8)
Southwest	5(1.4)	1(0.3)
South	14(3.9)	4(1.1)
Foreign countries	5(1.4)	4(1.1)
Total	360(100)	360 (100)

Figure 2

Settlers' Last State of Residence



The average number of moves performed by migrants before reaching present destinations is also indicative of long migration histories. Overall, Central Roraima settlers have performed an average of 4 moves before reaching surveyed areas; still, there is a statistically significant difference across the stages of frontier evolution with respect to the average number of moves performed. Unlike anticipated, pioneer frontier migrants are the most peripatetic individuals displaying an average of 4.68 moves (Table 11). Land speculation strategies, coupled with the hardships endured by the rural poor do motivate a sizable numbers of moves, partially explain this performance. Transitional frontier settlers come second with an average of 4.36 moves, followed by consolidated frontier individuals, with 3.56 moves; and urbanized frontier ones, with 3.40 moves. It is also important to notice how the average number of moves among urbanized frontiers' settlers present the highest degree of variation, which is produced by the variety of migrant groups arriving in such areas. Among them the peripatetic displaced peasants, and the positively selected urban migrants, who may be engaging in their first migratory experience (Diniz 1997).

Table 11
Number of settlers' migratory events by stage of frontier evolution

Stage	Mean	St. Dev.	C.V.	N
Urbanized	3.40	2.73	0,80	90
Consolidated	3.56	2.24	0,62	90
Transitional	4.36	2.59	0,59	90
Pioneer	4.68	2.69	0,57	90
Total	4.00	2.62	0,65	90

F= 5.187 (0.002)

Another way in which migration is influenced by the process of frontier evolution can be grasped by the gradual unimportance of migration chains. Overall, 85.6% of pioneer frontier settlers had acquaintances in the area before making the move (Table 12). The proportion of in-migrants with acquaintances, however, falls significantly at the more evolved stages. Notice that migration chains influence 71.1% of transitional frontier migrants; 48,9% of consolidated settlers, and 45,6% of urbanized frontier dwellers. These results confirm the expectations embedded in the model of mobility in evolving agricultural frontier settlements, as better endowed settlers, typical of the more evolved portions of the frontier, are less reliant upon friends and relatives. In fact, these individuals can count on their higher educational attainment and financial resources to access jobs and/or land markets.

Table 12
Settlers' knowledge of friends and relatives
prior to move by stage of evolution

Acquaintances prior to move	Urbanized	Consolidated	Transitional	Pioneer	Total
With	41(45.6)	44(48.9)	64(71.1)	77(85.6)	226(62.8)
Without	49(54.4)	46(51.1)	26(28.9)	13(14.4)	134(37.2)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

Chi^2 = 41.511 (0.0000) Tau B = 0.093 Eta = 0.340

When inquired about how settlers became familiar with present destinations, 91.1% pointed informal communication channels, such as the word of friends and relatives passed on via letters, and phone calls, as the primary source of information (Table 13). The proportion of migrants relying on informal communication channels remains stable throughout the stages of frontier evolution. Nevertheless, the role of formal communication channels is more pronounced among urbanized frontier settlements, where 18.8% of in-migrants heard about those locations via official advertisement put out by government agencies, television, or companies operating in the area, as anticipated.

Table 13
Migration information system by stage of evolution

Information system	Urbanized	Consolidated	Transitional	Pioneer	Total
Informal	74(82.2)	82(91.1)	86(95.6)	86(95.6)	328(91.1)
Formal	16(17.8)	8(8.9)	4(4.4)	4(4.4)	32(8.9)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

$Chi^2 = 13.171$ (0.004) Tau B = 0.057 Eta = 0.191

The changing geographies of frontier settlements also influence settlers' primary reasons for moving into Central Roraima. While the majority of settlers across pioneer frontiers (87.8%) pointed the desire of acquiring land as the primary reason for migrating into the area; transitional frontiers in-migrants are divided. Among these settlers, 57.8% were seeking land, and 41.1% employment (Table 14). At consolidated frontiers, the proportion of migrants pursuing land diminishes a bit more (53.3%), while the extent of settlers in search of jobs goes up to 43.3%. At urbanized frontiers one witness a more complex situation, in which individuals can be grouped in three different categories: those pursuing land (27.8%), those seeking jobs (34.4%), and those seeking the reunification with acquaintances, namely family members (37.8%).

