

Tropical decision-making: Livelihood and environmental decisions in land reform settlements in the Amazon

Land reform is a sensitive topic in public Brazilian life due to the landless workers movements' national and international visibility and the complexity of interests and positions involved. In September 2008, Mr. Carlos Minc, Brazilian Federal Secretary of Environment, announced INCRA-settlements (*Instituto Nacional de Colonização e Reforma Agrária*/National Institute of Colonization and Land Reform) as the major perpetrator of deforestation of tropical rain forest in the Amazon. According to official numbers, land reform settlements in the Amazon had cut 228,208.649 hectares of tropical rain forest by the year 2006. This number was contested by the president of INCRA, Mr. Rolf Hackbart, who explained that the majority of deforestation likely occurred in 1998 when legislation only required 50% of *reserva legal* (protected area) tropical rain forest on the allotments (O Portal de Notícias da Globo 2008). According to a list of deforested areas in settlements of land reform by Brazilian states through 2004, the state of Pará leads the list with a total of 52% of the forest in land reform settlements having been cut; see Figure 1.

Customary explanations for deforestation presume that the traditional population (including *ribeirinhos* (riverside dwellers), indigenous people, small farmers, rubber tappers, etc.) do not destroy nature (i.e. tropical rain forest and the general environment). As previously stated, the environmental situation in the settlements of southeast Pará (SE-PA) is also critical, because, according to Michelotti and Rodrigues, in 2002 only 30% of forest were left on the allotments of land reform; in São João do Araguaia (SE-PA), where I conducted field research (2005 - 2007),¹ only 26% of forest remained instead of an 80% *reserva legal* (government standard requiring that 80% of the forest must be kept untouched and only 20% of the soil may be used for agricultural aims) (Michelotti & Rodrigues 2004).

In considering these facts, which are common to other regions in the Amazon, there is one central question in political and environmental debates on tropical rain forest and land reform: Why do people deforest? During my fieldwork, it became

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evident that there are several options and behavioural patterns that lead some settlers to conserve the *reserva legal* and others to log nearly every tree on their land reform allotments. Even though environmental law sanctions against the destruction of tropical rain forest perpetrators of all types are rarely prosecuted due to political decisions and limited public resources. In the absence of prosecution, infringement of environmental legislation is facilitated. Knowing this, further questions should be asked about settlers' options, motives, and strategies. Finally, questions should be asked whether it is truly possible, as land reform proposes, to combine conservation of the tropical rain forest with the search for social equity.



Figure 1. Deforestation in land reform settlements in the Amazon between 1970 and 2004 (after: <[http://www.oecoamazonia.com/images/stories/jun2010/102620 Assentamentos_de_Reforma_Agraria_final.jpg](http://www.oecoamazonia.com/images/stories/jun2010/102620_Assentamentos_de_Reforma_Agraria_final.jpg)>; 01.12.2012).

At the base of decision analysis lies one of the key questions in economics and economic anthropology: The problem of knowing how to objectively know or measure a person's motives (Myers 1983; Wilk 1993: 191). The function of decision-making analysis is to detect the constraints and conflicts of the microenvironment of social actors, to detect the type of adjustments likely to be made, and to detect the cyclical nature of some adjustments (Ortiz 1983: 250). In order to analyze decisions, Ortiz suggests that

One can elucidate the norms and constraints that affect decisions by analyzing statistically the incidence of each type of solution. Studies on residence, rules and options are good examples of this approach. But production problems are more complex, requiring a priori assumptions about the principles that guide the choices among options (Ortiz 1983: 251).

Therefore, the case study of (former) landless people in the Amazon is even more complicated as it attempts to analyze the decision-making of actors in a complex social, political, economical, and environmental reality. This reality represents for settlers a new situation in different degrees, according to former experiences and assets available; it is a challenge endowed with multiple uncertainties. Furthermore, in this context, we must consider the important role and impact of the natural environment, the tropical rain forest, as well as the weight of the State and its development strategies through the land reform program on peasants' decisions and actions. The focus of this contribution is on decisions made by settlers regarding rain forest conservation on their land allotments as the vital element of their livelihood-strategies. According to my understanding these decisions are "core decisions" (according to Christina Gladwin's ethnographic decision tree modelling approach, 1989) made by settlers that influence all other livelihood decisions to be made by the beneficiaries of land reform in the tropics. In order to proceed with my inquiry, I give some basic information about the region in question.

1. The setting and context of this enquiry

The city of Marabá is the centre of the region of SE-PA, Brazil. SE-PA contains 39 municipalities and has an extension of 297,368.48 square kilometres. It is characterized by preoccupying social, economical, and environmental imbalances. Environmental imbalances are due to the indiscriminate deforestation of broad chestnut forests (Brazil nut tree) and of other genuine tropical rain forest areas. Deforestation is caused by mining enterprises, cattle ranchers, and producers of vegetal carbon, a material needed for stain production furnaces at the ironworks pole in Carajás, Brazil.

According numbers published in 2007 by INCRA's superintendence of Marabá (SR 27), the SE-PA region houses 473 settlements with 63,394 families, clients of the Brazilian land reform. The region is considered one of the most densely occupied

land reform regions in Brazil (INCRA 2007). In total, by 2002, a total of 1,354 land reform settlements occupying 231,000 square kilometres and having a population of approximately 231,815 families had been created in the Brazilian part of the Amazon (Brandão Jr. & Souza Jr. 2006). In order to become a land reform client, one must, among other things, be a landless peasant or at most possess a quantity of land inferior to one rural fiscal unit. Exclusion criteria include public servants or households earning more than three (by law defined) minimum salaries by off-farm activities. In SE-PA, as well as the rest of Brazil, a portion of the settlers do not fulfil the criteria to become beneficiaries of land reform but manage to be considered beneficiaries of land reform by fraud.

