Population and Environment: selected issues

Agrarian Reform, Population and Environment*

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Introduction

This chapter deals with the agrarian reform programs of the Ministry of Agrarian Development, particularly those programs undertaken by means of land expropriation, and their demographic and environmental impacts. These programs underwent a sharp increase (in numbers of settled families, expropriated area, and public monies invested)[1], in the second half of the 90s. Beyond numbers, of course, we are interested in the amelioration of the standard of living of these populations, as well as in their economic and environmental sustainability. But to understand the characteristics of agrarian reform and its impact, one must first deal with the macro-context of its implementation during these years, both macro-economic and socio-political.

The foremost mark of this period, especially having in mind our subject in this chapter, is that the 90s, particularly the second half, was a period of deepening democratization in Brazil. But it was also a period of tumultuous economic and social conditions, which severely limited possible public choices. Three groups of processes and changes marked these years in which agrarian reform efforts were being intensified. They are of economic and social-political context, whose causes we cannot focus on here but which strongly condition policies and programs in the agrarian as well as in other areas of public action.

First, this has been a time in which the country's economy and life has undergone a major structural change, especially visible in the urban sectors of the economy, which were mainly conditioned by the country's greater integration with the world economy. Secondly, we must point out the continuous macroeconomic efforts made, after the successful Real stabilization plan in 1994/5, to cope with an economic system that had been twice (in early 1990 and in 1994) on the verge of hyperinflation. Thirdly, almost all these recent years were deeply marked by successive external shocks which were promptly met by a renewal of Government stabilization efforts, with their consequent contraction effects.

One should also briefly particularize the aspects of the most relevant context for the rural situation. The integration into international markets, especially with the intensification of the MERCOSUL, is responsible for a wave of technological changes, especially the advancement of the so-called information economies, based on a common digital technology. All this greatly transformed both the organizational as well as the technological and economic basis of the urban sectors, and consequently the characteristics of their labor market. In the urban area, not only was direct labor of all kind of enterprises drastically transformed,

but sub-contracting, leasing, privatization of formerly State sectors, transfer of economic activities from major urban agglomerations, all of these became pervasive changes. This involved an over-all transformation of the urban labor market, with higher levels of structural unemployment, and increases of the informal and own-account sectors.

This wave of transformations obviously introduced profound transformations in all sectors – agricultural and non-agricultural - of the rural world, in all its aspects. Some of the major aspects of this transformation will now be briefly touched upon.

In search for higher external competitiveness, the Government engaged in an extensive process of deregulation, especially with regard to financing and credit for agricultural activities. In the wake of overall more intense international competitiveness, and of sharply declining land prices – in its turn closely linked to the effects of the Real Stabilization Plan which largely annulled the role of land as a value reserve - came declining prices of commodities, and modernization of agricultural production especially in the agri-businesses. Together with this contraction of the agricultural labor market, one should note, there continued in the 90s the "closing up" (now almost complete) of the "escape valve", represented in the 70s and 80s by migrations and occupations of "free" land on the frontier, in the Amazon and in parts of the Center-west regions

As a general result of the transformation of the rural labor market, following as it did, the change and contraction of the urban labor market and the "closing" of the frontier, two interacting socio-political processes may be observed in the 90s (especially in the second half of the period): the intensification of strong rural movements and organizations, on the one hand, and increased agrarian reform actions, on the other. A few sentences now on each is due, leaving additional and more detailed information for commentaries in the following items.

The two major social movements and organizations which moved strongly to the foreground in the 90s – although both have a history beginning in earlier periods – were that of the land-less workers (in short MST) and that of the rural unions with their state federations and Confederation. Both were strengthened in the 90s and got much higher visibility and favorable public opinion.

Largely in this context, the Government intensified its reform efforts. One may say that the momentum gained by the social movements (MST and rural unions), together with the economic and political weakening of large landowners, were the facts which made Government actions possible in these areas at the level that had been contemplated in the electoral programs of 1994 and 1998. As a more general background, one must repeat, that Brazilian society was undergoing a rapid process of democratization, in which the Government could not but be sensitive to public attitudes and opinion. This situation also helped to shape the form and content of such reform actions, as continuous and frequent interaction and negotiation (interrupted at certain points) occur between government officials and the leadership and advisors of the social movements.

Recent brazilian experience

Increase in Numbers and Settlement Areas

At the end of 1994, after 30 years of the promulgation of the Federal Statute of Land, a period longer than a generation, Brazil had had more than enough time to have undergone ample social transformation, similar to what had happened in other countries. Until that date, however, the country's agrarian question remained unsolved. The results of the agrarian reform programs up to then were scanty face the dimensions of the problem and the millions of families with no land or insufficient land, living under conditions midway between poverty and misery. Up to the middle of the 90s, around 300 thousand families had benefited from agrarian reform and colonization programs by the Federal Government and by the States' land institutes. In a country where the social demand for land may reach 4 million families[2].

The agrarian situation after 1994 became a politically sensitive matter, as much because of the land occupations by land-less workers (and subsequent expropriation by the National Institute of Colonization and Agrarian Reform – INCRA), as due to growing conflicts that culminated with the massacre of peasants in Eldorado dos Carajás in Southeast Pará with 19 deaths (1996). These serious facts, which provoked widespread national indignation, led to an acceleration of Expropriation Acts by the Federal Government and to the creation of new land settlements of land-less workers. Political conditions soon arose making it possible for important modifications of the legal and administrative framework of agrarian reform to take place, especially because of the effective commitment of the Executive Power to deal with the 'Agrarian Question', and the strong social pressures manifested, particularly after the "March of the Land-less", which culminated in Brasília in April of 1997.

The land conflicts and the previous lack of definitions of land policies led to important social movements to elect the occupation of idle lands as a priority option[3]. This process, led by the MST – Movement of the Land-less Workers, had strong social support, especially by the middle class, in its initial phase. All this resulted in the implementation by the Federal Government of a land distribution program, unlike anything in Brazilian history.

In the period of 1995/01 the Federal Government expropriated 18,737,000 hectares, contemplating 584,301 families. The cost of the program diminished from R$ 19,412 per family to R$ 8,294 in the period from 1995 to 1999, and the average price per hectare of expropriated land was reduced from R$ 382 to R$ 264 in the same period.

Data of Table 2 are based on a sample of agronomic files of evaluation of expropriations undertaken by INCRA in the period from 1997 to May of 1999. The information reveals the following results of the agrarian reform of the Government of Fernando Henrique Cardoso.

Of the total expropriated land, only 21.1% were in use, 54.0% were not in use, the other 24.9% were areas for permanent preservation, legal reserves or not adequate for farming or cattle raising. This meant that only 75% of the

expropriated lands were of use for agrarian reform. The land that was not in use was either due to its low quality or because it demanded investments too great to become productive. To distribute this kind of land creates great problems for the beneficiary families or imply investments in agricultural credit too high for the State.

Table 1

Numbers included by the program of agrarian reform, Brazil, 1995 to 2001

	Settled families	Total area (1,000)	Cost per family (R$)	Price per Hectare (R$)
1995	42,827	1,313.5	19,412.74	382.67
1996	61,674	4,4 51.9	16,385.04	343.21
1997	81,944	4,394.5	14,614.59	292.23
1998	101,094	2,540.6	10,116.34	287.49
1999	85,327	1,478.5	8,294.83	264.75
2000	108,986	3,861.3	9,094.91	256.70
2001	102,449	1,697.0	9,701.00	
Total	**584,301**	**18,737.3**		

Source: INCRA (2002). Balanço da reforma agrária e da agricultura familiar.

On average, the expropriated lands which present simple problems of conservation and that are usable for agricultural purposes (Types I and II) are 13.66% of the total of expropriated lands; those that have conservation problems of average complexity (Type III) are 41.56% of the total, and land with complex problems of conservation, but still of agricultural use (Type IV), amount to 22.38% of the total. The land not proper for intensive use, but still adaptable for pasture and/or reforestation and/or wild life reserve (Type V) correspond to 6.58%. Therefore, a great part of the families get their lots of land in need of significant amounts of investment in technology and credit to transform it into productive land. The average agronomic grading of 0.56 of the expropriated land, confirms this fact.