Table 14
Household heads' primary reason for in-migration by stage of evolution

Reason	Urbanized	Consolidated	Transitional	Pioneer	Total
Land	25(27.8)	48(53.3)	52(57.8)	79(87.8)	204(56.7)
Job	31(34.4)	39(43.3)	37(41.1)	6(6.7)	113(31.4)
Reunite acquaintances	34(37.8)	3(3.3)	1(1.1)	5(5.6)	43(11.9)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

$Chi^2 = 121.20$ (0.0000) Tau B = 0.178 Eta = 0.485

Circulation[12]

Fieldwork results demonstrate that a large portion of settlers (78%) presently engage in some sort of regular circulation (not shown). Among the major reasons for the intense intra-regional circulation is the performance of odd jobs in order to boost household incomes or exchange services[13] with fellow peasants during the more labor intense phases of the agriculture production cycle. Nonetheless, the likelihood of performing odd jobs is conditioned by the stage of evolution. Notice that over 81% of pioneer migrants regularly engage in odd jobs; whereas, the proportion of transitional, consolidated and urbanized frontier migrants engaged in parallel jobs is smaller (Table 15). This takes place because a larger portion of settlers of urbanized and consolidated frontiers hold formal jobs, being committed to fix working schedules and regular pay. Peasants and other autonomously employed individuals, prevalent across pioneer and transitional frontiers, and also present at expressive numbers at urbanized settlements, enjoy greater time flexibility and erratic income, being therefore freer to pursue odd jobs and needier of extra cash.

It was observed in the field that the months prior to the rainy season (December, January and February) are marked by intense job-seeking circulation movements. This is a period of high labor demand in the frontier, given the preparations for new agriculture fields. The process of clearing new tracts of forest and bringing them into production is arduous, long, and divided in a series of phases. During the hiatus of the forest clearing process, migrants take advantage of the high seasonal labor demand, to employ themselves temporarily at nearby areas; while, some venture as far as Boa Vista[14] and other urban places[15]. Circulation is

12 Circulation is regarded as any short-term move that does not involve declared permanent change of residence. This includes daily commuting, work trips, leisure and social trips, and seasonal, circulation among urban centers, farms, ranches and garimpos.

13 Job exchange groups are formed based on friendship and family ties, being facilitated by the arrival of different waves of related migrants in certain colonization areas. In the process, a given peasant (innovator) arrives at pioneering stages, managing to claim adjacent lots of land for him/herself and for his/her friends and family members left behind. Once land has been secured, the second waive of peasants (followers) soon arrive at the frontier, occupying the reserved neighboring plots. Mass in-migration is another strategy commonly adopted by settlers arriving at less evolved areas. Accordingly, a number of related families move concurrently into a given frontier area, claiming alongside plots, forming aid-groups. These informal associations call for communal type work, in which efforts are concentrated at different lots in an alternate fashion. During the preparation of land for agriculture, for instance, a group of peasants, rotate the lots of all group members, promoting specific tasks.

14 Roraima State Capital City.

also expressive during the rainy season (March to August), although not to the same degree as between December and February. After planting is over, peasants are found in a very needy state, as most of the previous harvest has been consumed and the scant financial resources were invested in seeds and tools for the new crops. This needy period is matched by low labor demands in the lots, as crops have different maturing times and harvesting is erratic passing over constant care. This state of affairs also stimulates odd-job-seeking circulation.

Table 15
Odd jobs undertaken by settlers by stage of evolution

	Urbanized	Consolidated	Transitional	Pioneer	Total
Perform odd jobs	37(41.1)	37(41.1)	44(48.9)	73(81.1)	191(53.1)
Do not perform odd jobs	53(58.9)	53(58.9)	46(51.1)	17(18.9)	169(46.9)
Total	90(100)	90(100)	90(100)	90(100)	360(100)

Chi^2 = 39.380 (0.000) Tau B = .084 Eta = 0.331

Corroborating the hypotheses embedded in the proposed model, survey results demonstrate that the place where odd jobs are performed is influenced by the process of frontier evolution. Pioneer and transitional settlers tend to travel less to perform such jobs. Notice that 83.6% of pioneer and 70,5% of transitional settlers develop these activities within the confines of the agricultural project they live (Table 16). It was observed, however, that the majority of odd jobs taking place in these areas is related to job-exchange informal groups. On the other hand, a large proportion of individuals performing odd jobs at the more evolved portions of the frontier travel further, as they count on reliable roads and regular transportation lines to move around. It is also important to point out that the more evolved portions of the frontier are concentration points for displaced peasants and recently arrived migrants, who after establishing residences locally, perform all sorts of informal jobs at farms, ranches, and government projects, such as road construction (Becker, 1990).

Table 16
Place where odd-jobs are undertaken by stage of evolution

	Urbanized	Consolidated	Transitional	Pioneer	Total
Local	14(37.8)	17(45.9)	31(70.5)	61(83.6)	123(64.4)
Non-local	23(62.2)	20(54.1)	13(29.5)	12(16.4)	68(35.6)
Total	37(100)	37(100)	44(100)	73(100)	191(100)

Chi^2 = 29.276 (0.000) Tau B = .120 Eta = 0.392

Furthermore, circulation in Central Roraima relies on well-established logistic support, as over 50% of settlers, across all stages of evolution hold two or more active urban and/or rural properties within region (not shown). Nonetheless, the periodicity in which circulation between residences takes place is also conditioned by the evolutionary process, as anticipated by the proposed model. Table 17 demonstrates that settlers located at the more evolved settlements tend to circulate between residences more often than those dwelling at less evolved locales. Notice how only 15.2% of pioneer migrants circulate on a weekly-basis, contrasted with a much larger proportion of individuals engaged in such movements at the more evolved frontier settings. Conversely, 50% of pioneer frontier settlers circulate on a 15 to 30 day basis; whereas, 34.8% of them circulate in intervals that exceed 30 days. Infra-structural levels present at the various stages of evolution explain the regularity of inter-residence circulation. Places that are better endowed with access roads and regular transportation lines, typical of more evolved frontiers, ease the seasonal movements and minimize the temporal hiatus between them. On the other hand, low infrastructure levels present at the less evolved frontiers, make migrants' seasonal movements more difficult and less frequent.