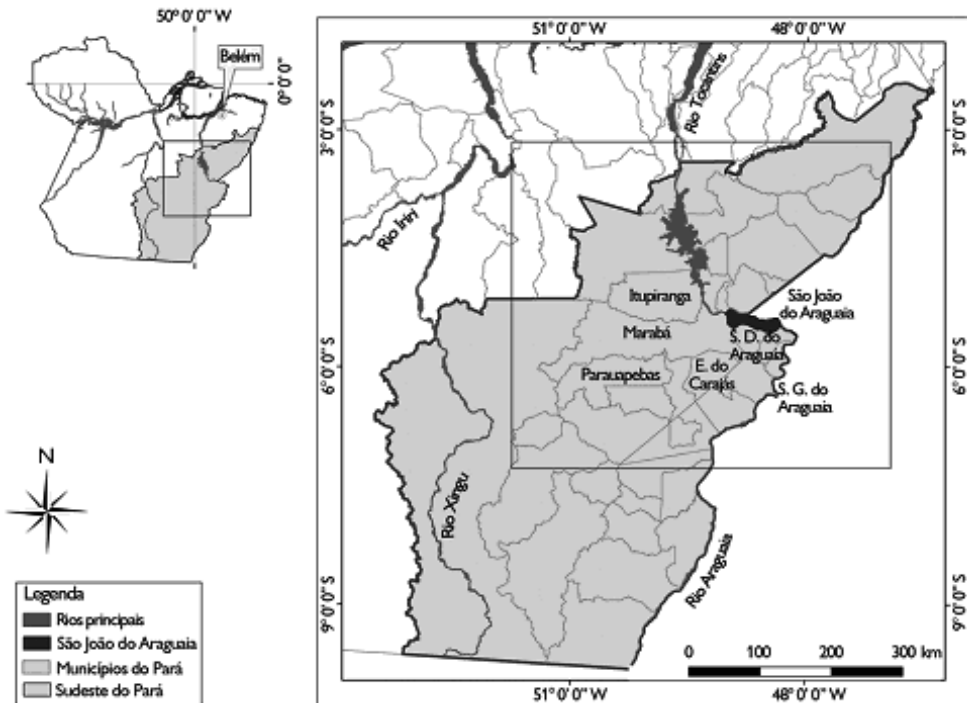


Figure 2. Map of southeast Pará (SE-PA), Brazil (Map: Gabriele Ferreira, Coordenação de Ciências da Terra e Ecologia, Museu Paraense Emilio Goeldi/MCT).

Furthermore, about 50-60% of SE-PA land reform allotments were abandoned and sold before settlers receiving their official land title. In theory, the allotments cannot be sold because settlers merely possess the land and only obtain the property deed after

several years through a recognition act by INCRA. Transactions of land sale are underdone by selling without official recognition in the land registry, or by transferring the allotment and land reform beneficiaries through INCRA. Target items for commercialization include the natural resources of the allotment, the infrastructure, such as houses and fences, and, in cases where new dwellers succeed in being admitted as new beneficiaries of land reform, they receive the benefits conceded by land reform, such as subsidised credits and grants. In order to deal with these theoretical questions, this contributions wants to answer, I examine some elements of social and anthropological theory in relation to settlers' decision-making in the context of land reform in the Amazon.

2. Theory

At the centre of the well known discussion on peasants' goals and motives is the question of whether (petty) farmers are utility-maximizers. Yet there is no consensus about what farmers seek to maximize and "...there is no evidence that poor farmers' goals or decision-making processes are consistently different from other people's". (Roumasset 1976; Berry 1980: 322-323). In opposition to conventional, utility-maximizing approaches, there exist "satisficing models" that, to date, are rarely part of scientific discussions (Ortiz 1983: 259). Therefore, more research is needed to define the satisfactory level that farmers aim to attain and how forecasts are created. (Ortiz 1983: 259). In contrast, moral economists claim that humans have two discrete motivations (or utility functions) instead of one. Margolis (1982) opposes self-interest versus group-interest, while Etzioni (1988) dichotomises material self-interest versus moral satisfaction (or moral conscience). Or, as a synthesis, actors tried to make a balance between two often incompatible goals (Margolis 1982; Etzioni 1988; Wilk 1993: 198).

2.1 Motives

In contrast to the conventional rationality approach, Wilk suggests a different model. According to Wilk, people act 1) "selfish" as self-interested rational individuals, or "economic men", and maximize their individual utility; 2) "socially", because they identify with a certain group and are motivated by the interests of the collective; and 3) "morally", with action shaped by culturally-specific belief systems (or religion) and values, and symbolic systems and cognitive categories of right and wrong and good and bad. In this context, Wilk raises the question of why people sometimes act in the interest of the group and other times act selfishly (Wilk 1993: 192 ff). Furthermore, it is important to consider that social, moral, and selfish goals constitute a continuum, instead of being sharp alternatives. These motives become rational options on

different scales. Motives can be mixed and ambiguous, or there may be multiple goals and motives (Wilk 1993: 199).

Additionally, decision-making itself is seen as a political process, whereby interests of actors and groups may be contradictory and a consensus must be built. Arguing from a different position, Ortiz warns against that in order to make a sound analysis possible,

[...] goals or criteria cannot change arbitrarily; they must be predictable and contingent on certain factors (uncertainty, technological requirements, changes in composition of unit of production, life cycle status of production unit, household consumption patterns, financial flows, and availability of labor (Ortiz 1983: 279).

It is critical that the timeliness of decisions be considered; decisions may vary accordingly based upon either the immediate or long-term benefits (Wilk 1993: 204). Focussing on further issues, Cancian claims people are prestige-oriented and therefore act according to their relative socioeconomic status. For example, upper middle class farmers would be more risk- and uncertainty-averse than lower middle-class farmers because they had more to lose in terms of rank (Cancian 1980).

In my present case study of settlers' choices and decisions in the Amazon land reform hamlets, I consider the group of land reform beneficiaries itself to be heterogeneous, and the temporal horizons of choice to differ considerably between settlers in one hamlet and beneficiaries of land reform at different waves of colonization.² In any case, a strong feature of anthropological decision-making analysis is the ability to consider the social context and the assets available for decision-makers. Therefore, I present several theoretical insights on behalf of this topic.

