Summary Report

Working towards sustainable biomass production in Mato Grosso, Brazil

June 2013

Oxfam Novib

FORMAD Fórum Mato-grossense de Meio Ambiente e Desenvolvimento - the Mato Grosso Forum for Environment and Development

Netherlands Centre for Indigenous Peoples (NCIV)

CREM

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Sugarcane, soy, Brazil, sustainability impacts, monitoring system, biofuels

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1. Introduction

This is the final summary report of the project 'working towards sustainable biomass production in Mato Grosso, Brazil' of the Sustainable Biomass Import (DBI) Programme of NL Agency. It has been implemented by FORMAD, in collaboration with Oxfam Novib, NCIV and CREM. This project, started in 2011, aimed to develop a monitoring tool to get more and improved independent and verifiable information on the social and environmental impacts of the production of sugarcane and soy in Mato Grosso State. It also aimed to enhance capacity of civil society organizations to monitor impacts and to participate effectively in policy dialogues; and to undertake steps with Dutch importers to contribute to sustainable biomass production.

The approach route was twofold: 1) the technical and monitoring capacities of local civil society actors in Brazil was to be enhanced, so as to help realizing a context in which alternative sustainable production of biomass can take place; and 2) interaction with the bigger Dutch importers of biomass was to take place to stimulate Dutch importers to help achieving a sustainable context for biomass production in Mato Grosso.

Activities of the project included:

- Developing a methodology for a participatory monitoring system
- Knowledge building for continuous, independent, variable overviews on the social and environmental performance of the sugarcane and soy producing sector in Mato Grosso State
- Capacity building to enhance civil society organizations in Mato Gross State;
- A survey among auditors and companies[1]

The reports from the first 3 activities[2] provided the main information for this final summary report. A separate report has been made on the outcomes of the survey.

In chapter 2 the role of soy and sugarcane in the European biofuel policy is described, including a description of what constitutes sustainability according to local stakeholders in Mato Grosso, Brazil. The main socio-environmental impacts of soy- and sugarcane production in representative communities of the State of Mato Grosso are presented in chapter 3. In chapter 4 a brief description of the monitoring tool is presented. Finally, chapter 5 contains the conclusions and recommendations from this project.

[1] The dialogue with stakeholders and the survey were conducted in cooperation with the project *Improving the social-economic impact of bio mass production for local communities and indigenous peoples,* which is implemented by NCIV, in cooperation with Oxfam Novib, CREM and AMAN (the Indigenous Peoples Alliance of the Archipelago), a local partner in Indonesia. This project is funded by NL Agency under their Global Sustainable Biomass (DBM) programme.

[2] These reports as well as a video can be found at: http://www.formad.org.br/

2. Soy, sugarcane and the European Union biofuel policies

2.1 Policy context of the project

High oil prices and the growing concerns about climate change have led the search for renewable fuels, and so the use of biomass for energy purposes has increased significantly over the past years.

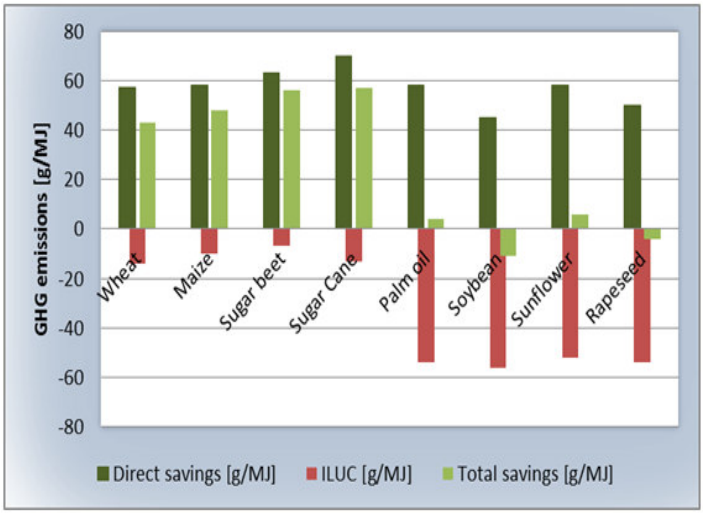
The policy of the EU about the sustainability of biomass for energy use is regulated in two directives:

- The 2009 Renewable Energy Directive (EU RED) which obliges the 27 countries of the European Union to achieve a 20% share of renewable energy in the final energy consumption and a 10% share of energy from renewable sources in transport by 2020.
- The 1998 Fuel Quality Directive (EU FQD) requires fuel suppliers to reduce the greenhouse gas intensity of the fuels they sell by 6% by 2020.

Recognizing that The Netherlands produces too little biomass to meet the needs of the energy and chemistry sector, the Sustainable Biomass Import programme of NL Agency aims to stimulate, support and facilitate the promotion of sustainability of the production, processing and import of biomass produced abroad, for the application of biomass for energy, transport or chemical purposes in the Netherlands[3].

A large part of the biomass production is taking place and is being expanded in Latin America and South East Asia[4]. In 2010, about 40% of the crops used for EU biodiesel and about 21% of the crops used for EU ethanol were grown outside the EU. Soy and palm oil, both for biodiesel, and sugarcane, for ethanol, represent the bulk of the crops used for biofuels (fuels based on biomass) grown outside the EU[5].

GHG savings from biofuels.



Source: European Commission

The competition of the use of feedstock for biofuels with food applications fuelled a debate on the impact of the EU renewable energy policy on rising global food prices. This is why the EC proposed to amend the EU RED and the EU FQD.[6] One of the main proposed changes is to limit the share of energy from biofuels produced from food crops to 5%. The proposal does not include an ILUC factor.[7] This proposal is currently being discussed by the European Parliament and the European Council of Ministers.