Seasonal inter-residential movements typical of urbanized frontiers, are those performed by the women and children of divided households. During the harvest of any given important crop such as rice, manioc, or beans, folks living at urbanized places move temporarily to the rural lots in order to help their family members.

15 Those seeking seasonal jobs in larger urban places usually employ themselves in construction or informal commerce activities.

Harvesting, thus reunite the divided households at the rural areas, becoming a task undertaken by the entire family. In fact, absence rates at local schools are so high that educational establishments have special intermissions during harvest time, allowing children of schooling age to aid their peasant parents. Once the task is completed, however, urbanized folks resume their urban lives, leaving their rural family members behind. Also typical is the inter-residential circulation performed by peasants and small-scale producers, who after adopting an urban residence still maintain strong linkages with the rural world, where subsistence is earned. Originating in urbanized frontier settlements are the weekly leisurely-motivated sojourns undertaken by the better-off urban dwellers at country places at rural areas during weekends and holidays. Thus, it becomes clear that circulation pattern originating in urbanized areas is markedly different, depending on the socioeconomic profile of settlers.

On the other hand, the circulatory moves originating in less evolved stages can be broadly classified according to their destinations. Rural-to-urban circulation is usually performed by men and children of divided households, who periodically leave agricultural plots in order to visit folks at urban and urbanized frontier areas. Also motivating the rural-to-urban moves are the facilities located at the urban and urbanized frontiers, which are regularly sought by peasants. In the urban realm they sell part of their production, purchase goods, consult physicians and dentists, go to church, and so on. Conversely, rural-to-rural circulation is associated with job exchanges within agricultural projects, and periodic visits made by peasants in order to check on or claim plots of land.

Table 17
Periodicity of the inter-residential circulation by stage of frontier evolution

Periodicity	Urbanized	Consolidated	Transitional	Pioneer	Total
Weekly	28(54.9)	50(54.1)	25(55.6)	7(15.2)	80(44.7)
15 to 30 Days	13(25.5)	13(35.1)	14(31.1)	23(50)	63(35.2)
Over 30 days	10(19.6)	4(10.8)	6(13.3)	16(34.8)	36(20.1)
Total	51(100)	37(100)	45(100)	46(100)	179(100)

Chi^2 = 24.037 (0.001) Tau B = 0.070 Eta = 0.341

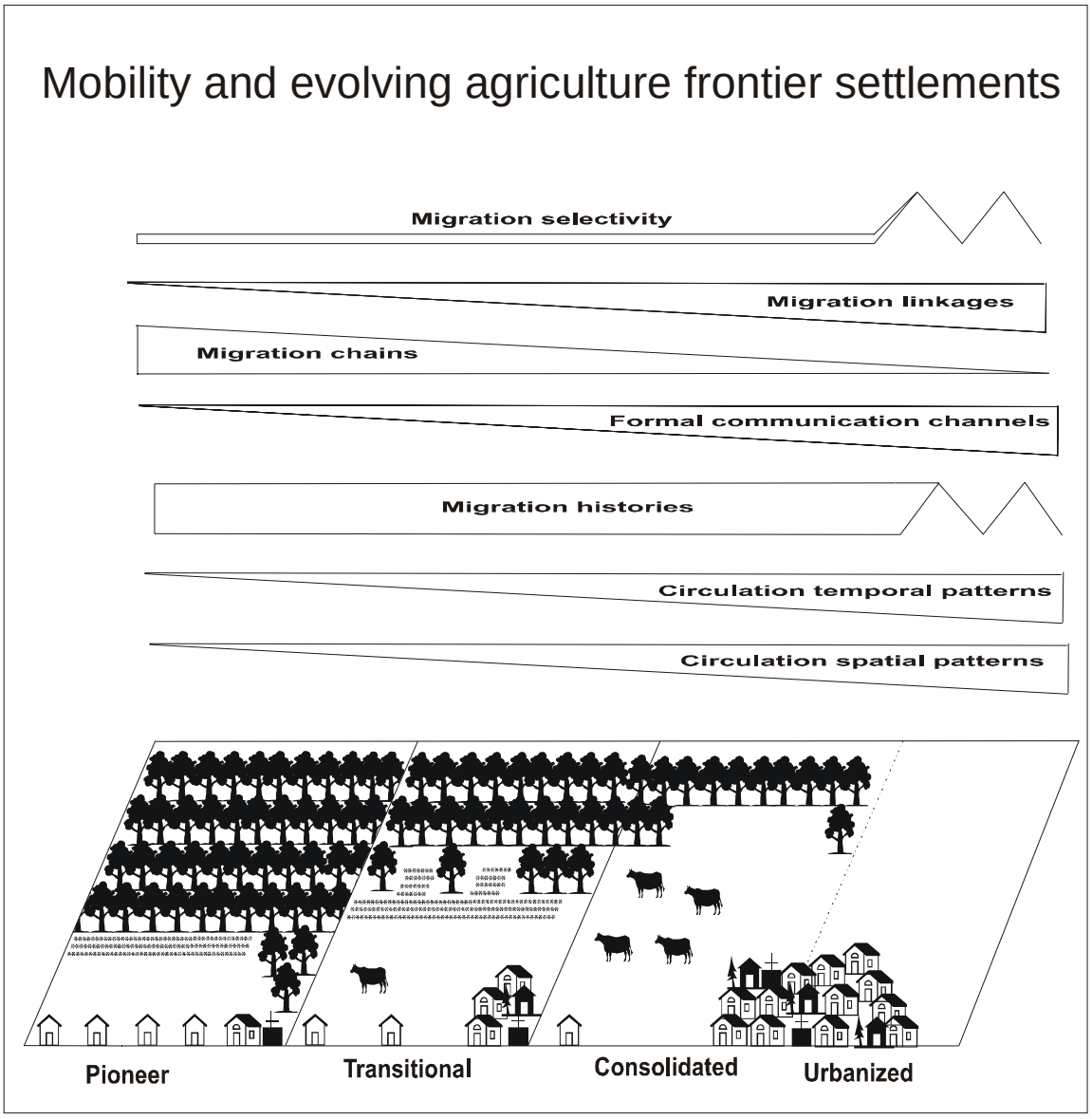
Mobility and evolving agriculture frontier settlements framework