2.2 *Social context and assets*

Conventional decision-making analysis assumes that individual attitudes or preferences influence actors' behaviour independently of the circumstances in which they act. Individuals or groups of homogeneous individuals would base their actions on independent assessments of given sets of circumstances as if social processes were sums of individual acts rather than complex processes of interaction among both individuals and groups (Berry 1980: 323). The challenge is to include social and group interest aspects in decision-making analysis. In considering social contexts, Wilk criticises that they are taken as granted and not as socially constructed products of choices and

2 Colonization programs started in the 1960s. Land reform was officially created in 1985. There were different moments of settlement creation, including participants from different origins and different livelihood strategies.

results of decision-making by itself (Wilk 1993: 195). It is “practice theory” (Bourdieu 1977) that envisions a dialectical relationship between intentional decision-making and the constraints of social structure, politics, and cultural knowledge. Social behaviour and modes of choices are negotiated, established, and changed through daily practice. Social norms and rules are questioned, modified, and renegotiated through strategic action. Through the symbolic process, objects and situations are invested with meanings, which in turn are used in social situations (Wilk 1993: 196).

In the SE-PA case study, social movements have been playing an important role in improving conditions for landless people by fighting to establish new roles and re-define social and political institutions during the last four decades (Esterci 1987; D’Incao & Roy 1995; Wambergue 1999; Hébette 2004; Wambergue 2004; Naase 2010). The impact of the land workers’ union (*Sindicato dos trabalhadores rurais*, STR), the landless rural workers’ movement (*Movimento dos trabalhadores rurais sem terra*, MST), and related organizations such as the Pastoral Land Commission of the Brazilian Catholic Church (*Comissão pastoral da terra*, CPT) is ongoing. On the other hand, pressure on Brazilian governmental performance is exerted by the increasing Brazilian and international environment movement concerned with tropical rain forest destruction and climate change by public debate and organizations such as the World Wildlife Fund (WWF), Friends of the Earth (*Amigos da terra* in Portuguese), Greenpeace, and others.

Resuming different studies on farmers’ decisions, Berry claims a special feature of farmers is that their “[...] readiness to take advantage of new income earning opportunities often depends more on their assets than on their attitudes” (Berry 1980: 329). Tacoli’s livelihood framework model (1999), which analyzes peri-urban poor’s livelihood strategies, is similar to Berry’s studies by systematizing the different assets of the peri-urban poor. Below, an adaptation of Tacoli’s livelihood framework to the SE-PA settlers’ case.

For our purpose, the categorization of settlers as peri-urban poor is adequate; they live on the margins of urban influence, and the majority have diversified income generation through multiple occupations. The aim of a “sustainable (rural) livelihood framework” is to detect the critical factors explaining resilience to stress or entrance into vulnerability. In this sense, Carney’s definition of a positive livelihood balance is expressed as “A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base” (Carney 1998: 2).

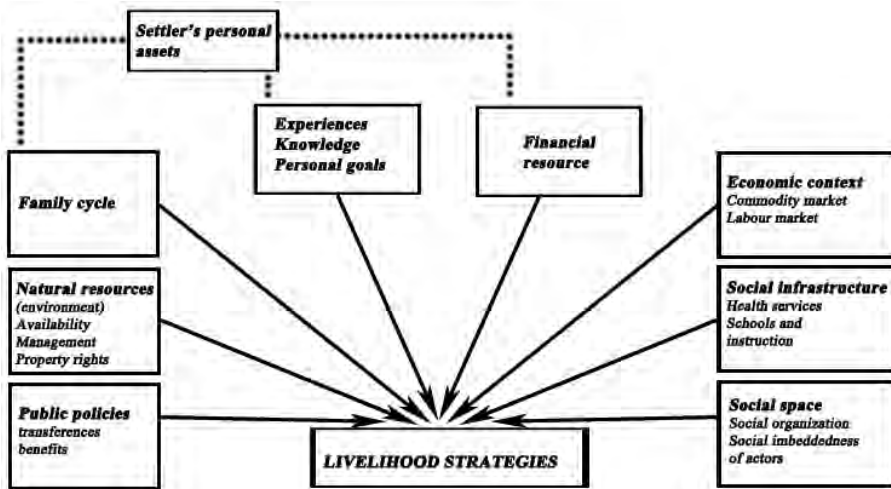


Figure 3. Settlers' livelihood assets in SE-PA (elaboration: the author).

Taking information as an important asset to create certain behavioural options, Berry states, that "improving the flow of information to a decision maker does not necessarily increase the capacity to act on it" (Berry 1980: 326). Further factors must be considered in order to understand decision makers' actions. In the special setting of landless settlers' hamlets in the Amazon, the natural resource (generally, the tropical rain forest) is the most important asset available to settlers. This resource is strongly linked to State control and public policies. According to Menzies,

States have intervened to assert control over the forest estate, claiming that only the State is able to engage in scientific, long-term management of a resource whose environmental services and economic benefits extend well beyond the area immediately under the control of forest communities (Menzies 2007: 5-6).

He also says

In partitioning the landscape between forest and other land uses, states divided the rural population into categories of legal and illegal residents, usually conforming to ethnic and cultural stereotypes of (legally) settled agrarian people and (illegal) squatters – mobile nomadic forest dwellers persisting in their customary way of life (Menzies 2007: 6).

In the case of the SE-PA, the tropical rainforest, the soil and its biodiversity, has been the focus of interests and conflicts since the early 16th century during Portuguese colonization. After identifying settlers' assets and realizing their role in livelihood decisions, I move on to explore ideas about risk, one of the major topics in academic discussions on peasants' rationale.

2.3 Risk and constraints

Risks are defined as new, unforeseen effects (Caplan 2000: 22); the acceptability of risks, i.e., what is being considered as a potential risk, is a political issue. The concept of risk is socially constructed, and the ongoing risk debate in society can be considered an indicator of rapid cultural change (Caplan 2000: 10). Beck (1992) and Giddens (1991) explain that the world today has entered into “late” or “high” modernity. Risk is central to this scenario, because risk taking and risk definition are characteristic issues of modern society. Late modernity introduces new kinds of risks former societies and generations did not have to face. A new feature of this scenario is that distant events impact local societies as well as on the world as a whole, even as

There can be no question of merely taking a negative attitude towards risk. Risk needs to be disciplined, but active risk-taking is a core element of a dynamic economic and an innovative society (Giddens 1991: 29 in Caplan 2000: 6).

