

BRAZIL OF BIOFUELS

Bolivia Impacts of Crops
on Land, Environment and Society

SOY

CASTOR BEAN

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**Brazil of Biofuels:
Impacts of Crops over Land, Environment
and Society - Soy and Castor Bean**

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INTRODUCTION

Biofuel Watch Center of Repórter Brasil starts a new project with the publication of “Brazil of Biofuels: Impacts of crops on land, environment and people” that, for the next two years, will be analyzing the effects of the cultures used in the production of biofuel on the environment and on men and women that work in the crops.

The project—divided into three annual reports—is going to analyze the socio-economic, environmental, agrarian, labor impacts—as well as the impacts on indigenous and native populations—of the cultures of soy and castor bean (volume 1), corn, cotton and palm (volume 2), sugarcane and *jathropha curcas* (volume 3). A cross-analysis of all the cultures will be carried out in the last report of each year.

Biofuel has become popular in the last few years because of the increasing demand for energy in the world. The concern with the energetic question is on the agenda of governments, companies, universities, social movements and NGOs, and the search for alternatives to fossil fuel has become an important issue lately.

The government of the President Luiz Inácio Lula da Silva, Brazil, considers the agroenergy—one of the main flagships of his term in office—as important as the fight against hunger. Lula has traveled to various countries to talk about the issue, signed cooperation protocols with many nations and argued for biodiesel in international forums. The aim of these efforts is to have biodiesel as commodity in the international market, and that would represent a new niche for Brazilian agriculture.

Brazil’s pioneering role in the biofuel sector will have impacts on the occupation of the land that might be used by agriculture as well as on how the land will be occupied. The oleaginous plants, such as soy or cotton, occupy great extensions of land that might expand even further, and the production for biofuel industry tends to produce changes in their traditional market. The world’s desire for ethanol has increasingly brought foreign investors to Brazil, and the perspectives of increase in the internal and international market of alcohol fuel has dramatically expanded the area covered with sugarcane as well as the number of biofuel industries built. The government believes there are opportunities of growth and opening of the market to some marginal cultures, such as castor bean, sunflower, dendê palm, babaçu palm and *jathropha curcas*, aspects that will have consequences on productive planning of agribusinesses as well as on family agriculture. Because of these aspects, agrofuel might be a better term than biofuel. The use of the term agrofuel – besides being the

choice of great part of university researchers, social movements and other civil society entities – tends to reinforce the link between this energy option and agriculture.

The present project analyzes the impacts of the seven cultures mentioned above on various aspects, and the aspects analyzed will not deal only with the farms that supply raw material for biofuel. As a result, an accurate and all-embracing analysis of the present situation – considered as the starting point – will be carried out whereby the expansion of the agroenergy national project will be examined.

It is worth mentioning that the growing demand for grains to be used in biofuel production – such as the corn used by the USA to produce ethanol – will have consequences on the price of the product in the market, the area covered with crops, the amount of work necessary for the development of the crops, among other aspects. These aspects, therefore, influence not only the value chain of the end product, that is, biofuel, but also the whole agriculture. Limiting the study to the visible impact will hinder the full understanding of the problem.

This project also consolidates the opening of a new frontier in NGO Repórter Brasil activities that has become nationally and internationally known because of the action against modern forms of slavery and the fight for proper conditions of labor. Because the area of land used for energy production will increase, Repórter Brasil believes that the project of social justice and sustainable development will face new challenges and, therefore, an all-encompassing understanding of this new paradigm is necessary.

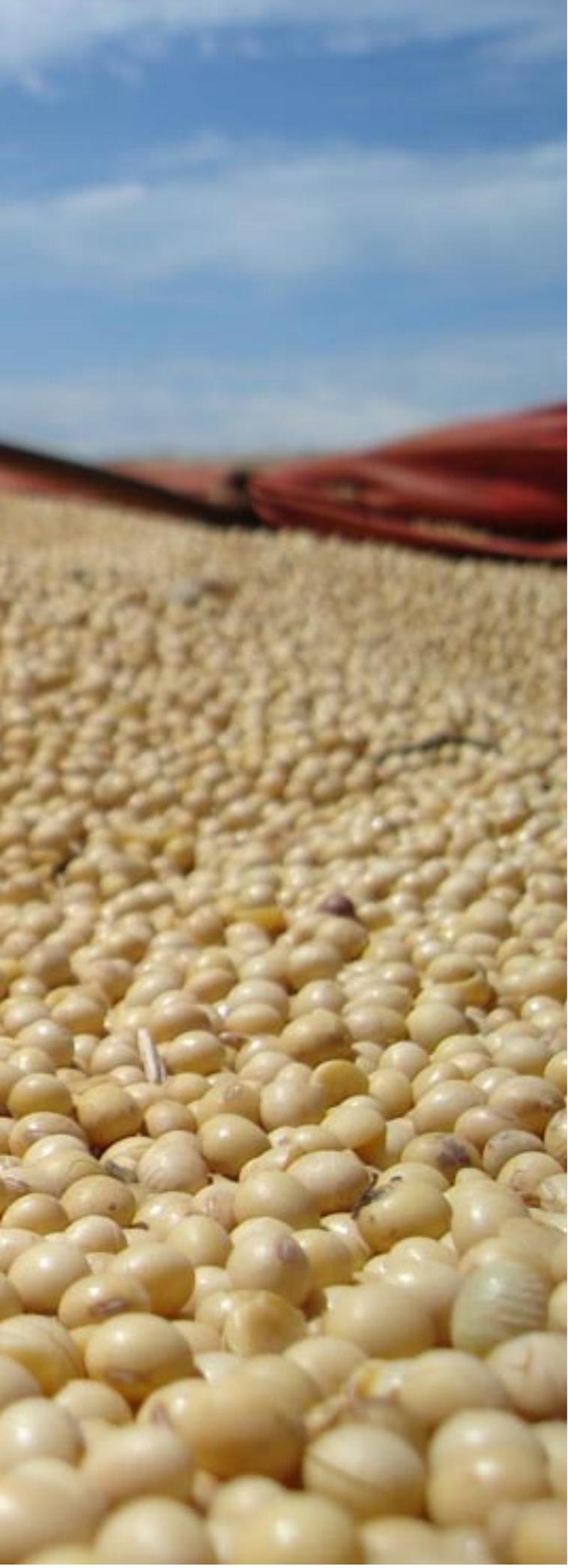
Biofuel Watch Center of Repórter Brasil benefited from the five-year experience on relevant and unique studies carried out about the productive chain of slave labor in the country from 2003 to 2007 and adopted the same research methodology: Study of data banks known for their reliability, interviews with researchers, lecturers, farmers, independent consultants, people from the government and leaderships of NGOs and social movement as well as field investigation.

In the process of elaboration of this first report that analyzed the impacts of soy and castor bean cultures, Biofuel Watch Center visited the states of Rio Grande do Sul, Paraná, Mato Grosso, Mato Grosso do Sul, Tocantins, Pará, Ceará, Bahia, Piauí and Maranhão as well as Paraguay. We had the invaluable solidarity and hospitality of partner organizations and movements that welcomed us in their cities, acted as guide in our field investigation and shared with us all their experience and knowledge. We would like to thank all of them.

We also would like to thank the partners that structured the project together with us and will support it this year and next year: Fundação Doen, Cordaid, Solidaridad and Aid Environment. Our special thanks to ICV (Center of Life Institute) that supplied the maps and helped us with information and data.

We also would like to express our gratitude to all the interviewee, specialists, social leaderships, researchers and people from the government that talked to us and helped us all the way through the soy and castor bean report.

We hope this report might be useful for the social movements, NGOs, inhabitants' associations from the regions affected, workers' and patronal unions, research institutes and the Brazilian and international media, as this is an important step for the implementation of efficacious alternatives for the predatory exploitation of the land, environment and society.



CHAPTER 1 SOY BOOM

The year of 2008 deserves a chapter on its own in the history of the expansion of soy in Brazil. The agriculture sector estimates point that from the 2007/08 harvest, Brazil will overtake USA in soy production and will certainly take the lead in the ranking of major exporters of the grain. When the balance closes, the Brazilian will have exported 30.7 million tonnes of soy, a 30.6% increase over the previous period. The USA export will be reduced by 12.8%, as they will export 26.5 million of tonnes, according to USDA (United States Department of Agriculture) estimates. Brazil will continue to be behind the USA in the ranking of the major producers, but not for long. Brazil shall take the lead in the 2010/11 harvest, according to USDA, or in the 2013/14 harvest the latest, according to estimates of Agroconsult, a consultant company, and ABIOVE (Brazilian Association of Vegetable Oil Industries).

When Brazil reaches the top, forty years will have gone by since the modern production of soy, associated to agribusiness, was introduced in Rio Grande do Sul State. The country has witnessed an interrupted expansion of soy crops since then. Soy crops began in Southern region advancing towards the Cerrado and tries to expand also towards the Amazon Rainforest. Soy is definitely the flagship of Brazilian agriculture as it covers twenty-one million hectares, representing 45% of all the cultivated area in the 2007/08 harvest.

Alongside the advancement of the grain, many complex economic activities associated to soy flourished: agribusinesses, involving agrochemical multinationals, genetic research, rural holdings, banks, trading companies and industries, ranging from synthetic resins to food industries.

Besides being the virtual leader in soy exports, Brazil is also the vice-leader in export of soy bran and oil, in both ranking behind Argentina. Brazil is also the first in poultry and pork exports—sectors that use soy as the basis of animal-feed¹. The latest novelty is the biofuel industry that produces the fuel from soy oil—used in at least 80% of the biodiesel produced in Brazil—in order to be able to guarantee the mandatory mixture of biofuel to petrol.

The history of the so-called “soy complex” in Brazil, responsible for the flourishing and development of whole municipalities in some states, such as Mato Grosso and Goiás, cannot be told only by the increases observed in the numbers. Degradation of the environment and so-

Table 1

PROJECTIONS FOR INTERNATIONAL SOY TRADE												
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
EXPORTS, MILLION METRIC TONS												
Exporters												
Argentina	8.7	10.2	9.1	8.5	7.7	8.2	8.2	8.2	8.3	8.5	8.6	8.7
Brazil	23.5	30.7	36.1	40.7	45.0	48.3	51.0	53.4	56.1	58.4	60.6	62.9
Other south-american countries	5.4	5.8	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1
China	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
Other foreign countries	2.2	1.7	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.6
United States	30.4	26.5	24.6	23.5	23.1	22.5	22.3	22.5	22.2	22.3	22.5	22.5
Total exports	70.7	75.2	78.5	81.6	85.2	88.6	91.6	94.5	97.3	100.3	103.1	106.0

Source: USDA

cial exclusion often come alongside with the modern agriculture. In order to guarantee a good rentability, soy needs to be planted in large scale, and the crops, therefore, have to cover large areas. This aspect often results in land concentration, and peasants are pushed off the field. The extremely high Brazilian productivity, reaching about 60 bags per hectare in some regions, one of the best in the world, is achieved because of massive use of pesticides and fertilizers that results in the contamination of the soil, rivers and workers, despite following the legal norms for their use.

Social movements and NGOs are closely articulated and share their analysis and researches in order to denounce the impacts caused by soy in Brazil. These aspects of the Brazilian agriculture have crossed boundaries and also called the attention of foreign institutions concerned with the Brazilian biomes, such as the Amazon Rainforest. Many initiatives calling for a dialogue and even the signature of commitments between the civil society and corporation groups are being spotted all over the world, and the aim of these dialogues is to achieve the much discussed sustainability in soy crops and in agribusinesses. The most noteworthy case in Brazil is the moratorium, started in July 2006 and proposed by ABIOVE (Brazilian Association of Vegetable Oil Industries) and ANEC (National Association of Grain Exporters), whereby they committed not to commercialize any product from deforested areas from Amazon or farms that use slave labor. The moratorium was proposed after international institutions, led by Greenpeace, made pressure on the adoption of these measures. The concern with other issues, besides rentability and productivity, has led to the establishment of paradigms by certifiers in order to guarantee sound environmental and social agricultural practices.

Because those are the first steps, there is mistrust on both sides. NGO Repórter Brasil is trying to contribute with this discussion through this report by reporting the socio-economic, environmental, agrarian, labor impacts—as well as the impacts on indigenous and native populations—of the expansion of soy culture in Brazil. This report started with the survey of data banks known for their reliability and interviews with representatives of social movements,

NGOs, lecturers, consultants, people from the government and, above all, Brazilian people who are being affected by the negative aspects of soy crops. This report, therefore, is an instrument to denounce improper handling management of the land. Field investigation carried out in the states of Paraná, Mato Grosso, Mato Grosso do Sul, Tocantins, Pará, Ceará, Bahia, Piauí e Maranhão as well as Paraguay between January and March 2008. If previsions are confirmed and Brazil becomes the major producer of soy in the world, the soy crops will expand chiefly in these states where the impacts will be mostly felt.

CHAPTER 2 SOY AS FOOD AND FUEL

Any analysis about the causes of soy expansion must contemplate its multiple uses and the potential of expansion of each one. The increase of world demand for meat in the past few years has increased the demand for soy bran, used in animal-feed. The boosting demand of China, a reflex of the fantastic Chinese expansion, guaranteed and will continue to guarantee a market for Brazilian grain, and this aspect stimulates the producer to invest in soy. Brazil exported² 3.6 million tonnes of soy to China in 1996. Export boosted to 22.4 million tonnes in 2005 and should reach 58.3 million tonnes in 2018, according to USDA. The use of soy in China and other countries will increase because of the animal-feed industry as a response to the rise in the international consumption of meat. Meat consumption should go up from 38.2 kilos per person in 2005 to 42.6 kilos in 2020, according to FAO (Food and Agriculture Organization of The United Nations).

Besides the animal-feed demand, the expansion of agrofuel in the world to substitute petrol derivatives whose price has been above US\$ 100.00 per barrel in the interna-

tional market lately is another factor that elevates the price of soy³—and as result it also rises the willingness of the producer to plant it. According to USDA, this is one of the explanations of the increase in the area covered by soy in Brazil in the years to come. Brazil tends to expand the area

covered by soy in order to compensate for the stagnation of the soy market in the USA where the corn should guarantee better rentability for the producers in the long run, as there was a boom in the demand of corn because by the ethanol mills.

Table 2

PROJECTIONS FOR INTERNATIONAL SOY TRADE												
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
IMPORTS, MILLION METRIC TONS												
Importers												
European Union*	15.4	15.8	15.5	15.4	15.2	15.0	14.8	14.6	14.4	14.3	14.1	13.9
Japan	4.1	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.2	4.2
South Korea	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2
Thailand	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Mexico	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.7	4.8	4.9	5.0	5.1
Former Soviet Union**	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other european countries	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
China	28.7	33.5	36.2	38.8	41.8	44.7	47.0	49.3	51.5	53.8	56.0	58.3
Malaysia	0.5	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
Indonesia	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.0
Other countries	12.4	11.4	12.1	12.5	13.1	13.7	14.3	14.9	15.5	16.1	16.7	17.3
Total imports	70.7	75.2	78.5	81.6	85.2	88.6	91.6	94.5	97.3	100.3	103.1	106.0
* Excluding intra-Euroean Union trade												
** Including intra former-Soviet Union trade												
Projections made in November 2007												
												Source: USDA

The estimates are that Americans will demand 104,000,000 of tonnes of corn only for the production of fuel. The prices of the grain in Chicago Board of Trade indicate that the price quotation of the product will be around US\$ 6.00 per bushel by the end of 2008, high above the average US\$ 2.40 registered in the last 20 years⁴. The soy should maintain the high prices—around US\$9.00 per bushel—in the USA market, but this is not enough to stimulate the Americans to plant more soy. According to USDA, the area covered by soy in the USA should drop from 71,000,000 million to 68,000,000 acres between 2008 and 2017.

The use of agrofuel is also going to increase in Brazil. Soy is the main raw material used to produce biodiesel, responsible for 80% to 90% of total produced. The cost of the fuel produced with soy is about three times cheaper than the one produced with castor bean⁵. The present consumption in order to supply the 2% addition in petrol diesel and produce 850,000,000 liters of biodiesel a year⁶ is estimated in 3.5 million tonnes of soy. The demand, however, is considered small to influence the prices of the products in a country that estimates to harvest about 60,000,000 tonnes of the grain in the present harvest⁷.

This estimate, however, can change depending on demand of soy by Brazilian biofuel industry. There will be an increase to 3% in the mandatory quantity after July, 1st, for example, when the demand projected will be above 1.2 billion liters of biofuel a year. Even though this is not enough to put pressure on the quotation price of soy, further rises in mandatory additions of biofuel in petrol diesel are expected in the years to come, and Brazil is one of the coun-

tries that participate in the international effort to transform agrofuel in a commodity. If this happens, then Brazil can produce biofuel not only for internal consumption but also to supply other nations.

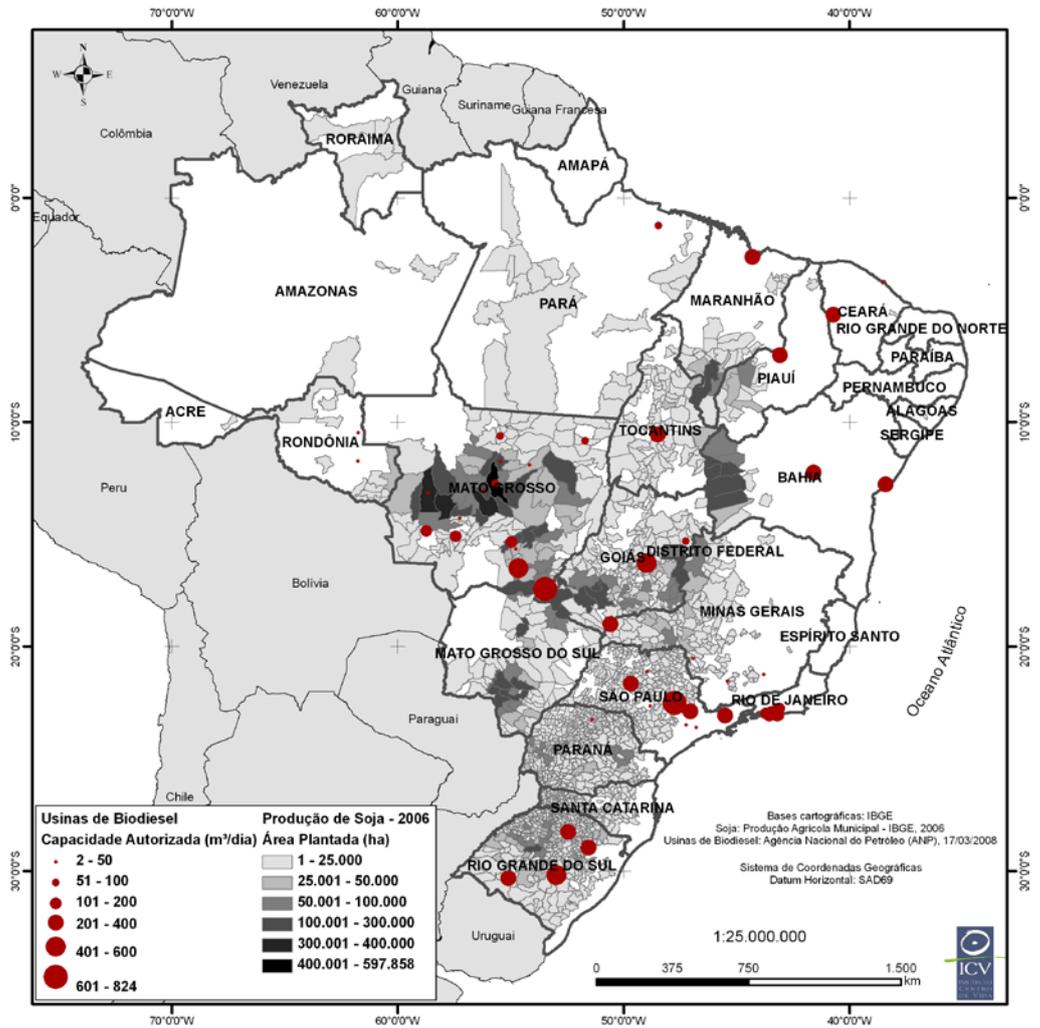
There are fifty-one mills for biofuel production authorized by ANP (National Petroleum Agency). The majority of them are established in areas where there is soy or transport infra-structure (see the map below). Besides these industries that are already functioning, the ANP is assessing the project of other fifty mills. There are sixteen projects in Mato Grosso State, seven in São Paulo State, five in Paraná State, four in Rio de Janeiro State and one in each of the following states, Rondônia, Rio Grande do Norte, Goiás, Sergipe, Maranhão and Santa Catarina. If the majority of these projects are not shelved, the capacity of the production would jump from 2.5 billion liters per year to 4.0 billion liters. Fiscal incentives created by the National Program of Biodiesel Production and Use (PNPB) are stimulating the expansion of the sector.

Even though the biofuel industrial park is relatively small, the Brazilian internal demand for the soy complex—whether soy is used in agrofuel production or not—has the potential of influencing the internal prices of the commodity. The agroindustry established in the country can absorb about one third of the Brazilian production. As a result, it can use stock control instruments and the idle capacity to influence prices paid to the Brazilian producers. This process can be widely used because the same multinational industry has control over the processing and exportation processes. The industries ADM, Bunge, Cargill and Coinbra are in charge of half of the negotiations of the

soy produced in the country. They are working alongside some powerful national companies, such as Amaggi.

There are doubts, however, if the soy can continue to be the main raw material for this kind of biofuel in Brazil, if the demand for the grain increases. According to Francisco Durães, from EMBRAPA Agroenergy, the soy oil used to produce biofuel is virtually a sub-product of the grain processing, corresponding only to 18% of the total mass of it. ABIOVE points out that the industry always considers the price of soy bran, the main processing product, in the calculation of soy use in the production of biofuel. This means that producing biofuel—that uses only the oil—using soy may not be such a profitable activity, if the price of the bran decreases.

Map 1



CHAPTER 3 THE FUTURE OF SOY IN BRAZIL

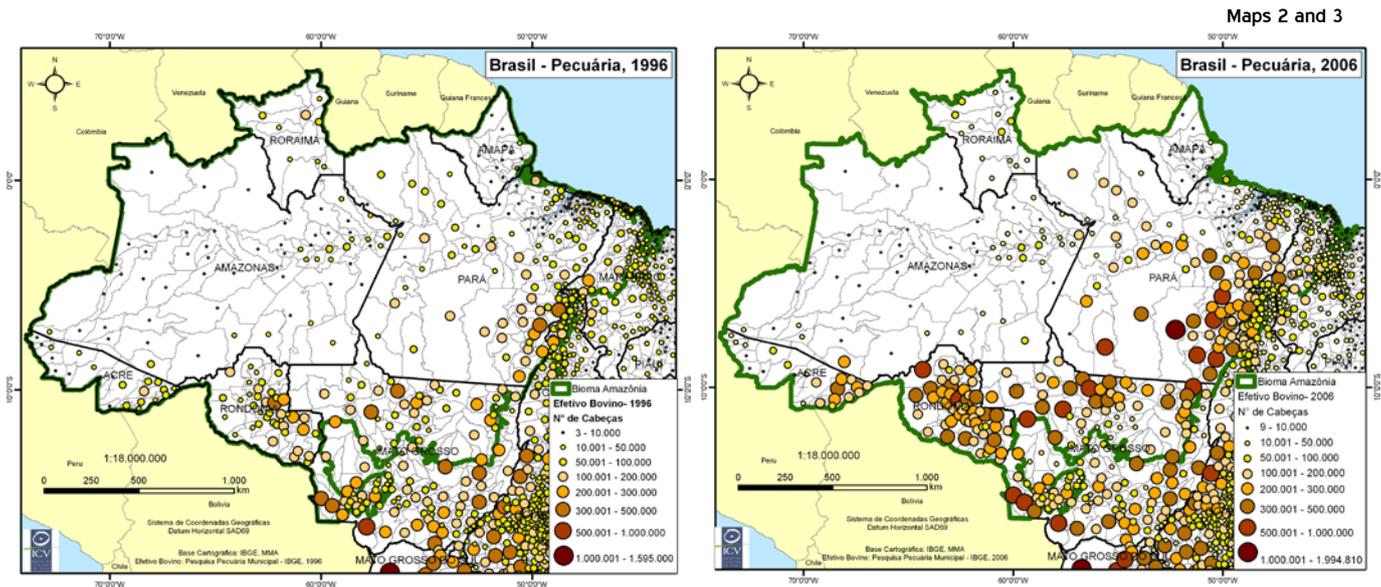
Considering the prevision of increase in the world demand for soy in the years to come and the expectation that Brazilian producers will be the ones that will mostly expand their offer⁸, what are the regions that will probably cultivate these additional crops? Will the agricultural frontier continue to expand? Or will the areas already in use and deteriorated by other activities, mainly by cattle herds, be transformed in new soy fields? This discussion is important as it can help to foresee the different types of impacts of each of the possible scenarios for expansion.