This study explored the interplay between the evolution of agriculture frontier settlements and human mobility. Rooted on the literature on frontier evolution stage models, and Amazonian human mobility, this work proposed and tested various hypotheses related to mobility across four different types of settlement: pioneer, transitional, consolidated and urbanized. The reality of Central Roraima corroborated most expectations of the proposed model, confirming that human mobility is indeed influenced by the process of frontier evolution. The overall relationship between human mobility and frontier evolution is portrayed by Figure 3.

Evidence showed that at the least evolved portions of the frontier, settlers tend to be predominantly uneducated, married, and male. Also intriguing is the fact that households are also much smaller at these pioneer areas. Conversely, at more evolved settings there is an increasing presence of females, single and educated individuals. Another curious finding is the fact that frontier evolution is not selective of settlers' age, as the majority of surveyed individuals arrived at present locales of residence with similar age. Therefore, throughout the evolutionary path, the selectivity process remains relatively stable, as negatively selected individuals dominate the system. At urbanized frontiers, however, one witnesses a more erratic trend, as migrant socioeconomic profiles are more diversified.

Migratory patterns, however, are highly influenced by the evolutionary process. Recall that the more evolved settings draw migrants from a broad range of places; whereas, the least evolved ones display strong links with specific places. Thus, an incremental trend exists between the variety of in-migrants' source areas and the evolutionary process.

Figure 3



Conversely, the role played by migration chains diminishes with increasing levels of evolution; while, the importance of informal communication channels also dwindles. Another way in which migration has been impacted by the changing geographies of agriculture frontier settlements has to do with the primary reason disclosed by settlers for moving into various frontier types. At the least evolved settings land-seeking moves dominate; while, family reunification and jobs are the primary motive behind the moves into urbanized areas.

Results demonstrate that circulation patterns are also sensitive to the frontier evolutionary process. First, odd job seeking circulation is increasingly less prevalent at more evolved settings, and those who engage in such practices at least evolved settings tend to travel less than those individuals dwelling at more evolved areas. Fieldwork also unveiled that circulation is based on a well-orchestrated logistic support, as a sizable number of settlers, regardless of stage of evolution, rely on dual or multi-residences. Nonetheless, the periodicity in

which settlers circulate between properties is influenced by the frontier evolutionary process, as the settlers at more evolved areas tend to circulate more frequently than those living at less evolved areas.

The overall findings can also be organized in terms of a generalized model of mobility and evolving agriculture frontier settlements at four different stages. The following paragraphs describe the predominant mobility patterns and behaviors at each stage of evolution.

Pioneer frontiers

Given the incipient nature of pioneer settlements, the lack of market for land and labor, and the physical stamina involved in settling and surviving in the harsh equatorial forest, households tend to be small, headed by males, marked by low levels of education and long migration histories. Due to the remoteness and the uncertainties associated with these areas, migration chains dominate the system, constituting the primary migration type, linking pioneer frontiers with very specific rural origins. In the process, informal communication channels strength the links between pioneer frontiers and very specific source areas. At this stage, land is the primary migration pull factor. As transportation networks are poor at this stage, circulation is spatially and temporally restrained, as individuals travel within short distances to perform odd-jobs and exchange agricultural services with fellow peasants.