In addition, a different perception of time prevails in modern society; in former societies it was the past which defined the present; today, it is the future which determines decisions made in the present (Caplan 2000: 5).

In the context of the Amazon land reform settlements, risk is defined differently by different groups of actors and different layers of impact. For the settlers themselves, risks exist in relation to the immediate satisfaction of basic needs and in relation to financial means not being available in time and in the desired quality, for example for the acquisition of the required inputs for agricultural and animal production. This occurs constantly due to delays in land reform bureaucracy and slowness of standard procedures in bank and credit institutes. Furthermore, forecasts in relation to agricultural outputs and market chances may fail. Opting for animal husbandry and for diminishing the protected area on their allotments, the settler might not initially focus on the environmental damage that raising cattle could provoke, but instead focus on their own immediate needs and expectations. In contrast, an environmental activist or a conscientious politician analyzes logging of tropical timber in terms of danger for local or world climate. In either case, it is clear that people prioritise risks. According to my own observations, even land reform peasants who cut tropical trees know that deforesting might harm the environment as a whole and cause damage to water availability or to climate.

Furthermore, nobody considers all potential risks at once, and “acceptability of risk is always a political issue” (Douglas & Wildavsky 1982 in Caplan 2000: 8). Additionally, the definition of risk is always a product of knowledge and consent about the most desired prospects of a given social group; risk is related to consenting about the future and “*all* modes of assessment are biased by the social assumptions they make”

(Douglas & Wildavsky 1982 in Caplan 2000: 8). In my case study, initially social movements and public agencies overrated the benefits of land reform as a means of creating social justice and equity at the detriment of the environment. Risk perception is determined by social organisation and by culture (Douglas & Wildavsky 1982 in Caplan 2000: 8-9) and “Common values lead to common fears, thus the choice of risks and the choice of how to live are linked and each form of life has its own risk portfolio” (Caplan 2000: 9). Therefore, it is important to consider attitudes towards risk in the context of peasant livelihood decisions and the implications of risk management as

[...] farmers are unlikely to court disaster [...] (and) will not only display a preference for a certain probability distribution of outcomes, but also avoid options that may lead to starvation, indebtedness, or high incidence of very low incomes. [...] statements of safety-first behaviour – are eminently sensible (Ortiz 1983: 258).

Equally important is that “Most allocation problems are not resolved through a single complex decision. A sequence of decisions is often required” (Ortiz 1983: 259).

In the case of SE-PA settlers the initial stage is when landless people become aware of the opportunity to gain an allotment of land reform and where they must consider whether to join an invasion of *fazenda* land. The second stage is the encampment phase, characterized by the decisions on how to guarantee the permanence on *fazenda* land, still seen as an illegal act. Decision alternative is to abandon the place instead of expecting to become a beneficiary of land reform, as in certain cases INCRA does not transform the squatted land into a land reform settlement, when landlords successfully bring an action against land reform expropriation. The third stage, when finally the encampment is officially recognized and subsequently established as a project of land reform (*projeto da reforma agrária*), is characterized by multiple productive decisions about what to plant, additionally to the conventional *roça* (food crop), or whether raise cattle. The fourth stage I label as consolidation or split off phase; after several years of living on the allotment and trying to make a living, settlers evaluate whether to continue in these conditions, or leave the hamlet. Every phase provides opportunities to dispose of certain assets and unforeseen developments may occur in settlers’ households, or among extended family and kindred, due to supra-regional family bonds and family solidarity and their importance for settlers’ lives. These situations can cause alterations in settlers’ plans.

Conditions to resist, or even to profit from, land reform benefits depends on the aforementioned assets a certain settler (and his or her domestic group) has from the very beginning of the settlement stage. One of the core concepts in this context is “vulnerability”. Researchers relate vulnerability to risk provoked by the constraints and impacts of globalisation. The concept of “vulnerability” better expresses the new and multifaceted features of the impact of globalisation than do concepts such as “poverty”, “inequality”, “risk”, or “insecurity”. In contrast,

[...] analyses of globalisation [...] widely refer to many ways in which globalisation is making more vulnerable such features of our social world as national economies, social groups, fragile ecosystems, political systems or cultures [...] (Kirby 2006: 3).

Vulnerability is a useful concept that is described as a given situation where individuals or social groups (or classes) offer special characteristics in combination with external threats (Kasperson, Kasperson & Dow 2001: 24 ff). Vulnerability is dependant on certain circumstances and hazards and, therefore, not an independent value. In relation to environmental risk, the factors which provoke and influence vulnerability vary considerably and have to be analyzed in scales or spheres of influence. Factors which influence vulnerability of social groups are: “ecosystem fragility, economic sensitivity, social-system sensitivity, individual decision-making and demographic characteristics”, among others (Kasperson, Kasperson & Dow 2001: 27). The concept of vulnerability is an appropriate attribute for characterizing the settler population in land reform hamlets in SE-PA, because they are objectively exposed to environmental hazards, they may contribute on their own by destroying the natural resources on their individual allotments, and they suffer from economic deprivation and social exclusion. Some of the settlers manage to move out of initial vulnerability, others may worsen their situation until they must sell one of their few assets, the natural resources of their allotment.

2.4 Options and choices

According to Fox (1999) and Lupton (1999), risk and hazard are social constructions and life choices are made by people in relation to risk. One has to evaluate risk and hazard and its likelihood to occur, therefore forecasting the future outcomes of present acts by, for example, estimating future prices. Even if small farmers do not evaluate accurately estimate future output, at a minimum they will calculate if something will be worthwhile to plant or grow (Berry 1980: 325). Taking into account peasants’ livelihood decisions as a whole, Ortiz, discussing economic models on decision rules as early as 1983, states, “[...] there is a range of possible solutions [...] some of the favored solutions may be nonmaximizing strategies” (Ortiz 1983: 266). Furthermore, there is