The price by hectare of expropriated land, of R$ 215,00 is low, when compared with the prices of land in Table 1. But, taking into account that the expropriated land in average, are of type V, in reality that value is not so low.

The average cost per family of R$ 9,782.00 indicates only the price of the land, whereas the Government will have other costs so that agrarian settlers become economically viable.

Finally, these data clearly show enormous problems that both the beneficiaries of agrarian reform and the State have to face. Land ownership is the only necessary condition for undertaking farming and livestock activities. Together with providing the accessibility of land, the State, by means of public policies and programs, has to provide the conditions for the settlers to reach other markets, such as those of credit, inputs and technology, as well as to sell their farm products. Distribution of land is only the first step in the attempt that the poor of the rural areas reach a fuller and more dignified life.

Table 2

Brazil. Average indicators of the evaluation proceedings of land expropriation undertaken by INCRA

		%
Number of Evaluations in the Expropriated Lands (in sample)	847	
Period of Evaluation	1997-1999	
Evaluated Area (ha)	2,284,518	
Use of area of land estate (ha)		
♦ Permanent Preservation	137,553	6.16
♦ Legal Reserve	8,437	14.70
♦ Utilized	471,550	21.10
♦ Not Utilized	1,207,449	54.03
♦ Unusable	89,743	4.02
Potential use of the land area (ha)		
♦ Type I	8,734	0.39
♦ Type II	298,908	13.27
♦ Type III	936,540	41.56
♦ Type IV	504,362	22.38
♦ Type V	148,281	6.58
♦ Type VI	127,223	5.65
♦ Type VII	36,642	1.63
♦ Type VIII	192,535	8.54
♦ Accessibility	3.11	
♦ Agronomic Grading	0.56	
Averages Prices of Evaluation		
♦ Average Price of Land per ha	R$ 285	
♦ Average Price of Improvements per ha	R$ 71	
♦ Average Price of "Bare Land" (Terra Nua)per ha	R$ 215	
Estimated expenditure per Family	R$ 9,782	

Source: Agronomic Sheets of expropriation, INCRA. June, 1999.

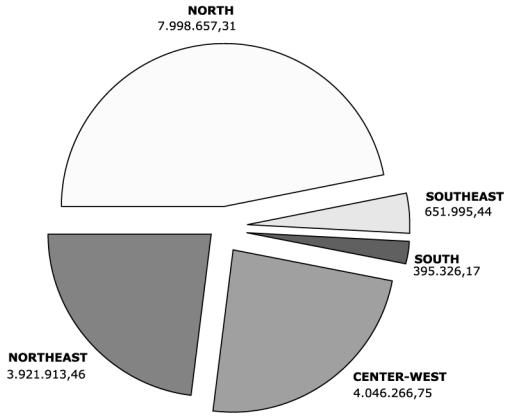
The Settlements and the concerns with the deforestation of the Amazon Region

This increase in area and in the rhythm of the establishment of settlement projects may have an impact in the area of forests. Concern with this question has been on the rise in recent years, both in academic and in governmental circles, as well as among NGOs, in particular in reference to the Amazon region,

where the greater part of expropriated area for the purpose of agrarian reform is situated.

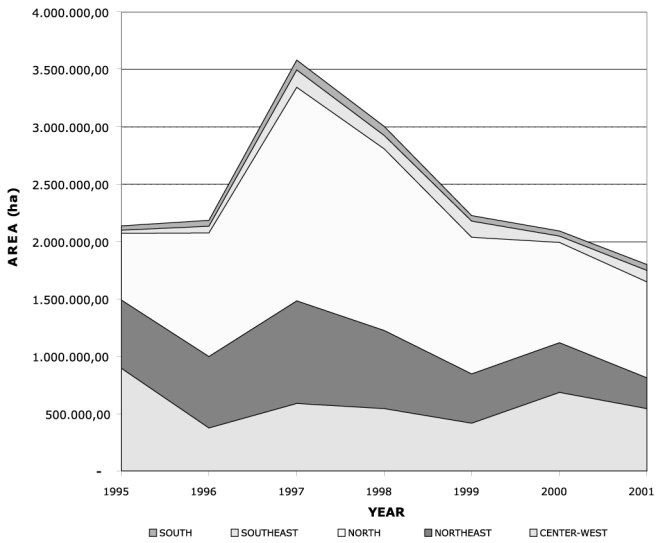
Graph 1

Area of settlements established between 1995 and 2001 (ha)



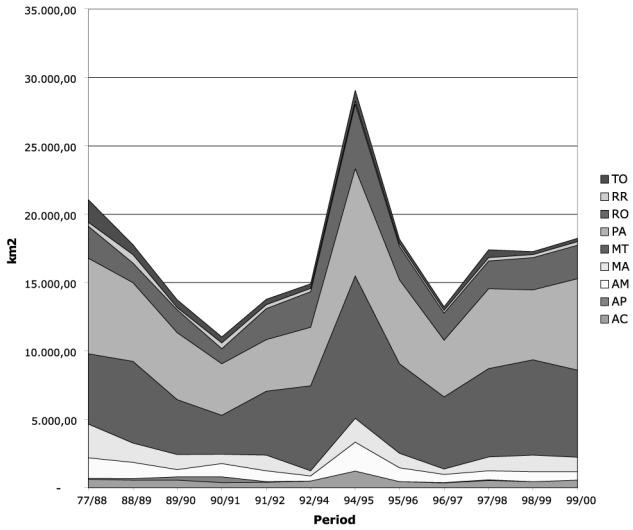
Graph 2

Area of settlements created - by region - 1995-2001



Graph 3

Average gross index deforestation (km2/year) - 1978-2000



Perhaps because of the size of the settlement areas in the Amazon region, some studies of deforestation pointed out agrarian settlements as responsible in part for the problems that were found. It is not possible in this chapter to analyze in depth this question, on which there is little data and only a small number of studies. To us now, it is important to point out its great complexity and indicate some lines of analysis.

The first fact is that the increase in numbers and in settlement area in the second half of the 90s did not result in an increase of the deforested area in the Amazon region (see graphs above).

On the other hand, it is very important to point out that these data refer to all kinds of areas included in the agrarian reform program. In its majority, these areas had already been put to use previously and most of it was already occupied by squatters (transformed in the official norms and statistics into "settlers"[4]).

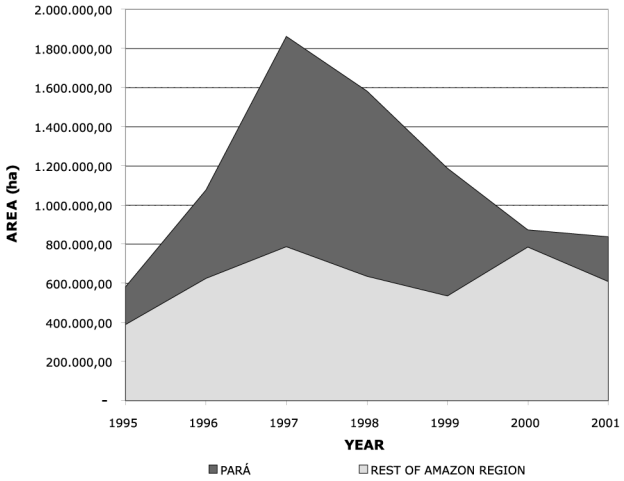
Let us give examples, to give an idea of the complexity of the situations. There were several extractivist settlements, whose objectives were precisely to allow the preservation of the forest threatened by the felling of the trees and to assure the livelihood of families that support themselves by extractivism[5]. There were areas of legitimization of old squatting rights, that were menaced by "grileiros" (people who forge land deeds), but which belonged to the Federal Union. There are also areas belonging to private owners, that were expropriated, but that also were occupied by squatters for years or even decades. And there are still other areas that had been deforested by large cattle farmers or by "madereiras" (enterprises that exploit wood or timber), to take out valued timber and areas that were under-exploited or unuseable.