Transitional frontiers

Household-heads at transitional frontiers are predominantly male, uneducated, and young, with long migration histories. Household size is not very different from pioneer areas, but here one begins to notice the increasing presence of farm and ranch workers to the detriment of landowners. Settlers are still drawn from a limited number of places, and informal information systems prevail. Individuals moving into such places also rely on migration chains, but not to the same degree as pioneer frontiers, given the improvements in transportation and communication networks. Land remains the primary stimulus for in-migration, but farm and ranch-jobs have also become important pull factors. Owing to improved transportation linkages, and increasing need for cash fomented by the ever present capitalist mode of production, settlers begin circulating among a vast array of places, within shorter intervals, engaging in temporary employment in farms, ranches, *garimpos* and even urban areas.

Consolidated frontiers

Unlike other frontier areas, most consolidated settlers do not own the land they presently occupy. These individuals tend to be late comers and displaced peasants, who employed themselves at the encroaching farms and ranches, while looking for land at adjacent areas. These settlers tend to in-migrate individually and form households with fellow workers. Therefore, household units are significantly smaller from the other stages of evolution. Settlers at this stage are still mostly, male, young, and uneducated, with long migration histories. Owing to their better infrastructure and more reliable transport lines, consolidated frontiers draw migrants from a broad set of places. In-migrants still rely on unofficial information systems, but the importance of migration chains diminishes substantially. The perspective of acquiring land remains important, but now job-seeking moves are also conspicuous. Job-seeking circulation occurs at a much lesser rate, due to the stable employment and fixed schedules at farms and ranches. Nonetheless, circulation, in general, tends to occur in a more frequent fashion (weekly), being spatially broader given the good road infrastructure and transport lines.

Urbanized frontier

Households at this stage are still primarily headed by males, although female-headed households are also significant. Moreover, due to the presence of higher infrastructure levels, households tend to be large,

generally with numerous children. Given the prominence of urbanized frontiers, they do attract two different major types of settlers: displaced peasants and better-off urban migrants. Thus, there is a bifurcation among settles in terms of educational levels, age, occupation[16], and migration histories. Urbanized frontiers have good communication links with their hinterlands and with the rest of the country, drawing migrants from a much broader pool of rural and urban origins. The role of migration chains is even smaller at this stage; while, formal communication channels influence an increasing number of moves. Here a broader array of motives inspires in-migration, among which land, job, and family reunification. Circulation is intense and spatially broad being facilitated by well-developed transportation networks. While displaced peasants seek jobs at surrounding areas with certain regularity; while, better-off in-migrants circulate on a regular basis especially for leisure activities.

Discussion

Evidence for the proposed model was acquired in Central Roraima State, Brazil. Nonetheless, the model should be applicable to various frontier settings given the scope of the claimed mobility and the premises in which it was built upon. In fact, future studies should explore the validity of these claims in other areas of the Amazon region in order to expand and calibrate the model presented here. A word of caution, however, has to be voiced. The model of mobility and evolving agricultural frontier settlements targets the specifics of frontier settlements, which have evolved from spontaneous or official agricultural colonies, or settlements, where small-scale producers predominated at pioneering stages. Frontier areas where the demographic and economic occupations have been promoted by other types of activities, such large scale resource extraction, namely *garimpos* and logging, mega-construction projects, and large scale cattle ranching activities, follow a more erratic and inconsistent evolutionary path, extrapolating the basic principles of the proposed model. Moreover, the set of mobility claims advanced here is pertinent to the settlement level only. The complexities embedded in the proposed model and the micro-scale dynamic entailed by the model prohibits its utilization in meso or regional scales.

Despite being discredited by many scholars, I believe stage-thinking models remain important analytical tools. They organize the temporal evolution of very complex phenomena in different segments, each being composed of strikingly different characteristics, offering the means to center attention in the most prominent aspects of reality. However, the proposed framework is not intended as a deterministic stage-model à la Zelinsky's (1971) "hypothesis of mobility transition". Instead, it should be emphasized that settlements do not necessarily follow a linear evolutionary path, going through all the previously identified stages in a progressive fashion. Reality challenges all mechanistic views, as the pace and direction of settlements' evolution are highly idiosyncratic. Therefore, the model should be utilized as a first step in the process of understanding the chaotic Amazonian mobility, being imperative a foot in the mud approach in order to bridge the theoretical construe with settlements' reality.

Lastly, it is important to recall that the proposed model could be applied to both, cross-section and longitudinal perspectives. The model was applied in this study in a cross-section fashion due to economic and time restraints, as well as lack of historical secondary data. Still, it is important to alert those willing to apply it on a longitudinal basis, that the timing and the direction in which settlements will pass through the identified phases are erratic. Therefore, discretion and sensibility should be exercised when applying it in a historical perspective.

[16] Not shown. See forthcoming doctoral dissertation – Department of Geography – Arizona State University.

Bibliography

Almeida, O. 1992. The Colonization of the Amazon. Austin, University of Texas Press.

Almeida, A. and David, M. 1981. Tipos de Frontiera e Modelos de Colonização na Amazônia: Revisão de Literatura e Especificação de Uma Pesquisa de Campo. IPEA, Instituto de Planejamento Econômico Social. Texto para Discussão #38. Brasília, DF.