a wide range of cultural patterns which define options and strategies. As Seitz (2008) explains in his case study on decision-making processes within the context of natural disasters in the Philippines by an ethnic minority of former foragers (today called swidden farmers), reactions follow patterns of mobile spatial strategy, utilisation of multifarious resources of their habitat, very flexible social organisation in small family groupings, and economic strategies characterised by short term planning and immediate food consumption. These patterns would be typical for hunter gatherers (Seitz 2008: 142). Even neo-rural populations in the Amazon of settlers with diverse origins dispose of some of these behavioural patterns which in Brazil seem to be structural to the poor, peri-urban population to a degree. Furthermore, position in household cycle ("Chayanov's concern" of the interrelation of family labour, consumption pattern, and output) is equally important (Ortiz 1983: 265) and evidently plays a role in settlers' decision making, e.g., deciding when to split the rural household into two units, one urban and the other rural. As previously stated, there is a range of options and a certain degree of control that a decision-maker has over available resources (capital, labour, land, etc.), which will affect his or her evaluation of options (Ortiz 1983: 278-279). In the SE-PA case, only acquiring enough arable or pasture land, and enough capital to buy animals, fences and other inputs, while possessing enough workforce inside the household or having the possibility of hiring help at low costs, enables the settlers to raise cattle. In this case, financial capital is often obtained via special credits by land reform, while pasture land and a workforce may be obtained via a mechanism called *a meia*, whereby settlers give cattle to neighbours with enough land who agree to pasture cattle on their allotment and in turn receive a certain percentage of newborn animals.

One of the most important factors biasing the options and the subsequent strategies is having an adequate time horizon. Ortiz (1973) found that long-term decisions, such as when farmers invest in a "life-time" income, modify the calculus of behaviour. Furthermore, one has to distinguish the sectors of subsistence and cash crop production as well as constant adjustments on behalf of land, time, and input according to changing circumstances. As a rule, Ortiz claims that decisions regarding subsistence production and occasional wage labour are made in the course of action, whereas decisions regarding cash crops are usually made beforehand (Ortiz 1973: 7-8 in Berry 1980: 328). In the case of settlers in SE-PA, the most fundamental subsistence "decision" (in brackets, because it is self-evident), is the cultivation of a *roça* (rice, beans, maize, manioc) based on slash and burn agriculture. The *roça* is the basic food crop of Amazonians and northeast Brazilians and even if peasants become cattle raisers they try to preserve a section for the *roça*. But the most commonly desired option is to become a cattle raiser which is nurtured by the myth of big estates in the Amazon, a fruit

of the 1960s and 1970s speculative boom on Amazon soil, and subsidised credits for cattle rearing in the 1990s. Additionally, even land reform credit lines basically have oriented peasants towards productive credits for animal husbandry (Ferreira & Salati 2005; Loureiro & Pinto 2005).

Additionally, attitudes towards risk and the implications of risk management are important as “[...] farmers are unlikely to court disaster [...]” (Ortiz 1983: 258). Farmers will not only display a preference for a certain probability distribution of outcomes, but also avoid options that may lead to starvation, indebtedness, or high incidence of very low incomes. This behaviour can be labelled as safety-first behaviour, typical for small peasants (Ortiz 1983: 258). In the case of land reform beneficiaries, motives for removing every available asset at their disposal could be called “clearing away”, as an attempt to profit from a situation already evaluated as wasted.

As a further constraint, Berry, resuming different studies on farmers’ decision, claims that “farmers’ readiness to take advantage of new income earning opportunities often depends more on their assets than on their attitudes” (Berry 1980: 329). This fact imposes important further limitations to farmers’, or in this case, settlers’, choices and strategies.

3. Settlers’ decision making in SE-PA

3.1 *Land in historical perspective in SE-PA*

In the 1930s, one million hectares of Brazil nut trees were distributed by the state of Pará in the form of transfer leases to political allies of the state government. There were about 250 groves in the hands of the local oligarchy, the so called polygon of Brazil nuts. In exchange for the estates, the retribution of favours conceded by means of “voter inducement” was expected (Emmi 1999). With the creation of the Land Statute Bill in 1964, an agreement was established between the reigning military government and sectors of the Catholic Church. Between 1971 and 1972 this bill allowed the distribution of 4,100 lots alongside the Trans-Amazon Highway (*transamazônica*) on a 10 km wide strip of land enabling landless colonists to settle (Wambergue 1999: 7). The areas furthest from the highway were given to Brazilian businessmen. Due to growing demand for land at the end of the 1970s, there was no longer any free land available for landless people. Therefore, rural and landless workers began invading and squatting upon larger properties as *fazendas* (large cattle farms) (Wambergue 2004). This process was accompanied by growing violence related to the occupation and expropriation of land, resulting in the death of hundreds of landless and other rural inhabitants.

In the 1980s, a new phase commenced in the Amazon in general, and in the SE-PA in particular. In regional and world markets, accelerated searches began for scarce

resources such as timber, electric energy, aluminium, and traditional raw materials such as iron-ore. In this period, a massive project named the *Projeto Grande Carajás* (PGC), with an extension of 900,000 km² was implemented. This was one of the largest integrated “development” projects ever launched by an emergent country (Hall 1991 in Ferreira & Salati 2005: 36). This stimulated, among other things, the arrival of more persons in search of economic opportunities. Another demographic boom occurred in 1985 with more than 500,000 people concentrated in agglomerations in Marabá, El Dorado dos Carajás, Curionópolis, Paruapebas, and Rio Verde. People were attracted by gold prospecting in the Serra Pelada and by employment opportunities with the PGC mega-project (Ferrari & Salati 2005: 37). A large portion of this population would become beneficiaries of land reform in the future; the first settlements in the region were established even in the 1980s. In 1987, the first officially recognized settlement of Araras was established in the municipality of São João do Araguaia.