[3] http://www.agentschapnl.nl/en/programmas-regelingen/sustainable-biomass-import

[4] Source:Ecofys (2008) -'Biofuels Baseline', Ecofys, http://www.ecofys.com/files/files/ecofys_2011_biofuels_baseline(2008).pdf

[5] Source:European Commission, Report from the Commission to the European Parliament and the council; Renewable energy progress report (2013) http://ec.europa.eu/energy/renewables/reports/doc/swd_2013_0102_res_en.pdf

[6] See for example: http://www.dw.de/food-or-fuel-debate-leads-to-eu-biofuel-changes/a-16313695

[7] Proposal of 17 October 2012 : http://ec.europa.eu/clima/policies/transport/fuel/docs/com_2012_595_en.pdf

2.1.1 Sustainability criteria

Both the RED and FQD Directives do include some sustainability criteria. These criteria aim at preventing the conversion of areas of high biodiversity and high carbon stock for the production of raw materials for biofuels. In order to receive government support or count towards the mandatory national renewable energy targets, biofuels used in the EU (whether locally produced or imported) have to comply with these sustainability criteria. To this end, the sustainability of biofuels needs to be checked by Member States or through voluntary schemes which have been approved by the European Commission (EC), but which are administered by the certifying organizations.[8] In order to get a certificate the criteria of that certification scheme have to be met. There appear to be big differences in the level of assurance offered by the various certification systems approved by the EU to prove compliance with the EU-RED and the majority of companies choose the systems with the lowest level of assurance.[9]

Some important sustainability issues are not addressed in the EU-RED as pre-ante compliance criteria. This includes environmental impacts on the quality of water, soils and air or indirect environmental impacts, such as the land use change to grow crops for food on other land. The RED also does not include mandatory social criteria, relating to social impacts such as decreasing food security or loss of land. However, paragraph 7 of Article 17 of the RED specifies a mechanism to monitor the potential social impact of biofuel production in source countries, whether EU members or not. Of particular relevance is the following stipulation:

¨[...] *The Commission shall, every two years, report to the European Parliament and the Council on the impact on social sustainability in the Community and in third countries of increased demand for biofuel, on the impact of Community biofuel policy on the availability of foodstuffs at affordable prices, in particular for people living in developing countries, and wider development issues. Reports shall address the respect of land-use rights.* [...]¨

Accordingly, the Commission shall assess the impact of increased demand for biofuel on food prices and 'wider development issues', including respect of land-use rights. The Commission shall also state whether source countries have ratified and implemented certain International Labour Organization (ILO) conventions, the Cartagena Protocol on Biosafety and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Following the EC report, 'corrective action' shall be taken, 'in particular if evidence shows that biofuel production has a significant impact on food prices'. However, paragraph 8 of Article 17 makes clear that social criteria cannot be used to define the eligibility of biofuels.

In the discussions on the EU RED was a big debate on the inclusion of social sustainability criteria. There was strong opposition against it from Brazil, Malaysia, Indonesia and some other countries. They argued this would be new protectionism that leads to preventing importing biomass products (mainly palm oil, soy and sugarcane) from these countries into the EU. A moratorium was discussed too, to be able to first regulate things well. After voting in the European Parliament it was decided

[8] Currently 14 schemes have been approved.
http://ec.europa.eu/energy/renewables/biofuels/sustainability_schemes_en.htm (18 June 2013)
[9] Dam, Jinke van, Ugarte, Sergio, Iersel, Sjors van, Selecting a biomass certification system – a benchmark on level of assurance, costs and benefits, published by NL Agency, 2012

that no social criteria and no criteria for water would be included, but only a reporting obligation for the European Commission on these issues[10], as discussed above. The first renewable energy progress report of the European Commission was published on 27 March 2013.[11] In its analysis, the EC has looked at three main issues: land rights, labour and food availability. This report is however very scanty and one of the conclusions of the EC is that further monitoring of socio-economic impacts is necessary. The report has met with very substantial critique on its methodology, for example from Action Aid[12] as well as Oxfam[13].

In the Netherlands the 'Commission Cramer' developed criteria which were presented in a so-called Testing Framework, which is considered the leading framework for sustainable biomass. Based on this Framework, the NEN, the Dutch Standardisation Institute, has drawn up the certification scheme for sustainable biomass, NTA8080 ('Nederlandse Technische Afspraak'). NTA8080 therefore does include social criteria such as on competition with food, local prosperity and social wellbeing. NL Agency required that the Testing Framework would be the reference for the projects funded under their Sustainable Biomass Import programme.

The project *Working towards sustainable biomass production in Mato Grosso, Brazil,* explicitly included in her activities to learn from local stakeholders what they understand sustainability to encompass. For the people participating in the project in Brazil, sustainability is understood as "the process by which societies administer the material conditions for their reproduction [survival], redefining the ethical and socio-political principles that guide the distribution of natural resources." It is fundamental to study the dynamics of local and regional sustainability, while remaining conscious about the relationship with sustainability on a global level.