Historically, Brazil expanded the agricultural frontier because of the world's increase in the supply demand. Because it is a country with continental dimensions and low population density, the costs of production could be reduced due to the "price of the land" aspect⁹. This issue

was relevant, for example, in the colonization of the Brazilian Cerrado areas by farmers from the South of the country in the 1970s, considered the mark of first establishment of the modern soy crops. The expansion of agropecuary activities in the Cerrado region meant a change in more than 90% of the vegetation of the biome in less than thirty years, whereas it took centuries for this process to happen in Mata Atlântica.

After crossing the frontiers of the Cerrado, the farmers arrived at boundaries of Amazon Rainforest, and the latter began to be explored as soon as they arrived there. Despite the international concern with the preserva-

tion of the forest, a rapid process of deforestation and expansion of areas used for cattle herds and agriculture has been observed, and these activities are carried out mostly in cheap, abandoned or grabbed land (the so-called *grilagem*) that belong to the public power. The most usual cycle for advancing the frontiers is the following: The farmers practice deforestation and profit by selling the noblest wood, after that they form pastures, start the herds and then can invest in more profitable cultures years later, such as soy for export¹⁰ or sell the land by a good price. The advance of herds, therefore, might be a sign that grain cultures might be established in the area.



A study carried out by Amigos da Terra - Amazônia Brasileira, an NGO, pointed out that cattle herds are responsible for the change in the use of soil in Amazon. A historic mark of ten million cattle slaughtered was reached in Legal Amazon for the first time in 2007, a 46% rise in relation to 2004. One third of fresh beef export in 2007 was from Amazon region, mainly in the states of Mato Grosso, Tocantins, Pará and Rondônia. Pará has increased direct export (by weight) in 7.800% since 2004, the same trend was observed in Rondônia (1350%) and Mato Grosso (360%).

The advance of grain crops, however, does not follow a single logic nor always depend on the previous cattle herds expansion. Greenpeace¹¹ carried out a research about the year of 2005, and it was denounced that soy had become the major threat to Amazon Rainforest up to that moment¹². New areas covered with soy are observed at each harvest in the Northern regions of Mato Grosso State and Southern regions of Pará State. Cheap or grabbed land (the so-called *grilagem*), the proximity of transport infra-structure, expansion of warehousing facilities and strong presence of soy multinational that finance the producers—Cargill, Bunge and ADM, among others—and guarantee the acquisition of the product are responsible for the advance of the crops into these new areas.

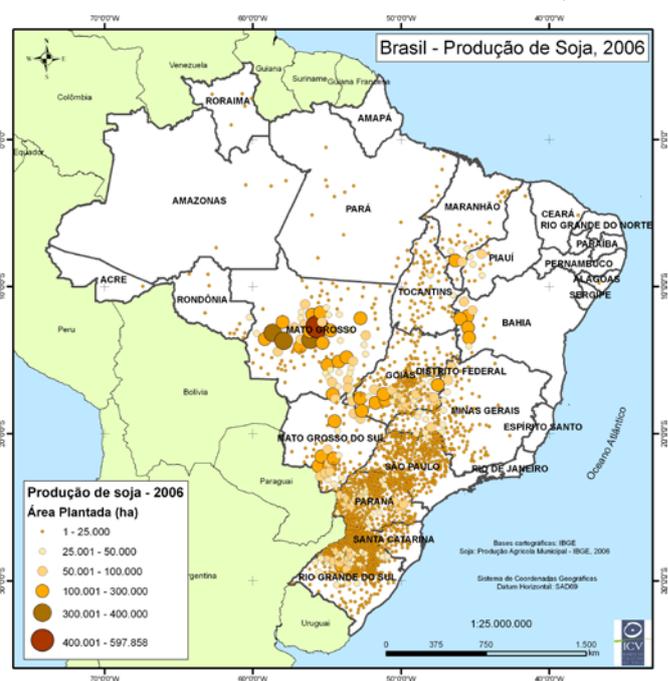
These factors explain, for example, why there has been an increase in deforestation rate in Santarém region since April 2003, the period when Cargill warehouse located in this municipality began to operate. Areas of forest gave way to soy crops because of financing facilities and a market for the product¹³. The money coming from abroad also explains the increase in deforestation areas, and those areas tended to follow Brazil's rate of economic growth up to 1990s¹⁴, but nowadays they are higher because external demand stimulates deforestation, even when the country does not grow.

Because of the increasing demand for Brazilian soy in a scenario where the big capital prevails, the crops might expand into Cerrado regions never explored before as the area is good for the exploration of the grain as well as Amazon Rainforest. As it is possible to observe in the map below, in the past years the grain has advanced into the Amazon Rainforest, the Cerrado regions and even the Caatinga in Northeastern states, such as South of Piauí and Maranhão and West of Bahia.

The features of this map on future soy expansion will depend on the changes in transport and warehousing sectors. One of the main issues in the soy sector is the lowering of costs of the flow of soy in Brazil, based on highways (67%) that are more expensive than railways

(28%) and waterways (5%). According to an EMBRAPA research¹⁵, the USA transport 61% of their production by waterways and only 23% by highways. In Argentine, 80% of flow of production is by highways, but the distances the trucks travel there (250 to 300 kilometers) are relatively

Mapas 4 e 5



shorter than in Brazil (900 to 1,000 kilometers). Therefore, estimate costs of internal flow of the Brazilian production are 83% and 94% higher than in the USA and Argentine, respectively. These kinds of concerns explain the projects discussed in Mato Grosso State years ago, such as the expansion of Teles Pires-Tapajós waterway¹⁶ and the recuperation and paving of highways, such as BR-163, that connect Cuiabá (in Mato Grosso) to Santarém (in Pará), and BR-158 that connects Garças (in Mato Grosso) to Redenção (in Pará).

According to EMBRAPA, another hindering aspect to the expansion of soy in Brazil is the condition of waterway. Products from the soy complex are transported through ten main corridors: Itacoatiara (AM), Santarém (PA), Itaqui (MA), Ilhéus (BA), Corumbá (MS), São Francisco do Sul (SC), Vitória (ES), Santos (SP), Paranaguá (PR) and Rio Grande (RS), whereby the three last waterway mentioned are responsible for 80% of export, and the majority of them do not have a good access to highways or railways. Only the ports of Itaqui, Santos, Paranaguá, Rio Grande, São Francisco do Sul and Vitória have access to railways. According to EMBRAPA, in order not to have problems with the transport of future harvests, Brazil has to increase the flow capacity of the ports to 31.0 million of tonnes up to 2012. According to Bunge's data referring to 2004, one vessel had to wait an average of twenty-two days to be unloaded because of the flow capacity of the ports, and the average cost in the waiting line is US\$ 50 mil per day.

Another important aspect to be considered for the soy expansion is warehousing. Because of inefficiencies of this aspect in productive chain, the producers have to sell it as quickly as possible and, therefore, they do not benefit from speculation. According to EMBRAPA, the capacity for storing grain on farms in Brazil corresponds to only 9% of the total capacity available, whereas in the USA and in Canada it corresponds to 56% and 83%, respectively. In 2005, the capacity of warehousing of grains in Brazil was 84%, but trucks, wagons and vessels behaved as mobile silos and stored the other remaining 16%. Therefore, the projects of investment in public and private infra-structure to improve the internal transport, storing and flow of the grains in ports will be essential to define the expansion soy future in Brazil.

Other scenarios, however, might be built. One of them—supported by a series of International NGOs and patronal entities—corresponds to the advance of the crops in a social and environmental responsible way. This would mean, for example, that the farms would have to respect the legal reserve of the forest and the areas of permanent protection. As fewer areas for crops would be available, the soy could expand in the land dedicated to cattle herds, and this would represent a consolidation process of the soil. According to ABIOVE, this scenario would contribute to the increase of the soy production without deforestation. In São Paulo, the entity says the number of cattle per hectare has reached 1.4 head in the past few years when

the national average is about 0.9, and this would mean that additional areas could be used for soy crops. The entity also estimates that the dissemination of the integration model of agriculture–cattle herds whereby the two activities would alternate the use of the land so that thirty million hectares could be used for crops up to 2020.

In fact, this does not take into consideration that one of the reasons for low price of production in Amazon is based on the search for additional areas, many times through land grabbing, illegal exploration of the environment and over exploitation of workers, including slave labor. The data on the expansion of cattle herds in the Amazon region points to the fact that this soil consolidation is only a palliative measure, as this handling management is occurring together with the opening of additional areas through deforestation. Many Brazilian social movements say that the agricultural model based on the agribusiness is incompatible with the sustainable development¹⁷. That is, if Brazil decides to supply the international demand for

bran and produce biofuel with soy, nothing can prevent the negative social and environmental impacts.

The conflict over these different positions has started, and it is difficult to foresee what the future holds for Brazil. Nonetheless, it is easy to see that the present model of exploration of soy in Brazil causes environmental devastation, land concentration, disregard for workers and human rights, pollution of rivers, soil and air as well as all kinds of pressure on indigenous and native people. In the next chapters, Repórter Brasil will systematically present a report about each one of these impacts and tell the story of Brazilians who are really threatened by the present soy expansion in the country.

THE "BRASIGUAYAN" EXPANSION

Soybean is one of the major items in Paraguay's economy. National production is estimated at 7.5 million tons for the 2007/2008 harvest - which is high relative to the small size of the country¹⁸ and its population of 6.6 million. The expansion of soybean crops started 30 years ago, when the harvest used to be about 500 thousand tons. Today, the country is among the world's ten largest producers, according to comparative data from FAO.

The history of the advancement of soybean in Paraguayan territory, as well as the agricultural modernization and the social impact it caused, is entirely related to the expansion of that crop in Brazil after the 1970s. At the time of the construction of the Itaipu hydroelectric plant, farmers, especially those from the Brazilian state of Paraná, started occupying land in Paraguay, drawn by geographic proximity, low cost of land and open support by General Alfredo Stroessner's dictatorship.

Landowners estimate that the sale of one hectare of land in a soybean area in Paraná resulted in an amount enough to buy an average of four hectares in Paraguay. That is, the opportunity would allow small and medium-scale producers to increase their production. That is the case of Brazilians in Londrina, Palotina, Cascavel, Marechal Rondon, and Campo Mourão, in the state of Paraná, who now live in the neighboring country. Besides selling the land itself, the money accumulated from soybean production and discouragement due to the decline of coffee were the driving forces for the "pioneers" to cross the border.

Farmer Virgílio Moreira arrived in the late 1970s at the district of La Paloma, at the Department (administrative area equivalent to a state or province) of Canindeyú. He sold his land in Paraná to move. According to him, at that point, some people were able to buy 30 times more land in Paraguay than they used to have in Brazil. "That was crazy", he remembers. He now lives with his family in a good porch house lined up by eucalyptuses. The rest of the landscape, until the horizon, is transgenic soybean - 2 thousand hectares planted together with other Brazilians. In the 2007/2008 harvest, the group expects at least US\$ 800 thousand from selling the product. La Paloma has Brazilian citizens who own silos, transport companies, and agricultural technology imported from Brazil.

Tranquilo Fávero, a Brazilian native and a naturalized Paraguayan citizen, is now considered Paraguay's largest soybean producer. He has properties spread over 13 different departments to plant soybean and other crops, such as corn, sorgho, wheat, canola, sunflower, besides cattle. The strong entrance of Brazilian capital in Paraguay's agriculture eventually concentrated land and puts the subsistence of small farmers at risk. The format of occupation created impacts similar to the modernization of agriculture in Paraná: rural exodus, land concentration, low generation of jobs and labor under degrading conditions at the opening of agricultural frontiers in the 1970s and 80s.

Driven by Brazilian agricultural capital, soybean occupied vast border areas in the Paraguayan departments of Canindeyú, Alto Paraná, Itapúa, up to Caagazú, San Pedro, and Guairá - this one on the Paraguayan side. Integration with - as well as dependence on - Brazil was strengthened. Paraguay's soybean industry depends on capital from Brazilian im-

migrants and on transnational companies such as ADM, Bunge, Cargill, and Dreyfus.

Besides Paraguayan workers, thousands of Brazilians have immigrated in search of work. Many were subjected to slave labor, treated inhumanely and prevented from leaving their jobs in mint plantations, coal production, and in preparing soil for soybean croppers. Until the early 1990s, denunciations often arrived at the Brazilian side. Reinaldo Paz, president of the Rural Labor Union of Guairá - a town located in Paraná near the Paraguayan border, says that people came to them escaping from the farms. "There were many cases. There were people who would escape from the farms and get to Brazil by crossing the river at night", he says. Labor situation is still precarious in many farms, disregarding both individual liberties and human rights. In that context, Paraguayan and Brazilian social organizations are discussing the establishment of a South American Covenant for the Eradication of Slave Labor, modeled in the Brazilian Covenant, forcing companies that operate in Paraguay to assume the same commitments for the promotion of decent labor to which they have committed themselves in Brazil.

In parallel, Paraguay starts to witness inflation in food prices. Food items included in the Consumer Price Index (Índice de Precios al Consumidor, IPC) increased 6.1% in the first quarter of 2008, driving global inflation up to 3.6% in the period. The country has agricultural production enough for its population, even though it cannot distribute it evenly. With a large part of the agriculture industry oriented for exports, food sovereignty of its population becomes vulnerable to increases in international prices and the growing demand from consumer countries.

Table 3

PRODUCTION EVOLUTION	
Year	Production
1980	537300
1981	761200
1982	756600
1983	849733
1984	975404
1985	1172467
1986	810000
1987	1310000
1988	1407362
1989	1614573
1990	1794618
1991	1402035
1992	1617940
1993	1793540
1994	1795790
1995	2212109
1996	2394794
1997	2670003
1998	2855742
1999	3053005
2000	2980060
2001	3511050
2002	3300000
2003	4204865
2004	3583680
2005	3513000
2006	3.641.186*
2007	6.000.000* (est)
2008	7.500.000* (est)

Source: FAO e *MAG

CHAPTER 4 SOCIAL AND ECONOMICAL IMPACTS

There are several possible ways of treating social economical themes related to the impact caused by soy. In this report, we have taken two of them into consideration, as these two are usually present in the discussion about grains: The conflict between the production of raw material for biofuel and crops for food, and the capability of this sector to generate work and income.

THE CLASH BETWEEN FOOD AND FUEL

The Food and Agricultural Organization of the United Nations (FAO), in its last report¹⁹ on biofuel announced in March 2008, reaffirmed that its political position by considering biofuel not only a good developmental opportunity, but also a threat to food safety for the people of Latin America and the Caribbean. In this report it was stated the following: “It is the responsibility of the local governments to maximize the opportunities and minimize the risks”.

The organization considers that the great Latin American and Caribbean agricultural potential allows one part of the agriculture production to be destined to biofuel production. It also emphasizes that the problem of hunger in the region is due not to the lack of food, but to the lack of income. There are 209,000,000 people living under the poverty line: That is equivalent to 39.8% of the local population. Its argument is very similar to the one of the Brazilian president Luiz Inácio Lula da Silva, who has been demonstrating in his international travels to that he is in favor of²⁰ the viability of substituting the fossil fuels by the biofuel.

The FAO and the Brazilian government proposal is to use the biofuel potential in order to generate income. This is the doctrine of the National Program of Biodiesel Production and Use (PNPB), created in 2004 by the Federal government. Their promise was that this program would be, above all, an instrument to strengthen the family farm as the main raw material producer for biofuel. This act would be guaranteed by the mechanism of the Social Fuel Certification, which was granted and inspected by the Ministry of Agrarian Development. The Social Fuel Certification does not operate with direct investments in the family agriculture, but does function with inspection facilities for the industrial sector.

In Mato Grosso, biofuel companies have been making contracts with farmers so that they produce soy. There is not, however, conclusive studies in Brazil indicating that the increase of biofuel production pushes up food prices, such as rice and beans (typical Brazilian daily food). In other countries, however, this is already reality. In Mexico, the price of tortillas has gone up to 400%²¹ in 2007, pushed up by the high quotations for corns, which is increasingly used by Americans to produce ethanol. It is worth mentioning, that price, even the internal market, can be influenced by global market.

In 2007, a controversial document produced by a special report for the Organization of United Nations (ONU) about Food Rights, Jean Ziegler, a Swedish sociologist, supported a moratorium for five years on the biofuel production. The report stated that the uncontrolled expansion of cultivation destined for biofuel production in Brazil is a threat to the food rights for the poor and puts biomes, such as the Amazon and Cerrado, at risk. The concern is the same expressed by other organizations as Landless Workers Movement (MST) and Via Campesina, as according to them there is a great risk of a reduction of the people’s freedom for food choices, if soy continue to be used in biofuel production and also if large companies continue to control the sector²².

Recently, Ziegler, on public declarations, provoked more criticism by declaring that “the production of biofuel is a crime against the human being”²³.

The Brazilian government and groups such as ABIOVE do not believe in the influence of biofuel on food prices, at least in biofuel production in Brazil. The arguments are based on the small quantity of oleaginous used in biofuel production—as it was mentioned in the previous chapter—to the agricultural potential that Brazil still has to be developed through the consolidation of animal breeding and use of degraded areas. All these conclusions, however, need further studies to be proved. Besides, the government and ABIOVE have political and commercial interests which make their evaluations very unlikely to be impartial.

If, on one hand, it is hard to evaluate the weight that the biofuels have in the price of the agricultural commodities, on the other hand it is essential to conclude that the increase of demand presented by them will pressure even further the food in a inflationary context, in which the quotations of products as the soy, corn and flour may reach the top level. The International Monetary Fund calculates the elevation of price on food by 30,4% from November 2004, beginning of the raise, and December 2007²⁴ - extinction of world hunger is an issue more like a dream than reality.

CREATION OF WORK AND INCOME

Considered as an isolated activity, the expansion of soy cultivation has been generating work and income for the workers, according to the data from Ministry of Labor and Employment (MTE). The number of created formal jobs for the grain cultivation throughout Brazil went from 5,405, in 1995, to 70,457, in 2006 (last consolidated data). Mato Grosso was the state where more work was created, in this same period went from 919 to 20,876.

These data help to explain why the expansion of soy cultivation and its direct and indirect jobs is popular for the population from municipalities where the activity is relevant. The soy producers often become regional leaders and politicians, they win elections for the government and for the parliaments. The most famous case is of the recent governor of Mato Grosso, Blairo Maggi, one of the biggest soy producers in the world and one of the owners of one of the largest exportation company of Brazil, the Amaggi Group.

Municipalities with the strong presence of agroindustry of soy has its image as an example of wealth, with its Human Development Index Report (IDH) average superior to the national average, as it is the case of Sorriso and Lucas do Rio Verde, both in Mato Grosso. The new characteristics of these cities inspire many inhabitants from neighboring municipalities', as they wish to reach, someday, the same standards of living in the areas where the soy cultivation has already settled.

This scenario, however, is only one face of the coin. Even if the soy generates work, its capability of opening new posts is much smaller than other agricultural cultivations. As the social movements related to the land say the expansion of grains by a capital-intensive model and in large land properties diminishes the space of family agriculture, where the generation of work is much higher.

A study of EMBRAPA²⁵ tried to discover the power that Soy Complex has on working opportunity issues, from the input industry to the industrial process such as poultry and swine production. Although it is true that agribusiness is one of the sectors that most generates work in Brazil, the study concludes that the automation and mechanization prevent this sector from generating new job opportunities, even during expansion time. One of these areas is soy production.

The researchers show that several academic works has concluded that the largest cultures of grains located in Cerrado generate between one to four new jobs at every 200 hectares. As for tomato, grape and castor bean, they can generate 245, 113 and 24 jobs respectively (at every 200 hectares). Similar data is given by another study²⁶ presented at the Center for Sustainable Development of the University of Brasilia. In this case it is expected fewer jobs, when the soy covers areas previously used by other agricultural activities, especially for native families, and, therefore, favoring the agricultural exodus, among other problems. It is worth mentioning that between 1991 and 2006, the number of Brazilians living in rural zone dropped from 24% to 16.7%²⁷.

When employment is generated, the tendency is to have more jobs in the tertiary sectors, both in commercial and administrative areas. The study of EMBRAPA estimates that one job in rural sectors can generate six upriver and downriver from the agricultural business, including work in the field; in other words, between suppliers and clients. This would explain the biggest economical vigor of the cities like Sorriso and Lucas do Rio Verde, where the agroindustry of soy processing, the swine and poultry production and the producing of biodiesel tend to generate more jobs than in neighboring municipalities marked by traditional rural activities.

It is based on this diagnosis that the government has been encouraging what is called "addition of values" to the soy, even through inspection encouragement. In Argentina for example, there are laws that guarantee benefits to the oil and bran instead of grains, such a thing has reflected on the country's agenda of external sales. In the crop of 2007/08, for example, the Argentines will probably export 29.5 million tonnes of bran and only 10.2 million of grains. In Brazil, where there is not such a thing, it will probably be sold to the external market 30.7 millions of tonnes of grains and 12.0 million of bran in the same period.

CHAPTER 5 LABOR IMPACTS

The study of the soy bean complex productive chain shows that increasing production does not necessarily imply employment generation. The increase of productivity depends on the development and employment of technology through capital investments (machines, pesticides and new techniques). Employing more technology means employing less people to do the job. An example of this is the use of genetically modified seeds, modern fertilizers and pesticides. In the quest for international competitiveness, workers are replaced by planting and harvesting machines. Because of lack of jobs, these workers contribute to the rural exodus and increase the unemployment rates.

The total amount of soy produced in Brasil is considered mechanized, directly responsible for the increase of the fleet of tractors and harvesting machines, estimated in 336,500 and 43,400, each. Harvesting machines, by the way, are used in more than one culture, like soy, wheat and corn, if some mechanical adjustments are made. Although the Brazilian agricultural output has been breaking records year after year, the number of people employed in the farming sector went down 3,1%, from 17.382 million to 17.263 million. In spite of the increasing “modernization” of the agriculture in Brazil, thousands of rural workers are being forced to work in degrading conditions. These cases can be found in places where agropecuary is expanding, in Amazon and Cerrado regions, and are mostly related to deforestation for new cultures in order to prepare the soil for introducing mechanized cultures; pasture cleaning; charcoal production; among others.

Considering that work productivity tends to increase constantly as a result of investments in technology by a great number of landowners, those farmers who rely less on technology compensate the gap by reducing the impact of wages on their costs. In other words, in order to obtain the average market rentability without having to invest in resources, farmers prefer to offer poor work conditions. Other farmers take advantage of this alternative not to gain competitiveness, but to increase their profits or capitalize over a certain period of time, like sugarcane producers do. This issue is discussed in Volume 3 of these series of reports to be published in December, 2008, by Biofuel Watch Center.

Due to low employment rates, the unionization and association rates of the soy workers is equally low, and attempts for improvements in working conditions and wages become fragmented. The posseiros (squatters)

and share croppers were replaced by medium leaseholders and big soy producers. The job profile in the farming sector also does not include any kind of benefits to the worker such as profit sharing. The monthly wages of a soy farm workers are not consistent with the increase in productivity, another aspect that contributes to income inequality.

In the year 2006, for instance, the soy culture in the municipality of Campo Mourão, in Paraná, resulted in an average income, according to the general register of employment and unemployment (Caged), of R\$ 697,30 monthly. If we divide the gross amount of soy production in that city in the year of 2006 (R\$ 52 million, according to the Brazilian Institute of Geography and Statistics) by the number of formal jobs directly related to the soybean production (around 850 workers), the per capita result is R\$ 61,000 per harvest or the equivalent to R\$ 5,000 a month. And there is no hope, in the places visited by the Biofuel Watch Center, of collective bargaining as to profit sharing on the farms, not even for those profits attained by trading companies from exports.