According to information of rural assistance staff in SE-PA, initially, the individual allotments for land reform in the region were an average of 50 hectares, and occasionally up to 100 hectares in size. This information is compatible with numbers provided by INCRA SR 27. According to information obtained during fieldwork, by 2007, the lots are often inferior to 20 hectares, making sustainable land utilization impossible. The reduction in allotment size administered by INCRA is due to the overcrowding of settlements in order to show good results of implementing the land reform in the region. The traditional production system employed in SE-PA is the so called slash and burn practice. The traditional production system employed in SE-PA is the so called slash and burn practice. In this system the forest is cut down and burned after a period of desiccation. The ashes left over the top soil, from 2 to 5% of the original forest biomass, give enough nutrients for a cycle of soil cultivation. The area is maintained under cultivation mainly with subsistence annual crops, such as rice, manioc, and beans (*roça*) for a period varying from two to four years. The exhausted soil is then left for the natural succession with subsequent growth of secondary vegetation (*juquira* or *capoeira*) for a period of 10 to 20 years. In this period of time the soil fertilization would be recovered with the replacement of the nutrients and organic matter. Sometimes, useful plants of longer life-cycle as fruit (i.e. Brazil nut - *Bertholletia excelsa*) and medicinal trees etc. are planted and left for posterior return in the area. This can be the case to find so many Brazil nut and other useful trees grouped in some areas thought to be of primary or untouched forests. With the proximity of the civilization, modifying the values of the former inhabitant (*caboclo* and indigenous people), and the rise in demography of the neighbourhood makes land scarce for the employment of this production system. The area under cultivation rises and the rotation period is shortened sometimes to

five or less years giving not enough time for soil reestablishment. The over intensive soil use declines its fertility with the instauration of an impoverishment cycle.³ Also crop rotation is not possible with the introduction of cattle which requires more area designated for pasture (Michelotti & Rodrigues 2004; Reynal et al 1995). Sustainable animal husbandry in the region is only viable with at least 100 hectares of land, and, as already pointed out, as the majority of settlers only have less than 20 to 30 hectares of land, rearing cattle, without any doubt, leads to environmental destruction.

In addition to the natural resources (soil and vegetation) conceded to the beneficiaries, transferences provided by land reform (credits, grants, and agricultural services) are the most valuable assets donated to the settlers. These assets are constant objects of dispute between different interest groups in the settlements and the region as a whole, as well as are attracting “free riders” (Pies 1997) from across Brazil. It must be emphasized that currently the functioning of settlements depend considerably on public organizations such as INCRA, IBAMA (Brazilian agency for the environment), EMATER (*Empresa de Assistência Técnica e Extensão Rural do Pará*, rural extension and assistance service in Pará), and the banks and on groups such as unions and local politicians mediating between these entities and the individual settler. Consequently, the question of which group to align with is one of the most important for settlers’ representatives. This can lead to power struggles between interest groups within the hamlets as the issues of access to public resources and internal hegemony of the settlements are at stake.

From the 1980s and 1990s cattle-rearing activities intensified and the cultivation of perennial crops was promoted and supported by the credit policy of the government through specially subsidized credits like FNO (*Fundo nacional de financiamento do norte especial*) and PRONAF (*Programa nacional de fortalecimento da agricultura familiar*), both national programs to fortify smallholders’ agriculture). By contrast, when present-day settlements are being recognized by INCRA, the settled family has the right to a series of benefits like housing credits, food baskets and others, but making these rights available can take a considerable amount of time. When settlers commercialized their allotments, apart from land, the right to the benefits of agrarian reform are being sold, even if it is forbidden.

3.2 Settlers’ trajectories

To continue our analysis on settlers’ decision making, we must remember that settlers’ livelihood does not depend entirely on farming. Therefore, certain assumptions about

3 This information was kindly provided by the Brazilian professor of agroforestry Ciro Abbud Righi (ESALQ).

farmers' decisions and behaviour are not adequate for the reality discussed here, even though researchers on peasant studies admit that in large parts of the world peasants earn their living from on-farm *and* off-farm activities. In this case study, the majority of the settlers can be characterized as peri-urban and rural poor, with diversified income generation. Before becoming a client of the land reform, settlers worked as rural day labourers, ambulant salespeople, maids, and guards, or they had tried to make their fortune as mining prospectors. A considerable portion of settlers experienced different migration episodes, and had even lived in distant Brazilian cities such as São Paulo or Belo Horizonte in the developed south and south-east of the country. In the case of land reform hamlets, multiple uncertainties, actors, and institutions are involved, in addition to a fragile environment being at stake. In order to outline sequences of decision-making, in the following I present the stages of becoming a client of land reform.

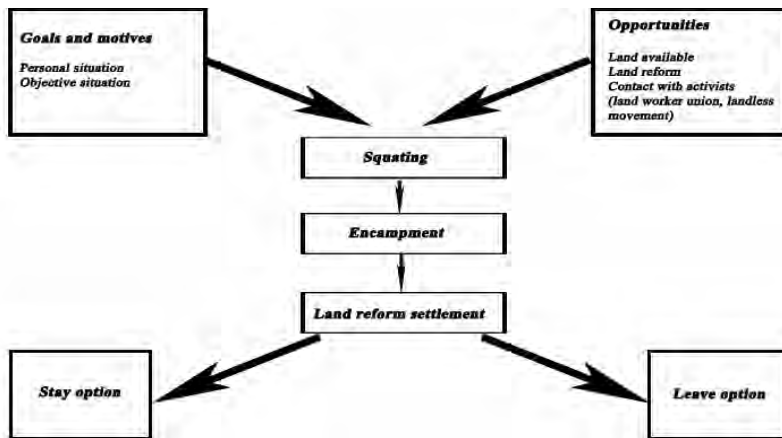


Figure 4. Settlers' trajectories: stages of becoming a client of land reform (elaboration: the author).

At the initial stage, the interested persons, usually landless, become aware of the opportunity to gain an allotment by land reform. They may not have been living in the surroundings of the estate in question; perhaps they hear of planned actions through relatives or acquaintances, or maybe they are informed through the landless movement or land worker unions of planned invasions. Generally, the formal process of private land appropriation by the State and its further distribution as land reform parcels is initiated by squatting illegally on appropriated territories or unproductive *fazenda*

land.⁴ Landless people's individual situations and their respective motives are diverse from the very beginning and onward. They may be an impoverished, de-capitalized rural population, working as day labourers in the surroundings of the future land reform hamlet, or they have recently come in search of opportunities from one of the poor rural north-east states of Brazil, such as Maranhão, Piauí, Ceará, or Bahia. Both groups are vulnerable. Others are provided with financial resources due to productive or commercial activities, or they are former urban or rural employees who have been receiving a retirement payment. In addition to financial assets, the composition of the domestic groups in relation to the consumer-producer-ratio and its household cycle status are of importance. Motives to squat on land are to improve their income situation in general, to improve livelihood conditions like education, health, and consumption pattern, to become a cattle raiser (*fazendeiro*), or to wait for an opportunity to again become a gold prospector.⁵