Aragón, L. 1980. Mobilidade dos Migrantes no Norte de Goiás. Seminário promovido pelo Setor de Pesquisa (SEPEQ) do NAEA (Núcleo de Altos Estudos Amazônicos) em 31 de agosto de 1978. Série Seminários e Debates, # 4. Belém, NAEA

_____ 1983. Mobilidade Geográfica e Ocupacional no Norte de Goiás: Um Exemplo de Migração por Sobrevivência. In O Despovoamento do Território Amazônico: Contribuições Para Sua Interpretação. Mougeot, L. and Aragón, L. (Editors.) p. 91-122 . Belém, UFPA/NAEA

Aragón, L. and L. Mougeot. 1986. Introdução. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas, L. Aragón and L. Mougeot (eds.). pp. 17-53. Núcleo de Altos Estudos Amazônicos. Belém, Falangola.

Becker, B. 1985. Fronteira e Urbanização Repensadas. Revista Brasileira de Geografia. Rio de Janeiro 47 (3/4): 357-371.

_____1990. Amazônia. São Paulo, Ática.

Bentes, R. 1986. Zona Franca, Desenvolvimento Regional e o Processo Migratório para Manaus. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas. By L. Aragón and L. Mougeot (eds.). p. 220-254. Núcleo de Altos Estudos Amazônicos. Belém: Falangola.

Browder, J. and Godfrey, B. 1990. Frontier Urbanization in the Brazilian Amazon: A theoretical framework for urban transition. Conference of Latin American Geographers, 16: 56-66.

Bylund, E. 1960. Theoretical Considerations Regarding the Distribution of Settlement in Inner North Sweden. Geografiska Annaler B, 42, pp. 225-231.

Crócia, Nilson Barros. 1994. The Frontier Cycle: A Study of the Agricultural Frontier Settlement in the Southeast of Roraima, Brazil. N.J. Cox, Series. Department of Geography, University of Durham UK.

_____ 1995. Roraima, Paisagens e Tempo na Amazônia Setentrional. Recife, Universidade Federal de Pernambuco, Editora Universitária.

Da Silva, 1986. Retenção e Seleção migratórias em Rio Branco, Acre. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas, L. Aragón and L. Mougeot (eds.). pp. 182-216. Núcleo de Altos Estudos Amazônicos. Belém: Falangola.

Da Vance, J. 1970. The Merchant's World : The Geography of Wholesaling. Englewood Cliffs: Prentice Hall.

Dawsey, C. 1992. Migration in Brazil: Research During the 1980s. Conference of Latin Americanist Geographers, Vol. 17/18, p. 109-116.

Diniz, A. 1997. Growth and Urbanization in Roraima State, Brazil. Conference of Latin Americanist Geographers. Forthcoming.

Ferreira, I. 1987. Expansão da Fronteira Agrícola e Urbanização. In A Urbanização da Fronteira. Lavinas, Lena (Editor). Séries Monográficas #5, Volume 2. p. 1-26. Rio de Janeiro: IPPUR/UFRJ

Findley, S. 1988. Colonist Constraints, Strategies, and Mobility: Recent Trends in Latin American Frontier Zones. In Oberai, A. (ed). Land Settlement Policies and Population Redistribution in Developing Countries:271-316. New York, Praeger

Foresta, R. 1992. Amazônia and the Politics of Geopolitics. The Geographical Review .Vol 82 (2), p. 128-142.

Foweraker, J.1981. The Struggle for Land. Cambridge: Cambridge University Press.

Furley, P. and Mougeot, L. 1994. Perspectives in the Forest Frontier, Settlement and Change in Brazilian Roraima. Ed. by Peter Furley. New York, Routledge.

Godfrey, B. 1990. Boom Towns of the Amazon. The Geographical Review. Vol. 80 (2) p. 103-117.

_____ 1992. Migration to the Gold-Mining Frontier in Brazilian Amazonia. The Geographical Review .Vol. 82 (4) p. 458-469.

Henkel, R. 1982. The Move to the Oriente: Colonization and Environmental Impact. In Modern Day Bolivia: Legacy of the Revolution and Prospects for the Future. Edited by Jerry R. Ladman. Tempe: Center for Latin American Studies, Arizona State University. pp.277-300.

Hennessy, Alistair. 1978. The frontier in Latin American history. London, Edward Arnold.
Henshall, J. and Momsen R. 1976. A Geography of Brazilian Development. London: G. Bell & Sons, LTD.

Henriques, M. 1984. A Politica de Colonização Dirigida no Brasil: um estudo de caso, Rondônia. Revista Brasileira de Geografia 46(3-4) 393-414.

_____1985. A Dinâmica Demográfica de Uma Área de Fronteira: Rondônia. Revista Brasileira de Geografia, Rio de Janeiro, 47 (3/4): 317-356.

_____ 1986. Os Colonos de Rondônia: Conquistas e Frustrações. Revista Brasileira de Geografia, Rio de Janeiro, 48 (1): 3-42.

____ _____ 1988. The Colonization Experience in Brazil. In Land Settlement Policies and Population Redistribution in Developing Countries: 317-354 By Oberai (ed.). New York, Praeger.