One of the most emblematic cases of this complexity is the region of the "Bico do Papagaio" (Southeast of Pará and North of Tocantins). Conflicts between large farmers who owned the rights to commercialize Brazil nuts – who were not land owners, but "foreiros" – and the squatters who had established their lots in the region, were already frequent before the 70s, but isolated and not too serious[6]. At the end of that decade, two governmental acts modified the situation. On the one hand fiscal incentives and financing with subsidized interest rates worked as stimuli towards the establishment of extensive cattle-raising activities and in efforts by the "foreiros" and the "grileiros" to increase their squatting rights and to appropriate large amounts of land, expelling small squatters and establishing enormous areas of grasslands.

On the other hand, great governmental projects, as the mining complex of Carajás (extraction of bauxite, iron and manganese), the dam of Tucuruí, or the road from Belém to Brasília, resulted in an enormous population migration, only partially absorbed by the employment opportunities created by the great construction works established in the region. With the end of these construction works in the 80s, a significant part of this population found itself without employment, and had in the occupation of land almost untouched, its only alternative of sustenance. The region became, since then, the scenario of violent conflicts over the possession of land, which resulted in dozens of dead[7]. It is in this context that INCRA began increasing its action, multiplied the expropriation proceedings and intensified the creation of rural settlements in the area.

Graph 4

Area of settlements created in the Amazon Region - 1996-7



One of the events that marked recent history in the region was the massacre of "Eldorado dos Carajás", in which, in a conflict with the state police, 18 landless workers who had set up a roadblock in order to demand the acceleration of expropriations and solutions for their problems, died. The enormous repercussions of the massacre, in national and international media, resulted in the acceleration by the Federal Government of expropriations and of the agrarian reform program It was in the following two years, that the MDA[8] reached its highest indicators of expropriated land.

The graph above shows the relation between this event and the rhythm of creation of agrarian reform settlements in Brazil.

It is certain that the settlers and small squatters of the Amazon region fell the trees and continued doing so with small-scale fires to make their "roças" and raise their livestock. It is also certain that, in many cases, the small farmers have no conditions to observe before cultivation, the ideal period of regeneration of the vegetation after cutting and burning it. But on the other hand, in the majority of cases, they preserve an important part of the forest, as they depend on it for their cultivation.

As the data of INPE for deforestation demonstrate[9], deforestation of small areas represent a small percentage of total deforested areas, but it should in no case be overlooked[10]. In addition, as these small farmers use fire in the preparation of their cultivation areas, they cause accidental fires, responsible for a significant part of the forest area lost yearly in the region. More than deforestation, there is the risk of serious and accelerated degradation of soils, which are not adequate for constant cultivation.

The settlements may have also perverse indirect effects. The first of these could be caused by their demographic effects (migration flows). Research shows that, in the case of Southeast Pará, the greater part of the settled population already resided in the region before the creation of the settlement[11].

Another indirect effect, particularly observed in Rondônia, is that in anticipation of INCRA actions, squatter lots are established, in the expectation that the federal organ will soon engage in its "regularization" by means of the creation of a settlement project. In several cases, municipalities stimulated and organized this type of action, that afterwards brings to the area federal investments and votes.

In truth, we still lack sufficient studies to know all the resulting impacts of settlements in the Amazon region. But it is a consensus among specialists that they can hardly be made responsible for the deforestation that actually occurs. Deforestation, it is again necessary to emphasize, has complex and diversified causes, according to different parts of the Amazon region.

About 90% of the deforestation is concentrated within 100 km on each side of the main road network, around the development 'axis' and poles, established in the 70s and 80s (Alves). In effect, the history of the occupation of the Amazon region in the last decades has shown that the great projects in highways and in communications are the major vectors for the occupation of these territories, and of the deforestation process[12]. In more recent periods, these projects, which were concentrated before in the southern and eastern parts of the Amazon region,

are now directing deforestation to more remote regions located in the hinterland of the region. These are the projects that potentialize the diverse factors of deforestation.

In some regions, it is the large and extensive cattle-raising projects, financed with public funds[13], which result in deforestation, from which "madeireiras" (timber companies) profited. Besides the direct impact of deforestation resulting for the planting of pastures, these companies use fire for renovating pasture land, and this many times gets out of control and provokes the destruction of large areas of forest[14].

In other regions, these "madereiras" open clearings in the middle of the forest, places from where afterwards "grileiros" penetrate the forest and continue the deforestation for the establishment of cattle ranches, or open the way for squatters, coming from other regions, who use the traditional system of slash and burn farming. This pressure on the forest has accentuated in recent years, since the exhaustion of the possibilities of forest extractive activities in Southeast Asia has resulted in big international "madereiro" groups coming to Brazil to explore the Amazonian resources[15].

In the northwest of Mato Grosso, it was the production of grains in large scale (soy beans), by farmers coming from the South, which produced the deforestation of significant areas. About 1/5 of the production of soy beans in the country come from the legally defined Amazon region (Mato Grosso, Tocantins, Rondônia and Maranhão). In Rondônia, on the margins of the trans-amazon road or of other roads, colonization projects, established or sponsored by the Federal Government in the 70s or in the beginning of the 80s, resulted in various population movements (large and capitalized producers of grains or cattle-raisers, small family farmers with slash and burn technology, coffee producers, etc).

The great mining and siderurgical projects (Carajás and other mining projects, pig-iron industries, etc), continue being responsible for part of the deforestation, be it directly (charcoal manufacturing, great dams for energy production), be it indirectly (road construction, movement of population and enterprises). We should not forget, finally, the effects of population growth that in the region has been and is still in a rhythm above the national average.

In this context, the settlement policy (see footnote 8) may represent an important opportunity for planning the occupation of this vast territory. This planning may permit a relative fixation of a population that, by the action of the large farmers or of the big projects, has been traditionally pushed, each time further on, to areas of the territory in the interior of the Amazon region still not occupied.

The "assentados" may also contribute for the recuperation of already deforested areas that have been transformed in unusable pastures, which represent about 165 thousand square kilometers. As the "assentados" very seldom have resources to cultivate the totality of the areas of the lots, one of the trends may be the natural regeneration of the vegetation in the non-cultivated areas and the reintroduction of the slash and burn traditional system, in which the "capoeira", scrub grown on top of the burnt forest, has a fundamental role for recuperation of soil fertility.

The settlements can also introduce production diversification and the development of production systems in which the forest is preserved or subject to forest husbandry. This is a trend that has been observed by EMBRAPA, in a study following soil use, extending for almost two decades, in "Machadinho do Oeste", in Rondônia[16]. This region was occupied by a governmental project of colonization, in which mainly farmers coming from the South of the country were settled. In the beginning, deforestation was a necessity not only economic but legal. In effect, the cultivation of the area of the lots was one of the criteria for permitting the "colonos" to stay on this kind of project.

However, with time, diversified production systems were developed, some farmers specializing in meat cattle, which in general demand re-grouping of lots and land concentration, or more diversified projects of extrativism or coffee agriculture. This diversification reduced the rhythm of deforestation and even permitted the re-composition of the forest coverage of some areas.

Action by the Ministry of Agrarian Development may contribute to partly control these processes. In 1998, the Ministry established, together with the Ministry of Environment (MMA) , an agenda of common actions ("Land that I Want Green ") that contemplated, among other points:

- Not to expropriate properties that have more than 50% of its area covered by forests that are being exploited according to plans of sustainable forest husbandry approved by IBAMA – The Brazilian Institute of Environment and Natural Resources;

- Suppression of deforestation by "corte raso" (low level cutting) in settlement areas;

- Stimulation of partnerships with NGOs in areas with vocation for forest husbandry, with priority for educational actions and the management of natural resources;

- To develop training programs for INCRA technicians and settlers, beneficiaries of Agrarian reform programs, in subject matters relative to the natural environment and the conservation of natural resources;

- And especially, to redirect the policy on Agrarian Reform, in the Amazon region and in the Atlantic tropical forest, to already deforested areas or to areas that have already suffered human intervention[17].