The second stage is the encampment phase which, after having joined the squatters' movement, is characterized by a period from several months up to several years of insecure and unstable living conditions on the occupied area until receiving official recognition as beneficiaries of land reform. The process of expropriation of the squatted area is complicated and time-consuming. In this stage, the harshness of the situation causes the majority of people to desist because they cannot stay longer or do not have a relative who could intermittently stay in the encampment; permanence on the allotment is a prerequisite to be considered as a beneficiary of land reform. On the other hand, this period is important for the construction of a social organisation of the future settlers. The association of settlers is created in response to a demand from the land reform bureaucracy; the landless movement or the Church provides organizational and, sometimes, material support. Before the creation of land reform in 1984, landless movements had no legal base to rely on and confrontations between landlords and landless people were violent, and hundreds of dead across Pará were mourned as a result of land conflicts (Hébette 2004, also reports of Pastoral Land Commission of the Brazilian Catholic Church⁶). Today the expropriation process of unproductive or illegally acquired estates (*terra grilada*) and their transformation into official land reform settlements is a regularized process, including several supportive measures such

4 Unions and social movements are often aware of the fiscal and legal situation of territories through their legal departments or are informed by human right activists.

5 One of the largest gold mines in the world, the Serra Pelada, exists in southeast Pará. Decades ago, adventurers across Brazil were tempted to try and make their fortune there. Due to prohibition in the 1980s, a portion of former gold prospectors remained in the region and looked for other income-generating opportunities. Many became clients of land reform in the region.

6 See online reports at <<http://www.cptnacional.org.br>> (01.12.2012).

as the provision of food baskets for the squatters by land reform agency INCRA. But the process by itself is complicated and landless' claims are fought against by real estate owners. Even violent conflicts and assassination of union leaders still happen.

During the third stage, which I designate as the settlement phase, which is the first three years after the official creation of the settlement where recognized beneficiaries of land reform receive credit benefits and grants. During this period, public funds and transferences are essential for a large portion of settlers and their families, to make their living. Productive activities like planting the *roça*, as well as deforesting in order to gain graze land for cattle production, begin.

In the fourth stage, which I designate as the consolidation phase, the gap in terms of adopted strategies and well-being between the settlers widens even more. For some of them, the goal in this phase is to consolidate the livelihood basis through splitting the household into an urban and a rural nucleus. Wives and female children may live in the central city of Marabá where the children attend school and the wives work in the informal sector (cloth- or food-fabrication, sales, etc.). The husbands stayed in the countryside together with their adolescent or adult sons to run the farm as diversification of activities by off-farm income is a key strategy of settlers' households. Furthermore, access strategies to additional financial resources such as credit opportunities or off-farm employment are applied via unions, middlemen, or political parties. For others, the most urgent goal is to secure livelihood after having used productive credits primarily for consumptive expenses. Settlers use the natural resources on their allotments mainly by destroying big parts of the natural vegetation, such as timber, to cover subsistence costs. This is often the case of people who were already impoverished at the moment they received their land reform allotment. Additionally, the household often suffers an unfavourable producer-consumer rate. Eventually, unforeseen expenses cause further vulnerability to the domestic group, like severe illness, accidents, or unforeseen expenditures or lost of money. At any given moment, the households may no longer be in a position to spare natural resources from devastation. For many settlers, the fourth stage is when they evaluate whether they should stay in the hamlet. Nevertheless, for impoverished, vulnerable settlers, there may be no further options. The "free riders", people who have only come to plunder the natural and financial resources, may have already left their allotment.

3.3 *Social context and assets*

Social capital is at the disposal of nearly all clients of land reform, and primary bond solidarity is based on the cooperation of their nuclear family or domestic group which is a very strong and common feature of the rural population in Brazil. As a beneficiary of the land reform, a settler gains an allotment provided with natural resources.

Quality and extension may vary between the allotments, according to the conditions of the territory under consideration. Settlers gain further assets at the beginning of the settlement process in the form of grants and credits provided by governmental social programs or as specific measures by land reform. Certain assets are available for all clients of land reform; others are only at the disposition for some of them. These limited assets can be personal savings, off-farm income, and imbeddedness in networks and strategic groups that facilitate access to resources. In order to bridge the gap of missing financial assets, settlers may try to acquire access to resources via external representation such as land worker unions or political parties, or via client-type relationships to influential politicians. An additional asset is one the majority of settlers possess and which is essential for succeeding in the harsh conditions of the encampment and settlement episode: cultural capital in the form of behavioural patterns of settlers expressed by spatial mobility, imbeddedness in supra-regional family networks, and a great capacity to adapt to new circumstances. This resiliency is a proven capacity to live with uncertainties and is a special pattern very present in rural and peri-urban Brazilian peoples' livelihood.

3.4 Risks and constraints

One of settlers' most important obstacles is the availability of financial capital or credit. Even if credit support is being offered by government through special programs such as PRONAF, public funds are limited and procedures take long amounts of time. Credits are frequently made available at inopportune points on the agricultural calendar; usually when inputs should already have been bought and applied. Furthermore, the majority of settlers come from other environmental regions within Brazil and are not accustomed to tropical agriculture, thereby often committing severe errors. Another challenge is adapting from being a dependant rural labourer or mining prospector to becoming an independent farmer-entrepreneur. Many of them have considerable difficulties studying market opportunities and suffer after bidding on certain productive decisions, from failing market access, or from difficulties in meeting market demands. It is clearly difficult to implement a functioning market structure in a semi-deforested tropical region that does not offer basic infrastructure such as roads or transport facilities. Additionally, financial and economic factors as well as personal motives such as illness, separation of spouses, or the departure of settlers' adult children, can provoke settlers to search for other opportunities outside of land reform allotments. Unfulfilled dreams or expectations, i.e., to become a *fazendeiro*, may frustrate farmers and may function as an accelerating motive to search for alternatives to on-farm working.