So combining the Testing Framework as developed in The Netherlands, with the sustainability concept as understood by the stakeholders in Brazil, the key impacts and impacts (and indicators) were prioritized upon which to monitor. These became the focus of further in-depth research. These impacts / indicators are:

- Trends in food production
- Trends in the level of fish stocks in rivers and lakes
- Trends in de number of diseases in the population of the local communities
- Trends in pesticides application
- Trends in support for small-scale and family farming production by state and local governments
- Trends in ability to access the federal programs for the acquisition of food produced by family farming, such as the Food Acquisition Program (PAA) and the National School Nutrition Programme (PNAE);
- Trends in land concentration
- Trends in deforestation

[10] This reporting obligation is regulated specifically in Articles 17 (7), 18 (2), 18 (9) and 23 (1-6).
[11] http://ec.europa.eu/energy/renewables/reports/reports_en.htm
[12] Kropiwnicka, Magdalena A., The European Commission's Renewable Energy Progress and Biofuels Sustainability Reports 2013: A Critical Analysis of the Coverage of Land Rights and Socio Economic Impacts.
[13] http://www.oxfam.org/en/grow/pressroom/reactions/european-commission-report-impact-eu-biofuels-policy-food-land-rights

2.2 The use of soy and sugarcane from Brazil for renewable energy in the EU

Soy is predominantly used for the livestock feedsector, and increasingly also for biodiesel. Sugarcane is being produced for the use both of consumption sugar and ethanol. Both soy and sugarcane are important feedstocks to fulfill the renewable energy and fuel quality targets of the EU. The EU consumed 12.9 million tons of oil equivalent of biofuel in 2010, this is 4,5% of the energy used in transport. About 80% of that biofuel is biodiesel made from vegetable oil including rapeseed, soy and palmoil. Soy supplied approx. 22% of EU biodiesel in 2010. This came predominantly from Argentina and Brazil. The EU consumed 2,48 million tons of oil equivalent of ethanol in 2010. Sugarcane supplied approx. 14% of EU bioethanol in 2010, predominantly from Brazil. In total, Brazil provided 5.3% of all biofuel feedstock consumed in the EU in 2010[14].

The Brazilian government is making plans to be the world's leading exporter of the new fuels. The rapid growth of the automobile fleet in Brazil, coupled with ambitions to export, has led strongly to the increase of volumes produced with these raw materials.

3. Soy, sugarcane and its socio-environmental impacts in Mato Grosso, Brazil

3.1 Trends in Brazil

In Brazil, 8 million hectares of land are being used for sugarcane production, occupying about 10% of the agricultural area of the country. In comparison: more than 23 million hectares are used for soy production and 200 million hectares for cattle breeding. There is a strong connection between timber production, cattle breeding, food (grain) production, soy production and sugarcane production in the sense that they compete for arable land. More than competition, there is a sequence of exploitation that links these activities. It starts with the deforestation of the natural vegetation, the removal of timber, the production of vegetal charcoal with part of the wood, the burning of the remaining vegetation and the introduction of pasture. This sequence normally is followed by the displacement of cattle breeding by the introduction of monocultures on the pasture land. Cattle breeders will migrate to new forest areas, to start the whole circle again, leaving space for the monocultures. This space can be occupied by soy, cotton or sugarcane, depending on the climate and the available infrastructure (roads, proximity of sugarcane mills, availability of storage houses, etc.). In this way, pasture can be seen as the first activity, the activity that opens the door to the others.

[14] For all figures, data is from http://ec.europa.eu/energy/renewables/reports/doc/swd_2013_0102_res_en.pdf and http://ec.europa.eu/energy/renewables/reports/doc/com_2013_0175_res_en.pdf

Sugarcane

The top five sugarcane producing countries, which are also the largest consumers, were responsible for about 55% of world production 2011/2012. In this period, Brazil produced 36.2 million tons of sugar, about a third of the total harvest in the world. Second came India with 28.8 million, followed by China with 12.3 million. [15]

World production of sugarcane (million tons)

	2009/10	2010/11	2011/12
Brazil	36.4	38.4	36.2
India	20.6	26.6	28.8
China	11.4	11.2	12.3
Thailand	6.9	9.7	10.4
Mexico	5.1	5.5	5.2
Other	73.1	70.2	78.1
Total	**153.5**	**161.6**	**171.0**

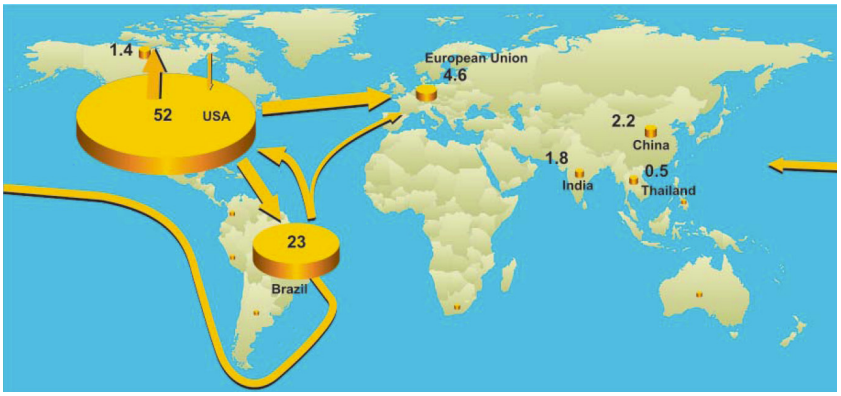
Source: USDA

Brazil has plans to increase the number of hectares for sugarcane from 8 to 14 million hectares, which the authorities deem sustainable. They claim to have at least 63 million hectares available and that no forest will be cleared for sugarcane production. Ecological zoning by the Brazilian authorities should help ensuring that this claim remains intact, although there is doubt whether this will address Indirect Land Use Change (ILUC) effects.