By the part of the MMA, a law was approved (Provisional Measure no. 1.956-50, of 26 May, 2000), which forbids the establishment of settlements (except agri-extrativists projects) in areas with forest coverage, primary or secondary, in an advanced stage of regeneration[17].

More recently, in a broad action to combat "grilagem" of land, the MDA cancelled the land registration in INCRA´s "Cadastro"(registry books) of many large land estates with irregular or forged deeds and asked the Judiciary to declare the annulment of the propriety titles for these land estates. With this

action, about 60 million hectares of land returned to the hands of the Federal Union. From this area about 20 million hectares were transferred to the Ministry of Environment, for the creation of Unities of Preservation. This is an area, we should remember, greater than the total area incorporated by Agrarian Reform during the last 10 years.

Other actions of the Ministry for Agrarian Development may also have contributed for environment preservation. A law regulating the public register of land of rural establishments, proposed by the Ministry and recently approved by Congress, makes geo-referencing (GPS) of all estates that are object of property transactions or transference obligatory. In parallel, INCRA is concluding the geo-referencing of all agrarian reform settlements and the Ministry is considering financing a program to do the same for all rural establishments (registration and geo-referencing) in more than 95 per cent of the national territory. In the case of the Amazon region and other environment-sensitive regions, this shall permit the immediate crossing of information of deforestation and fires, detected by satellite images, with the land boundaries network of all the land establishments in the country.

An evaluation of the local impacts of agrarian settlements

A recent study funded by NEAD (HEREDIA et alli., 2001), provides valuable information on the regional impacts resulting from agrarian reform settlements in Brazil[18].

The strong concentration of settlements in these regions have their origin in crises of their local agrarian systems, together with the situation of extreme poverty of their populations, and the worsening of endemic social conflicts, together with a renewed presence of social movements and organizations. The settlements studied had, in the great majority of cases (95%), origin in disputes over the possession of the land. The most notable examples are those of the Sugarcane region of the Northeast (crisis of the sugar cane sector), that of the cocoa zone of South Bahia (crisis of the system based on the large cocoa plantation) and that of the semiarid region of the hinterland of Ceará (crisis of cotton production, severe and long droughts, as well as the crisis of the large cattle-raising estates).

Data on the origin and previous residence of settlers corroborate these facts: 68% of the settlers resided previously in rural areas; 70% resided in the same municipality or in other municipalities of the same region; and 68% were born in the same municipality or in areas nearby. Adding to these facts, the information that around 15% of the population was born after the settlement was established, one may conclude that "endolocality" reaches proportions of around 84%.

Although it varies according to the region in question, the demographic impact of the settlement program cannot be overlooked. In the region near Brasília, for instance, the population dynamics derived from the agrarian program was diluted, so to say, in the larger and intense migrations towards the Federal Capital and its surroundings[19]. However, "the population of the rural settlements is equivalent to 23.73% of the total rural population (...)". This percentage reaches

80% in Natalandia, Minas Gerais (MG), 65% in São João d'Aliança, Goiás, and 63% in Riachinho, MG. In Riachinho, MG, the population of the rural settlements is equivalent to 68% of the urban population and in Flores de Goiás, it is 49% superior to the urban population. (Ibid., p. 225-226).

In some regions, the settlements absorbed part of the urban population that had been marginalized: in the region nearby Brasília, 34% of the settled population resided previously in the urban area; in the Southeast of Pará, 22 %; in the South of Bahia, 28%. In some municipalities, as in the West of Santa Catarina, the settlements, in the second half of the 90s, resulted in an inversion in the trend to a declining rural population that had occurred in the previous period. The rural population of Abelardo Luz, which had diminished in the years from 90 to 96, began again to grow at a rhythm of 6% a year, from 1996 to 2000[20]. In Passos Maia, in the same region, after a reduction of more than 21% of the total population and 25% of the rural population in the 80s, there was an inversion of the trend, to a great extent because of the rural settlements, which resulted in an increase of 30% of the rural population, and around 35% in the total population[21].

THE REDEFINITION OF THE SOCIAL SCENARIO AND OF THE DEMAND FOR PUBLIC POLICIES

The consequences of such an inversion in trend are important. Before, the basic reference of the programs of the municipalities was for the larger proprieties, and it was to them that a great part of public investments in infrastructure (roads, electrification, piped water, etc) was directed. Also, to the extent that they had their origin in conflicting situations, it is natural that in the beginning the rural settlements were stigmatized by the local community, which frequently referred to them as "trouble makers", or as a foreign element ("strangers", "invaders").

However, in many of the regions that were studied, the rural settlements were the origin of new agglomerations[22], which begun to attract the attention of the local authorities, and in some cases, to receive priority in the definition of public investments. The authors of the research refer to this point in the following words: "in many cases, the creation of rural settlements resulted in the increase of the demands for infrastructure *and in pressure on the municipal authorities, responsible for these services, and also in pressures on the state government." (Ibid., p. 218).*

Some data exemplify this: In 86% of the rural settlements there is a school, which was in the majority of them (75%) built after the creation of the settlement and result of demands by their population (71%)[23]. In these settlements, more than 90% of the children between the ages of 7 and 14 are studying; 63% of teenagers between 15 and 19 years of age are studying; and 19% of adults from 20 to 29 years of age are also studying. These data should be compared to others that reflect the previous situation before the rural settlement was created: 32% of the people over the age of 30 never went to school.

Moreover, in 64% of the rural settlements there exist educational programs for teenagers and adults, in particular those of the PRONERA - National Education

Program for Agrarian Reform, sponsored by the Ministry for Agrarian Development, as well as other projects by NGOs. More than 20% of the rural settlers have taken some technical course after coming to the settlements (less than 4 % had taken it before receiving their lots).

As in the greater part of the rural areas of the country, few settlements have Health Services, and even when they have it, the daily presence of health professionals is rare (only 4 cases). This being so, the population of the rural settlements look for medical treatment at the seats of the municipalities, overtaxing no doubt the health services at these places. However, in 78% of the rural settlements there are health agents, in most cases, at the cost of the municipalities.

For the overwhelming majority of settlers, being part of the settlement, has represented the first opportunity to have access to credit, to the banking system and to the financial market: if, before, 93% of those interviewed did not have access to credit, 66% of them have taken credit in the agricultural year of 98/99[24].

Not always, transportation to and from the rural settlements, or within them, is satisfactory[25], as a considerable part of the heavy investments in infrastructure is still to be done. However, in 66% of the cases there is collective transportation in the settlements at least once a week (in 42% of the cases, several times daily). One of the emblematic cases is of some of the municipalities of the Sugarcane Region of the Northeast, where old roads were abandoned and new ones were built by the municipal authorities, to give access to the settlements.

Housing conditions have also improved significantly: 74% of the population of the settlements have brick houses, as against 39% in the past; in 78% of the settlements there is electricity (in 53% of them, in the majority or in all of the lots).

For 59% of the families, the collective spaces of the settlements are important gathering places, followed by residences (53%) and by religious spaces (only in 18% of the cases). The rural settlements also made it possible for the emergence of new organizations (associations, co-operatives, nuclei, etc) and have contributed for the strengthening of organizations and social movements in their role of political intermediaries. In all regions studied, in several municipalities for example, rural settlers participate in the Municipal Councils for Rural Development, of Agriculture or other councils. In many cases, assentados have run for public office (aldermen, mayor, state deputies) and in some cases they were elected, even for mayor.

The advancement, in terms of citizenship or human development, is double. On the one hand, the settled population, considered marginalized before, is given access to public policies, and gain social and political recognition. On the other hand, the rural settlements and their organizations have, gradually, gained respect by the municipal authorities, by commercial establishments and by the local political elite, and so they start to exert an active role in the definition of policies and of public investments. Therefore, in many cases, the order of priorities is altered by the local authorities. In Abelardo Luz, in Santa Catarina, for instance, "municipal authorities affirm that today, (...) 41% of the expenses for health and social assistance and 55% of school transportation is supposed to have been directed to the rural settlers" (Ibid., p. 218).