SLAVE WORK IN SOY PRODUCTION

Thousands of farm workers from poor regions in Brazil are obliged to work in farms and charcoal production sites under degrading work conditions and without a chance to break the work relations with their employers. They remain bounded until they finish the task they were enticed to and suffer threats of sanctions which can translate into psychological torture or even spanking or murder. In Brazil, this form of degrading labor exploitation in which there is a restriction in the freedom to quit an employment is called contemporary slavery, new slavery or work analogous to slavery. The economic nature of these work forms differs from the forms of slavery practiced in ancient times or during colonial or imperial times. But the inhumane treatment, the restriction of freedom and the process of objectifying human beings are characteristics which are similar to all forms of slavery.

Although the number of workers involved in slavery is relatively small, it is not negligible. Between 1995, the year in which the federal government created a system aimed at opposing slave work, until April 2007, 29,000 people were found working under such conditions, according to the Ministry of Labor and Employment, main agency in charge of verifying complaints and freeing workers. In the same period, the Pastoral Land Commission (CPT), a main reference when it comes to opposing this type of exploitation, filed complaints involving approximately 50,000 workers.

A study on the profile of rescued slave workers, according to data from the Ministry of Labor and Employ-

ment and NGO Repórter Brasil shows that the majority of those slave workers are men that have attended school less than four years and who are from the North and Northeast regions, the poorest in the country. Fifty-five per cent of slave workers are from the states of Maranhão, Pará and Tocantins.

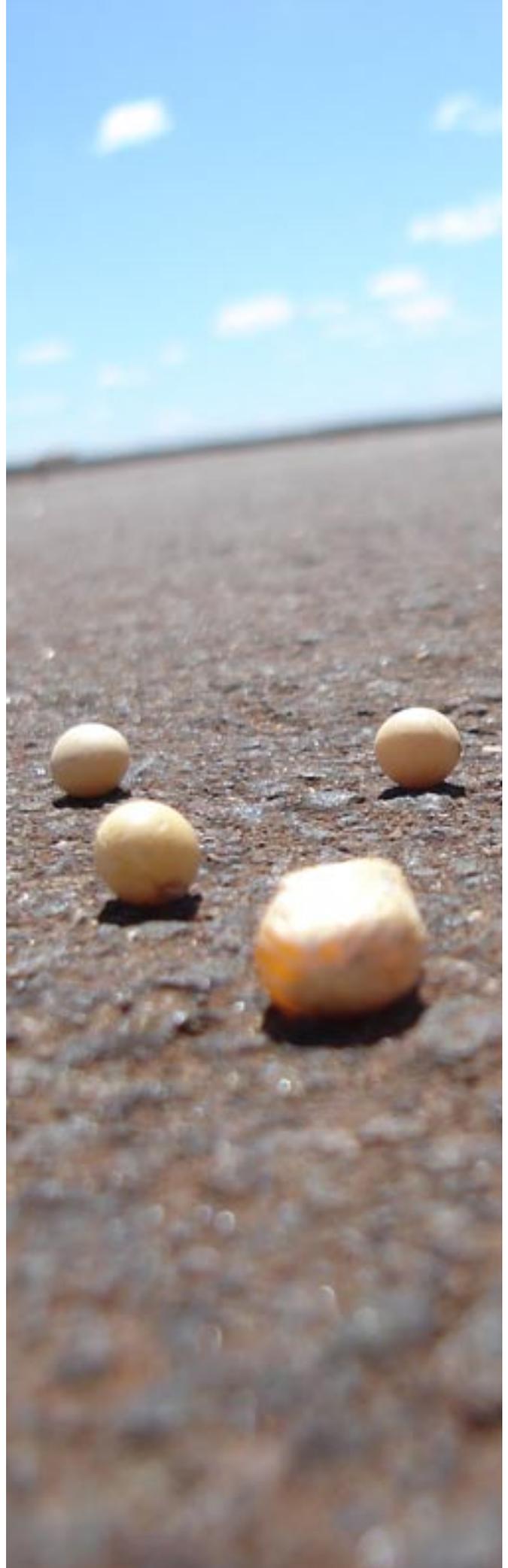
The incidence of the problem concentrates mainly in the Amazon and Cerrado regions, where the farming industry is under expansion. In the Amazon, these regions encompass the states of Rondônia to Maranhão, coinciding with the so called deforesting arch, where the forest loses space to agriculture and livestock. In the Cerrado, it encompasses the states of Bahia, Goiás and Tocantins. However, there are confirmed cases also in other states, such as São Paulo, Rio de Janeiro, Minas Gerais, Santa Catarina and Rio Grande do Sul. These are regions where capital and government institutions are already established, which means that the origin of the problem is not related to the location of the agriculture frontier, but to another element that happens throughout different social realities.

Surveillance reports by the Ministry of Labor and Employment show that in the majority of the cases the employers involved in these sorts of exploitation are not small farmers that are isolated from the rest of society, but rather big farm owners where they use state-of-the-art technology. Researches carried out by the NGO Repórter Brasil, indicate that these producers supply commodities to large industries and to local and international trade companies. Hence, they are under the direct influence of the market economy and dependent on it.

In spite of the intense mechanization in the soy business, in which both harvest and planting are carried out without human interference, there are some activities concerning the preparation of the soil that still involve manual non-qualified work. Slave workers are used to fulfill these tasks. According to a study by Repórter Brasil, the majority of the workers rescued from soy farms used to work as “root collectors”, clearing the land for plantation. Slave workers are not regular farm employees, but temporary workers hired to carry out tasks that any low-skilled individuals without great physical strength can perform.

The use of contemporary slave labor in Brazil is not a remainder of archaic production modes that survived only during a limited time, but rather a mechanism used by the production modes to facilitate the accumulation in the expansion or modernization process of their agro-business. This mechanism ensures competitiveness for farm-owners in regions and situations of agricultural expansion who chose to follow an illegal path.

There are mechanisms to prevent commodity buyers from buying goods produced by means of sla-



ve labor. They can, for instance, consult the “laundry list”, a database released by the federal government with names of employers that do not comply with the rules—<http://www.reporterbrasil.org.br/listasuja>. Banks have been denying credit to those individuals, and companies who signed the National Agreement to Eradicate Slave Labor in Brazil have been canceling business activities with them.

Soy farms occupy the 3rd place in the rank of farms that violate the local and international laws against slave labor. A study conducted by Repórter Brasil shows that these farms are responsible for at least 10 out of the 163 farms that use slave workers; they were included in the “laundry list”. The majority of these farms grow rotating crops, including cotton, corn, coffee among others, but there are some that grow only soy.

In spite of the surveillance by the mobile groups having begun in 1995, it was only after 2004, with the study conducted by the NGO Repórter Brasil on the value chain of the “laundry list” farms, the first study of its kind conducted in Brazil, that the National Agreement to Eradicate Slave Labor in Brazil was created. Today, this agreement has been signed by 130 companies. The agreement aims at eliminating from the suppliers list those farms involved in slave labor, thus contributing to improve the quality of life of farm workers, and avoiding financial losses on account of business partners or damages to the institutional image. The management of National Agreement to Eradicate Slave Labor and the monitoring of the farms that signed it are carried out by Ethos Institute, the International Labor Organization (ILO) and Repórter Brasil.

The most recent study of the slave labor supply chains made by Repórter Brasil shows two examples of soy purchasers listed in the “laundry list”. The first case is Ribeirão SA company, whose farm Ribeirão, em Baixa Grande do Ribeiro (PI), hold 17 workers in slavery condition. According to the Ministry of Labor, the worker didn’t receive security gear, the lodging condition where unbearable, the work day longer than permitted by law and the salaries were not paid. The companies in the “laundry list” stay listed for two years, period during which they need to improve the work conditions according to the law. Ribeirão SA entered the list in July 2005, but was excluded through a legal procedure in October 2007. Cargill purchased products from this company.

The second case relates to Fernando Ribas Taques, a producer from Paraná State and owner of the Carolina do Norte, a farm in Alto Parnaíba, Maranhão State. The farm of 13,500 hectares yielded 36,000 metric tonnes of grain in 2004, according to statistics. The mobile inspection team, led by the Ministry of Labor and Employment, and to which also the Public Prosecutor Office and the Federal Police contribute, rescued 20 workers enga-

ged in the transportation of treated soy seeds. Workers quarters were made of straw and there were no sanitary installations nor fresh water available for them. Ribas Taques entered the “laundry list” in December, 2006. Nonetheless, the production of his farm was bought by the Uruçuí unit of Bunge Alimentos S/A. This unit, located in the Piauí State, resells to large supermarket chains. The processed soy is used in the production of cooking oil, mayonnaise and margarine.

The description of the Carolina do Norte and Ribeirão farms value chains proves that the large companies of the sector did not comply with their own manifesto in the “Soy Moratorium”. In its official text, the document stated their “repudiation of slave labor”.

The first soy moratorium monitoring report, commissioned by ABIOVE to GLOBALSAT concluded that there has been no deforestation in the Amazon region for the purpose of soy planting (further information can be found in the environmental impact section). The account given to the community, however, does not mention the evaluation criteria in so far as labor is concerned. According to a Repórter Brasil study, the companies Cargill and Bunge purchased soy from suppliers accused of slave labor and that were in the “laundry list” of the Federal government, even though they had signed both the National Agreement to Eradicate Slave Labor in Brazil and the moratorium.

The management committee of the National Agreement acknowledges that the mentioned companies are taking action to avoid making business with slave labor employers. This shows that it is possible to eradicate this crime from the soy business. The latest study of slave labor productive chains showed, however, that companies still have problems in this aspect. They are, for instance, expected not to purchase grain from pre-financed producers (producers that receive money and/or raw materials on account of anticipated contracts to be paid back with the production) included in the “laundry list”. The act of doing so implies distributing soy from a farm that the Brazilian government itself considers irregular. It is known that companies are starting to work in this direction, but they still receive soy as a payment for previous debts.

The relation between the expansion of the farming industry and the employment of slave labor turns on a yellow light in the soy business. Since prices of grain have picked up in recent years, and considering that the number of soy farms will increase, it is to be expected that temporary labor will be employed to clear former pastures and to cut-down native forests. As stated before, temporary workers are the most vulnerable ones when it comes to slave labor.

WORKPLACE INJURIES

Brazil still follows the same routine when it comes to underreported workplace injuries that are being hidden in official statistics and in the informality of the market. The data that is available refers only to formal employment, i.e. workers who have a work and social security card. The law requires that a CAT (workplace injury report) should be issued in case of a workplace injury. However, this does not happen often because workers are unaware of their rights or afraid of losing their jobs. In the rural area, the reporting system is even more precarious due to the high grade of informal work, which accounts for two thirds of the market. Besides, the distances to the nearest first-aid stations make it even more difficult to get a clear picture of the situation.

Workers are usually exposed to countless hazards, which most of the time are neglected by their employers. Some of such hazards are: Contamination by pesticides due to the lack of proper protective equipment; injuries as a result of agriculture machinery operation, misuse of manual tools; stings or bites of poisonous animals; and precarious means of transport to the work site. In the soy sector it is not different. Here, problems start

with land preparation and go up to the crop consolidation. Although here the incidence of injuries is lower than in the case of the sugarcane sector, for instance, this is due to the low employment generation in the soy sector. Although the trend shows small absolute numbers, there is a high growth since 1999. Registrations have multiplied by 800% following the increase in production. They refer to illnesses, typical accidents or accidents during work commuting.

Analysis of workplace injuries in the soy sector show a slight fall after 2005, exactly the period when commodity prices had declined and there was reduction of growth soy regions. Even though, it is not possible to demonstrate a relation between these two matters, considering the limited data available. First of all, because it only refers to formal jobs. Secondly, because farmers whi-

Table 4

REGISTERED LABOUR ACCIDENTS IN SOY PLANTATIONS (1999-2006)							
1999	2000	2001	2002	2003	2004	2005	2006
35	120	134	195	249	284	330	304

Source: Anuário Estatístico Ministério da Previdência Social

ch produce more than one culture related to soy, like cattle breeding and corn crops, may generate other entries in the Ministry for Social Security's system. As a baseline, we could use the year of 2006, last period with updated statistics, to say that the incidence of workplace injuries in the soy sector is 17,40 to 1,000 generated works, with a mortality rate of 34,35 to 100,000 generated works.

Seven out of eight economic activities related to the soy culture, like storage and processing, have registered an increase in the number of workplace injuries. The worse occupations of the sector after harvesting are the industrial production of foodstuffs, and the production of bran and oil, followed by the wholesale trade of soy. Formal jobs in these areas have generated more benefits related to workplace injuries in the chain sector.

Since the level of underreporting is rather high, several studies on workers' health seek secondary data, such as death certificates and hospital records. They also rely on the analysis of Brazilian micro-region samplings in order to determine the dimension of the problem. In 2001, for instance, the public university of Pelotas, in Rio Grande do Sul State, conducted a study about the local problems and concluded that 10% of all farm workers had suffered at least one workplace injury in the previous 12 months. This is a rather high percentage, if compared to the formal data. The International Labor Organization (ILO) believes that is precisely the countryside that holds the larger incidence of underreported workplace injuries. No workers' unions, health care centers or trade associations conducted any study as to determine the size of the problem in the soy sector.



The analysis of some data by the Ministry of Social Security shows illnesses that indicate pesticide contamination, as shown in the sequence, to death in the operation of machines or silos. On 1st April 2008, for instance, a harvester operator died when he was “swallowed” by the machine. This happened in Sorriso, Mato Grosso State. Valdecir Pires Ceslestino, 26, attempted to clear the weed from the feed system of the machine while it was on. He was pulled in by his arm. There are also casualties in storage silos. Records show that workers die of confinement and suffocation, buried under tonnes of grain. “Soy burials” occurred in the following locations: Pedro Gomes (Mato Grosso do Sul), Unaí (Minas Gerais), São Paulo (São Paulo), Cambé (Paraná), Ipiranga do Norte (Mato Grosso), Nova Mutum (Mato Grosso), Valparaíso (Goiás) and Santos (São Paulo).

PESTICIDES AND HUMAN HEALTH

The expansion of the soy culture and its productivity in Brazil is due to the increase in the use of pesticides. In order to have one hectare to yield more than 50 bags of soy in Mato Grosso State, it is necessary to use fertilizers, herbicides, ant killers, termiticides, insecticides, fungicides and desiccating agents. EMPAER estimates that in Sorriso, the largest soy producing municipality in Brazil with 615,000 hectares of soy in the 2007/08 harvest, and where the productivity surpasses 57 bags/hectares on some farms, chemical products are employed by the order of 5 kilos/hectare from the sowing to harvest. This means that the soil received at least three tonnes of chemical products only in the current crop.

This cocktail produced by large transnational companies and which assures the productivity records in Brazil may, however, be causing serious public health problems. The dimension of these problems has not been studied in depth by public health authorities or universities. According to Sinitox (National Poisoning Information System), the number of Brazilians contaminated by pesticides that sought help increased enormously in the last 20 years. In Brazil, there were 1,749 cases in 1985, 4,911 in 1995 and 6,870 in 2005—there is no data after 2005.

Experts, however, point out that it is not safe to draw conclusions considering only these figures. The historical series is largely influenced by data acquisition at one end, which is not always carried out properly by doctors and nurses. The World Health Organization believes that only 1 out of 50 occurrences are reported. Interestingly, the high crop producing states in Brazil indicate a reduction in the number of contaminations. In Mato Grosso, the number of cases reported dropped from 40 to 18, between 1995 and 2005; in Paraná, they dropped from 303 to 275, in the same period.

One common case of underreporting is the contaminations that do not have acute symptoms, like cancer,

which seldom is associated with working in the land. A study²⁸ led by Wanderley Pignati, a lecturer, shows that the increase of casualties on account of neoplasia and congenital malformation in Mato Grosso State may be related to the increasing use of pesticide. According to his study, between 1998 and 2005, mortality rate by neoplasia per 100 inhabitants went up from 41.5 to 57.1, a 37% increase in the state. The Brazilian average by 1,000 births in the same period went up only 14%, from 68.8 to 78.6. In that same period, mortality due to congenital malformation by 1,000 born alive in Mato Grosso went up from 2.7 to 4.4, a 62% increase. In Brazil, the increase was only 14%, from 2.9 to 3.4.

“This abrupt increase may be related to several causes. It is possible that there is a real increase due to the “use and abuse” of pesticides; it also may be related to the increase of hospital beds for this kind of pathology. In the case of congenital malformations, it is possible that there was a sudden introduction of an expressive amount of new teratogenic pollutants in the environment. As for what concerns neoplasias, this might be their manifestation after decades of human exposure to carcinogenic pesticides both in the fields and in the combat against infecto-contagious diseases²⁹.”

One of the best known cases of indiscriminate use of pesticides happened in the municipality of Lucas do Rio Verde, in Mato Grosso State, in 2006. The pulverization by air of soy fields reached the urban area causing losses for rural producers and health problems to the population³⁰. Civil society organizations in Mato Grosso State also report numerous cases of blindness among workers in Feliz Natal, a town 530 kilometers away from the capital, Cuiabá. They also report congenital malformations among inhabitants of the Cláudia municipality (578 km away from Cuiabá). In both cases there seems to be no scientific studies on the problems.



CHAPTER 6 ENVIRONMENTAL IMPACTS

If it is impossible to measure the direct contribution of soy in the devastation of forests in Brazil, it is possible, however, to be certain about its preponderance in the stabilization process in deforested areas. Soy crops are becoming the natural successor of cattle breeding in the new agricultural frontiers.

When one analyses the spatial distribution of the characteristics of soy culture, one realizes that it covers areas previously occupied by cattle breeding. It, therefore, plays the role of stabilizing deforested areas, creating a real barrier of crops immediately behind the “deforestation arch”.

While cattle pushes expansion northwards from Mato Grosso State and westwards from Maranhão State, the soy crops are responsible for generating an initial growth boom whereby new cities are created and the previously low budgets of municipalities rose dramatically.

Nonetheless, the soy generates a series of impacts in the environment in this pretense development—that will prove to be unsustainable and highly concentrated in the future. Some of the impacts are new deforesting, water contamination, high concentration of pesticides, introduction of transgenic seeds, disregard for conservation units (UCs), a threat to biodiversity priority areas, among others.

SOY DEFORESTS

The most meaningful fact related to soy expansion was that soy has arrived at the Legal Amazon. About 1.2 million hectares of forest had been transformed into soy culture up to 2004. This fact has caused alarm among environmentalists and authorities³¹, even though the production from the region represents only 5% of the total Brazilian production.

The article “Comendo a Amazônia” [“Eating Amazon”], written by Greenpeace in 2005, had great impact as the problem was systematically identified for the first time, forcing the companies from the sector to take a public stand in relation to the problem. The result was a declaration issued in July 2006, “Moratória da Soja” [“Soy Moratorium”], by ABIOVE (Brazilian Association of Vegetable Oil Industries) and ANEC (National Association of Grain Exporters)³². The document

states that the companies are forbidden to buy soy from Amazon deforested areas and farms that use slave labor in any biome.

On 31 March 2008, ABIOVE published the first result of the moratorium monitoring³³. The association declared that none of the 193 polygons larger than 100 hectares examined showed new deforested areas. According to the report that presented the research conclusions, they studied only the municipalities that had crops covering areas above 5,000 hectares, both in the 2006 and 2007/08 harvests, that are located partially or totally in Amazon biome and in states considered as “meaningful areas of soy culture” by ABIOVE, that is, the states of Mato Grosso, Pará and Rondônia.

To enhance the efficiency of the monitoring, the entities involved in the process, among them Greenpeace, are creating forms of improving it. One of the possibilities is for the analysis to cover also areas where deforestation is of less than 100 hectares, because they can also serve to soy expansion and were not included in this first study.

At the present, Greenpeace is developing a tool for remote assessment of soil use that will allow the stretching of the moratorium monitoring area.

Soy is present and expanding in areas of Legal Amazon, but the largest area covered by soy culture is in the Cerrado, Brazil’s second biggest biome. There is a wide network of initiatives for the conservation of the Amazon forest—as inefficient as they may be—that help to refrain the expansion of crops in the forest, but the reality of Cerrado is marked by public neglect and private predation.

Mercedes Bustamante, from Brasília University, has researched the Cerrado biome for 14 years. She calls attention to the fact that this region is not yet seen as having a great biodiversity and environmental value, such as climate regulation and preservation of fresh water resources.

A strong indication of this neglect is the lack of recent information on the advancement of deforestation. There are no satellite monitoring systems for this biome, such as PRODES (Amazon Deforestation Monitoring Project) and DETER (Real Time Deforestation Monitoring System) systems for Amazon. The last map about the topic was published in 2002, by Conservation International, an NGO, and the situation of the region was really alarming. Estimates made at that time said that only 34% of the biome was preserved, but it faced great threat. The states that were originally covered by Cerrado, such as Goiás and Tocantins, were in advanced process of degradation³⁴.

Specialists also point out that there are some aspects that worsen the situation, such as few conservation units in Cerrado, as only 2.2% of Cerrado biome area was protected by a conservation unit in 2002. Lack of government investments directed specifically for these regions is another aspect that contributes to worsen the situation.

All those variables show how appalling the situation is: If the rhythm of devastation of the Cerrado between 1985 and 2002 is maintained—a period that registered a 1.1% loss of the biome—then it will have disappeared by 2030³⁵.

The picture is even more appalling when one notices that the advancement of soy crops occurs exactly in the areas that have more native forests.

This is what happens in the Southern regions of Maranhão State, as in Balsas municipality, and in Piauí State, as Uruçuí municipality. In 1990, in the case of Maranhão State, the area covered with soy in the municipality was of almost 6,000 hectares. In 2006, the area covered was over 108,000 hectares. But the expansion in Piauí State is even worse: in 1990, only 60 hectares were

covered with soy, and this agriculture activity even disappeared in the following year. In 1992, however, the production of soy was adopted again and 250 hectares were covered with crops and the advancement of soy continued increasing until the crops covered 76,695 hectares in 2006³⁶.

Others areas that witnessed an advancement of soy, corresponding to the richest area of Cerrado, are the Western region of Bahia, the region around Barreiras and Luís Eduardo Magalhães, and the Northeastern part of Tocantins State, where the advancement is centered around Campos Lindos agricultural project.



Remains of "posseiro's" house in Campos Lindos

BUNGE'S CASE IN URUÇUI

In the Southern region of Piauí State there is judicial battle in progress. It is between Bunge Alimentos SA, an agribusiness multinational corporation that benefits most with the soy production—in expansion—in the region, and civil society.

The polemic point is that the multinational corporation opted for the use of wood as their energy source in their Uruçui soy processing plant. It is fundamental to burn fuel in the storage silo in order to avoid humidity that might affect the soy. In Bunge's case, the own corporation declares that 100% of the energy generated by the plant comes from burning wood. This procedure was adopted by various branches of the corporation in Brazil and this has led to a heavy demand for raw material in Piauí State. Biomes, such as Cerrado (a sprawling savanna), and Caatinga (a xeric shrubland and thorn forest, which consists primarily of small, thorny trees that shed their leaves seasonally), are suffering with this option for burning wood as these biomes are rather neglected by environmental preservation initiatives.

A legal action, therefore, was brought against Bunge soon after Uruçui soy processing plant began functioning in 2003. The Federal Public Ministry (MPF) and State Public Ministry (MPE) were the ones that started the legal action. Funaguas, an NGO presided by Judson Barros, joined the action later on.

A year later, this civil action resulted in the signature of TAC (Term of Adjustment of Conduct) by MPE and MPF. Funaguas thought that agreement was not enough and did not sign it.

What led to TAC was the confirmation that the corporation was using more wood than it could be produced by Bunge's eucalyptus reforestation project, according to the Plan of Action established at the time the company began to operate in Piauí. Consequently, it was impossible for the company to become self-sustainable in wood supply. According to TAC, the corporation, therefore, had to adjust the production to this wood consumption and try to supply the wood needed for their functioning.

According to IBAMA's resolution, the raw material should be obtained within a thirty kilometers belt around the soy processing plant as it would take six years for the eucalyptus to be able to supply the wood ne-

eded for burning. This was before signing TAC. Bunge by itself decided to increase this belt to a hundred kilometers, as it can be observed in the legal action.

The corporation, however, declared that it went far beyond this limit, even when considering the wider belt. The corporation asked IPT (Technological Research Institute) to carry out a study, and it is possible to access the information about the authorization for deforestation on farms that were more than eight hundred kilometers away from Uruçui soy processing plant. Even seaside towns, such as Parnaíba, were present in the list.