Ethanol

Brazil and the United States hold more than 80% of global ethanol production. Currently, ethanol is used as a gasoline additive in 35 countries, primarily in the Americas and Europe. In most of them, setting targets for renewable energy use provides opportunities for expanding the market. In fact in Brazil, the production has been showing rapid expansion in recent years, driven mainly by rising domestic consumption of ethanol.

World production of ethanol in 2011 (billion liters)



Source: USDA[16]

[15] www.fas.usda.gov/psdonline/psdReport.aspx?hidReportRetrievalName=World+Centrifugal+Sugar.

[16] http://www.biofuelstp.eu/spm5/pres/nibarger.pdf.

The Brazilian domestic consumption of ethanol, after a long period of expansion, decreased in 2010, 2011 and 2012. Since the global crisis started with the collapse of U.S. bank Lehman Brothers in 2008, ethanol, billed as the product which would turn Brazil into a green Saudi Arabia, has suffered successive blows, leaving the horizon of agrofuels somewhat desert.

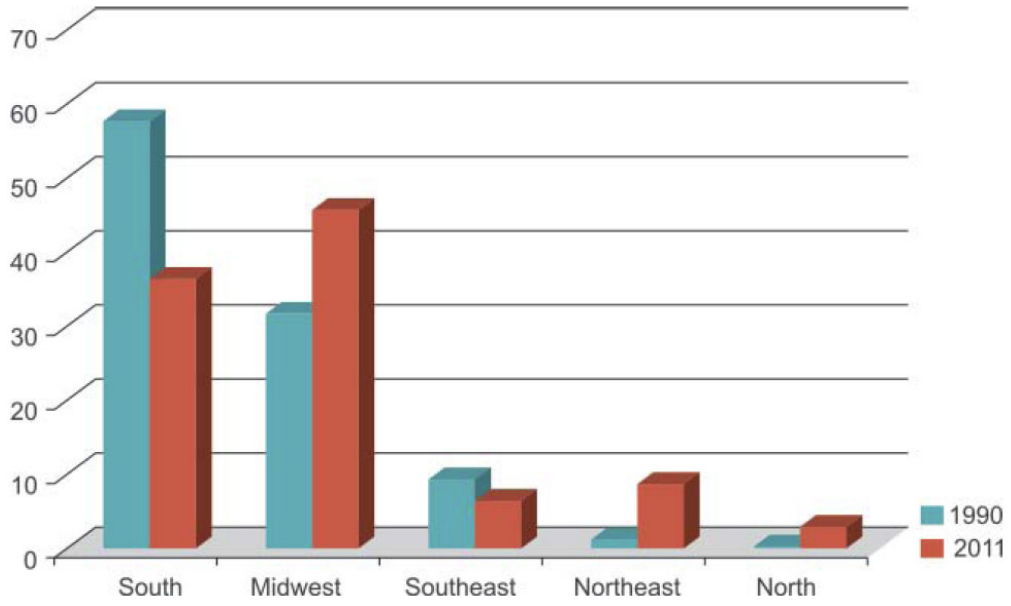
The sector, which has spent the past year working to lead the export of ethanol in the world, had to import 1.45 billion gallons of fuel in 2011/2012 to serve the domestic market. Forecasts of a sharp increase in ethanol production have not been realized.

The United States is the largest importer of ethanol of Brazil, with just over 1.5 billion liters, nearly double the volume sold the previous year. The second largest importer is the Netherlands with 1.3 billion liters. Brazil needed to import the product in the off-season periods in 2011 and 2012 to attend its own mandatory blending with gasoline. Still, it keeps its status as a net exporter.

Soybean

The soybean production in Brazil has seen strong growth from the 1960s in Rio Grande do Sul where there were predominantly small properties, with family farmers organized in cooperatives. In the 1970s, there was a substantial growth of soybean over Brazilian territory, mostly in the states of Rio Grande do Sul and Paraná. Also in that decade soybean began to grow in the Cerrado biome. The opening of highway BR-163, linking Cuiabá to Santarém, along with other government programs that encouraged the occupation of the Midwest region by agriculture and livestock, accelerated a process that would make this region the largest producer of soybean in Brazil.

Soybean production by geographic region of Brazil



Source: Conab

In recent years, economic growth in populous countries such as China and India is causing continuous increases in the demand for soy, and Brazil is the country that is attending the majority of this demand by increasing production and acreage. Currently, China is the largest buyer of Brazilian soybean. Two-thirds of the soybean exported by Brazil is intended for that country.

Production, crushing and trade of soybeans (million ton)

Production	2009/10	2010/11	2011/12
USA	91.4	90.6	83.2
Brazil	69.0	75.5	68.5
Argentina	54.5	49.0	46.5
China	15.0	15.1	13.5
Other	31.1	34.0	45.4
Total	**261.0**	**264.2**	**245.1**

Exports	2009/10	2010/11	2011/12
USA	40.8	40.9	41.0
Brasil	28.6	30.0	34.2
Argentina	13.1	9.2	10.1
Paraguay	5.7	6.7	5.1
Other	4.8	5.9	6.9
Total	**92.9**	**92.6**	**97.3**

Crushing	2009/10	2010/11	2011/12
China	48.8	55.0	63.4
USA	47.7	44.9	45.0
Argentina	34.1	37.6	39.8
Brazil	33.7	35.9	36.8
EU-27	12.5	12.3	11.1
Other	32.7	35.5	38.1
Total	**209.5**	**221.2**	**234.2**

Imports	2009/10	2010/11	2011/12
China	50.3	52.3	61.0
EU-27	12.7	12.5	11.0
Mexico	3.5	3.5	3.5
Japan	3.4	2.9	2.8
Taiwan	2.5	2.5	2.5
Other	14.4	15.1	15.0
Total	**86.8**	**88.8**	**95.8**