THE RESTRUCTURING OF THE AGRARIAN SYSTEM AND THE GREATER DYNAMISM OF ECONOMIC LIFE

The impact of rural settlements in the modification of the degree of land concentration is quite variable, according to the specificity of the regions. The existing census data still do not permit us to make an overall evaluation of the changes that have occurred[26]. However, the research permits some interesting comparisons. In the sum of the regions included in the study, the area of the settlements include a little less than 12% of the total area of all agricultural establishments. This percentage is smaller in the South of Bahia, and in the region near Brasília (3 and 5%, respectively), but it reaches 23% in the *Sertão* of Ceará and 40% in the Southeast of Pará. These data show the dimension of the territory included in the programs of Agrarian Reform in these regions.

The partitioning of large land estates (more than 500 hectares, in 76 % of the cases) also resulted, in all regions, in a considerable increase in the number and in the area of family farms in the local agrarian system. In some regions, the area occupied by the settlements represent more than 100% of the area of the establishments in the strata characteristic of *family agriculture*[27], as is demonstrated in table 3.

Table 3

Participation of the area of settlements in the total area of the municipalities studied, by main area stratum

Region	Stratum of area under consideration	% of settler lots in the stratum under consideration	Area of settlement lots (created until 1997) of the given stratum compared with the total area of the establishments in the stratum
South of Bahia	0-50 ha	70	5.5
Sertão of Ceará	0-50 ha	90	113.2
Surroundings of Brasília	0-100 ha	98	57.6
Southeast of Pará	0-100 ha	79	119.5
West of Santa Catarina	0-50 ha	90	18.8
Sugarcane Region of the Northeast	0-20 ha	100	142.7
Total	**-**	**-**	**62.0**

Source: Heredia et alli, 2001, p. 262.

In the more extreme cases, as in some municipalities of the Sugarcane region of the Northeast, the area of establishments in the relevant strata was multiplied by 4 (Pedras de Fogo, and Espírito Santo), by 5 (Água Preta) or 6 (Maragogi).

On the contrary to what is frequently affirmed, the research has found that re-concentration of lots occur in a very small proportion: in 91% of the cases, families originally settled are those still responsible for them; and, in 96% of the cases, the *assentados* manage only their own lot.

One of the first consequences of the substitution of large estates by a production based on the labor of the family is the productive reorientation of the

local agrarian system. In some regions, specialized agriculture was dominant in the large land estates. In the rural settlements, on the contrary, the diversity of production is considerably greater.

Aggregate data for all regions studied demonstrate the transformation that has occurred in the production of the areas included in agrarian reform. Six groups of products characteristic of family farm in the regions studied represent more than 70% of the gross value of production (GVP), excluding cattle raising and meat: milk and dairy products; manioc and manioc flour; corn; beans; eggs and rice. Some products of regional importance correspond to about 20% do GVP in the total for all regions in the sample: pineapple, soybeans, cassava, sugarcane, tobacco, *maracujá* (passion fruit), potatoes, pumpkin, sweet potato and cotton. More than 70 other products complete the rest of the total production of the settlements.

Animal products are also diversified. Cows for milk are present in 52% of the settlements; poultry, in 80%; pigs, in 34%; goats and sheep, in 21% (in 74% of the rural settlements in Ceará). For all regions studied, dairy cattle represent 8% of the total informed by IBGE (the National Census Bureau) in its Municipal Livestock Research of 1999; pigs, 9%; poultry, 14%; and goats and sheep, 25%.

Many of these products go for agricultural processing. One part of this processing is done by agri-businesses (as cotton, in Ceará, or milk, in almost all regions), but a not insignificant part is processed inside the settlement or in the immediate surrounding area (cheese and manioc flour, in the area nearby Brasília; honey and manioc flour, in the South of Bahia; manioc flour in the Southeast of Pará and in the Sugarcane region of the Northeast). This has direct consequences for the economic activities outside the lots, in the settlements and outside them.

The importance of "feiras" (produce street markets) and the fact that this production has increased the supply of agricultural products for local consumers is emphasized in various interviews. In the case of the Southeast of Pará, this new economic dynamism was considered important, because it supplied the local market with produce for everyday consumption that before was difficult to be found. In the case of the Sugarcane region of the Northeast, "*street markets have increased in size, reaching additional streets and, in some cases, increased its periodicity*" (Ibid., p. 252).

Consumers interviewed in the street markets of Pedras de Fogo, in Paraíba, affirm that settlements resulted in an increase of merchandises available and in a fall the prices of food products. So, diversification of production translated itself in an important opportunity to enhance the nutrition pattern, not only of the settlers, but also of the urban population.

Naturally, the use of inputs is not always a good indicator of the sustainability of the production systems in use[28], but it can be an indicator of the market that settlements create for industry and services. Only 18% of people interviewed declare to have used any kind of agricultural input. In about 53% of the lots, seeds or seedlings bought outside the lot are used; in 42% veterinarian inputs are used; in 40%, pesticides; in 37%, chemical fertilizers; in 18%, organic fertilizers.

Also in the financial market, the *assentados* are gaining space. The volume of credit obtained by settlers in the agricultural year 98/99 represented 12.5% of the total volume of credit given to agriculture in the municipalities included in the study. This percentage is smaller in the South of Bahia (4%) and in the nearby region of Brasília (6%), but it reaches 58% in the Southeast of Pará and 81% in the Sugarcane region of the Northeast.

THE CREATION OF EMPLOYMENT AND THE INCREASE IN INCOME

One may ask: what benefits do these changes bring to the assentados themselves? The study provides much data on this. Before the settlement, 30% did not have any access to land: 5% were unemployed; 11% were temporary workers; 14% were permanent wage earners. Another 50% had precarious access to land: 18% were sharecroppers or tenants; 17% were unremunerated members of the family; 3% were small owners; 12% had along with precarious access to land, some other form of employment (permanent or temporary).

These precarious situations change radically with settlement: 84% of those interviewed affirm that conditions of work got better. The reasons for this becomes clear when we analyze the information on work and employment in the rural settlements. In the 1,568 lots that were studied, 4,765 people above the age of 14, work; this represents about 3 people in average per lot. If one considers all age groups, in each lot live on average, 3.57 people who work. Of these, close to 80% work exclusively on the lots (on average, 2.6 employed people per lot). Only 1% of the people work exclusively outside the lot. More than half of the assentados who work outside the lot, do this only within the settlement, of which a significant part engage in non-agricultural pursuits (50% in the South of Bahia and about 20% in Santa Catarina and the Sugarcane Region of Paraíba). Only 25% of those who work outside the lot, work only outside the settlement[29]. Moreover, the settlers create employment for people outside their families: in 36% of the lots people outside the lot were hired.

There is, therefore, in the very great majority of cases, net employment created directly by the settlement[30] and in the settlement. In at least 12% of the lots there was loss of members of the family by reason of lack of work. In compensation, in 23% of the lots there was incorporation of new members in the family (first degree kin to the head of the family), resulting, on average, in 2.4 relatives per lot, outside the nuclear family (Ibid., p. 235 and 236)[31]. It is worth mentioning that the percentage of these other members of the family who lived previously in urban areas is greater than this proportion pertaining to the heads of the families and their consort.

We should add to this direct employment the non-agricultural employment that was created or made stable by the creation of the rural settlements, analysis of such dimensions was not part of the original scope of the research (employment creation because of industrial inputs and processing, because of building of infrastructure, because of increase of public services, and of commerce).