The reason of concern with the limits of this belt is simple: If the limit is not established, the corporation can stimulate the deforestation in all Piauí State. In such a poor state, the guarantee of a major buyer of wood easily extracted becomes an income alternative, even considering the long distance the wood would have to travel in order to be delivered, sometimes hundreds of kilometers.

Funaguas addresses further these issues. According to Barros, the corporation is taking wood from certain areas without authorization of Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and uses the authorization for other regions of the state to justify the origin of the wood. Funaguas also denounces that Bunge planned to have soy crops in deforestation areas. Nonetheless, according to the list of municipalities in the study carried out by IPT, many of these municipalities do not even have a register of soy production. This fact points to an exclusively predatory deforestation.

Based on these facts, Funaguas decided to maintain the claims and carried on with the legal action. On 28 March 2008, the Federal Regional Tribunal (TRF) of the 1st region ruled in favor of the NGO's claims and the Term of Adjustment of Conduct was invalidated. Besides this, as the normal course of legal action continues, the corporation was forbidden to use wood as a source of energy, even if it comes from reforested areas.

According to Bunge, if the options left are not economically or environmentally viable, this soy processing plant in Piauí may close down.

Uruçui soy processing plant processes around 500,000 to 600,000 tonnes of soy per year and it is responsible for absorbing the increasing production of the region around Uruçui. The only major corporation in the region is Bunge, different from what happens in other regions where there is the presence of many trading companies from this sector.



Cargill plant in São Desidério (BA), surrounded by firewood

SOY AND BIODIVERSITY

The intersection between the areas of expansion of soy crops and of great environmental relevance, not only in the Cerrado region, happens all over the country. One of the major impacts is the threat that the agricultural monoculture represents to biodiversity in these areas as well as in the whole country.

The map of Priority Areas for the Biodiversity—prepared by Ministry of Environment (MMA)—lists dozens of areas of great environmental and biodiversity potential that require urgent preventive measures for their protection. In the latest updating, issued in March 2007, the publication includes a series of new areas that require specific public policies³⁷. The

intersection of the main axis of soy crops expansion and those areas reveals an unsustainable tension. A good example is the area in the bordering regions of the states of Bahia, Tocantins, Maranhão and Piauí that includes important regions for soy poles in the Western region of Bahia, Northern region of Tocantins and Southern regions of Maranhão and Piauí. The largest growth of soy culture has occurred in this area in the past few years. The agropecuary activity developed in the region does not comply with the requirements of at least 14 new priority areas for biodiversity conservation. Thirteen of them are in the Cerrado biome (see Table 5).

Table 5

NEW PRIORITY AREAS FOR BIODIVERSITY THREATENED BY SOY					
Code	Name	Importance*	Priority level	Area (In km ²)	Area (In ha)
Am097 (within Amazon area)	Interflúvio Araçuia-Tocantins	Extremely High	High	13330	1333000
Ce213	Rio Caracol	High	Very High	2558	255800
Ce215	Lizarda	High	Extremely High	2725	272500
Ce220	Ribeirão Tranqueira	Very High	Very High	9974	997400
Ce228	Palmeirante	Extremely High	Extremely High	2116	211600
Ce218	Alto Parnaíba	Extremely High	Extremely High	7352	735200
Ce221	Baixa Grande do Ribeiro	Extremely High	Very High	398	39800
Ce222	Ribeiro Gonçalves	Very High	Very High	3497	349700
Ce225	Rio Balsas	Extremely High	Extremely High	3568	356800
Ce226	Uruçuí	Very High	Extremely High	8150	815000
Ce181	Bacia do Rio Corrente	Extremely High	Very High	9069	906900
Ce192	Baianópolis - Tabocas do Brejo Velho	High	Very High	12250	1225000
Ce196	Bacia do Rio Grande	Extremely High	Extremely High	11124	1112400
Ce207	Rio Preto	Extremely High	Extremely High	13324	1332400
*Regarding conservation level and biodiversity use/ Source: MMA.					
http://www.arcplan.com.br/mma/ap_fichas_pdf.htm .					

In the Northeastern region of Tocantins State, two of the units included in the list—the Caracol River and Lizarda—are in a region that MMA (Ministry of Environment) considers as the “major uninterrupted stretch of well preserved Cerrado”. Both areas are under threat of uncontrolled fire, erosion, desertification, siltation of rivers and sugarcane and soy monocultures. There are two other areas in the same state—Tranqueira Stream and Palmeirante (near the land of Krahô, indigenous people)—threatened by the monoculture.

These aspects also affect Alto Parnaíba, the region of the canyons in Maranhão State where endangered species can be found, as deforestation and agricultural expansion are present in the region. The same happens in the Balsas River region.

Soy culture experiences great growth in two areas of Piauí State—Baixa Grande do Ribeiro and Ribeiro Gonçalves, and each municipality had more than 34,000 hectares covered with soy crops in 2006³⁸—that are also affected by the pressu-

re of the agriculture. The former faces an extra problem—intensive use of pesticides. The most serious case, however, is the one where soy crops cover 76,000 hectares: Uruçuí. This area is “one of the remnants [of Cerrado] and of endangered species [...], and the creation of two Conservation Units are necessary for this region”³⁹. The threats in the region are the use of pesticides, specially on soy farms, disordered urban expansion, deforestation and illegal animal traffic.

In the case of Western region of Bahia State, in the regions of the rivers Corrente and Grande basins and in Baianópolis municipality, the main concern is a series of socio-environmental problems: improper use of fresh water resources, land concentration, land grabbing, charcoal plants, crops of eucalyptus, cotton, sugarcane and soy. In the region of the Grande River basin, the major one to the left of the São Francisco River, there is the largest underground lake in the world. The municipality in the area is São Desidério—national leader in rural income generated by grains in 2006—that has 290,000 hectares covered with soy⁴⁰.

SOY AND INVASION OF CONSERVATION UNITS

The creation of conservation units, however, does not guarantee the end of unsustainable exploration of natural resources. The initiatives of preservation are not often taken into consideration when they clash with the interest of soy monoculture. This is occurring in the region of Barreiras and Luís Eduardo Magalhães municipalities, in the Western region of Bahia State. The latter was emancipated in 2000—before it belonged to Barreiras—and has already 128,000 hectares covered with soy⁴¹, and great part of the crops are in an Environmental Preservation Area (APA).

The Environmental Preservation Area of Rio de Janeiro Basin, mostly in Bahia State, created in 1993, does not have a handling management plan to define the areas to be used and occupied and the ones destined to preservation, according to Balbina Maria de Jesus, the APA's gestor. The local landowners, both small and big, have no idea that the area is protected. The structure of fiscalization is really inefficient to oversee the 351,300 hectares area.

One of the most important environmental values of the region is that this is the area of Urucua aquifer recharge. Certain agricultural management practices, such as dry-farming and irrigation, deforestation and agricultural burning have been practiced in the region. Besides, the farms in the region do not have a legal reserve.

In the mean time, Luís Eduardo Magalhães local government says the municipality is located in “the world's major reserve of land suitable to agriculture in the Cerrado”, as there are three million of hectares to be explored⁴². There is also the perspective of the establishing a biofuel plant to absorb the soy production of the area.

TRANSGENIC SOY

There is another kind of invasion of Environmental Preservation Area that is being stimulated by soy crops: the transgenic contamination. This is exactly what is happening in the Iguaçú National Park, in Paraná State, according to local organizations. Up to 2007, the transgenic variety Roundup Ready (RR), liberated in Brazil through preliminary orders, was expressly forbidden in indigenous lands, conservation units and their buffer zone, in watershed areas and in priority areas for biodiversity conservation.

In March 2006, an IBAMA investigation detected irregular RR soy crops on 14 farms located in the buffer zone of the park, including an experimental field of the multinational company Syngenta Seeds that was fined in the amount of one million reais⁴³.

IGUAÇU PARK IS SURROUNDED BY TRANSGENIC SOY

Iguaçu National Park is surrounded by transgenic soy. It borders more than ten municipalities and has 185,000 hectares of land, corresponding roughly to all the area covered by São Paulo City. It is located in Paraná State, at one end of a corridor of soy crops that begins in Londrina region and goes near Foz do Iguaçu. At the north side of Iguaçu National Park, near Medianeira, soy crops reach the border.

This is not an isolated case, as the history of Genetically Modified Organisms (GMOs) in the regions near the conservation units—where theoretically the biodiversity should be preserved at all costs—began due to the pressure of rural holdings and agriculture technology companies to enact a new production model in Brazil, even at the cost of not respecting the Brazilian environmental legislation.

The law that forbade transgenics in conservation units' buffer zones was not respected. Based on a NGO Terra de Direitos' denouncement, IBAMA—Brazilian Institute of Environment and Renewable Natural Resources—began an operation in March 2006 against transgenic crops in the buffer zone. Thirteen farmers that have modified soy on their land were fined and had their production confiscated, including an experimental field belonging to Syngenta, a multinational. The majority of the fined had links with Lar Agroindustrial Cooperative (Cooperativa Agroindustrial Lar). Lar considered IBAMA's fiscalization an illogical action and organized a political attack⁴⁴.

Due to the pressure, the Federal Government accepted the rural producers' demands. The Provisory Measure 327, signed by President Lula, reduced the prohibition of GMOs crops in buffer zones in conservation units⁴⁵. He has also signed a decree that established a five-hundred-meter ring that would separate the park from the transgenic soy resistant to glyphosate herbicide⁴⁶.

In 2006, the prohibition was cancelled with the promulgation of 11.460 law. But the planting and research have to be considered in the respective Handling Management Plans of the conservation units. Because of Iguaçu National Park omission in this respect, the Federal Justice has maintained the restriction concerning Syngenta's research activities in the region.

As a consequence, environmental entities such as Terra de Direitos regard as illegal any transgenic crop in the region while there are no changes in the Handling Management Plan.

In the bordering region of Iguaçu National Park, at least two farmers cultivated transgenic soy within less than ten kilometers from this conservation unit in the 2007/08 soy harvest. There is no register of transgenic product within less than 500 meters. The first land owner is Anélio Rotta, whose farm is in Céu Azul (Paraná State). He used modified soy in an area very close to the headquarters of his company, Rotta Mill (Moinho Rota), and sold his production to Bunge and Carçill⁴⁷. Irineo da Costa Rodrigues⁴⁸, the president director of Lar Agroindustrial Cooperative, is another land owner and also one of responsible people for the organization of the group who demanded the reduction of the buffer zone. He also cultivates OGMs in his farm in Matelândia. Rodrigues sells his production to Lar Agroindustrial Cooperative.

SOY, RIVER CONTAMINATION AND GROUNDWATER USE

Another form of contamination that goes beyond the boundaries of indigenous land and conservation units is the one that affects rivers and groundwater in soy crops regions. As this is a form of pollution that is not apparent, it is difficult to decide what soy culture is responsible for the damages. Besides, there are few researches in Brazil aiming at establishing a direct relation between the agricultural activity and the contamination of water.

Anyway, vestiges that might establish the contamination of rivers by fertilizers as well as reports of local population led us to the conclusion that the impacts of soy culture also affect this environmental aspect.

Reports of Secretariat of Environment of the Mato Grosso State show that phosphate concentration in many sub-basins of the state—that might be caused by fertilizers, among other causes—is above the limits allowed by National Environmental Council.

The problem was detected in samples collected in the Garças River in 2003 and 2004. The same happened in the sub-basin of the Cuiabá River, in 2005. In 2006, assessment of the basins of the rivers Paraguai and Tocantins-Araguaia also showed the presence of phosphate above the recommended limits⁴⁹.

The Farm Workers' Union from Sorriso municipality, in Mato Grosso State, says that the number of fish in the Teles Pires River, one of the most important in the region, has decreased. Because there are no researches about this, the Federal University of Mato Grosso (UFMT) and Oswaldo Cruz Foundation, with the support of National Council of Technological and Scientific Development, have started a study to verify this fact.

While the results are not published, another study is being carried out by Federal University of Mato Grosso researchers whereby the relationship of agricultural activity and pesticide contamination will be established. The research used remote monitoring tools to assess this kind of interaction in the basin of Upper Rio das Mortes, considered the most productive area in Mato Grosso State where mostly soy and cotton crops are found⁵⁰.

The risk of pesticides in the surface water of the basin was assessed through a complex model of probability, and the authors concluded that the probability of the major part of the area to be contaminated was over 70%, and only a small segment of the region presented a probability below 50%.

Another variable to be studied in the management of water resources is the contamination and over exploration of groundwater. In the Western region of Bahia State, for instance, the use of center-pivot irrigation system is widely used, even in cultures that are traditionally associated with dry-farming, such as soy. This has represented a dramatic increase in the demand for groundwater in the region.

A research was carried out in September 2007 in the region of Urucuia aquifer⁵¹, but the results have not been published yet. The study detected that “the region has witnessed a fast increase of mechanized agriculture in the past decades whereby the native Cerrado is being substituted by crops. The region has also been affected by these cultures because of the permanent irrigation and great waste of water, mainly in soy, coffee, rice and cotton crops. As a result, a great number of wells have been drilled in Urucuia aquifer, both for human consumption and for extensive irrigation systems, without having a proper assessment of the water resources. There are serious risks that over exploration might be affecting one of the most important aquifer systems in the state, as the water resources are not duly assessed and dimensioned according to the environmental tolerance of the groundwater resources.”

The research points to the vestiges of the impacts of the high demand of water resources: “In the dry period, from March to October, the perennial rivers receive water from the aquifers, but the flow of some rivers of the region have already been affected by the use of great quantity of groundwater for irrigation. [...] Besides the problems mentioned above, there is also deforestation of ciliary forest and soil compactation for agricultural practices and, therefore, the rain infiltration decreases, reducing the recharge of the aquifer.”

CHAPTER 7 AGRARIAN ISSUES

Soy expansion in intensive capital model based on big properties in Brazilian Cerrado has led to land concentration and expelling of the man from the field. This conclusion was reached by social movements, such as MST (Landless Workers' Movement) and CPT (Pastoral Land Commission) as well as by researches carried out by specialized institutions.

A recent EMBRAPA research compared the 1985 agropecuary census to the last one carried out, in 1996, and noticed a process of land concentration happening in Brazil, specially in relation to soy. At that period, the number of rural properties dropped from 5.8 million to 4.9 million, a 16.3% decrease. On soy farms, however, the decrease was even higher, dropping from 420,204 to 242,998, representing a decrease from 7.2% to 5.0%. Alongside with the decrease of soy farms, it was noticed a decrease of people working with the grain from 1985 to 1996, from 1.6 million people to 891,000—the opposite of the movement of soy expansion in the period, as there was an increase of 1.1% a year.

When considering the expansion of soy crops in Brazil, it is possible to foresee further concentration of land in the country.

Gini index measures the level of land concentration—whereby zero indicates absolute equality, and one absolute land concentration. In Brazil, the income distribution index is 0.6, and the land concentration index is over 0.8. According to INCRA⁵², data from 2003, 31.6% of the total number of properties is in plots of land with 10 hectares, corresponding to 1.8% of the total area. Properties with more than 2,000 hectares correspond to 0.8% of the total number, and cover also 31.6% of the total area.

The concentration process of the land was detailed by another study⁵³ whose focus was Santarém municipality, where Cargill's soy port is located. A fact observed in the region is that small farmers are selling their plots of land to farmers who are migrating mostly from the states of Rio Grande do Sul, Paraná and Mato Grosso. The price of the land near the highways has increased approximately from R\$ 50.00 to more than R\$ 1,000.00 per hectare in the period between 1997 and 2008.

These small farmers had different fates. Some of them went to the big cities and began to live in the outskirts of Santarém, a typical example of the rural exodus. Some bought cheaper land in more distant places or

occupied public land in forest areas, where they carried out some deforestation for the family agriculture and cattle for their own consumption. Cases like these have been recorded by the IBAMA's Tapajós National Forest fiscalization department.

SANTARÉM CASE

Cargill's warehouse is situated in Santarém exactly where there was the only bathing place, calling attention not only because of the huge size, but also because of the strong contrast with the typically Amazon scenario, as it is located on the banks of Tapajós river at the point where it joins Amazon river.

Cargill's warehouse was built despite the environmental legislation⁵⁴ and has been functioning because of successive legal decisions, but it is undergoing the registration process according to Environmental Impact Study and Report (EIA/RIMA). The present demand of the social movements is that researches should include the consequences not only of the creation of the port but also of the soy producers—over a hundred of them—who moved to the region because of the logistic facilities and Cargill's financing lines for crops. While this registration process is not completed—and the company has used the Justice to delay it—nothing prevents the use of the port and the financing for soy crops.

The warehousing port helps to diminish the costs of soy transport produced in Mato Grosso, the state responsible for nearly one third of the national production of the grain. Today, part of the soy from Mato Grosso goes by highway to Porto Velho, in Rondônia State, and there it boards vessels that transport the production to Santarém. This Santarém port option is going to become more appealing when the paving of BR-163 (almost 900 km of the 1,850 km from Cuiabá, Mato Grosso State capital, to Santarém) is carried out—this project has been discussed since the beginning of Lula's government as part of PAC (Acceleration Program), a series of high-priority federal investments in infra-structure to be concluded in 2010.

At present, there are 30,000 hectares of soy⁵⁵ in the region known as Santarém plateau, as a contrast to the floodplain area known as Várzea, where the large scale mechanized agriculture is not feasible. However, Cargill estimated, in 2003, that an area of at least 300,000 hectares in that region could be used to grow the crop. If the high soy prices of 2008 are maintained, this will represent a stimulus to expand even further this area.

Except for the debate on the extension of deforesting directly related to soybean expansion in the region, in recent years (see initial excerpt), there is a consensus that the crop represents an indirect threat to the environment since soybean producers are approaching areas of family-based agriculture and cattle-raising that are closer to the routes for production transport and urban centers. The result is that cattle raisers and small farmers have been pushed towards the forest, thus promoting the felling of more trees⁵⁶.

Those "degraded areas" are the most targeted by soybean production, but it is precisely in them that a large part of family farming

communities are settled. Known as posseiros (small squatters), they typically occupy land with irregular papers⁵⁷, or even public areas. There are also cases in which those groups claim a distinct ethnic identity, as Indians⁵⁸ or quilombolas⁵⁹. In the area of Santarém, specifically, those groups still lack recognition of their territorial rights. In that context, they are especially vulnerable to economic power and violence by large and organized squatters.

To complicate things, even under pressure by social movements, Cargill, which has an agreement with the NGO Natural Conservancy since 2006 to encourage good environmental practices among a group of 150 local providers, still has not defined clear standards to be demanded in terms of land regulation. According to Greenpeace, studies have shown that this leaves the doors wide open for large squatters and other criminals.

Researches carried out by CPT (Pastoral Land Commission) from Santarém have explained the modus operandi of grabbers of land in the region. CPT has recorded cases of grabbing of land mainly from 2004 onwards, when the price per hectare of the land suitable for soy and mechanization was over R\$ 2,000.00 in the region⁶⁰.

The case of Glebe Nova Olinda, a state area of about a million hectare in the Arapiuns River was highly documented by CPT. The lack of infra-structure for the flow of production (it takes twelve hours by boat to reach the city) led the grabbers of land to invest in wood extraction, but CPT monitoring shows that the group in action in the area is originally from Mato Grosso State soy culture.

In 2002, this group of grabbers registered a protocol at ITERPA (Pará State Land Institute) whereby they request the land corresponding to the glebe, and they also presented a cartographic study and georeferencing. Even though the analysis of the grabbers' request had not been analyzed to decide if it should be accepted or rejected, as soon they had the protocol in hands, they invaded the land where fourteen communities of family farmers lived⁶¹. The invaded land was used as a communitarian area for hunting, fishing and picking fruit.

The grabbers fenced the area that they plan to own legally, built houses, formed pastures in some areas, paid armed keepers to remain in the place and put a placard with their name and ITERPA's protocol number. In fact, the protocol has no legal value, but it really intimidates the communities. Marks to be used as referencing the land had been put there and whose objective is intimidating these communities, even though they have no legal value.

After taking hold of a document known as ADIP (Authorization of Detention of Public Property), the grabbers managed to obtain handling plans issued by Secretariat of Environment from Pará State and have began to extract wood from the region since 2005. These irregular authorizations to extract wood were cancelled by the state government only last year. At the moment, the proceedings for the regularization of the land benefiting the communities are in progress.

In the case of federal land, as Glebe Pacoval, there were a series of similar scheme for taking hold of the "possession declaration" issued by INCRA (National Institute of Colonization and Agrarian Reform). This practice stopped being used in 2004. At the same year, the so-called "Western Operation" carried out by the Federal Police arrested a series of suspects involved in the scheme, including José Roberto Faro, superintendent of INCRA, and state deputy by PT at the moment.

The reaction of the soy producers to the posseiros' (squatters) struggle for their rights is fierce and violent. Ivete Bastos, president of Santarém's Farm Workers' Union, is leading a campaign—"Don't give up your land"⁶²—for stimulating the communities to resist to grabbers' pressure and she has police protection at the moment because of the threats she has received lately. José Odair Borari, an indigenous leader from Glebe Nova Olinda, is also being threatened.

Because of the perspective of BR⁶³ been paved and the vulnerability of the rural communities to this type of crime, the federal government announced in 2004 an intensification of the process of regularization of the land tenure in the region. The numbers of the regularization of land tenure were included in the National Plan of Agrarian Reform⁶³—almost all goals had been accomplished (about 95% of them)—and announced with great pomp and circumstance by the Federal Government in early 2007.

The success of the allegedly regularization of land tenure in the region is, however, uncertain, according to sources interviewed for the research. There is no guarantee that the shield against the advance of the soy, something the regularization of land tenure could provide, mainly through collective deed of title to property to rural communities. At present, more than a hundred projects of settlements are being embargoed by the Public Ministry because they do not fulfill the requirements of the environmental legislation⁶⁴. Besides, various projects included in the collective title of deed to property, as this is considered the safest measure to prevent the occupation of these areas by big farmers, but this measure is questioned by settlers⁶⁵.

However, provisory measure 422—issued by the Federal Government in the end of March 2008—is considered the greatest threat at the moment. The provisory measure does not require the public bidding for the regularization of at least fifteen modules of public lands (corresponding to about 1.5 hectares in Santarém region, whereas before the requirements for bidding were 500 hectares). The problem can be more serious if one considers a usual practice in the region: Having the so-called "laranjas" (people who lend their names for others who do not want their names to appear in the commercial transaction) to buy great extension of land under cover. The grabbers in Santarém are laughing out loud, according to the social movements of the region.

PRESSURE ON SETTLEMENT

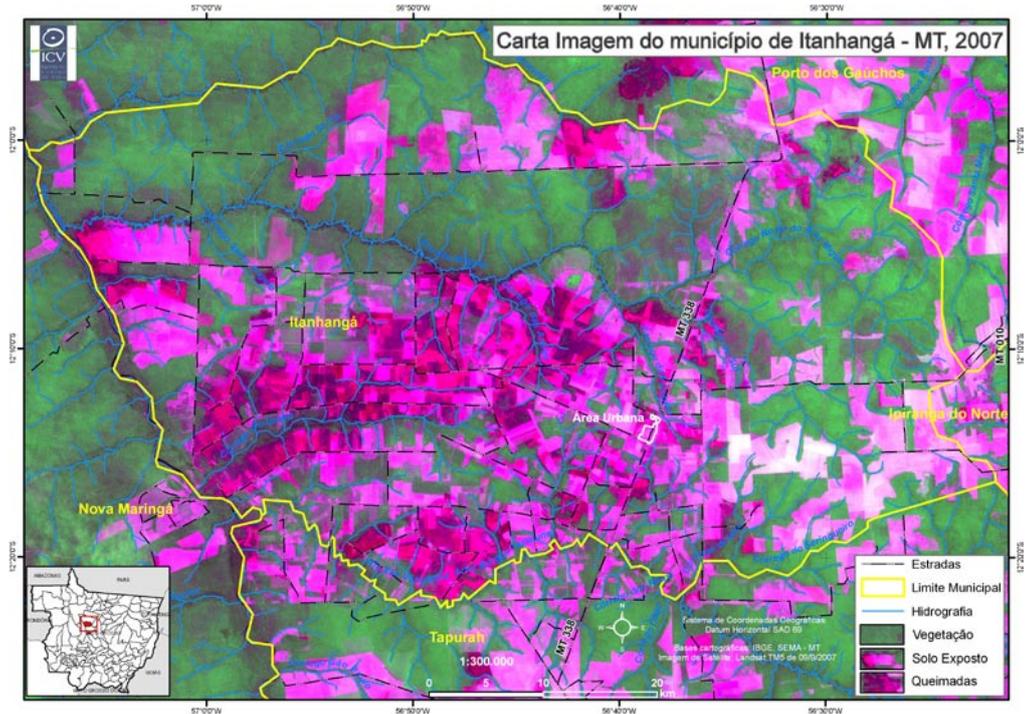
Another process of land concentration that deserves to be studied is the illegal market of selling and buying plots in the settlement. Rural producers that have money buy plots of land from impoverished small farmers and form bigger farms, and this process goes against the basic principle of the creation of a settlement—democratization of the land. According to FETAGRI (Agricultural Workers Federation) of Mato Grosso State, this phenomenon of the re-concentration of land can be observed in many municipalities of the state. Itanhangá, 475 kilometers away from the capital Cuiabá, is one of the most evident examples.