Source: USDA

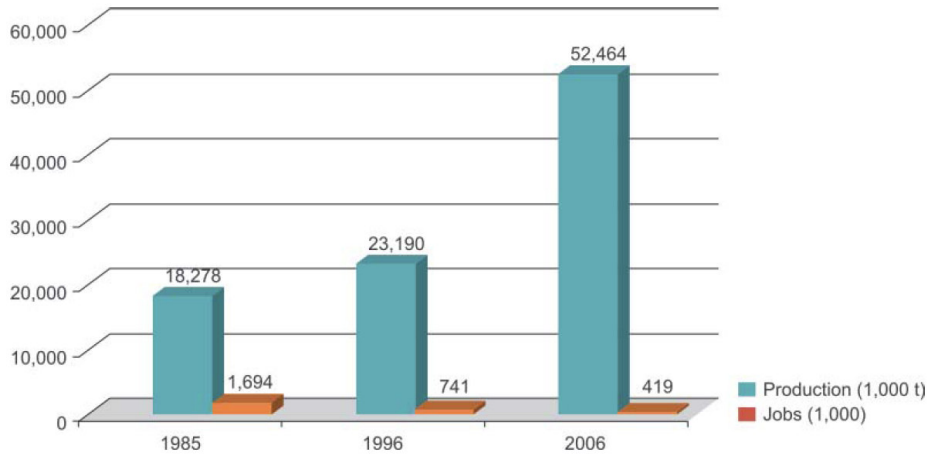
Globally, the soybean cultivation is heavily concentrated in three countries: the United States, Brazil, and Argentina, which account for 80% of grain production and 85% of world exports. China, in turn, imports two-thirds of all soybeans traded in the international market. For the 2012/2013 harvest, the Department of Agriculture of the United States provides that Brazil is the largest producer and exporter of soybeans.[17] The three main products of the so-called soy complex are beans, meal, and oil, which in 2012 represented 27% of all agricultural exports and 10% of the country's total exports or $26.11 billion.

Nowadays the soybean, the main crop of Brazil's export portfolio, is one that has a lower share of family farmers according to the IBGE Agricultural Census 2006. While family farming was responsible for 87% of national production of manioc, 70% of bean production, 46% of corn, 38% of coffee, 34% of rice, 58% milk, 59% of pork, 50% poultry, 30 % of cattle raise and 21% of wheat; regarding soybean production this sector participated with only 16%. In 1996, this share was 33% (IBGE, 2009).

The increasing mechanization of soybean production and the production on large properties at the expense of family farming characteristic of southern Brazil, are the main reasons for the continuous reduction of jobs in this sector. While the production volume grew from 18,278 to 52.464 million tons between 1985 and 2006, the number of jobs declined from 1.694 million to 419,000 (IBGE, 2009).

17 www.fas.usda.gov/psdonline/.

Brazil: more soybean, fewer jobs

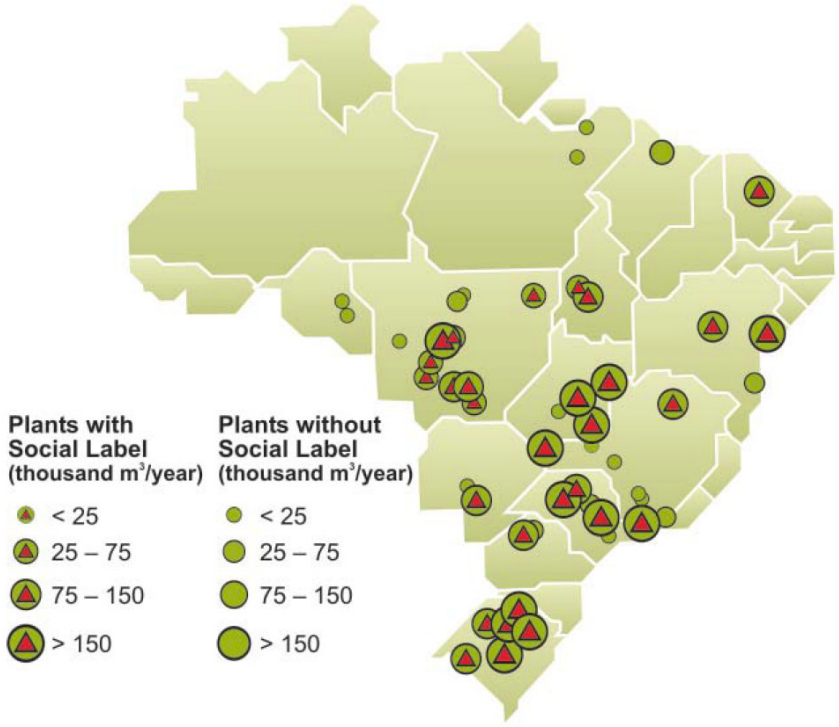


Source: IBGE

Biodiesel

Soybean is the predominant raw material in biodiesel production. Together, Mato Grosso, Goiás, Rio Grande do Sul and São Paulo concentrate 82% of the biodiesel production.

Brazil. Location of biodiesel plants



Plants with social label and plants without social label.

PS: includes only plants with Commercialization Authorization in the ANP and the Special Registration RFB / MF. Held on 30/06/2011

Source: MME/SPG/DCR – 30/06/2011

3.2 Trends in Mato Grosso

Due to the strong increase in the international demand for biofuels, Brazil has experienced a rapid expansion of biomass production. This increase has promoted the quick expansion of the production of soy (for biodiesel) and sugarcane (for bioethanol). Especially in Mato Grosso State, the production still increases and much more land has been targeted for sugarcane production in the coming years. Nowadays, Mato Grosso is the leading State on soy production and the 8th largest sugarcane producer for Brazil.