3.5 Options and choices

Important options and choices during the settlement experience are: Whether to join the squatter movement, whether to endure to the long lasting and uncertain encampment period, whether to opt for the agricultural practice of slash and burn, whether to raise cattle, and if so, to what degree, and whether to work in off-farm activities. As previously stated, every option depends on certain conditions or assets. For our purpose, we consider deciding whether to deforest, the core decision, even though the Ministry of Environment only permits at maximum 20% of a given estate to be deforested for agricultural or commercial aims. I previously explained that reality is far from legislation – not only in the case of land reform settlers – but this is especially true for landlords, mining and timber companies, and for large cattle raisers. In order to analyze the motives affecting decisions relating to the rain forest, I adapted in figure 5, as an analogy to Wilk's analyses of motives based on the correlation of time and social space (Wilk 1993: 199 ff), the correlation between scales of conservation (or deforestation) of the tropical rain forest and time.

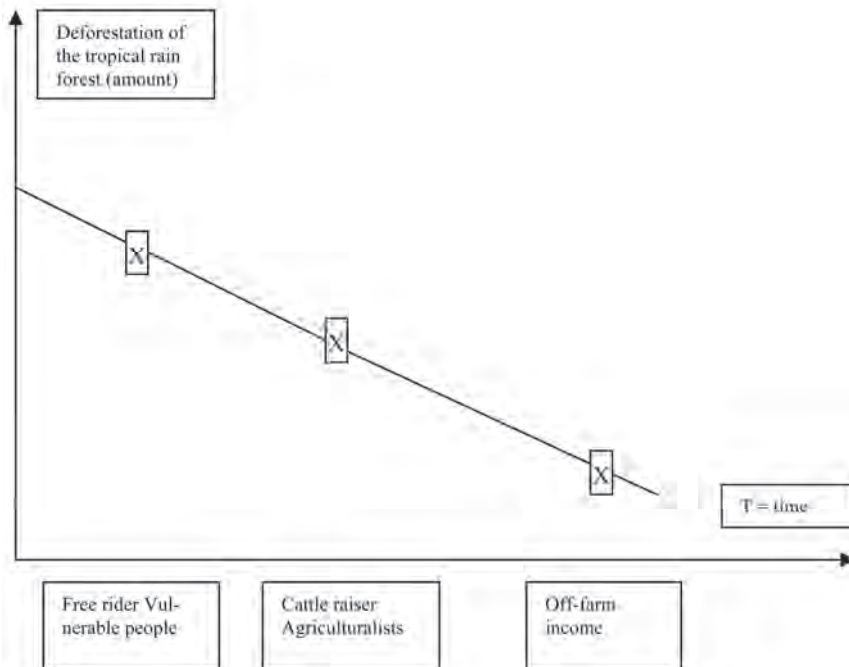


Figure 5. Scales of deforestation of the tropical rain forest and time.

4. Deforestation and motives

On the deforestation–time-grid the y-axis shows the amount of tropical rain forest deforested by specific settler groups; the x-axis shows the time-factor. By combining these two values we can now compare the relation between time and the amount of deforestation. The highest amount of deforestation, caused by *free riders* and by vulnerable people, allows us to identify “selfish” motives underlying the behaviour in both groups; i.e., that the precious natural resource is sacrificed for egoistic motives. However, by more closely examining the respective situations of the two groups under observation; we recognize that from the beginning “free riders”, have a short term expectation on behalf of their allotment. In contrast, vulnerable people may have had middle or long term expectations on behalf of their allotment but, due to circumstances, had not been able to leave vulnerability. These persons and their motives could be labelled as “without choice”.

In the middle position are cattle raisers and agriculturalists. The behaviour of cattle raisers could be labelled as “selfish”. This may be due to attitudes from the beginning of the settlement experience, or it may have been adopted as a strategy due to the emergence of opportunities to assist in raising cattle, such as credits conceded by land reform, market opportunities, etc. The result is that the environment becomes a victim of utility maximization. Even agriculturalists act “selfish” and cause damage to the environment when they adopt the slash and burn method for their *roça*. As we consider ideal types of productive behaviour, the actual amount of deforestation may be larger in the case of cattle raisers than in the case of agriculturalists.⁷ Artesian extraction of native fruit like cupuaçu, cacao, or planting of orchards is positive for the environment because insignificant amounts of forest are destroyed and these practices can therefore be labelled as “compatible to the environment”.

The third group deforests little and is composed of those who earn their living by off-farm-activities. In cases where a conscious choice was made not to deforest, their behaviour could be labelled as “moral” because they explicitly desire to maintain and protect the rain forest as a public good. They consider nature as a value of its own in order to preserve it for future generations, for the world climate, or like the group of settlers who are evangelicals (*evangélicos*) as a creation of God. The moral decision-makers’ behaviour can also be labelled as “social” because they want to spare the forest for their own children and grandchildren; this group clearly has a more long-term perspective than the “free riders”. On the other hand, even in this group of forest conservers we find attitudes or motives to be considered as “selfish”, because they are people or urban employees who are not target groups of land reform, as stated earlier.

7 Agronomists consider agro-forest systems as the only sustainable form of agriculture in the tropics.

They can be considered as “with other options”. People “with other options” have alternatives to deforesting the natural resources on their allotments.

The identified groups and their motives for deforesting the tropical rain forest are: people having no other options, and people with immediate necessities or goals, such as vulnerable people who do not see any other option to earn their livelihood and thereby sell the environmental resources of their allotments. Furthermore, have been identified the “free riders”, whose aim is to profit from the facilities of land reform such as credit programs and donation of an allotment. They are often a front for fraudulent entrepreneurs who want to re-concentrate land. Cattle raisers also destroy forest by increasing their herds over time, and, as a consequence, later need larger parcels of pasture. As has been shown, people are least likely to deforest when their livelihood is earned primarily by off-farm-activities. As an alternative to the classification used in Figure 4, a further classification could be described. The options could be ordered according to a discrete continuum of people “with choices” and others “without choices”. Additionally, deforesters as well as rain forest protectors may be motivated by selfish reasons. But, in any case, the outcome of this behaviour is more important than its intention, therefore, we might introduce “compatibility to the environment” as a new category in combination to the existence of options. Accordingly, settlement policies and programs should be revised and the compatibility between social programs and environmental protection and the subsequent actions should be re-discussed.

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