Table 4

Composition of family gross average annual income (*) – 1999/2000

		South of Bahia		*Sertão* of Ceará		Region near Brasília		Southeast of Pará		West of Santa Catarina		Sugarcane region of Northeast		Total	
		R$	%	R$	%	R$	%	R$	%	R$	%	R$	%	R$	%
Average Family Gross Income from the Lot (A)		2,872	70.3	576	41.1	3,712	71.3	3,416	70.7	4,291	81.5	1,75	60.8	2,568	68.6
Average family Income from work outside the lot (B)	Rural wage earners	154	3.8	115	8.2	372	7.1	323	6.7	332	6.3	111	3.8	229	6.1
	Urban wage earners	321	7.9	48	3.4	192	3.7	189	3.9	164	3.1	233	8.1	177	4.7
	Own account	123	3.0	30	2.1	40	0.8	247	5.1	63	1.2	45	1.6	95	2.5
	Other	0	0.0	1	0.1	3	0.1	1	0.0	4	0.1	1	0.0	2	0.0
	No inf. Or no activity	30	0.7	7	0.5	0	0.0	11	0.2	30	0.6	71	2.5	27	0.7
Average family income from other outside sources (C)	Retirement & Pension	587	14.4	621	43.3	877	16.9	642	13.3	375	7.1	653	22.7	641	17.1
	Monetary help received	0	0.0	4	0.3	7	0.1	7	0.2	7	0.1	13	0.4	7	0.2
Average Gross Family annual Income (A+B+C)		**4,088**	**100.0**	**1,401**	**100.0**	**5,203**	**100.0**	**4,835**	**100.0**	**5,265**	**100.0**	**2,876**	**100.0**	**3,746**	**100.0**

Source: Heredia et alli, 2001, p.435.
(*) Average income considering all informants, including those without income. To facilite reading the table, we have eliminated fractions.

Also, it was not part of the objectives of the research to measure with exactness the agricultural income and the total income of the families. But the research allowed us to make estimates about the capacity of the settlements to create income. The following items were considered: "*income of work done outside the lot; income resulting from the marketing of the agricultural products produced in the lots; and other incomes or financial help received*" (Ibid. p. 426).

It is important to emphasize that income derived from marketing that is considered here is an estimate of the potential monetary rent of the lot, and that products that, according to the declaration of interviewees, were exclusively for self consumption, were not considered[32]. It is also important to remember, in particular in the case of Ceará, but also in part in the case of the Sugarcane Region of the Northeast, that during the period of the study the farmers were being hit by a long period of drought.

Table 4 shows that close to 70% of the gross income of families have their origin in the lot. Retirement payment is the second major source of income for settled families (17%), which reproduces a phenomenon pointed out in several studies of family farming about the importance of social security among the mechanisms of income distribution in the country[33].

The average gross family income, for all the income is R$ 312.00 per month, or, in other words, a little over 2 minimum salaries, varying from R$ 116.4, in Ceará, to R$ 438.2, in the Southeast of Pará. Although with strong regional variations, the greater part of the population studied is over the level of poverty[34], as is shown in Table 5 below.

Table 5

Levels of Average Gross Family Income, according to ranges of minimum wage (M.W.), 1999/2000 (in %)(*)

	South of Bahia	*Sertão* of Ceará	Region near Brasília	Southeast Pará	West of Santa Catarina	Sugarcane Region of Northeast	Total
No income	1.15	3.92	5.49	3.55	0.00	2.58	**3.12**
Till 1 M. W.	22.99	63.40	29.96	30.33	15.68	46.65	**38.62**
>than 1 to 2 M. W.	33.33	22.88	20.25	24.86	26.49	25.52	**24.60**
>than 2 to 3 M. W.	16.09	7.84	13.08	12.30	16.76	12.63	**12.36**
>than 3 to 5 M. W.	17.24	1.63	15.61	16.67	26.49	6.70	**12.30**
>than 5 M. W.	9.20	0.33	15.61	12.30	14.59	5.93	**8.99**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Heredia et alli, 2001, p. 435.
(*) The minimum wage was, at the time of the research, R$ 151.00.

In 83% of the cases, the *assentados* consider that the improvement in their life is due to access to land, be it because this fact resulted in an increase of income, or because work got better, or because their production was improved. Only 7% of the settlers consider that conditions of work and employment got worse.

We have the confirmation of this fact when we analyze the rhythm of capitalization of the lots, an indirect indicator of the level of income of family farmers. In effect, capitalization occurs either by means of credit, or when the

family's income gets above what is necessary for the simple reproduction of the family and for productive purposes. The great majority (67%) of the productive buildings etc. were constructed with resources of the *assentados* themselves; 55% of the machinery and of implements owned was also purchased with their own resources.

COMMENTS ON ENVIRONMENTAL ASPECTS

The development of productive systems in the settlements is not always due to official action, still insufficient and inadequate. In the great majority of cases, technical assistance to the assentados is precarious or nonexistent. During a short period, the Ministry of Agrarian Development financed and implemented a broad program of decentralized technical assistance, the LUMIAR Program, by which the communities themselves would choose the technicians who would undertake the assistance, and these would in turn be hired by INCRA.

It was an experience to a large extent successful. Not only did it reach an expressive number of settlements, but by the program, technicians who were sent to settlements did not limit their action to technological aspects, but also dealt with the organization of the settlers, with the integration of the settlement to other social and economic agents, etc[35]. These aims encountered several obstacles. In various regions, the settlers instead of choosing, were, in reality, being chosen by the social movements and organizations, in a kind of "partition" of settlements among them, negotiated with INCRA. Other factors contributed for the suspension of the Program: budget limitations and erratic liberation of resources; resistance by sectors of the Government and of the "civil society", who saw in the program a kind of "privatization of public service"; failures in the mechanisms of supervision and control by INCRA of the rendered services, etc.

The mechanisms of financing to which the settlers have access, in spite of their results being in general positive, have also been object of criticisms on the part of specialists and of the social movements. INCRA subsidizes each settler family with resources for its maintenance during the first months after being settled, and for the first cultivation ("crédito-fomento"); it also finances the construction of the houses, and more recently, other activities as well, such as the elaboration of plans for the development of the settlement. However, because of budget limitations, difficulties in the liberation of these funds, the execution of roads and other works of infrastructure suffer delays sometime for considerable periods – often for more than a year – between the settlers receiving the lots, and getting these other financial benefits. Important changes were introduced in the last few years in the settlement program, in order to enhance their management and accelerate the disposal of the funds by the settlers (the resources being grouped in a single funding[36] and the fact that they are managed by the settlers themselves), in such a way as to shorten the time intervals significantly. But there are many old settlements that still have not obtained all the financial resources foreseen in the norms and regulations.

The main means of financing, and the one that has the greatest share of resources is the credit program for financing production and productive investments. In its beginnings (from 1985 to 1995), it was a program specific to the Extraordinary Ministry of Land Policy, called PROCERA – Special Program of Credit for Agrarian Reform. With the creation of the MDA and its incorporation of the Secretariat of Family Agriculture, which before was part of the Ministry of Agriculture, the PROCERA became part of PRONAF – National Program for Strengthening of Family Agriculture, as one of its specific lines of credit (PRONAF-A)[37]. This gave greater stability and consistency to the program, but did not solve all problems faced before by PROCERA.

As they depend on budget resources, for interest equalization and the subsidies included in the financing, the resources for the credit programs never reached the levels demanded by the Ministry, that now has to deal with a considerable "deficit", i.e. settlers not yet contemplated by the program. Other serious operational problems have also been pointed out: resources for credit are delayed, being available only after plantation time; projects of investments that need financing are many times purely formal documents, prepared only for the approval of the financing, in a standard way and identical for all settlers.

The research on impacts of the settlements reveals that, in spite of these difficulties, settlements were able to develop their productive systems and acquire some capacity for investment. In effect, as already mentioned, the great majority (67%) of the productive installations were built with resources of "assentados" themselves; 55% of the machinery and individual equipment were also financed with their resources.

However these advancements do not always translate themselves in the development of more sustainable productive systems. For government technicians as well as for activists of the organized social movements, the main indicators of "progress" or "development" are related to agricultural practices considered "modern": increase in cultivated area; mechanization and employment of technology and inputs, including seeds, produced by the chemical industry; increase of physical productivity; abandon of traditional or associated systems, in general more diversified, less intensive, and with a more adequate soil management, etc.