Hudson, J. 1969, A Location Theory for Rural Settlement. Annals of the Association of American Geographers 59, pp. 365-381.

IBGE 1992. Censo Demográfico de 1991. Rio de Janeiro: Fundação Institudo Brasileiro de Geografia e Estatística.

Jardim, A. 1987. Aspéctos do Processo de Urbanização Recente na Região Centro-Oeste. In A Urbanização da Fronteira. Lavinas, Lena (Editor). Séries Monográficas #5, Volume 2. p. 103-128 Rio de Janeiro: IPPUR/UFRJ.

Lavinas, L. 1987. A Agro-Urbanização da Fronteira. In A Urbanização da Fronteira. By Lavinas, Lena (ed). Series Monográficas #5, Volume 1. p. 91-108. Rio de Janeiro: IPPUR/UFRJ

Lewis, W. 1954. Economic Development with Unlimited Supplies of Labor. Journal of the Manchester School of Economics and Social Studies. 20, pp. 139-92.

Lisansky, J. 1990. Migrants to Amazonia. Spontaneous colonization in the Brazilian frontier. Boulder, San Francisco and London, Westview Press .

MacMillan, G. 1995. At the End of the Rainbow? Gold, Land and People in the Brazilian Amazon. London, Earthscan Publications Ltd.

Martine, G. 1981. A Migração Repetida e a Busca de Sobrevivência: Alguns Padrões Brasileiros. Projeto de Planejamento de Recursos Humanos. Relatório Técnico #52. Brasília.

_____1984. Frontier Expansion, Agricultural Modernization and Population Trends in Brazil. Brasilia: IPEA/IPLAN/ CNRH.

_____ 1989. Internal Migration in Brazil. IPEA, Instituto de Planejamento Econômico Social. Texto pare Discussão #13. Brasília, DF.

Martins, José de Souza. 1975. Frente Pioneira: Contribuição para uma caracterizacao sociológica, in Capitalismo e Tradicionalismo pp. 43-5. By Velho, Otávio (ed.). São Paulo, Pioneira.

_____1984. The State and the Agrarian Question in Brazil. In Frontier Expansion in Amazonia, By Marianne Schmink and Charles Wood (eds.). Gainesville, University of Florida Press, 463 - 490.

_____1996. O Tempo da Fronteira, retorno à controvérsia sobre o tempo histórico da frente de expansão e da frente pioneira. Tempo social; Revista de Sociologia da USP. São Paulo, 8(1): 25-70, maio de 1996.

Meyer, D. 1980. A Dynamic Model of the Integration of Frontier Urban Places into the United States System of Cities. Economic Geography 56, pp. 120-140.

Morrill, R. 1963. The Development of Spatial Distributions of Towns in Sweden: An Historical-Predictive Approach. Annals of the Association of American Geographers 53, pp. 1-14.

Mougeot, L. 1982a. Ascensão Sócio-Econômica e Retenção Migratória na Fronteira. Série Seminários e Debates (8). Belém, Universidade Federal do Pará - Núcleo de Altos Estudos Amazônicos.

_____ 1982b. Alternate Migration Targets and Brazilian Amazonia's Closing Frontier. Paper prepared for the Commission on Regional Systems and Policies. Latin American Regional Conference, International Geographical Union. Belo Horizonte - Rio de Janeiro, Brazil. August, 9th -21st, 1982.

_____ 1983. Retenção Migratória das Cidades Pequenas, nas Frentes Amazônicas de Expansão: Um Modelo Interpretativo. In O Despovoamento do Território Amazônico: Contribuições Para Sua Interpretação. Mougeot, L. and Aragón, L. (Editors.) p. 123-146 . Belém: UFPA/NAEA

_____ 1986. A Recente Ocupação Humana da Região Amazônica: Causas, Durabilidade e Utilidade Social. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas. Aragón, L and Mougeot, L. (Editors) p. 17-53. Belém:UFPA, NAEA, CNPq.

Mougeot, L. and Aragón, L. (Editors.) 1983. Introdução. In O Despovoamento do Território Amazônico: Contribuições Para Sua Interpretação. Introdução: 9-26. Belém: UFPA/NAEA

Muller, C. 1980. Frontier-based Agricultural Expansion: The Case of Rondonia. In Land, People and Planning in Contemporary Amazonia. F. Barbira-Scazzocchio, ed. P. 141-53. Cambridge: University of Cambridge, Center of Latin American Studies.

Muller, E. 1977. Regional Urbanization and the Selective Growth of Towns in North American Regions. Journal of Historical Geography 3, pp. 21-39.

Neiva, Arthur Hehl. 1949. A imigração na política brasileira de povoamento. Revista brasileira de municípios, ano II nº6, abril-junho, p.266.

Oliveira, C. 1986. O Campo Migratório de Soure, Pará. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas, L. Aragón and L. Mougeot (eds.). pp. 148-181. Núcleo de Altos Estudos Amazônicos. Belém: Falangola.