It produces 32% of the Brazilian soy. In 2012, it represented more than 9% of all soy produced in the world. The private sector estimates that the production of soy will continue to grow at ratio of at least 7% a year in Mato Grosso State due to an increase in global meat consumption and the increasing use of soy for biodiesel production (this is still small in the Netherlands, but could grow as well; in the UK, for example, soy is often used as an ingredient for biodiesel). According to projections from the Mato Grosso Institute of Agricultural and Livestock Economics (IMEA, acronym in Portuguese), the cultivated area will grow from 7.9 to 11.9 million hectares between seasons 2012/2013 and 2021/2022. Soybean production in Mato Grosso will grow 52% in the same period, from 24.15 to 39.10 million tons, or 40% of the country's total output[18].

At the same time, though São Paulo accounts for most of the sugarcane production (54%), followed by Minas Gerais (with 9%), Mato Gosso is presently the 8th biggest sugar cane producer of Brazil[19], and expansion of sugarcane production is expected to be the highest in this State. This is encouraged by an additional new pipeline that will be built between Mato Grosso and the port in Sao Paulo. In 2009, more than 219,000 hectares of Mato Grosso land was covered by sugar cane.

Between 1995/1996 and 2003/2004, the sugarcane production of the state more than doubled. Thereafter, however, the amount produced showed only minor fluctuations. The production for the 2011/2012 harvest was 13 million tons. For the 2012/2013 harvest, Conab predicts 16 million tonnes, meaning an expansion of more than 22% of sugarcane harvested in the state.

There currently are 11 sugar cane mills in operation in the State, while some new projects of mills are being analyzed by CONSEMA – the State Environmental Council. Some of these new mills projects are pending at CONSEMA, because they are planned to be installed in the “boundaries” of the permitted area to grow sugar cane. It is important to notice, however, that the definitions of these boundaries are in dispute at Federal level and State level. There is a possibility that a change in the zoning will result in an approved expansion of the area on which it is allowed to grow sugar cane. This could be the reason why some representatives of the sugar cane sector estimate a huge increase in the area of sugar cane cultivation in the coming years in Mato Grosso; from 219,200 hectares to more than 1,4 million hectares. A focus on sustainability is therefore essential at this stage.

In the last decades, Mato Grosso State was responsible for the highest percentage of deforestation in Brazil. More than 42% of Mato Grosso State is Cerrado vegetation (Savannah like vegetation or Brazilian Savannah) and almost 66% is Amazon forest. Nowadays, more than 43% of the Cerrado and 33% of the forest have already been destroyed. Large scale agriculture and cattle breeding, the most

[18] IMEA, 2012
[19] Conab, 2012

important economic activities in Mato Grosso, are mainly responsible for the deforestation of Cerrado and Amazon vegetation and degradation or damaging of soils through the use of chemicals and soil decarbonisation and contamination or depletion of water resources.

For these reasons, the Mato Grosso Forum for Environment and Development (Formad) supported impact studies on these two crops in two different regions of the state, involving affiliated organizations, local people directly involved and their representative institutions in the research.

The Middle North region of the state, as most representative for for the soybean study, used the municipality of Lucas do Rio Verde as a reference. Lucas and neighboring municipalities are largely covered by this crop. To analyze the sugarcane sustainability impacts, the municipality of Barra do Bugres, located in the Center-South region of Mato Grosso, and the neighboring counties where the sugarcane crop is found, were studied.

We began the impact study based on information about soybean cropproduction, their main impacts and the region of Lucas do Rio Verde. Our actions were facilitated and guided by the Rural Workers Union of Lucas do Rio Verde, a member of Formad. We held dialogues with various social organizations of the region, representatives from other rural workers' unions in the region, settlements and productive organizations of family farmers. The following municipalities were covered by the study: Lucas do Rio Verde, Sorriso, Sinop, Nova Mutum, Feliz Natal, Peixoto de Azevedo, Tapurah and Nova Ubiratã. In Lucas do Rio Verde, we also conducted interviews with representatives of the municipal government.

In Barra do Bugres, representatives of traditional populations as well as land reform settlers participated actively in this study. We believe that no one knows better than they the problems presented here. However, if they are unassisted then they will meet enormous difficulties in facing these problems. Our main goal in this publication is to give a voice to those most affected by the expansion of agribusiness segments, producing and disseminating information to strengthen the struggles of civil society organizations for better conditions of life and environmental preservation.

3.3 Soy in Lucas do Rio Verde

Lucas do Rio Verde, one of the largest Brazilian producing regions of soybeans, is a place that has a lot of discussion over the impacts of this monoculture, responsible for over 80% of its agricultural production. The spraying of pesticides by plane over the city, which occurred in 2006, was followed by a series of studies and debates on the topic. It is also one in which Formad had more relevant action on the issue of soy. These are the reasons that led us to choose Lucas and its surroundings as the object of our soybean impact study in Mato Grosso.

The city is located 350 km from Cuiabá, in the edges of the Cuiabá-Santarém road. Its population is composed of 45,000 inhabitants and the total area is 364,500 hectares. The predominant original vegetation is from the Cerrado biome, but in the municipality and its surroundings are also present areas of Amazon rainforest and the transition between these two biomes.