Considering one of the major settlement created in Brazil—with 1,145 plots of 100 hectares each, Itanhangá was delimited in the forest in 1996. As there was no basic infra-structure at the time, many settlers sold their plots or abandoned the place. But things have changed since then. Today the municipality—emancipated in 2005—witnesses the advance of soy and the valorization of the land. The best plots of 100 hectares can be sold by R\$ 150,000.00. The municipality became well-known in 2004 when a study⁶⁶ made by the Socio-Environmental Institute showed that it was observed that deforested areas were transformed into soy crops, without any of the intermediate steps, an exception to the rule, as it often takes some years to “soothe” the deforested land for crops.

It is possible to check the farm commercialization in Itanhangá in a simple Internet research, even though nobody has authorization to buy or sell land in the municipality, according to INCRA’s information. In the town, people say that some producers have dozens of plots of land, sometimes using “laranjas”. Besides the wood, usually extracted illegally from the area, soy crops are increasing, stimulated, for example, by biodiesel companies that want to get the Social Fuel Certification, and so they need to buy family farmers’ production.

Nelson Takao Tumushi, 59, a settler in Itanhangá, has urucum (*Bixa orellana*, a natural pigment) and rub-

Map 6



ber plant (*Ficus elastica*) in his lot. He is one of the family farmers who is considering soy for the following harvest because of the higher demand for the product. This option has been suggested by a representative of a multinational, Agrenco, that would finance the production in exchange for a sale contract. He said “I am waiting for the next contact as I am really interested in it”. After inaugurating a new plant in Mato Grosso in March, Agrenco’s goal is to buy the grain from small producers in order to obtain the fiscal benefits offered by National Program of Biodiesel Production and Use. Besides supplying the internal market, Agrenco exports bran, oil and grains of soy to the markets in Europe and Asia.

LAND GRABBING

One of the most usual crimes committed by agriculture producers in the agricultural frontiers, including soy producers, is land grabbing. A research⁶⁷ carried out by Ariovaldo Umbelino de Oliveira, a lecturer on Agrarian Geography at University of São Paulo, estimates that there are about 172,000,000 hectares of grabbed land. He reached this number by subtracting the 436,596,394 hectares registered at INCRA in 2003, the 120,000,000 hectares occupied by indigenous people, the 102,000,000 hectares reserved to environmental conservation units and the 20,000,000 hectares occupied by small posseiros (squatters) from the total size of the country—850,201,546 hectares.

This public land illegally fenced and known as “vacant areas” is divided into the following way: Eighteen million hectares in the North, fifty-four million in the Northeast, thirteen million in the Middle-West, sixteen million in the Southeast and nine million in the South. Cases of land grabbing are often the cause of fierce and violent struggle among farmers and social movements. The cases of conflicts for land have been monitored for many years by CPT (Pastoral Land Commission), in their annual report *Conflitos no Campo* [Conflicts in the Field]⁶⁸. The latest data, referring to 2007, show that there was a reduction in the struggles in relation to the previous year (1,042 to 540). The land occupation by social movements diminished from 329 to 247, and settlements also decreased from 60 to 35. The number of families expelled also decreased from 17,443 in 2006 to 10,669 in 2007, and the number of families in occupations carried out by social movements increased to 37,630, whereas before it was 35,315.

The national coordination of CPT does not take into consideration the agropecuary activity whenever there are conflicts over a plot of land. Repórter Brasil has interviewed the CPT’s representatives in order to obtain this data. The assumption of this relation is that the intention of the landowner to expand the area of crops is the cause of the agrarian conflict. In this survey, it was observed that soy expansion might be behind of at least sixteen agrarian conflicts registered by CPT in Mato Grosso in 2007, and behind eighteen out of thirty-eight conflicts in Paraná and at least two out of the 105 conflicts registered in Pará—and the major part of them correspond to the advance of the agropecuary and wood extraction.

Twenty-seven agrarian conflicts were registered in Tocantins State last year. There the cases of land grabbing to expand the soy crops are not rare. The story told below illustrates the struggle between small farmers and powerful land grabbers in Campos Lindos region.

LAND GRABBING AND CONFLICT IN TOCANTINS

While there is an escalation in the production of soy in the North region of Brazil, the history of grain in this area is intermingled with traditional regions of land conflicts and violence in the field. In the near future, one of the epicenters of this relationship will be Bico do Papaqão in the Northern region of Tocantins State. This area is marked by a fierce and violent struggle for space—the scenario of fights between the guerrilla warfare and the military government—Bico do Papaqão witnesses the advance of the soy from Araguaína municipality. As soy stretches the frontiers further and further, the grain promotes the conflicts between small farmers and big producers.

In Barra do Ouro municipality, where production is modest—2,200 hectares in 2006⁶⁹—a case of public land grabbing whereby posseiros (squatters) are threatened portrays well the expansion dynamics. Raimunda Pereira arrived in the area at 1952, when she was seven. “We had a little plot of land with some crops and animals. Everybody was close”, she recalls. Their problems began when a group of farmers from Santa Catarina State arrived at the region around 1974.

The model of land occupation was the same used in many regions of the agricultural frontier: Rice crops to “soothe” the land, and after that pastures and then soy more recently. The first seventy hectares of soy in the municipality were registered only in 2003⁷⁰. One of the ways used by producers to expand their land is through a form that characterizes land grabbing: Acquisition of a small plot of land and the incorporation of the neighboring vacant land. Dona Raimunda and her family live in one of these areas.

In 1994, her house was pulled down as a form of threat. Dona Raimunda, however, refused to abandon the land. But she is one of the posseiras (squatters) who still resists the pressure made by big producers. She tells that other small farmers who owned a title of deed accep-



Contaminated creek on D. Raimunda's lot

ted to exchange their legalized plot of land for other plots offered by the farmers. The plots offered, however, were in vacant land and the posseiros (squatters) could not occupy the land. As a result, they had to exchange their plot of land for the city.

She has eleven children and told us that after the first deforestation in the legalized area—the ones with title of deed for the property—the farmers began to occupy the public land. At that moment, they began to intimidate the posseiros (squatters) demanding that they should remove their animals from the land and stop having crops in that area. Besides, the intensive agricultural activity, especially soy that needs agrochemicals, has also affected the health of people who live in the area. The brook used by Dona Raimunda is not only drying up but it is also turning cloudy because of the contamination by agrochemicals. Therefore, it cannot be used as a source of fresh and clean water for the family.

The situation has become more difficult for her and her family recently—after having her family crops destroyed many times by tractors, and after her son was threatened by a hired gunman who has been hired to kill them, Dona Raimunda and her son. The house where the hired gunman, Manoel Cebola, lives is pretty near their family plot of land.

In the mean time, the group from Santa Catarina State started a legal suit in 2007 in Goiás in order to claim the lands. They declared that they were “the legal owners of the land” and had been there for a long period of time. When Repórter Brasil tried to talk to them, one of the leaders of the group refused to talk to us.

The farmers have been terrorizing the posseiros (squatters) while they are waiting for the case to be ruled by the Justice. In February 2008, some animals belonging to Dona Raimunda were shot. She and her son keep creole seeds and seedling in their house waiting for the moment when they will be able to plant them freely. “We are waiting for the authorities to take these people [the land grabbers] out of our plot of land”, she says.

Dona Raimunda’s hope, however, does not seem to be in accordance with the private and governmental expectations for the area as well as for the North and Northeast of Tocantins State. In the road from Araguaína to Barra do Ouro it is possible to see the construction sites of the railway that will link Palmas to Açailândia. The concessionary of this part of the railway is Vale, previously called Vale do Rio Doce. When the railway is ready, this link will be connected to Carajás Railway. And that would mean to have access to ports in Maranhão State—Itaqui e Madeira—to serve as a way to transport the increasing soy production in the state. The producers from Campos Lindos Agricultural Project are some of the people who will benefit from this railway.

The region to be separated for fruit and grain production has been decided in a polemic way. The area was available after the legal dispossession of a farm called Santa Catarina, occupied by 27 alleged owners, and each of them had more than 2,000 hectares and by 80 families of posseiros (squatters). The information is based on a study carried out by FASE (Federation of Social and Educational Organizations), Pastoral Land Commission from Araguaína and APA-TO (Alternatives for Small-Scale Agriculture) by Mariana de Castilho and José Gerley Castro.

The research denounced that the president of Land Institute of Tocantins declared that those plots of land were disposed by Goiás State “between the years of 1981 and 1982 without observing the criteria required by law and it seems the area was marked by a real state speculation”. None of the 27 alleged owners would have any rights to compensation for real state dispossession—totaling more than one million reais—paid in 2001.

Once the land was dispossessed, it was yielded to some allies of the governor at that time, Siqueira Campos. Among the people who benefited with this measure are Kátia Abreu, senator at the moment, and Dejanir Dalpasquale, the former Agriculture Minister in Itamar Franco’s government.

At the moment, this project is responsible for the state leadership in soy production, and 48,000 hectares were planted in the region in 2006. The people who act in the region feel that the area of crops has increased since then. The study carried out by Castilho and Castro in 2006 pointed out that 90% of the production of project is destined to exportation using Itaqui port, in Maranhão State. The flow of production will cost a lot less with the railway.

In 2001, Environment Impact Study pointed out that the project would generate a series of negative impact, but the producers have not taken any action so far to prevent the damage. In the mean time, the



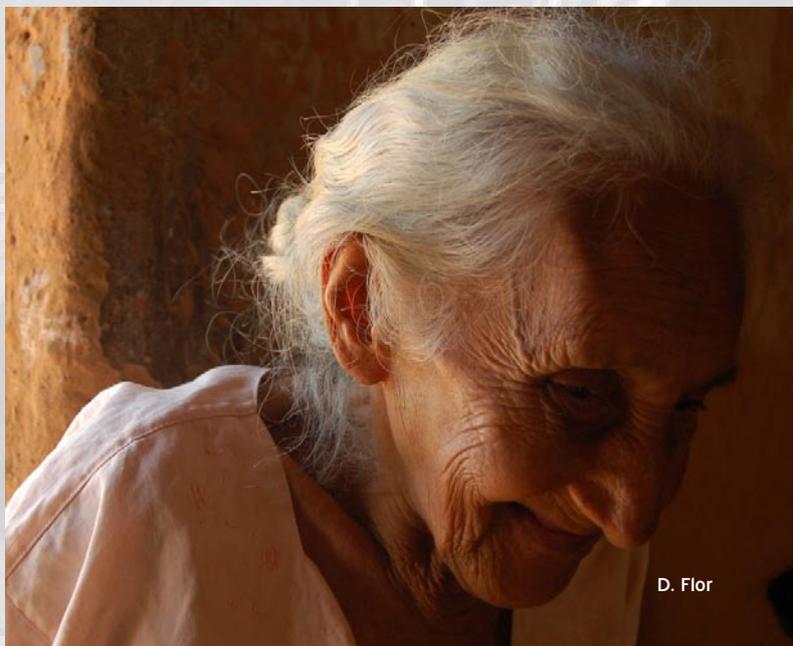
Bullet extracted from one of D. Raimunda’s animals

people who suffer most with these negative impacts are the small farmers who continue in the region. The posseiros (squatters) occupation dates back to 1900. One of the oldest inhabitants is Maria Florença Ribeiro, 91, from Vereda Bonita. She has always lived in the region.

Even though the ostensive presence of land grabbers is not felt in the region, as in the case of Barra do Ouro, the pressure on the local population is present and can be felt in the quality of life changes. “Before we hunted in the region, but we cannot find game anymore. Now there is only soy”, complains Dona Flor, Maria Florença’s nickname. “They threw poison on the land, and the fish went away”.

Dona Flor’s children declared that they have not left the land yet because their mother refuses to leave it. They received offers from farmers interested in their land, but they did not offer much. According to them, the greatest reason for abandoning the region is the poisoning of the land. They can feel the smell of agrochemicals from far away, when they are used to dry the soy. They suspect that their deceased brother’s children had died because of contamination with pesticides. “They threw poison from an airplane, and two nephews died soon after”, told us Joaquim, Dona Flor’s son.

The social entities from the region strongly suspect that part of the legal reserve of Campos Lindos Agricultural Project is taking over posseiros (squatters) land that have title of deed for property in the majority of the cases. That is, the big producers have registered the land that does not belong to them as theirs. The owners of the plots of land from Campos Lindos Agricultural Project have been charged for using slave labor on their farms. Three great trading companies from the sector—Agrenco, Bunge and Cargill—are located near Campos Lindos Agricultural Project and they commercialize soy.



D. Flor

CHAPTER 8 THE IMPACT ON INDIGENOUS AND NATIVE POPULATION

Nowadays the soy is the vanguard in the advance of agribusiness in the most densely populated regions by native populations in Brazil. In its onslaught in the Amazon and the most Northern parts of Northeast Region of Brazil⁷², the soy culture has been reaching indigenous communities and the remnants of quilombos⁷³.

Even though the cultivation of soil was initiated in the 1970s in various regions, the existence of soy is older, but in some regions it is something new brought by the new cycle of valorization of this commodity in the international market. The research done by Repórter Brasil studied the two situations. One in Paraná and the other one in Mato Grosso States, the two major producers of soy, besides the Maranhão State⁷⁴. We have also consulted the main Brazilian Civil organizations that act in data collection of these traditional populations⁷⁵.

Soy threatens the traditional groups, specially the indigenous one, in many ways:

- ▶ Direct occupation of the traditional lands, already guaranteed by the Brazilian Federal Government;
- ▶ Environmental degradation of the native lands, thereby affecting their communities;
- ▶ Political or judicial pressure against the demarcation of lands considered native and already considered by the social anthropologists;
- ▶ Consented occupation of native land and traditional land, by means of financial agreements with the native leaders, through the so called “partnerships”.

At least in four Brazilian states, the research discovered that soy have been produced on lands that were already officially recognized as indigenous by the Brazilian State⁷⁶. By using maneuvers either through politicians or through the courts of Justice, the soy producers have refused to leave these areas, however there is no indication of sanctions by the agriculture companies that supply them. This is what happened in Mato Grosso, indigenous land of the Maraiwatsede dos Xavante Indigenous (see case), in Alto Boa Vista, authorized by the National Government in 1998. In the state of Maranhão, an area already recognized as native by the traditional study—carried out by the National Indian Foundation—on two native villages in Canela, in Barra do Corda municipality, have

been devastated by soy farmers in retaliation for the impending dispossession.

According to a report by Cimi, the inhabitants of the Xerente Indian Land, in the town of Pedro Afonso, State of Tocantins, still live with the consequences of the so-called Prodecer III (Project for the Development of Cerrado III), a joint venture between the government of Brazil and Japan. Eliminating 40 thousand hectares of Cerrado to plant soybean damaged the water resources, fauna and flora of the Indian land. In Formoso do Araguaia (TO), near Karajá and Javaé land, water from the Javaé and Formoso rivers have been constantly polluted by irrigation projects of large soybean and rice plantations.

In Paraná, the research team visited the Boa Vista Indian Land, already officially recognized by the Ministry of Justice. Confined in 2 hectares of land, surrounded by transgenic soybean and strong pesticide pulverization, 130 kaingang Indians, living on food donated by the state, await procedures that will give them back their 7 thousand hectares of traditional territory from where they were expelled in the early 20th century. Cimi also reports a similar problem in the Yvy Porã Laranjinha Indian Land, belonging to the Guarani, already recognized by the Ministry of Justice, but still occupied by soybean and sugarcane producers, because of provisional judicial decisions.

Finally, the most dramatic case in the state of Mato Grosso do Sul, several areas recognized as native lands of the Guarani-Kaiowá tribes in different levels of legal recognition – there are claimed areas, such as Paso Piraju, Guyraroka, and at least one homologated reserve, Nhanderu Marangatu – are still being occupied by soy producers. This has been going on for three decades and has been causing a desperate situation for dozens of thousand of Indigenous⁷⁷ and, as a consequence, causing a high occurrence of malnutrition and infant mortality and the quick spreading of violence and suicides.

In addition to all negative consequences mentioned above that direct land occupation has caused, there are regions where the deforestation has been a cause of concern, as well as the indiscriminate cultivation of soy on the native lands where the headwater runs. The representative case is the headwater of the Xingu river (see the following text) in Mato Grosso, but the reality of this particular case has a greater degradation, siltation and visible contamination of the rivers by pesticide with consequences not yet known, such reality concerns the whole native community⁷⁸.

The research obtained data about problems of this nature, concerning at least five Brazilian States⁷⁹. Ac-

According to the Indigenous Work Center, the Timbira Indian groups between the states of Tocantins and Maranhão (see text on the chapter about the environment) are particularly affected. Between Itacajá and Goiás in the state of Tocantins, soy cultivation has reached the Kraolândia tribes lands, affecting the Vermelho and Manuel Alves rivers, with reports of death of fish and also of children with skin diseases. Canela, mentioned above, also suffers with the contamination of the river Corda due to pesticide as the headwater is on a soy farm.

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In the South of Mato Grosso, according to the Indigenous Missionary Council, the community Baroro de Piebaga, and the indigenous territory of Tereza Cristina, in Rondonópolis, are surrounded by soy. The wastes originating from the large soy companies Basso and Amaggi are contaminating the water source, and the indigenous people nowadays do not risk using water that is not from local artesian wells. The problem of water pollution is becoming more and more common in indigenous areas⁸⁰. In the regions where soy cultivation is older, as it is in Paraná and Mato Grosso do Sul, this problem has existed for decades. What is new is that this has been becoming common also in the Amazon.

The concern is not only with the ichthyofauna, which has already been studied in the Xingu indigenous area (Indigenous Park of the Xingu [PIX]) to discover the level of water contamination caused by the pesticide coming from soy cultivation. Among the Irantxe and Paresi Indigenous, in the East of Mato Grosso State, the fear of water contamination has been already changing their food habits. The liver of the game, such as rhea, boar and wild pig, once considered delicacies, is rejected today, for fear of contamination.

The scene finishes with the polemic relationship of “partnership” of indigenous communities⁸¹ with the soy producers. Although Funai considers that there is a difference between partnership and land leasing, arguing that in the first case the land use by the community is preser-

ved, in fact the partnership has been characterized by the adoption of extensive monocultures inside the indigenous areas, causing environmental, economic and social problems such as the reproduction of the outside deforestation or internal conflicts about the division, between the families, of the financial resources paid by the “partner”. In the South region, it happened that families were expelled by other community members to give place to soy farmers.

The study found indications of such practices in at least three states: Paraná, Mato Grosso do Sul, and Mato Grosso. For several observers of the Indian issue and NGOs, the “partnership” is land lease disguised. Regardless of that, the fact is that in Mato Grosso, for instance, the government seems to make no effort to create alternatives to the practice: on the contrary, it directly encourages (see text on the Xingu region).

In Mato Grosso, the practice of “partnership” has been performed by Paresi Indian groups for many years now. Such a group, in 2003, protested asking for public financing for the cultivation of soy in their areas. Nowadays, according to reports, there are around 10 thousand hectares of soy cultivated on Paresi land, and they would receive four bags of soy for each hectare planted. The money from the sale of the soy is shared in the community.

This year, the Irantxe Indian group began to do the same in an area of around one thousand hectares. The area, originally formed by brush land, was opened in 2004 with paid participation of the Indigenous in slash and root removal. According to the reports of the Irantxe Indian, there is awareness about the soy cultivation being not a good deal due to its demand for deforestation, application of agrochemicals and, therefore, the community does not have any other option to obtain financial resources to buy maintenance pieces and fuel for the motorized vehicles of the communities.

XINGU CASE

The social and environmental diversity on the Xingu river is very impressive, not only for Brazil, but for the whole world. Since the expedition of the German ethnologist Karl von den Steinen, in 1884, in the area of Alto Xingu in Mato Grosso, ten people of different languages and origin have been revealed to the world. These people used to live in peace among themselves based on cultural complex which involves commercial exchanges, marriages, parties and rituals such as the Kuarup.

Although the pressure from farmers and politicians of Mato Grosso has managed to diminish the reserved area, created in 1961, to 2.6 million of hectares, one fourth of what was intended by the project makers, Darcy Ribeiro and Villas Boas brothers, the Indigenous Park of the Xingu (PIX) still incorporated four other ethnical groups which inhabit the area of middle Xingu. There are around five thousand inhabitants in this park.

PIX, however, is only the beginning. Xingu area occupies 2.7 kilometers all together before flowing into the Amazon river, covering what is considered one of the largest environmental corridor of preserved areas of the world: 19 indigenous lands and 10 units of adjacent conservation, totaling almost 28 millions of hectares in the Amazon⁸².

The problem is that the very region where the main headwaters of the Xingu river is located, at the South of PIX, is not being protected by the demarcation of the park. Instead, during the last three decades the area has been the target for intense colonization and threatening this huge social and environmental patrimony of Xingu. It is also threatened by uncontrolled agribusiness mainly the soy cultivation. It is estimated that only in Querencia-Mato Grosso, the main cultivator of soy plantation, there are more than 150 thousand hectares of this cultivation⁸³.

The concern about Xingu's headwater developed the campaign 'Y Ikatu Xingu' ("Safe the Good Water of Xingu) in kamayura in Xingu. It was coordinated by the Social and Environmental Institute (ISA) and lot of organizations of the civil society got involved in the campaign. This initiative had its origin in the Xingu River Headwaters Meeting. This event took place in October 2004 and gathered more than 300 of representatives from the economical sectors, political sectors and of the communities of the area, mainly the indigenous ones in order to discuss about the issue.

The goal of the campaign is the encouragement to the restoration of the ciliary or riparian forests. It is estimated that around 300,000 hectares of the ciliary or riparian forests were destroyed until 2005. According to the Brazilian Forestal Code, based on the width of the water flow, it should be preserved from 30 to 500 meters of riparian forest. If headwater is present, the mandatory preservation is of 50 meters.

These estimative do not dealt with a much more serious problem that involves a strong political discussion with the farmers of the region: The 2001 provisional measure, which changed the Brazilian Forestal Code to establish the mandatory legal reserved area by 80% of the property. In relation to the forest located in the Legal Amazon, its constitutionality is questioned by the National Confederation of the Agriculture, and the legal action has not been ruled by Federal Supreme Court yet. If the total extension of the land located in the Xingu basin in Mato Grosso is taking into consideration, the deforestation reaches 5.5 million hectares⁸⁴.

In the municipalities located in the East of PIX, originally covered by forest, the discussion is particularly strong. Querência was recently included in the list made by the federal government that appoints the champion municipalities of deforestation. This causes several penalties and stirred up the people of that region. The farmers there felt as if they were betrayed, because on the seventies they received an official encouragement from the military government to move to the South-Center of the country and settle there.

The challenge for the campaign is to involve the farmers through education and awareness. Several local projects have been taking place in the municipalities and receiving support from the Y Ikatu Xingu, this includes: the formation of social and environmental agents, the management planning of the tributary basins; improve farmers' alternative practice of handling the property and environmental restoration of the damaged area of the ciliary or riparian forest⁸⁵.

The main issue to involve the landowners is still the price of what is called "good deeds". The cost for restoration is very high (around R\$ 3,000.00 to R\$ 5,000.00 per hectare, according to the campaign's estimate) and there is no public financing in Brazil for the reforestation of native trees—even if the project foresees the financial feedback, with the removal of fruits or wood in a sustainable way. The result is that after three years of campaign, there are only fifteen pro-

jects of restoration in private areas. To exemplify, only in Canarana there are 1,200 rural properties.