It is revealing, for instance, the fact that the INCRA technicians do not discriminate, in the characterization of the expropriated estates, areas covered with forests from scrub area (forests in regeneration)[38]. In planning for the use of the area of the estate, traditionally criteria also used to limit them to determine the maximum potential of incorporation of areas "not used" or "not useable" for production (see Table 2 and its discussion in the text), without greater concern with the environmental characteristics of the different parts of the expropriated estate"

In the case of settlements, from the environmental point of view, the scarcity of financial resources have two kinds of results with different consequence. On one side, the massive use of technology and chemical inputs is limited by the lack of credit or lack of capacity for self-financing of the settlers: as we have already pointed out, only 42% of the "assentados" use tractors for the preparation

of the soil; only 3% use irrigation (Heredia et alii, 2001, p. 363 to 372); only 40% use pesticides or such chemicals, 37% use chemical fertilizers; and only 52% buy seeds. The researchers established an indicator combining these several technological factors and classified the producers according to the intensity of use of chemical inputs: only 4% adopted the "high" intensity pattern, 32% medium intensity, and 64% low or zero intensity.

In the studied settlements, in the same research, technology and agricultural productivity reached, in general, "similar levels" to that observed in the prevailing local agriculture, including therein that of the large farmers employing wage labor ("setor patronal") (Heredia et alii, 2001, p. 372). If the production systems of the settlements are more diversified than that of the large estates that they have substituted, this diversification is still limited in the greater part of the lots.

But these difficulties may have worse consequences in some cases, as they induce families to look for income alternatives in the short run, to ensure their immediate subsistence, as well as to invest in the lots. In Santa Catarina, 12% of the families declare to have sold wood to make charcoal; in the Southwest of Pará, 17% of the families sold wood for building materials (stakes, poles or beams).

But the results of that research also show two important aspects. On the one hand, part of the extractive activities found in the settlements is sustainable or permit the sustainable use of natural resources. This is the case of the harvest of" piaçava" palm in the South of Bahia, which induces a greater conservation of remains of forests where this palm tree is found, or the production of maté ("erva mate"), in Santa Catarina, which has even resulted in the extension of the native woodlands in the region. On the other hand, the research shows that extractive activities has little statistical expression in the composition of the family income and does not represent a significant menace to the sustainability of ecosystems that prevail where settlements are localized. In effect, considering all extractive products, they represent 8% of the income of the lot in the South of Bahia (mainly "piaçava"), 2.5% in Santa Catarina (wood for charcoal and, especially, maté) and 1.4% in the Southeast of Pará (wood for building materials).

In this form, settlements tend progressively to be assimilated to the ways of family farming in each region, and to confront the same problems of economic and environment sustainability. The establishment of the lot and the development of production takes place, some times, through the extraction of natural resources existent in the lot, in the same manner as in the greater part of the areas where family farming was established and developed in the country. Likewise, it is plainly observable in the case of settlements, the tendency to develop systems of production based on the green revolution, the sustainability of which has been questioned all over the world.

Various recent initiatives strengthen those already mentioned and aim to give answers to these deficiencies or to solve the mentioned problems. The most important of these is the approval by the National Council of Environment - CONAMA, of a resolution that establishes the need for environment licensing previous to the creation of settlement areas and the licensing of its establishment and operation, which must precede the settling of half the settlement families[39].

In the area of PRONAF there also have been advancements. In all lines of credit there is the possibility of contemplating agri-ecological or organic systems of production, with increased volumes of credit. The program of training for family farming, created in 2002, gives priority in its selection to proposals that aim at the same time at economic, social and environmental aspects. A new line of credit, the PRONAF-Forest, is planned to start in 2002, having in view providing credit (with low interest and subsidies) during the second semester to 10,000 family farmers who are located in areas of the "Mata Atlantica" (Atlantic forest). This financing has as its objective the recuperation of forests on the margins of rivers and at the mountain sides, in order to combat erosion and the pollution of rivers.

Studies on environmental topics have also multiplied, both those of an exploratory kind as well as the development of methodologies stimulated or sponsored by the Ministry of Agrarian Development[40]. Some of these works were object, in 2001, of a prize created by NEAD – Nucleus of Agrarian Studies and Rural Development, part of MDA, where, in the first version of the prize, four of the five prizes were awarded to themes dealing with environmental questions[41].

Conclusion: The settlements as a factor of development

The settlements diversified their productive system and their means of commercialization, amplified the offer of foodstuffs and their consumption of goods and services, agricultural and non-agricultural, including that of durable goods[42], created a considerable amount of direct and indirect employment, both in the agricultural and non-agricultural sectors, increased the demand and the investments in infra-structure and in basic services (health, education and transportation), all this resulting in the diversification and greater dynamism of the economic life of the local communities.

Resulting from the crises of local agrarian systems, the settlements diversified and introduced a greater dynamism in the local economy, and greatly increased the social and economic opportunities, not only for the settled families, but for all. The settlements became, in short, an important factor of local development.

Final comments on environmental aspects

The establishment of the Ecological and Economic Zoning being contemplated by the Federal Government, is of great interest for the activities of the MDA. It can be an important instrument for sustainable development; but it can only become effective if it is built on solid bases, from the technical point of view, as well as from the social and political ones. One can not say these conditions have already been fulfilled. There lacks knowledge about the prevailing economic, demographic and environmental processes in the several regions of the country – in particular in the Amazon region. And, due to the serious conflicts of the past and of the enormous social inequalities, dialogue and consensus among the implicated actors are not easy matters. To this end, the social capital that may be developed in the settlements could be a favorable factor.

Glossary

Agricultura Patronal – Agriculture of establishments that farm using hired labor; hence setor patronal, associação patronal.

Assentado – Settler in official projects, be it agrarian reform in its various forms or colonization projects.

Bairros rurais – Rural agglomerations of houses, not yet organized as the seat of municipalities or districts.

Corte raso – Felling trees by close to the ground cutting.

Foreiro – One that pays an annual rent for a land estate.

Garimpo – Place where precious minerals like gold or diamonds are exploited.

Grileiro - Person who forges land deeds to appropriate large pieces of land, usually of public ownership; hence "Grilagem".

Madeireira – Enterprise that exploits, industrially or commercially, wood and/ or timber.

Roças – Small tracts of land, usually near houses, to cultivate vegetables and foodstuffs needed for the sustenance of family farmers

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Notes

* This text is the sole responsibility of the authors, and cannot imply the agreement on the part of NEAD or the MDA with any of its particular assertions.

[1] During these years policy changes were not restricted to this increase in numbers; they also included the addition of new and complementary programs, as well as important modifications in the legal and administrative framework of agrarian reform in the country. Some of these changes shall be touched further on in the chapter.

[2] The social demand for land in Brazil is estimated in 4 million families by the social movements. This number includes around 2.5 million people with insufficient land (*minifundistas)*, together with rural wage earners, sharecroppers, and tenants. Probably a more realistic number would be around 2 million families (considering that not all *minifundistas* and wage earners demand land). By the end of 2002 about 1 million families will have been benefited in the last 15 years.

[3] In Brazil, the struggle for land in 1992, according to the National Secretariat of the CPT – The Land Pastoral Commission of the Churches, presented the following

balance sheet: 185,996 people suffered the most varied forms of violence, houses of more than 700 families and the landholdings of another 1,040 were destroyed and more than 1,600 were victims of arbitrary expulsion from the land (Cadernos CEAS, nº 148, 1994).

[4] The legitimation of titles most probably increases the chances of material improvement for these family farmers.

[5] Several of these settlements were created after the organisation of the Movement of Struggle of Extrativist Populations, of which Chico Mendes was one of the major leaders.

[6] This very region was the scenario of the guerrilla war in the 70s that resulted in the creation by the Army of various colonization projects, not only as a reward to its collaborators, but also to permit the development of a planned and controled occupation of the region. It was during this period, still during the military regime, that INCRA began its actions in the area, creating the GETAT, controled by the military. It was also there that the *garimpo* of Serra Pelada appeared, well known by its extremely high population density, its inhuman working conditions and by the degree of violence prevailing in the 80s.

[7] The presence of MST in the region is recent, as these squatters were organised in the beginning by sectors of the Catholic Church, as Church Base Communities and as the Land Pastoral.