The Cerrado is considered the largest water tank of Brazil. Besides housing much of the watershed headwaters of the country, it is also responsible for recharging the most important aquifers and the Pantanal biome that is formed by plateaus, which makes it also essential to the production of hydroelectric power.[20]

Brief history of the region

Since the proclamation of the Republic, the idea of occupying the central countryside of Brazil, including the shift of the Brazilian capital to the region, was a recurring theme. The old project began implementation by the Second World War during the Estado Novo dictatorship period in Brazil which was ruled by Getúlio Vargas between 1937 and 1945. It was necessary to urgently begin the process of integration of the Amazon and Central region to the rest of Brazil, already populated and economically productive.

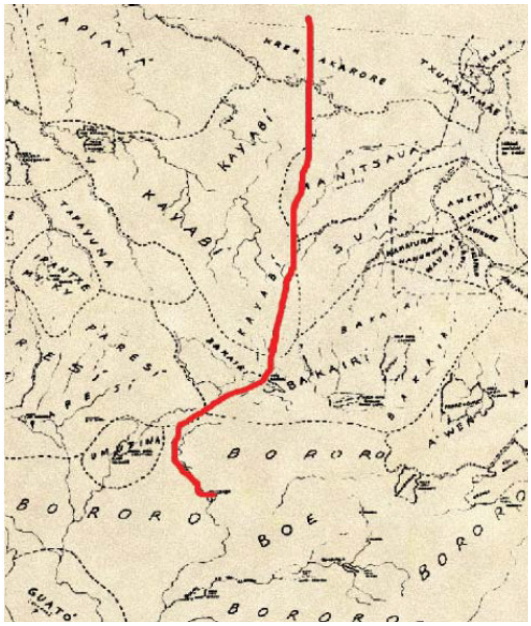
The state of Mato Grosso received greater attention by being seen at the time as a natural potential for the production of raw materials in a country that had a strong moment of industrialization. This process became known as "The March to the West." It was part of the Expedition *Roncador-Xingu*, led by the Villas-Boas brothers, which resulted in the removal of indigenous peoples who inhabited the vast region of Vale do Araguaia and Xingu.

[20] PNUD - Brasil já perdeu área superior à da Venezuela em Cerrado. www.pnud.org.br.

The region was part of the territories of the indigenous peoples Bororo, Bakairi, Kayabi, Suiá, Manitsauá and Panará (Kren Akarore) in Mato Grosso, and in Pará; Panará, Kayapó, Kube-Kra-Noti, Yuruayá, Kuruaya, Sipayá, Mundurukú, Guahuara Macaw Yuruna, Sipáy, Maué, among others. They were displaced to where later the Xingu Indigenous Park would be created. It was also occupied by cattle ranchers, peasants, Northeastern groups attracted by mining, and other populations.

Then these areas proceeded to be occupied by the population of Southern Brazil. The indigenous people of Mato Grosso Northern were the first ones to face the theft of their land. The period was marked by numerous clashes between new owners and squatters. The BR-163 route became the backbone of Mato Grosso's economic growth where cities have emerged as Sinop, Colíder, Alta Floresta, Terra Nova, Lucas do Rio Verde, Nova Mutum, Sorriso, Peixoto de Azevedo and Guarantã do Norte.

Original indigenous territories in Mato Grosso



Source: Oliveira, 2005.

Official figures show that 57% of migrants who went to Mato Grosso in the 1970s came from the center-south of the country, especially from Paraná. In total, more than 456,000 people migrated to Mato Grosso, making the state's population grow by 86% between 1970 and 1980. (Oliveira, 2005)

In 1980, Lucas do Rio Verde was the venue for the second major project of INCRA's (National Institute for Colonization and Agrarian Reform) colonization in Mato Grosso. The story begins in Ronda Alta - RS, where thousands of landless people started the Encruzilhada Natalino camp. After a violent repression 213 families agreed to move to Lucas. Due to the abandonment that the families were relegated most of them returned to the south, eighteen families only remained in the region.

According to Oliveira (2005), afterwards the MST (Landless Workers Movement) struggle also reached Lucas do Rio Verde, giving rise to the first landless camp in Mato Grosso, then transformed

into an association that fought for agrarian reform. Nilfo Wandscheer, who was landless and now is a member of the Workers Rural Union of Lucas do Rio Verde, describes this stretch of the history of territorial occupation of the region very well:

> "Lucas do Rio Verde was a land reform settlement. It was all land plots of 200 hectares. And there was a people in Rio Grande do Sul which was camped at a place called Encruzilhada Natalino. Then came the colonel Curió, who was in Brazil a kind of 'boss' responsible for dismantling the social movements, that divided the people there into two parts: one to stay in Rio Grande do Sul and the other to come to Mato Grosso. So they put these people here without any living conditions, not even a health clinic. Then the people despaired, tried to change everything they had for a return ticket to Rio Grande do Sul. Then came another people also from Southern of Brazil which had more conditions and it was also family farmers. They sold their land there and bought larger lots here forming the farms that are here nowadays. "

In this process, as explained Nilfo, João Paulo Rodrigues and Jorge Dalla Rosa, the latter two members of the Rural Workers Union of Nova Mutum

> "The people, who were in these villages, districts, and small towns had to move. You still can see the old abandoned *taperas* from people who lived there along the way. But everything turned into one farm and one owner. Ten years ago there were twelve of these communities, but only four are left. Where there was a school and health clinic now there is none. And many of those who had plots of 200 hectares sold to big farmers and left on the BR-163 highway, spreading with them soy in the Amazon with properties each time larger. "

In the mid-1980s, the occupation of the region gained new momentum with the arrival in Mato Grosso of Prodecer – the Japan-Brazil Agricultural Development Cooperation Program for Cerrado. The goal of Japan was to establish areas of agricultural production in the Cerrado region that could supply the international market and thus force down the prices with emphasis on soybean. The Prodecer acted in the selection of areas and settlers, usually from the South and Southeast regions of the country, for the installation of agricultural projects:

"The settler of Cerrado is not the Northeastern migrant farmer or landless from the South, but farmers selected for their entrepreneurial capacity and capability to deploy all the technology package which was already being developed for the agricultural exploration in that region" (Ribeiro , 2005).