The severe deforestation of the riparian forest is attributed to the cattle raising, the first agribusiness activity that settled in large scale in that region. In order to make easy the access for the cattle to the water, large gaps were opened⁸⁶. The latter practice of soy cultivation in these areas intensified the siltation process and a new and more severe consequence started to happen—the contamination of the rivers due to agrochemical waste.

There is still not a clear idea about the water contamination and its real effects, conclusive studies on the level of waste originated from agrochemical waste in fish or water are still being carried out. At the moment it is possible to see visible changes on the river, the water is darker, the waterbed is not as deep, fishing activity has become harder, and also the occurrence of diarrhea, death of fish during raining season due to soy cultivation, such things have worried the indigenous communities.

The only company of commodities commercialization that has joined the 'Y Ikatu Xingu' is Amaggi. This company has been practicing a follow up program based on the environmental practice of the products it supports financially—the results have not yet been evaluated by experts. However, the fact is that other large companies of this sector (Bunge, Cargill, ADM, Dreyfuss e Caramuru) are still acting in the region as soy commercialization without concerning about the right and wrong way of handling products from the rural area.

Also in the PIX region, there are the Xavante tribes, one of the most numerous indigenous population of Mato Grosso and whose fate was not the same as they could not have the same guarantee for their lands since the arrival of the colonizers, as the others natives had. The Xavantes from the area known as Maraiwatsede, a municipality of Alto Boa Vista, have been fighting till today for the return of their land, although it has already been guaranteed for them by two judicial decisions in principle urge was already ratified by the President ten years ago. Meanwhile, the cattle breeders and soy producers still occupying the land as well as two large international companies—Bunge and Cargill—maintain two big stocks of grain commercialization not too far from the area. While the Federal and State Governments do not act, the Xavante Indigenous of Maraiwatsede live with the aerial spraying of pesticides on the soy, not too far from the place where they established their village.

The aerial spraying issue also affects the Kisedje, or Suya group of inhabitants of the indigenous land called Wawi, in the east of PIX. Once more the Indigenous cannot prove that the poison has been causing them evil, but they complaint about headaches and diarrhea during the soy plantation season, which is located 10 kilometers away from their village. In the Kisedje case, the spraying system takes place in the farm that has one area already demarcated as indigenous land, but it is still under the power of the farmer José Ricardo Resek by a judicial preliminary decision. It is believed that the rivers where the Kisedje Indigenous fish and bath is also affected by the contamination.

While, in Western Mato Grosso state, "partnerships" for cultivating soy and other single crops grow in Indian lands, due to the diminishing of natural resources and increasing necessity of access to money, state authorities don't seem to be committed to creating alternative means of production for generating income in Indian lands. On the contrary: According to community leaderships' reports, state governor Blairo Maggi has already encouraged Indians in the Parque Indígena do Xingu to plant soy in their lands. In a 2005 meeting with leaderships, he brought up the possibility of financial gains in return of soy cultivation and public support to the initiative, according to these sources⁸⁷.

CHAPTER 9 FINAL CONSIDERATIONS AND RECOMMENDATIONS

The names of the main forums about soy—the most polemic and most profitable grain on the agenda of the global agriculture—abolished any mention of the term “sustainability”. On the whole, the most acceptable term is “responsibility”. The reasons for this option are obvious: No intensive capital monoculture with a very low potential for creating new jobs and with exportation as the major objective can carry the “sustainability” label.

By taking this context into consideration, this study has decided to evaluate the impacts of soy cultivation—here treated as raw material for biofuel production—in its various dimensions. After an extensive investigation and visits to the field, it is possible to affirm that the dynamics of this activity is systematically responsible for destabilizing the environment, a concentration of lands in the hands of fewer owners, and arousing violations in labor relations, and other effects from the North to the South of Brazil. By gathering previous studies on this theme, along with dialogs with research centers, social movements, non-governmental organizations, public organs and rural workers it is not possible to say that even the term “responsibility” has been adequate when it comes to the culture of soy in Brazil.

As other studies take place evaluating the problems caused by the cultivation in several different dimensions, the actions of the government seem to be more and more contradictory. Opposition between an archaic vision of the progress from ministries related to the production sector, that place the agribusiness as the controlling factor of the national economy, and a conservationist philosophy, but destitute of resources, side by side to the Ministry of Environment polarizes the public politics. It does not, however, cause a polarization, as the political and monetary support received from producers and the industry have as usual been much stronger. The power of the agribusiness representation in the National Congress contributes to the maintenance of this status quo.

Meanwhile, important soy companies, strongly influenced by large transnational as ADM, Bunge and Cargill, announce initiatives that abuse the marketing, but does not change the structure of production and the development pattern of the agriculture.

Exactly in the middle of this euphoric moment, when everyone is betting that biofuel has turned into the substitute of fossil fuels, the European market is already verifying the real viability for this substitution. The reluctance hides strong underlying protectionism, but also expresses a global concern: just how healthy would the option for biofuels be, in social environmental terms, if it comes from a cultivation that causes a great impact on nature?

The production of biofuel from soy is still small in Brazil, but its growth will take place in the context of a global increase of price of this commodity, which is currently used for animal feed. The price given outside Brazil for this commodity influences its value here. The results of this can already be felt in the pocket book of the average Brazilian: Over the last 12 months the price of the soy has gone up 56%⁸⁸. Not to mention the raise in the cost to breed fowl and swine that depends on soy meal. These price increases are being passed on to the consumer. The price of pork rose 10.7% and the price of chicken 6%.

In the United States, the demand for corn has risen after its use by the ethanol industry. Because of that, tendency is that corn planted area grows and soy planted area stagnates, pressuring international grains’ and its by-products’ prices. Everything is linked. We have dealt here with Brazilian impacts, but they are only a small part in the global impact caused by commodities that are sought by the biofuel industry. A worldwide search for these commodities is not keeping pace with its availability. The stocks are low and therefore are unable to control prices. The worldwide inflation of food prices is already causing hunger in poorer regions.

A study like this “Brazil of Biofuel: Impacts of crops on land, environment and people” at this difficult moment of the international commercial relations is highly strategic, for it allows the identification of damaging behavior performed by the productive sector and the government, which invest billions of dollars on soy, also invest to reduce the negative impacts. All the projections point to the fact that the demand for grains will remain high, increasing the number of plantation area. This scene will take place followed by an intensification in the international requirement of the environmental certifications which are increasingly rigorous.

Therefore, if Brazil desires to stand out and settle in the market as main protagonist of this market in the future—either by demand of biofuel or soy—it will be essential that the country makes immediate adjustments. Below are mentioned some concrete proposals of actions to be performed either by private sectors or the government, in order to diminish the impact caused by soy cultivation on every point mentioned on this study:

PUBLIC SECTOR:

- ▶ 1) Establish the renegotiation of the agricultural companies debts, about R\$ 74,000,000,000, and the environmental and social compensation, especially in relation to the legal indigenous reserves and the structuring of formal rules for work relations.
- ▶ 2) Intensify preventive operations of work inspection on soy expansion, in order to prevent cases of slave labor that happen during the cleaning and soil preparation, as well as the prevention of health risks, such as avoiding exposing the worker's health to pesticide contamination.
- ▶ 3) Increase environmental inspection on pesticide usage and stimulate the use of organic means for soil correction. Improve the mechanisms of recycling the herbicides and pesticides recipients.
- ▶ 4) Develop tools for remote sensing dedicated to Biome of Caatinga and Cerrado, as happens with the PRODES and DETER systems.
- ▶ 5) Other States should also adopt the Mato Grosso system of Environmental Licensing in Rural Property (SLAPR).
- ▶ 6) Be more transparent in relation to trials and fines due to environmental violation of the law. In order to do that, it is recommended to implant as soon as possible, an instrument, such as "the laundry list" of the slavery work from Ministry of Labor and Employment, which registers those who were fined for this violation and guarantee the possibility for the business section to cut relationship with these accused producers.
- ▶ 7) Encourage regional research on the impact of soy cultivation based on the themes discussed on this paper, focusing on monitoring the relationship between the area covered with food crops and with oleaginous cultivation, as the latter is the suppliers of raw material for biofuel production.
- ▶ 8) Encourage alternative agricultural practice, such as direct planting, agroforestral systems and organic agriculture. Strengthening the control of water resources, especially groundwater by large important agricultural holdings.

BUSINESS SECTOR:

- ▶ 1) Cancel immediately the contracts of pre-financing and/or buying soy from producers that are on indigenous or quilombolas lands that are in the process of being thus recognized once the anthropologic studies and the expiring date of contestation is over. The same applies to pre-financing that has environmental and worker related problems, by immediately stopping the contractual payments and stop receiving the products. Create contract clauses to allow immediate breach of contract.
- ▶ 2) Develop lines of credit from both public and private banks in order to finance specific actions of environmental compensation, with the re-establishing of the riparian forest and reforestation, both returning to native forest.
- ▶ 3) Demand the presentation of official ownership documents of the property of the lands at the time of contract signing for pre-financing between soy trading companies and producers.
- ▶ 4) Stop the advancing of soy cultivation in new areas of the Amazon and Cerrado. Elaborate studies and reports of the social and environmental impacts and discuss them with the community involved before the implementation of silos and large soy properties. To fiscalize the respect of properties' legal reserves.
- ▶ 5) Stop the use of wood as an energy resource and the drying of grain where the soy are harvested in primary forest or bush lands.
- ▶ 6) Tradings, cooperatives and large scale soy market should create rules of profit shares for farmers and, especially, farm workers through agreements or contracts. This mechanism would improve the low wages of the workers, when compared to the per capita gains of the sector.

Finally, the social manifestations, Farm Workers' Union and non-governmental organization are in favor of an extensive agrarian reform and the creation of alternatives of work and incomes, apart from those large agricultural holdings, as essential aspects to guarantee food security and an example of sustainable and responsible development.

The distribution of lands is not the panacea for the problem of land exploitation, neither for the environment nor for the society, but the socialization, at least partial, of the ways of production in the fields would be a heavy blow to the large agribusiness that, directly or indirectly, take advantage of the excessive exploitation of natural resources and of the people for profitable means in order to guarantee a better future for thousands of people.



CASTOR BEAN

Castor bean was an important culture in Brazil in the past. In the 1980s, the country was the world's major producer of this oleaginous plant and major exporter of castor bean oil, also known as ricinus oil. From 1960 onwards, the chemical industry has guaranteed a market with great demand for this oil, as it is used in the production of pigments, aniline, disinfectants, germicides, plastics, synthetic fibres, glues, adhesives, synthetic resins and in high rotation engines, as, for example, airplanes and rockets engines.

When the Brazilian production of castor bean was supplanted by India and China in the 1990s, castor bean crops declined in Brazil, and this situation was worsened by lack of proper technologies and investments in the sector. Castor bean crops ceased to be a profitable culture for the producers, mainly for the small producers from the Northeast—historically the main producers of castor bean in the country. Consequently, the area covered with castor bean crops has shrunk some dozens of thousand hectares.

The focus turned again to castor bean after the launching of National Program of Biodiesel Production and Use (PNPB) in 2004, as this oleaginous plant was elected as one of the main flagships of the Federal Government's social inclusion policies whereby family farmers would be included in the agroenergy productive chain. The Federal Government decided that the acquisition of castor bean produced by family farmers mainly from the Northeastern semiarid would result in fiscal benefits for the biodiesel industry.

The project, however, has not yet brought any concrete results to family farmers. Despite the efforts of the government to popularize castor bean, the productive chain is still very much linked to private projects of biodiesel industry and subordinated to the logic of this market, and that has given rise to disagreements between the agricultural and processing sectors. But there are exceptions. When organized producers appropriate themselves of the productive chain and impose their own criteria for handling and commercialization of the product, castor bean has proved that it can really be an alternative to environmentally and economically sustainable social income.

Repórter Brasil has chosen the states of Ceará, Piauí and Rio Grande do Sul to carry out a research with family farmers involved in the projects of castor bean cultivation for biodiesel in order to find elements that could contribute to a clearer picture of the present situation and the perspectives of castor bean culture in Brazil. In the present report, castor bean family production—two unsuccessful cases and a successful one—are analyzed, and it seems castor bean crops are at a cross roads. Depending on who assumes the productive chain—whether the government, or the private initiative, or the organized producers—castor bean perspectives can be incipient, disastrous or promising.

CHAPTER 1 BIOFUEL: A PUBLIC POLICY INSTRUMENT TO ENCOURAGE CASTOR BEAN PLANTATION

The Federal Government officially launched the National Program of Biodiesel Production and Use (PNPB) in December 2004, and the promise was that the PNPB would be an instrument to have family farmers as the main producers of raw material for biodiesel, and this would be guaranteed by the Social Fuel Seal.

Conceived, granted and controlled by Ministry of Agrarian Development, the Social Fuel Certification does not follow the idea of direct investments in the family agriculture, but adopts fiscal benefits for the industrial sector. That is, the producers of biodiesel that complies with acquiring raw material of family farmers will have some benefits, among them some of the following:

- ▶ 1) Qualification for tax deductions for Brazilian taxes PIS/PASEP (Social Integration Program Tax) and COFINS (Social Security Funding Tax) with specific tax reduction coefficients (see tables). The specific tax reduction coefficients are proportional to the acquisition of raw material from family farmers.
- ▶ 2) Qualification for better financing conditions at BNDES (National Bank of Economic and Social Development) and its accredited financial institutions—BASA (Bank of the Amazon), BNB (Bank of Northeastern Brazil), BB (Bank of Brazil S/A) or other financial institutions that have special conditions for financing Social Fuel Certification projects.
- ▶ 3) Authorization to take part in biodiesel auctions.

To obtain the Social Fuel Certification that guarantees the benefits mentioned above, the producers of biodiesel have to comply with some obligations. If the biodiesel plant is located in the Northeast region or in semiarid regions, it has to acquire at least 50% of raw material produced by family farmers. This percentage drops to 30%, if the biodiesel plant is located in the Southeast and South region, and to 10%, if it is located in the North or Middle-West region.

Moreover, the biodiesel plant has also to celebrate contracts with family farmers through negotiations in which at least one union or entity representing the family farmers should take part. The commercial conditions should be detailed in order to guarantee income and establish delivery terms compatible with this activity, besides assuring technical assistance and training.

In the talks that preceded the Social Fuel Certification creation in which the Federal Government, social movements and entities representing the family farmers took part, the MDA—Ministry of Agrarian Development made it clear that this instrument would, above all, benefit the small farmers from the semiarid regions of the Northeast. That would mean, in the last resort, an incentive to motivate family farmers to plant castor bean.

Alongside with the Social Fuel Certification, the government adopted some measures to encourage the expansion of the crops, such as the creation of the biodiesel PRONAF (National Program for the Strengthening of Family Agriculture) to provide financing for family farmers whereby they can take some credit for paying the expenses of planting oleaginous plants before they pay the previous one. This line of financing would allow the family farmer to continue to invest in the usual crops, such as corn and beans, together with the oleaginous plant destined to biodiesel.

The Federal Government has also allowed the family farmer who is a beneficiary of the microcredit (PRONAF B) to take some credit for paying the expenses of planting oleaginous plants, something that was forbidden before. It

made use of the instrument of harvest guarantee in order to give priority to family farmers from the semiarid regions of the Northeast who plant beans together with castor bean. It has stimulated

the public institutions, such as BB, BNB (Bank of Northeastern Brazil) and BASA (Bank of the Amazon), to comply with the credit demands through PRONAF in order to finance the costs of the plantation of the oleaginous plants used in the production of biodiesel.

Table 6

PIS/PASEP AND COFINS ALIQUOTS APPLIED TO BIOFUEL		
PIS/Pasep and Cofins (R\$ per biofuel liter)		
	Without social certification	With social certification
North, Northeast and Semi-arid regions:		
Castor bean and palm	R\$ 0.15	R\$ 0.00
Other raw materials	R\$ 0.22	R\$ 0.07
Midwest, Southeast and South regions:		
Any raw material, including castor bean and palm	R\$ 0.22	R\$ 0.07

INSTABILITY IN THE CULTIVATION OF CASTOR BEAN IN BRAZIL

The Federal Government tried to reduce the instability that affects the family farmers, in special the castor bean producers, through the expansion of financing channels and stimulation of the instruments of market that would guarantee a demand for their production. According to CONAB (National Company of Food Supply), castor bean crops in Brazil have suffered great oscillations in the last 20 years—a reflex of difficulties faced by small Brazilian producers.

After reaching the highest place in the ranking of major producers of castor bean, Brazil witnessed a decline in castor bean crops between the late 1980s and mid 1990s. In the 1988/89 harvest, for instance, 278,700 hectares were planted. The area destined to castor bean crops dropped to 77,600 hectares in the 1994/95 harvest and it slowly increased until the end of 1990s, reaching 92,000 hectares in the 1998/99 harvest.

In the early 2000s, castor bean crops had a further period of instability and faced their ups and downs in terms of cultivated area. With the launching of the National Program of Biodiesel Production and Use (PNPB) and the creation of Social Fuel Certification, the situation has improved slightly from 2004 onwards. According to CONAB's estimates issued in March 2008, the records showed 147,000 hectares of castor bean crops in the 2005/06 harvest, 155,600 hectares in the 2006/07 harvest, and 158,200 hectares in the 2007/08 harvest.

The Northeast continues to be the major producer of castor bean in Brazil, but the production may decline in the 2007/08 harvest, whereas the opposite happened in the rest of the country. According to CONAB's estimates, the area covered with crops fell from 151,200 in the previous period to 150,200 at present.

Among the states of the Northeast, the main producers are Bahia, Ceará, Piauí and Pernambuco. Historically, Bahia is the major producer of castor bean in Brazil and holds the first position with 114,000 hectares in the 2007/08 harvest—a slight decrease in relation to the previous crop that covered 121,000 hectares. Ceará has observed the greatest increase in the area covered by castor bean crops, jumping from 9,600 hectares in the 2006/07 to 21,500 at present. Ceará has reached the second place in the ranking and overtook Piauí where the area covered with castor bean crops was reduced to 7,100 hectares, whereas before the area was 13,400 hectares. At the same period, Pernambuco State's area covered with castor has slightly risen, 6,400 hectares to 6,700.

CASTOR BEAN: THE MARGINAL CROP

Although there has been an improvement in the cultivated area lately, castor bean still holds a minor share of the country's agricultural production. Among the oleaginous plants used for biodiesel production at the moment, soy and cotton, for example, should cover an area of twenty one million hectares and one million hectares respectively in the 2007/08 harvest.

Due to the difficulty in having access to technologies and mechanized harvesting, castor bean is mostly grown by family farmers. Up to 2008 the main focus of the social investments of the National Program of Biodiesel Production and Use was on castor bean and palm, castor bean, however, still lacks more solid technical studies, as specialists of EMBRAPA—Brazilian Agricultural Research Corporation admitted.

Among some organs of Brazilian government there is even some disagreement about some basic data related to amount of castor bean produced in the country. According to Secretariat of Family Agriculture of the Ministry of Agrarian Development, the institutions of government responsible for the statistics referring to the development of the national agropecuary—CONAB and IBGE

Table 7

HISTORICAL SERIES OF CASTOR BEAN CROPS IN BRAZIL (In 1 000 ha)					
REGION	N	NE	CO	S	SE
1980/81	0	375.7	4	33.2	32
1981/82	0	406.4	3.9	29	30
1982/83	0	253.9	5.3	31.3	27.5
1983/84	0	342.9	8.4	36	28
1984/85	0	410	10	37	28
1985/86	0	391.9	2.7	24.3	22.5
1986/87	0	254.9	0.9	25.5	16.2
1987/88	0	236.1	0.2	20.3	10.9
1988/89	0	256	0.3	16.8	5.6
1989/90	0	221.8	0.1	15.2	4.4
1990/91	0	223.8	0.2	12.1	2.8
1991/92	0	166.6	0	12.2	1.9
1992/93	0	129.5	0	5.1	1.2
1993/94	0	112.6	0	3.1	1
1994/95	0	76.3	0	1.3	0
1995/96	0	119.9	0	1.6	0
1996/97	0	148.6	0	1.4	0
1997/98	0	131.9	0	0.7	0
1998/99	0	90.9	0	2	0
1999/2000	0	177.9	0	17.5	0
2000/01	0	155.6	0	5.8	0
2001/02	0	123.2	0	2.9	0
2002/03	0	126.3	0	2	0
2003/04	0	163.8	0	2.4	0
2004/05	0	209.8	0	4.3	1
2005/06	0	142.2	0	5.2	0.5
2006/07 ⁽¹⁾ Projection	0	151.2	0	4.3	0.1
2007/08 ⁽²⁾ Projection	0	150.15	0	8.047	0
(1) Preliminary data: subject to change					
(2) Estimated data: subject to change					

Source: CONAB

(Brazilian Institute of Geography and Statistics)—have underestimated the growth of castor bean in some Southern states (Rio Grande do Sul and Paraná), Southeastern states (São Paulo and Minas Gerais) and Middle-West states (Mato Grosso and Goiás).

In the crop estimates issued by CONAB in March 2008, for instance, the Southern states production was not considered. Despite that, more than 500 family farmers have adopted castor bean crops for 2007/08 harvest and there are estimates of 724 cultivated hectares in the North and Central regions of the state, according to Paraná's Secretariat of Agriculture.

An article published by EMBRAPA (Brazilian Agricultural Research Corporation) and EMATER-RS (Rio Grande do Sul State Company for Technical Assistance and Rural Extension), "Castor Bean Crops in Rio Grande do Sul" ["A cultura da Mamona no Rio Grande do Sul"], said that Rio Grande do Sul State began to plant castor bean in 200 hectares for the 2003/04 harvest, and this number reached 600 hectares for the 2006/07 harvest.

CASTOR BEAN HAS NOT IMPROVED FAMILY FARMERS' LIFE

Have the public policies of the Federal Government aiming at stimulating the castor bean crops improved the family farmers' life? Has there been an increase in the creation of jobs and income in the backcountry due to the demand generated by biodiesel and the concession of Social Fuel Certification to biodiesel mills?

The answers to these questions can be guessed by the irrelevant growth of the area covered with castor bean in 2004, the year in which National Program of Biodiesel Production and Use was launched. Castor bean crops in the 2007/08 harvest, representing 1.7% increase in relation

to previous harvest, point to the fact that they have not achieved the expected result, neither in relation to family farmers nor in relation to biodiesel industry.

According to estimate issued in March 2008 by the Brazilian National Petroleum Agency (ANP), responsible for regulating petroleum activity in Brazil, fifty-one industrial plants produce biodiesel at the moment in the country. According to Ministry of Agrarian Development, twenty-eight of them received the Social Fuel. Nowadays, all biodiesel produced in Brazil for the mandatory mixture of 2% to fossil fuel - making the so called B2 - is purchased through auction by the National Agency of Petroleum (ANP - Agência Nacional do Petróleo). The product, paid for with resources from Petrobrás, is sold by the industries directly to the state-owned company which is responsible for mixing the biodiesel with the diesel fuel and for its final sale to the fuel dealers. These, in turn, are responsible for taking the B2 to the gas stations. Starting next July the mandatory mixture will change to 3%.

According to the PNPB rules, 80% of the biodiesel purchased by the ANP must originate in companies which carry the Social Fuel Certification. A much small-

Table 9

CASTOR BEAN AREAS IN NORTHEAST (IN 1 000 ha)		
State	'06/'07 Harvest	'07/'08 Harvest
BA	121.1	114.2
CE	9.6	21.5
PE	6.4	6.7
PI	13.4	7.1
RN	0.7	0.6

Source: CONAB - Levantamento: Mar/2008

Tabela 8

COMPANIES WITH SOCIAL CERTIFICATION			
Industrial units	City	UF	Capacity (million liters per year)
Granol	Anápolis	GO	122
Granol	Campinas	SP	90
Soyminas	Cássia	MG	12
Biocapital	Charqueada	SP	247
Fertibom	Catanduva	SP	12
Cia Refinadora da Amazônia	Belém	PA	24
Brasil Ecodiesel	Crateús	CE	100
Brasil Ecodiesel	Floriano	PI	100
Brasil Ecodiesel	Iraquara	BA	100
Comanche	Simões Filho	BA	20
Barra Álcool	Barra do Bugre	MT	50
Ponte di Ferro	Taubaté	SP	27
Oleoplan	Veranópolis	RS	100
Caramuru	São Simão	GO	113
Binatural	Formosa	GO	9
Brasil Ecodiesel	Porto Nacional	TO	100
Ponte di Ferro	Rio de Janeiro	RJ	48
BSBios	Passo Fundo	RS	100
Brasil Ecodiesel	Rosário do Sul	RS	100
Agrosoja - Sorriso/MT	Sorriso	MT	24
Fiagril - Lucas do Rio Verde/MT	L.do Rio Verde	MT	41
ADM do Brasil Ltda	Rondonópolis	MT	170
Bertin Ltda	Lins	SP	100
Granol	Cachoeira do Sul	RS	100
Bioverde Indústria e Comércio de biocombustíveis Ltda.	Taubaté	SP	40
CLV Indústria e Comércio de Biodiesel Ltda	Colíder	MT	23
Brasil Ecodiesel	Itaqui	MA	100
Total			2070

ler portion of biodiesel is acquired through auction directly by Petrobrás and is aimed at forming the so called strategic inventory. By law, this product must be 100% originated in companies holding the certification.