Santos, R. The Problem of Land in the Brazilian Amazon. In Frontier Expansion in Amazonia. Ed. Marianne Schmink and Charles Wood. pp.439-462. Gainesville, University Press of Florida, University of Florida.

Sawyer, D. 1981. Ocupação e Desocupacao da Fronteira Agrícola no Brasil: Ensáio de Interpretação Estrutural e Espacial. Trabalho apresentado no seminário sobre expansão da fronteira agropecuária e meio-ambiente na America Latina. Brasília, 10-13 de Novembro de 1981.

_____1982. Industrialization of Brazilian Agriculture and Debilitation of the Amazon Frontier. Paper presented at the Seminar on Land Development in the Tropics. August, 8th-13th 1982. Belo Horizonte, Brazil.

_____ 1984. Introduction. Frontier Expansion and Retraction in Brazil. In Frontier Expansion in Amazonia, 180 - 203.By Marianne Schmink and Charles Wood (eds.). Gainesville, University of Florida Press.

_____ 1986. A Fronteira Inacabada: Industrialização da Agricultura Brasileira e Debilitacão da Fronteira Amazônica. In Migracões Internas na Amazônia: Contribuições Teóricas e Metodológicas, L. Aragón and L. Mougeot (eds.). Núcleo de Altos Estudos Amazônicos pp. 54-91. Belém: Falangola.

_____1987. Urbanização da Fronteira Agrícola no Brasil. In A Urbanização da Fronteira. Lavinas, Lena (Editor). Séries Monográficas #5, Volume 1. p. 43-60 Rio de Janeiro: IPPUR/UFRJ.

_____ 1989. Urbanization of the Brazilian Frontier. Presented in a Seminar on Urbanization in Large Developing Countries, IUSSP and Gujarat Institute of Area Planning, Ahmedabad, India, 28 th of September to October 1st.

Sawyer, D. and Carvalho, J. 1986. Os Migrantes em Rio Branco, Acre: Uma Análise a Partir de Dados Primários. In Migrações Internas na Amazônia: Contribuições Teóricas e Metodológicas. Aragón, L and Mougeot, L. (Editors) p. 112-147. Belém: UFPA, NAEA, CNPq.

Sawyer, D.; Torres, H.; Pereira, A. and R. Abers 1990. Fronteiras na Amazônia: Significado e Perspectivas. Centro de Desenvolvimento e Planejamento Regional - CEDEPLAR - Universidade Federal de Minas Gerais . Relatório final da primeira fase da pesquisa "A Dinâmica Demográfica da Região Amazônica Numa Perspectiva Nacional" for ELETRONORTE

Sewastynowicz, 1986. Two-step Migration and Upward Mobility on the Frontier?: The Safety Valve Effect in Pejibaye, Costa Rica. Economic Development and Cultural Change 34 (4) 731-753.

Shoemaker, R. 1981. The Peasants of El Dorado: Conflicts and contradiction in a Peruvian Frontier Settlement Ithaca. NY: Cornell University Press.

Shrestha, N., Velu, R. and D. Conway. 1993. Frontier Migration and Upward Mobility: The Case of Nepal. Economic Development and Cultural Change. Vol. 41 (4) pp. 787-816.

Sternberg, H. 1987. "Manifest Destiny" and the Brazilian Amazon: A Backdrop to Contemporary Security and Development Issues. Conference of Latin Americanist Geographers. Vol. 13. p. 25-35.

Taaffe, E., R. Morrill, and P. Gould. 1963. Transport Expansion in Underdeveloped Countries: A Comparative Analysis. Geographical Review 53: 503-529.

Volbeda, Sjoukje. 1996. Pioneer towns in the jungle, urbanization at an agricultural colonization frontier in the Brazilian Amazon. Revista Geográfica # 104 - Jul/Dec. Pp.115-140.

Wood, C. 1982. Equilibrium and Historical-Structure Perspectives on Migration. International Migration Review 16, pp. 298-319.

Woods, C. and Wilson, J. 1984. The Magnitude of Migration to the Brazilian Frontier. In Frontier Expansion in Amazonia, 142-152. By Marianne Schmink and Charles Wood (eds.). Gainesville, University of Florida Press.

Wood, C. and Schmink, M. 1983. Culpando a Vítima: Pequena Produção Agrícola em um Projeto de Colonização na Amazônia. In O Despovoamento do Território Amazônico: Contribuições Para Sua Interpretação. Mougeot, L. and Aragón, L. (Editors.) p. 70-90. Belém: UFPA/NAEA

Wood, C. and Wilson, J. 1984. The Magnitude of Migration to the Brazilian Frontier. In Frontier Expansion in Amazonia. Ed. Marianne Schmink and Charles Wood. P. 143-152. Gainesville, University Press of Florida, University of Florida.

Zeballos-Hurtado, H. 1975. From the Uplands to the Lowlands: An Economic Analysis of Bolivian Rural-Rural Migration. Ph.D. Diss, University of Wisconsin.

Zelinsky, W. 1971. The Hypothesis of the Mobility Transition. The Geographical Review Vol. 61 (2) pp. 1-31.