[8] The transformation in 1999 from a temporary ministry, dealing almost exclusively with the agrarian reform program, to a permanent ministry, the present Ministry of Agrarian Development, with several important objectives, the most significant of which is to strengthen family farming in the country (with the transfer from the Ministry of Agriculture of the already prestigious credit program – PRONAF), is one of the most significant institutional changes in the last few years (see also footnote 27). It means for instance, that agrarian reform actions should be considered "the entry" into the category of family farming, with its specific policies and programs, distinct from those directed to the agri-businesses. It means also, with the creation of the National Council for Rural Development, that MDA has the incumbency of preparing a National Plan of Rural Development.

[9] INPE, 2002. This deforestation area is equivalent to the total expropriated areas between 1995 and 2001 aiming at agrarian reform in the country; it is more than double the expropriated areas in the same period in the Northern region.

[10] Deforestation of areas of up to 15 ha represent, in average, less than 15% of all deforested areas between 1995 and 2001 (maximum of 19% in 95 and minimum of 11% between 1997 and 1998).

[11] Only 9% of the *assentados* lived in other states before being settled and only 2 % in regions of Pará distant from the settlement, while 22 % of the *assentados* lived in municipalities of the same region. On the other hand, 49% of the settlers lived in the same municipality and 16% were born after the creation of the settlement (Research on Regional Impacts).

[12] In effect, the main foci of large scale deforestation or the so-called "arc of fire", that goes from the South of Pará to the North of Mato Grosso and Rondônia, is located on the margins of the main roads of the region.

[13] This financing was given through several channels: fiscal exemption to enterprises that invested in the Amazon region; direct subsidies to SUDAM – Superintendence for the Development of the Amazon Region; subsidized interest rates for rural credit or by oficial banks; and even cession of public areas for projects (by state governments).

[14] Accidental fires are, according to specialists, responsible for na area of deforestation equivalent to the area caused by the purposeful felling of forests, in the proper sense.

[15] According to Lawrence et alli (2001), there exist 400 Brazilian enterprises in the *madeireiro* sector in the Amazon region, which are now suffering the competition of various asiatic multinationals, that have invested about US$ 500 million in the country and control an area in Brazil of about 13 millhon hectares (almost twice the total area of settlements created in the Northern region between 1995 and 2001).

[16] Dorado, A. J.; Miranda, E. E., 2000.

[17] It is important to emphasize that this law resulted from an ample social consensus, which included environmental organisations, unions of family farmers as well as associatons of agricultural employers (*associações patronais)*, the Ministeries of Environment, of Agriculture, and of Agrarian Development, etc. The law introduced, among other innovations, a greater flexibility of the Forest Code, in order to contemplate the specific needs of the small farmers, as well as a new concept of conservation of natural resources that do not exclude their use by proper management.

[18] This study, sponsored by NEAD (Nucleus of Agrarian Studies and Rural Development, part of the Ministry of Agrarian Development), included a sample of 92 settlements in 6 regions of **high concentration of settlements** in Brazil: South of Bahia; *Sertão* of Ceará; Nearby Region of Brasília; Southeast of Pará; West of Santa Catarina; and the Sugarcane Region of the Northeast.

[19] The same seems to occur in the South of Bahia, with the migration towards the regional metropolises of Itabuna and Ilhéus.

[20] Between 1980 and 2000, the increase of rural population was 36%.

[21] Of course, the transformation of the district into a municipality, also contributed to the increase of the urban population in the period.

[22] In 71% of the cases, the settlements have population agglomerations or space divisions comparable to those of districts and rural *bairros*. The clearest case is the creation of the municipality of Floresta, in Pará, greatly due to the population increase resulting from the establishment of settlements.

[23] It is important to point that, in 73% of the cases these schools go up to the 4th grade of the Fundamental Level (Elementry School), and in 77% of the cases, have multi-graded classes. The level of schooling that the *assentados* reach varies considerably from region to region, being higher in the West of Santa Catarina. In the Nearby Region of Brasília and in the Southeast of Pará.

[24] 80% of the *assentados* had obtained credit for production (*crédito–fomento*); 72.7%, financing to build a house (*crédito– habitação*); 74.6% credit for family

maintenance (*crédito–alimentação*). It should be pointed out that 59% of those that obtained credit affirmed they experienced difficulties because of delays in getting the financing (78%).

[25] More than 50% of the roads that give access to the studied settlements are closed for use during the rainy season. In 30% of the cases, there are lots difficult or impossible to access; and in 37% of the cases there are transportation problems within the settlements during the rainy season.

[26] The last agricultural census was in 1996, while the major part of settlements studied were created in the second half of the 90s (nationally, the settlements after 1995 represent three quarts of the total). On the other hand, the settlements are not separate census tracts and this makes it difficult for tabulations to be made that would permit a more accurate analysis of their direct impact.

[27] A very important and recent advancement was the introduction in Brazil, as legal concepts, of "family farming" and "family farmers". This means that now, policies and programs may be fashioned especially for these categories, whereas before they were included in general farming policies and programs, which in reality had in mind almost exclusively or mainly the needs and characteristics of large commercial establishments, based on hired labour (now known as "agricultura patronal"). The first of these programs taylored for the needs of family farming was the credit program PRONAF – The National Program for the Strengthening of Family Farming (see also footnote 8).

[28] In 40% of the lots, the technological pattern was characterized by the research as *"chemical-intensive".* In 64% of the lots, however, the intensity of use of inputs was classified as *"low or nonexistent* " (Ibid., p. 370).

[29] The authors of the research suggest prudence regarding these data, because *"the settlers are afraid to reveal their engagement in other types of work, as this conduct is condemned both by INCRA as well as by the agents of representation (unions, MST, Church)"* (Ibid. p. 412).

[30] Expanding these data for the sample to all the settlements in the regions that were studied, we have an estimate of 43,000 places of employment created in the settlements.

[31] This incorporation of new members of the family, together with the fact that almost 40% of the families have relatives in other lots of the settlement (Ibid., p. 235), contribute for the re-composition of extended family ties, weakened or broken by the necessity to migrate in search of new opportunities of subsistence.

[32] The estimate of income from farming and cattle raising considered only the products that, according to statements of the *assentados*, were wholly or partially commercialized, multiplying the total volume produced by the local average price in the harvest of 98/99.

[33] See, in particular, Delgado (2000).

[34] We should remember that, as said before, data relative to the work outside the lot could be underestimated.

[35] In the research of the impacts of settlements, quoted above, we find a fact very revealing of the importance of this technical assistance program: 80% of

the technical assistance received by the settlements (among those that had access to this service) had been provided by LUMIAR.

[36] Only part of the resources is paid back to the official agencies.

[37] PRONAF is segmented acccording to its different clienteles. PRONAF - A is destined to the *assentados* of agrarian reform, in its various forms. PRONAF - B is a micro-credit program (amounts of about US$ 200.00), with a high subsidy, aimed at the low-income farmers of Northeastern Brazil. PRONAF C and D are aimed at family farmers that can provide real guarantees (morgage of property or providing underwriters), all with differentiated conditions (interest rates and subsidies) in accordance with the level of income of the farmer.

[38] See above, Table 2. The areas with forest coverage may have been included among the areas of Permanent Preservation or of Legal Reserve, as well as those classified as "not useable ".

[39] This resolution also determines that "agrarian reform projects whose implementation demands an increment of '*corte raso*' cannot be created in areas of forests or of other kinds of vegetation protected by legal norms."

[40] We may cite the diagnostics of agrarian systems undertaken by FAO, such as the training of technicians done by this organisation; the courses of training underrtaken by INCRA on alternative forms of water resources management proposed by the so-called Zero Base Project.

[41] One of these studies was exactly the result of a work done with the sponsorship of INCRA of Minas Gerais and dealt with the necessary conditions to assure the sustainability of settlements (Mazetto, 2000).

[42] Data of the Study on Regional Impacts show that the number of families that own household appliances and equipment, such as refrigerators, gas stoves, television, parabolic antennas, and washing machines increased considerably after they were created. The number of families that own means of transportation (bicycles, animals, motorcycles, cars or others) more than tripled.