In spite of the expectations created by the PNPB that biodiesel would be an economical promoter for family agriculture, official data from the Ministry of the Agrarian Development (MDA - Ministério do Desenvolvimento Agrário) show that, according to the estimates of planted area of oleaginous in the beginning of 2008, only 15% of the biodiesel produced in the country will come from raw materials supplied by small farmers - emphasizing that this volume may increase with new plantings during the year. According to the specialized site Biodieselbr.com, three years after the creation of the Social Certification, the official results regarding castor oil plant culture are negligible, since at least 80% of the biodiesel production is based upon soy oil, 15% upon animal fat and the remaining upon other oils.

Retaking the estimates by Conab for castor oil plant planting in the 2007/08 harvest - an increase of only 1,7% in planted area in comparison to the last harvest, at national level, and a decrease of 0,7% in comparison to the 2006/07 harvest in the Northeast -, it is shown that the culture, in spite of the government efforts, didn't succeed as expected neither with family farmers nor with biodiesel industrial producers.

According to the MDA, currently only the Brasil Ecodiesel company indeed produces biodiesel starting from castor oil plant. Other companies which have been making agreements with family farmers for the production and acquisition of the oleaginous have made it in order to acquire the Social Certification or to participate in the biodiesel auctions of Petrobrás, since the Stamp and the state-owned company require that the producing plants acquire family production, independently of the product's final destination (biodiesel production or other markets). The much higher price paid for castor oil by the ricinochemical industry - which, in February of 2008, topped R\$ 4,7 thousand per ton of oil (as compared to R\$ 1,9 thousand which is paid, on the average, by the ANP) -, has been driving farmers and biodiesel companies which hold castor oil contracts to favor selling to the chemical industry. About 70% of the production from the state of Bahia, for instance, is still destined to this market, according to Embrapa.

CHAPTER 2 SOCIOECONOMIC IMPACTS

We selected two emblematic states to talk about the socioeconomic impact of castor bean agriculture. In the Northeast, Crateús, in Ceará State (the state that has most increased the area for castor bean crops for this harvest), will be analyzed. In the South, the experience of the small producers from Cangaçu region, Rio Grande do Sul State, will be reported.

BRASIL ECODIESEL'S ECONOMIC POWER REPRESENTS A DRAWBACK FOR CASTOR BEAN PRODUCERS IN CEARÁ

One of the major demands from unions and social movements linked to peasant and family agriculture during the process of elaboration of National Program of Biodiesel Production and Use as well as Social Fuel Certification was that the Federal Government should not restrict the sector to the agricultural activity in the chain of production. They demanded the creation of mechanisms that would give the small producers conditions to process castor bean in order to increase their income and add value to their product with the sales of oil by means of cooperatives and associations. The idea that the family agriculture remained at the base of the production chain as a mere supplier of raw material was strongly rejected due to the perspective that the agroenergy sector would be established as an additional economic front in the agricultural activity.

Three specific initiatives linked to FETRAECE (Federation of Agricultural Workers in Ceará), MST (Landless Workers' Movement) and FETRAF (Federation of Family Agriculture Workers) were implemented in Ceará in projects for processing castor bean. According to Petrobrás' plans, these undertakings can become the exclusive supplier of the company in the state in 2009. The great majority of family farmers that produce castor bean are still bound by contracts of supplying oleaginous plants to the companies. According to some specialists, this is where all the problems begin.

According to the evaluations of the Ministry of Agrarian Development, EMBRAPA (Brazilian Agricultural Research Corporation) and independent consultants, we present an emblematic case of the failure of integration between company and family farmers model happened in Ceará—in this case Brasil Ecodiesel, a company that holds the country's monopoly in castor bean.

After installing a mill in the municipality of Crateús in 2004, Brasil Ecodiesel signed a series of contracts with family farmers from the region. Among other things, these contracts established the following for their counterparties: supplying castor bean and beans seeds for crops, equipments and technical assistance as well as the purchase of the production at R\$ 0.56 per castor bean kilo. The average productivity anticipated by the company was 1.5 million kilos per hectare, and that would guarantee R\$ 840.00 per hectare to the castor bean producer.

Eunice, a settler, was one of the people who signed the contract with the company. She planted a hectare of castor bean in 2005. According to her report, the problems began with the bad quality of the seeds supplied and lack of technical assistance. This and the lack of rain that year resulted in a production of only 150 kilos, and her income was only R\$ 75.00, way below the amount she could have earned if she had opted for corn crops.

Delays in the delivery of seed and sowing, low productivity, lack of technical assistance, breaching of contracts (as the company did not fetch nor pay for castor bean produced by various family farmers whose production was rather low) and delay in payment as well as nonpayment of the insurance agreed in case of failure of crops—these were some of the problems observed in all Cratéus region, according to the municipality's STR (Farm Workers' Union). Similar complaints were heard among producers from Saco do Juazeiro settlement, in the same region of the state.

In 2006, Maria Cleusa, a family farmer, and her family were able to harvest 250 kilos of castor bean in the nine hectares planted. She sold her production to Brasil Ecodiesel and received R\$ 150.00 as payment for it. According to the settler, there was no technical assistance, and the insurance was not paid. She decided not to have



Brasil Ecodiesel plant in Crateús

castor bean crops in the following year due to the awful result of this experience, and great part of the 80 settlers who also signed contracts with the company did the same. Only Valdemar Soares, a productivity “record holder” in the settlement who managed to harvest 400 kilos per hectare, and three other families will continue in the project according to the farmer.

The directors of Saco do Juazeiro settlement association also related that Brasil Ecodiesel had signed a ten-year partnership contract with settlers, but it “broke the contract” in the second year. Promises of investment in infrastructure and schools in the settlement as well as the payment of bonuses per production above 1,500 kilos per hectare, a mark never reached, have fallen in the void.

A similar situation occurred in Santo André and Realejo communities, also in Ceará. The family farmers from these communities have also complained about Brasil Ecodiesel's breach of contract and delays in payment. Similar problems have been observed in Realengo, where they had a successful experience with irrigated castor bean crops in 2007. According to Manoel Ferreira, a family farmer, this coupled with the breaching of contracts has led to complete disappearance of these crops in the region.

According to Liv Soares, an EMBRAPA's researcher, Brasil Ecodiesel's disastrous action has left a trace of distrust among family farmers. According to FETRAECE, at the moment 90% of the biodiesel produced at Cratéus' mill uses soy from Piauí and Maranhão, and their production should be 18 millions liters, as agreed in contract with ANP (National Petroleum Agency) at the last biodiesel auction.

The majority of small producers of castor bean that had a contract with this company do not intend to have any further partnership with Brasil Ecodiesel, according to FETRAECE. The union members say that castor bean crops will only expand in the following harvests if the federal and state governments give a stronger support to producers and also if the almost monopoly of Brasil Ecodiesel in producing biodiesel from castor bean ends. Despite the fact this so-called almost monopoly is not official, it is a reality.



Maria Cleusa: castor bean paid only 150 reais for nine hectares

The Ministry of Agrarian Development has already started an audit to check the character and gravity of the problems denounced. MDA says that if the company does not fulfill the contract signed with small producers, it may lose the Social Fuel. In the case of Cratéus unit, however, it is necessary to “act with responsibility”, as the demand by castor bean created by Brasil Ecodiesel is still relevant to the region. MDA recognizes that the Northeast needs to have more incentives to plant castor bean, such as a program for soil correction, because without this measure castor bean crops would not be feasible in the region.

Liv Soares, an EMBRAPA’s researcher, believes that the success of the National Program of Biodiesel Production and Use in generating social benefits depends on a stronger intervention of the governments, both the federal and state. According to Soares, if the sector is left to the self-regulation of the market and if it follows businesses flair and way of thinking, castor bean has no future in the semiarid regions.

Aware of specialists’ and their own personnel’s diagnosis of the situation, the federal and Ceará State governments began to take some steps and generate some incentives. From 2006 onwards, Ceará State administration, in partnership with Petrobrás whose biodiesel plant in Quixadá uses castor bean, has begun to distribute seed and also offered to small producers registration at the state company and even at Brasil Ecodiesel for the payment of R\$ 150.00 per harvested hectare of castor bean (an incentive limited to 3 hectares per producer). It was decided that an increase by R\$ 0.60 per kilo on oleaginous plant destined to biodiesel should be paid, and these oleaginous plants were sold by R\$ 0.70, average price, in the beginning of 2008.

Initiatives like this one can explain why the area covered by castor bean has boosted to 124% in the present harvest, and, strictly speaking, this has not contributed to change the marginal character of the castor bean culture. Even though the economic relevance that castor bean might represent to family farmers is recognized, adjustments in the National Program of Biodiesel Production and Use are needed. The proposal of generating income to small producers so that they can remain in the field and do not have to migrate to the cities in search for jobs can fail without these adjustments.

IN RIO GRANDE DO SUL STATE, AUTONOMOUS ORGANIZATIONS HAVE YIELDED GOOD RESULTS

Castor bean has come to become a culture of certain importance in Rio Grande do Sul State since the 2003/04 harvest. At that time the oleaginous plant covered 200 hec-

tares, according to EMBRAPA’s unit in the municipality of Pelotas. In the following years, 2007/08, there was a gradual increase to about 6,000 hectares. Despite the problems faced at the initial stages related to handling and soil management, the productivity in the state ranges from 1,800 to 2,600 kilos per hectare, higher than in the Northeast.

The establishment of four biodiesel plants in Rio Grande do Sul State in 2007—Ecodiesel, BSBios, Granol e Oleoplan—that signed agreements with family farmers for the cultivation of castor bean represents a good possibility of expansion of these crops, according to EMATER-RS (Technical Assistance and Rural Extension Company—Rio Grande do Sul). EMATER-RS believes the demand has guaranteed good prices to producers and, therefore, it can promote the expansion of the incipient culture in the region.

In the raw material market for biodiesel in Rio Grande do Sul State, castor bean occupies the last place in the ranking, behind canola and sunflower (covering 20,000 hectares each). Ninety-nine percent of oleaginous crops are produced by family farmers, and these crops are highly mechanized and, because of that, intercropping with food crops is not a common practice in the state. According to EMATER, there is no imminent danger that castor bean crops will substitute food crops, as the oleaginous plant is generally produced in soy areas—a positive characteristic, as castor bean crops can break the monoculture of soy and represent an economic alternative in face of the aggravation of droughts in the state. The expansion of the culture, however, remains linked to the price of soy, at least in the near future.

One of the prominent projects of castor bean produced by family farmers in Rio Grande do Sul State is being developed in Canguçu municipality, in the Southeast region of the state. In 2003, UNAIC (Canguçu Association of Small Holding Farmers), an association present in 29 municipalities located in the South part of the state, started a process of discussions about the participation of family agriculture in agroenergy projects in the region and this led to the adoption of castor bean as an experimental trial by 800 families that would be overseen by the association, responsible for delivering the seeds, supplying technical assistance and guaranteeing the acquisition of production.

Because of faulty handling management of the soil, this first experience was not so successful, and the poor results discouraged part of the family producers, but about 250 families decided to carry on with castor bean production.

Good results have been achieved in the region with the necessary adjustments of handling and soil. According to Carmem Garcez and her husband work on a 20 hectares farm, producing milk, corn, beans, peanut, peaches, vegetables and honey, besides having hens and swine

for their own consumption, and she said that one hectare of castor bean planted in October 2007 might yield about R\$ 700.00 in this year's harvest.

Because of the drought that destroyed last year's corn production, the Garcezes consider the possibility of increasing to 6 hectares the area covered with castor bean, as the crop is drought resistant. When asked if this area would interfere with food crops, Carmen Garcez declared that the corn demand for their consumption would be met by their production, but the corn production to be commercialized might be substituted by castor bean as the latter is a better alternative of income at moment.



Satisfied with results, Carmen Garcez may expand castor bean production

UNAIC WANTS ENERGY AUTONOMY AND SUSTAINABILITY FOR FAMILY AGRICULTURE

Because some major biodiesel mills might be established in Rio Grande do Sul State, UNAIC (Canguçu Association of Small Holding Farmers) has decided to step ahead and assumed the role of mediator, supporter and representative of the small producers in the Canguçu region. UNAIC provides seeds and technical assistance for associates and guarantees the acquisition of their production. Because of the advantage of having great quantity of product offered, it negotiates better prices with biodiesel mills and, therefore, it can pay R\$ 0.71 per kilo of castor bean to small producers.

Peasants' organizations and unions have not come to a conclusion in their political discussions concerning the participation of family farmers in the agroenergy, as land dedicated to food crops might be shift to biofuel crops. UNAIC, because of the inevitability of fuel crops in the region, understands they have to be under family farmers control or else the biofuel industry will control them, as it happened in the integration model of the mills in the North and bordering regions of the state.

According to UNAIC administration board, in order to achieve the autonomy and self-sustainability in family agriculture, the plans for the agroenergy sector in 2008 include the construction of a unit for castor bean crushing and production of oil as well as production of seeds for commercialization. Both projects aggregate value to the activity.

As soon as UNAIC masters the crushing and oil production process, it estimates that the major part of the oil will be used on the family farms to substitute the diesel currently used in the machines and tractors. The aim is to achieve energy autonomy in the productive chain of family agriculture so that the biofuel industry and mills represent a secondary market whenever there is a surplus in production. The producers will also benefit from sub-products of castor bean crushing, something that has been benefiting the mills so far.

UNAIC is encouraging the diversification of crops—canola, sunflower and other oleaginous plants—and says it is also taking into consideration the environmental aspects of the activity, besides the economic aspect of agroenergy. UNAIC has an agroecological approach and believes castor bean can substitute soy transgenic crops and represent an alternative to tobacco crops, a predominant agriculture in the region that uses pesticides. It also works to avoid monocultures—the substitution of food crops by agroenergy raw material—and try to stimulate the rotation culture procedures.

CHAPTER 3 ENVIRONMENTAL, AGRARIAN AND LABOR IMPACTS OF CASTOR BEAN

IMPACTS OF THE CULTURE

As mentioned before, castor bean is produced in Brazil by family agriculture in 99% of the cases. Castor bean crops, therefore, have little impact in the agrarian structure and issues (land concentration) in the regions where it is produced as, in the majority of the cases, castor bean has been included in the productive cycle of small producers.

In so far as environmental issues are concerned, deforestation and use of pesticides and chemical fertilizers do not represent a serious problem in the majority of the regions, mainly in the Northeast where poor technological level predominates in the family agriculture. However, there has been detected a negative impact of these practices in regions where there is greater concentration of castor bean producers units.

According to EMBRAPA Environment, the results of a research on socio-environmental impacts of castor bean crops⁸⁹, carried out in the regions of São Raimundo Nonato, Piauí State, and Irecê, Bahia State, showed that the situations would vary depending on the intensity of the activity in a given area.

In São Raimundo Nonato, because of the poor technological level in agriculture practices, the impacts on natural resources were low, mainly because the small farms are scattered, and the same reality characterizes, for example, Crateús region, in Ceará State. The research says that intercropping of castor bean with beans has improved the soil quality, and this aspect, therefore, has contributed to quality of the water as well as biodiversity and habitat conservation.

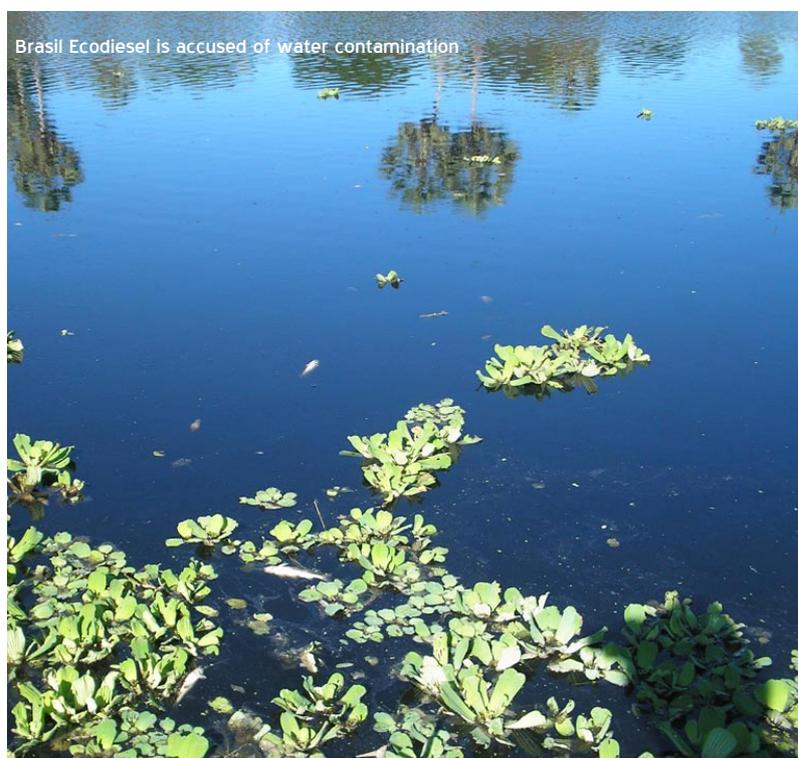
In Irecê region, historically one of the major producers of beans in the country, the strong demand for castor bean crops in a relatively more advanced technological model—compared with other Northeastern regions—has led to an increase of natural resources consumption. The production intensification, even when intercropped with beans, has led to a strong pressure on soil quality, having negative impacts on water and biodiversity conservation. The increasing demand for castor bean for biofuel has had negative consequences in the region, says EMBRAPA Environment.

In so far as the social aspects are concerned, the increasing demand of raw material for the production of agro-energy has led to an improvement of the technical capacity of producers as well as betterment of workers qualifications and generation of jobs and income. In Irecê, it has been observed an improvement in capacity-building of producers and in job offers, as harvest is manual, but the activity has not influenced the quality of work. This is due to precarious type of work and workers, on the one hand, and increased exposure of the workers to pesticides used in handling the culture, on the other hand. However, the competition between castor bean crops and beans, even when there is intercropping, showed negative results in relation to food security, as the research pointed out.

IMPACTS OF PROCESSING

If the environmental and social impacts of the agriculture sector of the productive chain of castor bean have not been alarming—at least they were not the focus of accusations that brought about a national discussion on the issue—the biofuel industry, and more specifically Brasil Ecodiesel—holds hegemony in the processing of castor bean in the country—has had problems in these aspects.

In Ceará State, the Cratéus mill of Brasil Ecodiesel was accused of polluting the Poty River, one of the tributaries of the Parnaíba River, resulting in great fish mortality, among other consequences. In the public civil action presented by the State Public Ministry, ruled on 22 March 2007, the Justice issued a preliminary judicial order on 3 July 2007 that determined “the interruption of the company activities concerning crushing and throwing waste of castor bean seeds and other oleaginous plants in Poty River” as well as the removal of solid and liquid residues to appropriate places. If the company did not comply to obey the order, it could face daily fines of R\$ 5,000.00.



Brasil Ecodiesel is accused of water contamination

Despite denying the responsibility for the river pollution, Brasil Ecodiesel signed a hearing agreement with the Justice whereby the company complies with accepting the demands of the State Public Ministry, among them the “transference of the plant to another place in the same municipality and the environmental recovery of the area occupied at the moment, an area that will hold a social project whose characteristics are to be decided by the community that will benefit from it”.

In Piauí State, where Brasil Ecodiesel established a mill in Floriano municipality, the company created a private project of settlement in Canto do Buriti municipality (500

km away from Teresina, the capital of the state). Brasil Ecodiesel brought about 600 families who would plant castor bean and beans in 7 hectares, in a system of partnership with the company whereby there was a perspective to receive the title deeds for the property after 10 years of labor. Besides the area, the seeds, technical guidance and machines for the culture, the company also gave the farmers a brick house and offered education and health care to workers.

After four years, Santa Clara Production Nucleus—a Brasil Ecodiesel project and a pioneer experience of Communitarian Production Nucleus—has faced a series of problems.

SANTA CLARA PRODUCTION NUCLEUS, IN CANTO DO BURITI, PIAUÍ STATE

Santa Clara Production Nucleus, in Canto do Buriti, was created in November 2003 in an area of 53.000 hectares of land given to Brasil Ecodiesel by the governor of Piauí State, Wellington Dias (PT—Workers’ Party). This land was divided into 20 residential nucleus—called cells and identified by the letters of the alphabet—and each of the nucleus has 35 houses built in circles. This project brought 600 families to the region and estimated that initially each family would plant 7 hectares of castor bean and cowpea beans. It was also agreed that the families would have some basic facilities, such as house, plumbing and electricity in the plots of land, besides a common nucleus where they would have access to some facilities, such as a school, a health center, a market and a communitarian center.

Brasil Ecodiesel signed a partnership contract with the farmers in order to establish the rules of production of Santa Clara Production Nucleus where it was stated that the company would give the seeds, inputs and agricultural equipment as well as infrastructure and technical assistance necessary for production and harvest. The agreement between the parts also establishes that Brasil Ecodiesel will give to the partners a title of deed for 25 hectares of the nucleus land. The contract also says that the farmers will have to deliver 3.000 kilos of castor bean and commit themselves to handle the area (mainly cleaning the land dedicated to the culture) in order to guarantee the production established.

The contract also stated that Brasil Ecodiesel would initially transfer R\$ 250.00 per month for a period of six months, as payment in advance, and the new contract terms would be negotiated by both parts after the delivery of the castor bean. At present, payment is R\$160.00 per month for a period of 12 months.

According to farmers, the results of the first year were satisfactory. The crops were planted in due date by the company, and the productivity was very good. The 3.000 kilos agreed were delivered as well as a share of 20% on beans production, charged because of the preparation of the soil. There was also a surplus that generated an addi-

onal income to the families. The situation, however, has changed in the following years.

In three different cells, the farmers confirmed in interviews that delays in planting and problems with the quality of the seeds and technical guidance have led to a drop in productivity from 2005 onwards. The production was 200 kilos per hectare last harvest, and it would be necessary 900 kilos per hectare to reach the numbers agreed in the contract. Because they are unable to deliver the 3.000 kilos agreed in contract, the only income of the majority of the families was only R\$160.00 per month (paid regardless of the production), but this amount is not enough to keep many families that are even starving, according to some farmers.

The company decided to reduce the planted area from 7 hectares to 5 hectares in 2008, because of the problems caused by the plague that attacked the crops by the end of last year. According to the workers, the planting of castor bean and beans had not been done in many plots of land until the end of February, and this would certainly affect the productivity of the present harvest. According to the farmers,

In many lots, castor bean had not been seeded until the end of February



one of the causes of the delay was the transference of Santa Clara machinery to another Brasil Ecodiesel propriety.

The company, however, had also forbidden the intercropping with beans, a handling management used in previous years, according to a farmer who planted 26 rows of beans in the area reserved to castor bean so that she could have "food to give to the children". She did it because her area reserved for beans had not been planted yet, but Brasil Ecodiesel ordered that the bean should be pulled out or else it might suspend the payment and the monthly supply of food to the family. Despite the threat, she decided to keep the rows of beans and ask for legal support in case she might be penalized. Many farmers said that the company has repressed "little jobs" done outside the farm and threatened the farmers with rescission of the contract because allegedly external jobs could harm the cleaning of cultivation area dedicated to castor bean.

The workers also report problems with the company employees, such as repression of organization in order not allow them to present their demands. A family farmer said he was handcuffed because of disagreements about the changes in contract. Threats of expelling them from the land seem to be a usual practice among employees.

According to family farmers, the financial difficulties have resulted in having their youths and children working filling holes in BR-324 road in exchange of "contributions" from drivers, and these little jobs represent an additional income of about R\$ 60.00 per day. Even though the farmers do not inhibit this practice—"We need the money", they say—they acknowledge that child labor is just the other face of the coin of this practice, a problem spotted in Santa Clara in 2005. MPT—Labor Prosecutors Office—observed the presence of children working in castor beans cultures in 2005 and signed a TAC—Term of Adjustment of Conduct—with Brasil Ecodiesel whereby the company committed to prohibiting this practice on the farm as well as promoting an awareness campaign among farmers and in Canto do Buriti region.

Environmental organizations and unions from that state

have been discussing the environmental handling management in the area. In January 2008, Environmental Network from Piauí denounced deforestation of native vegetation in an area that it was to be covered with cashew and manioc (also known as cassava) for the settlers. The company has many masonry kilns for the industrial production of charcoal, activity that is not authorized by IBAMA (Brazilian Institute of Environment and Renewable Natural Resources). According to farmers, this activity happened in a legal reserve that will be part of the 25 hectares of settlement that each family will be entitled to after 10 years of partnership. No crops have been cultivated there so far.

The accusations of irregularities carried out by workers, unions and press led the DRT (Regional Department of Ministry of Labour and Employment) to start a legal action at MPT (Labour Prosecutors Office) in April 2006 (the DRT fiscalization report was sent to MPT on 28 September 2006). This legal action resulted in two inspections on Santa Clara farm—the first on 14 December 2006 and the second on 26 June 2007.

According to MPT, the legal action—about to be ruled—includes accusations of "fraud in employment relationship, because it does not comply with the agricultural partnership contract; moral harassment; child labor; unsafe working environmental condition."

Brasil Ecodiesel says that it has complied with all the terms of the contract with the farmers, discussing periodically the schedule of production with leaderships and unions that represent the farmers. According to the company, the delay in planting the 2008 harvest was due to a severe attack of caterpillars in last year's crops, causing the loss of 2,000 hectares of castor bean. Because of this incident and due to the fact the machinery was really moved to other areas, only 8 tractors were left behind (and some of them in maintenance) to carry out this year's cultivation, there was some delay, but activities are coming back to normal, according to the company.

Concerning the intercropping of castor bean with beans, Brasil Ecodiesel says that it has been agreed with farmers that these crops

should be produced in different areas so that one would not interfere with the other due to their specific cycles of development. If farmers do not comply with this term of the contract, this will represent a breach of contract.

Brasil Ecodiesel also denies interfering with the workers' external activities. Concerning the insufficient income of farmers, R\$ 160.00, the company says that is trying to stimulate alternative economical alternatives, such as productive yards around their houses, and that part of the workers receive rural pension. In relation to the children and youths work at BR-324, the company says that it cannot stop the activity of "filling holes", an activity widely adopted in many regions of the Northeast. Concerning Santa Clara partners, the company requires that the children attend school and it is trying to develop parents' awareness about the risks of this kind of activity.



Children from Santa Clara work on BR 324

CHAPTER 4 FINAL CONSIDERATIONS AND RECOMMENDATIONS

When one considers castor bean crops in Brazil, it is necessary to take into consideration some basic premises: a) castor bean is mostly cultivated by family farmers; b) historically, the Northeast is the region where castor bean has always been present and played an important role in the local economy; c) despite the easy adaptability to different soils and climates, castor bean crops need rain and some care, such as soil correction and cultural practices; d) National Program of Biodiesel Production and Use (PNPB) has been introduced as the main force behind the development and advancement of castor bean crops in Brazil.

All these factors have necessarily to be taken into consideration when castor bean perspectives are analyzed, since they show the technical, social, economic and political variables to the problem.

The first fundamental aspect is that castor bean is basically produced by family farmers, and this aspect alone carries the burden of many elements that characterize this type of production, as family agriculture is so diverse in Brazil as the regions where one can find castor bean crops and as the political points of view of the movements and organizations that represent family farmers. The relatively high technology development of the Southern states contrasts with the total impoverished family farmers from the Northeast, as there is also a great contrast in the experiences, possibilities and conditions of organization and production in the various regions. Little details might be relevant, such as the fear that bovine and caprine herds can be intoxicated if they eat castor bean because of the lack of pasture in the inhospitable environment of the Northeast, and such detail may prevent the integration of the rural activities. Many family farmers from the Northeast have to take into consideration even the cost of fences to separate the herds from castor bean crops when deciding on adopting the cultivation of this oleaginous plant, whereas in the South this aspect is not important at all, as there are plenty of pastures in the majority of the cases.

The political point of view of organizations and entities that represent the small producers also influences the decisions about the kind of culture and rural development model to be adopted. Unions associated to the National Confederation of Agricultural Workers (CONTAG)—an entity of CUT (Central Única dos Trabalhadores), a national federation of trade unions—close to the present

government consider the National Program of Biodiesel Production and Use (PNPB) an interesting idea for family agriculture. As a result, they have acted as partners of the state and federal governments in projects that promote the agroenergy cultures, stimulating the adoption of these cultures for biodiesel as well as mediating the agreements with the private initiative. As for the movements associated to Via Campesina—an international peasant movement—such as MST (Landless Workers' Movement), MAB (Movement of Dam-Affected People), MPA (Movement of Small Farmers) and CPT (Pastoral Land Commission), they discuss the issue based on the function of the land and try to evaluate, for example, if the “bioenergy crops” affect negatively the crops aimed at producing food. Despite their distrust in relation to bioenergy, it is necessary to point out that these groups and movements have not reached a conclusion about this issue, not even internally, and, therefore, have adopted different positions depending on the region or crops in question.

The importance of technological development for castor bean is another fundamental aspect for the future perspectives of the crops. It is worth mentioning that the lack of improvement in handling and variety of crops caused the decline of castor bean in the Northeast in the 1990s. The false idea that castor bean “grows in barren plots of land” and does not require much care must be abandoned. The productivity depends on the quality of the land and requires soil correction, rain and cultural practices. But, above all, it requires the production of short-cycle varieties, easily adapted to new climate changes and varying climatic conditions and whose oil quality is compatible with the requirements of the biodiesel industry.

The Ministry of Agrarian Development and EMBRAPA as well as biodiesel companies and unions all agree that castor bean needs more investments, if castor bean is to become an economic alternative for family agriculture. It is necessary to have programs of handling and soil improvement for the small producers as well as extreme increase of production of high quality seeds in order to supply the expanding demand of the sector that has not been met yet.

Finally, it necessary to reevaluate the National Program of Biodiesel Production and Use (PNPB) mechanisms so that it can really play the important role of promoting castor bean, mainly in the Northeast. In the cases of Ceará and Piauí analyzed here, the negative results of the private initiative as the regulator of the activity are emblematic. According to Liv Soares Severino, from EMBRAPA's unit in Paraíba, the companies have their own interests and follow the logic of market that does not prioritize the social and economic development of producers. Severino also says that it would be necessary a stron-

ger government action to have real benefits through the National Program of Biodiesel Production and Use. If the productive chain of castor bean is controlled by the companies, then this program will not benefit the Northeastern semiarid.

Because of the relatively little impact in the environment and agrarian issues, castor bean can open the possibility of intercropping with food crops as castor bean is drought resistant and because of the economic potential in face of the increasing demand of raw material for biodiesel. It also has a good opportunity of becoming a culture that would bring great benefits to the small agriculture, if the social movements consider agroenergy a good option for the sector.

Following the example of UNAIC (Canguçu Association of Small Holding Farmers Associations), it is possible that the culture can again have a major economic and social importance in the country, if castor bean productive chain—including not only the agricultural activity, but other areas as well—has a well defined management that is implemented by the small producers and their associations, as demanded at the process that led to the creation of National Program of Biodiesel Production and Use, and if the Federal Government (PNPB), and if Federal Government together with the public institutions of research and rural extension as well as Petrobrás make the necessary investment both in the process of production and processing of castor bean and in the support and training programs for the producers. At moment, however, the future is uncertain.

1 According to the magazine Agroanalysis, Fundação Getúlio Vargas. Maio de 2007. http://www.agroanalysis.com.br/index.php?area=conteudo&mat_id=243&from=mercadonegocios.

2 <http://www.agricultura.gov.br/>

3 *The prices of agricultural products, among them soy, have been influenced by successive failures in the past years because of climate problems. Folha de S. Paulo, 12/04/2008.*

4 One bushel equals to 0.367437 of the bag (60 kg).

5 **Margarido, M e Leão de Sousa, E.** *Formação dos Preços da Soja no Brasil. Agricultura em São Paulo, SP. 45 (2): 52-61, 1998. Abreu, M. P., Medeiros, M. C., e Werneck, R.* *Formação de Preços de Commodities: padrões de vinculação dos preços internos aos externos* (Texto para Discussão nº 474). **Departamento de Economia. PUC-Rio.**

6 Lucílio Alves' estimate, a Cepea/USP researcher.

7 **Margarido, M e Leão de Sousa, E.** *Formação dos Preços da Soja no Brasil. Agricultura em São Paulo, SP. 45 (2): 52-61, 1998. Abreu, M. P., Medeiros, M. C., e Werneck, R.* *Formação de Preços de Commodities: padrões de vinculação dos preços internos aos externos* (Texto para Discussão nº 474). **Departamento de Economia. PUC-Rio.**

8 According to USDA, Argentine will also expand the soy area in the years to come, but two aspects should not allow them to produce more than Brazil: Their products are less capitalized and the export fiscal incentives to oil and bran. These two aspects represent barriers to soy grain exports.

9 Galinkin, Maurício. *Expansão da Soja no Cerrado – Uso de instrumentos econômicos para a defesa da biodiversidade.* Brasília, Cebrac, 2002.

10 **Amigos da Terra - Amazônia Brasileira.** *Rei do Gado, 2008; Cohenca, Daniel.* *A expansão da fronteira agrícola e sua relação com o desmatamento detectado em imagens Landsat TM e ETM+ na região norte da BR-163, Pará entre os anos de 1999 a 2004.* Lavras, Universidade Federal de Lavras, 2005.

11 **Greenpeace.** *Comendo a Amazônia.* Amsterdã: Greenpeace Internacional, 2006.

12 In 2008, Greenpeace considered “Soy Moratorium” a successful initiative; it started in 2006 and considers that the grain expansion is no longer a threat to the forest, at least for the time being.

13 **Cohenca, Daniel (2005)**

14 **Dros, Jan Maarten.** *Managing the Soy Boom: Two scenarios of soy production expansion in South America.* **Amsterdam, AidEnvironment/WWF, 2004**

15 <http://www.cnpso.embrapa.br/download/cirtec/cirttec43.pdf>

- 16 <http://www.agenciabrasil.gov.br/noticias/2007/03/01/materia.2007-03-01.8210335329/view>
- 17 Analysis of data about the conflicts in the field in 2007. <http://www.cptnac.com.br/?system=news&action=read&id=2108&eid=6>
- 18 Paraguay has 406.7 thousand square km, compared to Brazil's 8.5 million and Argentina's 2.7 million.
- 19 <https://www.fao.org.br/download/LARC-08-4%20biocombustiblesE.pdf>
- 20 <http://www.agenciabrasil.gov.br/noticias/2007/07/05/materia.2007-07-05.2234833076/>
- 21 *Folha de S. Paulo*, pg. A22, 06/04/2008
- 22 *Biofuel and Family and Peasant Agriculture – Subsidy for the Debate*. Phase, 2007, pg. 37 to 39.
- 23 *Agency France Presse*, 14 of April 2008. <http://www.france24.com/en/20080414-food-world-crisis-biofuel-crime-against-humanity-jen-ziegler&navi=SCIENCES>.
- 24 *Folha de S. Paulo*, pág. B3, 11/04/2008
- 25 http://www.cnpso.embrapa.br/download/publicacao/documento_233.pdf
- 26 <http://www.cisoja.com.br/index.php?p=artigo&idA=49>
- 27 Data from the Brazilian Institute of Geography and Statistics (IBGE)
- 28 **Pignati, W. e Machado, J.** *O agronegócio e seus impactos na saúde dos trabalhadores e da população do Estado do Mato Grosso*, in **Pignati, W.** *Os riscos, agravos e vigilância em saúde no espaço de desenvolvimento do agronegócio no Mato Grosso*. Tese de Doutorado. Rio de Janeiro, Fiocruz/ENSP, 2007, p. 81-105.
- 29 **Ibdem.**
- 30 One year later, there has been no penalization on account of pesticide pulverization in Mato Grosso State.
- 31 **Greenpeace Internacional.** *Comendo a Amazônia*, 2005.
- 32 http://www.abiove.com.br/sustent/ms_comunicado_abiove_br.pdf
- 33 http://www.abiove.com.br/ss_relatorioso_br.html
- 34 Original distribution map from Cerrado and main remaining native vegetation in 2002. <http://www.conservation.org.br/arquivos/Mapa%20desmat%20Cerrado.jpg>
- 35 **Machado, R.B., M.B. Ramos Neto, P.G.P. Pereira, E.F. Caldas, D.A. Gonçalves, N.S. Santos, K. Tabor e M. Steininger.** 2004. *Estimates of loss of area in Cerrado. Technical report, not published.* Conservação Internacional, Brasília, DF. <http://www.conservation.org.br/arquivos/RelatDesmatamCerrado.pdf>
- 36 *Sidra/IBGE.*
- 37 *MMA.* <http://www.mma.gov.br/index.php?ido=conteudo.monta&idEstrutura=72&idMenu=3812>.
- 38 *Sidra/IBGE.*

39 Sidra/IBGE.

40 Sidra/IBGE.

41 Sidra/IBGE.

42 http://www.luiseduardomagalhaes.ba.gov.br/admin/app_index.php?chave=0ca83216837995e26e990f56820250c292b1509e&tacao=exibir_composicao.

43 Another consequence of the RR soy liberation is the impossibility to separate the organic grains from the transgenic ones. The 10.668 law demanded that a label should be used whenever the contamination was higher than 1%. It also forbade the use of transgenic grains in the following crop. The entities from Paraná State, however, denounced that none of these demands were met. As a result, producers have opted for maintaining only the conventional crops, that is, the organic ones, and these crops are facing problems. The contamination of these crops by the genetically transformed varieties was denounced in Rio Grande do Sul State as early as when the first transgenic cultures were planted in Brazil. In 2007, the Paraná State government confirmed this fact when 283 tonnes of conventional seeds contaminated by RR seeds were seized. In some plots of land the contamination was as high as 9%. Eleven companies from the seed sector were supervised. According to the perspective of government of that state, “The probability of soy crops that use soy seeds that are commercialized as ‘conventional’ results in the production of genetically modified soy is above the acceptable and legal level.”

44 Lar Agroindustrial Cooperative organized a political group to lobby for transgenic crops and liberate the confiscated soy. In Paraná State, where Governor Roberto Requião had stated his position against the transgenic crops, the main mediators of soy producers were the governor of Mato Grosso State, Blairo Maggi, the Brazilian director of Itaipu Binational, Jorge Samek, and the Minister of Planning, Budget and Administration, Paulo Bernardo. A-PROLI (Association of Rural Producers Bordering Iguaçu National Park and Itaipu Lake)—an entity that aimed at gathering the people who articulated this action—was created.

45 PM 327 revoked the article 11 of the law 10.814/03 that forbade OGMs crops in a ten-kilometer buffer zone in conservation units and in indigenous people’s land. The minimal distance for planting transgenic products would be determined individually, case to case, according to each of the transgenic variety.

46 The publication of decree n° 5.950 repeated the formula of changes in the law without carrying out environmental studies.

47 Anélio Rota’s farm can be found in the georeference 25°10’30.80” S and 53°54’44.60” W.

48 Irineo da Costa Rodrigues’ farm can be found in the georeference 25°13’52.40” S and 53°57’01.10” W.

49 Superintendência de Recursos Hídricos/Sema-MT.

<http://www.sema.mt.gov.br/recursoshidricos/roteiros/Relatorio%20MQA%20Rio%20das%20Garcas%202003%202005.pdf>;

<http://www.sema.mt.gov.br/recursoshidricos/roteiros/Relatorio%20MQA%20Cuiaba%202005.pdf>;

http://www.sema.mt.gov.br/recursoshidricos/relatorios/relatorio_de_qualidade_da_agua_-_rh_do_paraguai_2006.pdf;

http://www.sema.mt.gov.br/recursoshidricos/relatorios/relatorio_da_qualidade_da_agua_-_rh_tocantins-araguaia_2006.pdf.

50 Zeilhofer, Peter; M. de Oliveira, Ivani; M.Klemp, Suzy; S. dos Santos, Emerson; F.G.C.Dores, Eliana. *SIG e*

regressão logística para mapeamento de risco de contaminação por pesticidas nos mananciais superficiais da bacia do Alto Rio das Mortes-MT. Anais XIII Simpósio Brasileiro de Sensoriamento Remoto, Florianópolis, Brasil, 21-26 abril 2007, INPE, p. 3623-3630.

51 “*Comportamento das Bacias Sedimentares da Região Semi-Árida do Nordeste Brasileiro*”. Ministério da Ciência e Tecnologia.

52 http://www.mda.gov.br/arquivos/PNRA_2004.pdf

53 Cohenca (2005).

54 See, among others, “*Comendo a Amazônia*” [“*Eating Up Amazon*”], Greenpeace, 2006, and fact sheet “*Forests to Farms*”, Coalizão Soja Holanda, 2008.

55 IBGE, 2006.

56 According to the Catholic Church’s Land Pastoral Commission and Greenpeace, which contributed with a large part of the data reported here.

57 According to reports by farmers, there are settlement areas established decades ago by the Federal Government’s National Institute for Colonization and Land Reform, for instance, whose dwellers never requested the proper documents to the agency.

58 At the Nova Olinda area, that is now the case of three communities, self-styled Borari.

59 According to Santarém’s Quilombos Association, there have been cases in the city when members of the Bom Jardim and Murumurutuba communities leased land for soybean crops, resulting in deforesting and conflicts with the families because of pesticide use.

60 Considering that three or four years before the cost was less than R\$ 100.00 per hectare for soy farmers who were arriving in the region at that time.

61 Information from ITERPA report, September 2007, obtained by CPT-Santarém. The 14 communities, according to this data, include 1,300 people. Besides, there is a group of agribusinessmen legally settled in the area and who received the land in exchange of the plots in Altamira region that were expropriated because of the demarcation of land for Kayapó tribe.

62 According to the union, more than 500 family farmers left their land in the rural area of Santarém during the initial phase of soy expansion (up to 2005). At present, in partnership with Greenpeace, the entity is carrying out a detailed mapping of the communities.

63 According to leaders of social movements in the region, this has happened because the Federal Government wanted to show how successful the agrarian reform was, as 2006 elections were drawing close and because of MST groups.

64 See the report “*Assentamentos de Papel, Madeira de Lei*”, August 2007, Greenpeace. INCRA authorities supported publicly the settlers’ union in struggles with the wood industry as a form to make the agrarian reform possible in the region. According to the social movements in the region, the public hearings that decided about the creation of settlements recently had the participation of loggers and their representatives, the so-called “*laranjas*” (people who lend their names for others who do not want their names to appear in the commercial transaction) who tried to make pressure about the areas to be designed for the agrarian reform. Areas of primary forest rich in the noblest wood had been privileged in the process.

65 The problem concerning the resistance of settlers—as well as the quilombolas (black communities who are

descendants of quilombos' inhabitants and/or live in quilombos' traditional land)—to a collective deed to the property can be verified in many regions of the country. In Santarém region, the problem was the haste to define the projects what led to more social resistance to them, according to Farm Workers' Union. If there had been more time for discussions, the settlers could have reached an agreement about this kind of deed to property, according to unionists.

66 <http://www.socioambiental.org/nsa/detalhe?id=1887>

67 http://www.radioagencianp.com.br/index.php?option=com_content&task=view&id=2225&Itemid=43

68 <http://www.cptnac.com.br/?system=news&action=read&id=2108&eid=6>

69 *Sidra/IBGE.*

70 *Sidra/IBGE.*

71 *Sidra/IBGE.*

72 Among all the States with the largest number of indigenous and quilombos lands there are three states which represent a frontier for soybean: Mato Grosso, Maranhão e Pará. There are also known cases of pressure against “faxinais” communities, in Paraná, amongst the other categories of traditional communities.

73 Nearly 13% of the Brazilian territory is considered as indigenous and is under Federal protection. The indigenous areas are formed by about 600 lands. There are also 80 recognized remaining quilombo communities, – although the process of demarcation of these areas is still right in the beginning. It is estimated that there might be over 3.500 remaining quilombos communities throughout Brazil, with their rights constitutionally guaranteed on the lands they occupy or traditionally used to occupy – even those areas where they were forcibly removed in the past (Trecani, G. Terras de Quilombo. Belém, 2006).

74 It's important to note that that the researcher who coordinated this sector, Spensy Pimentel, had ten years of experience following the problems caused by the cultivation of soy among the Guarani-Kaiowá of Mato Grosso do Sul, among which he developed academic research in the areas of anthropology at USP.

75 In this section it was consulted the Social-Environmental Institute (ISA), Indigenous Missionary Council (Cimi), Pastoral Land Commition (CPT), Native Amazon Operation (Opan), Center for Indigenous Work (CTI) and National Coordination of Quilombos Communities (CONAQ), besides other several experts in this area.

76 The process in which a territory is recognized as indigenous has three typical phases: 1) Identification and delimitation, 2) Declaration and demarcation and 3) Homologation and registry. First, by the existence of claim for the recognition of the area as traditional occupation, the National Indian Foundation makes a study by making the limits of this area, based on the criteria determined by the community, also according to the constitutional rules and by talking to an anthropologist. After that, this study is published and the possible non native occupants of the land have a time limit to dispute the decision, if they desire to do so. If the confirmation is denied, the Ministry of Justice emits an order so that the area should be demarcated, and visible marks to delimitate it are put there. Then finally, the area is ratified by the president and registered as national patrimony.

77 The Guarani-Kaiowá tribes are the second biggest indigenous ethnic group in Brazil, totaling around forty thousand people, covering thirty areas throughout the south of Mato Grosso do Sul State according to several historical data.

78 The research has discovered that in Mato Grosso there are still several indigenous communities worried about the bad consequences caused by the expansion Small Hydro Plants (PCHs), due to soy cultivation and therefore due to the demand of agroindustry. The Brazilian legislation is not as strict with these small plants, but they cause impacts on the ichthyofauna. It can particularly affect life routine of the indigenous communities, in the Xingu region for example several communities eat only vegetables and fish. The experts worry about that because the small industrial plants have been projected in series. Along the Jurema river, for example, there are plans to build eight new plants.

79 Evidently, in the states where the expansion of monocultures is older, this situation has been more common for decades.

80 This has reached a certain point that the National Health Foundation, while presenting, in 2007, its participation in the Plan for Growth Acceleration has shown that the goal is that 90% of the indigenous communities in Brazil start to have treated water system. In the Amazon 6% of the communities today has treated water system, and the goal is that by 2009 60% will have it.

81 In Santarem, there is at least one register of concession of quilombola land to soybean producers in the community of Bom Jardim.

82 Data from the Social and Environmental Institute about the campaign Y Ikatu Xingu.

83 Information from Agriculture Secretariat of Querência (MT).

84 According to Y Ikatu Xingu campaign.

85 The NGO Earth Alliance also has around 60 soybean producers and cattle raising farmers. They are associated to the Amazon Institute of Environmental Research (IPAM), which has been articulating the contact between producers with researchers and technicians. The goal is to improve patterns of sustainability of agriculture production in the region.

86 According to information from people of the area there are farms that had their river flow changed to facilitate cattle access to the water.

87 The governor of Mato Grosso State press office said that “they do not have information” about this case. About the indigenous people of Xingu, according to the press office, the governor just do “what they ask for”. The press office confirms that in cases like Sangradouro, the State promotes the dialogue between indigenous and farmers to make a partnership to the rice crops. It is important to remember that rice crops comes before soy in that region.

88 Data from Foundation Institute of Economic Research (Fipe). On that same period the inflation in Brazil was 4.3% (IPC-Fipe).

89 Socio-Environmental Impact of Biodiesel Production in Brazil - Geraldo Stachetti Rodrigues¹, Izilda Aparecida Rodrigues, Cláudio César de A. Buschinelli, Marcos Antônio Ligo, Adriana Moreno Pires, Rosa Frighetto, Luiz José Maria Irias.

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