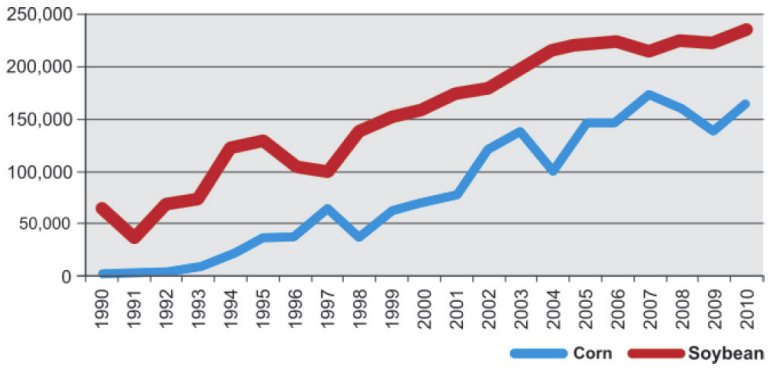
The criteria for choosing the new settlers were to have experience in agriculture and take part of the investment from its own resources, corresponding to 20% of the total. In return, they were entitled to get funding for the purchase of two tractors, a harvester, a house, a shed and an area of 400 hectares.

These conditions have established a special social position for new migrants in relation to squatters and settlers already established there. Just as the settlers coming from the South, the new farmers brought by Prodecer are today called "pioneers". The images associated with them are "courage", "entrepreneurial spirit", and “explorer". However the ancient inhabitants, as well as those settled by INCRA called parcel owners / *parceleiros,* are considered "not suitable for work", "troublemakers," people with "no courage" (Rocha, 2006). This so-called "elitist land reform" gives rise to the model of production prevailing today in the region, characterized by concentrated land ownership through plantations, sophisticated technology and agricultural production toward exports.

The economy of the municipality

On its website, the city hall announces that Lucas do Rio Verde is responsible for 1% of the Brazilian production of grains, occupying only 0.04% of the total area of the country. And its economy is consolidated with the arrival of the giants of the food industry. The installation of companies is encouraged by tax exemptions and subsidized supply of plots, equipped with the necessary infrastructure. In the region are present the largest Brazilian and global agribusiness companies such as Brazil Foods (result from the merger of Perdigão with Sadia), Maggi Group, Cooperative Comigo, JBS Friboi, Cargill and Bunge.

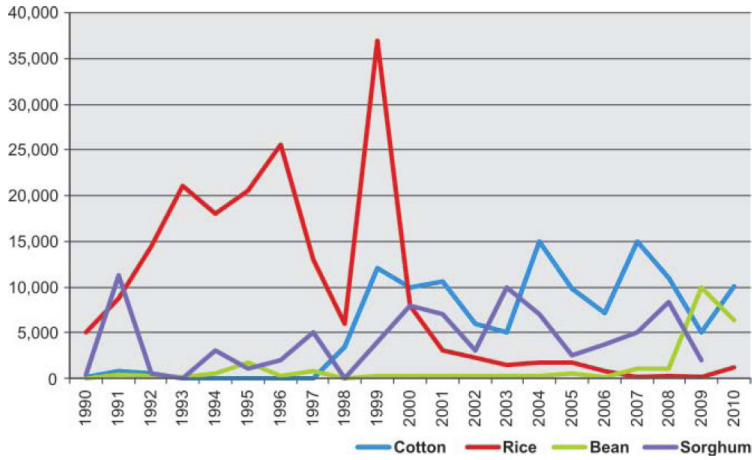
Soybean and corn in Lucas do Rio Verde (area in hectares)



Source: IBGE, Pesquisa Agrícola Municipal.

Medium and large farms in Lucas do Rio Verde specialize in the production of grains and fibers such as soybean, corn and cotton. Some of these areas produce beans, rice, sorghum, millet, and other products on a small scale. However, rice cultivation which occupies 37 000 hectares in 1999 today is insignificant. Also according to information from City Hall, "The bean crop is not geared for exports; its consumption is domestic and by these circumstances is not much cultivated by the farmers of the county."

Cotton, sorghum, rice and beans in Lucas do Rio Verde (area in hectares).



Source: IBGE, Pesquisa Agrícola Municipal.

IBGE data shows that the herds of cattle has been declining in recent years. Although there are some experiences of cattle confinement, raising cattle is predominantly extensive, requiring large areas of grassland. For this reason, export crops are expanding on areas of pasture and moving cattle to areas where land is not so valued, especially in the states of Northern Brazil. Already the production of poultry and pork has soared in recent years from the arrival of large slaughterhouses which have direct access to soymeal and corn used as animal feed.

The domain of soybeans in Lucas do Rio Verde

In 2012, from 364,000 hectares that compose the total area of the county, 266,000 (73% of its territory) were occupied by soybeans.

Source: Globalsat.

"Explorers" and "slackers" or "gaúchos" and "others"

In a simplified way we can say that the population of Lucas de Rio Verde is divided into two groups. On the one hand, there are large soybean producers and those who live around their activities in the industrial, commercial and services sector. On the other, there are the INCRA settlers from the South, also including migrants from the Northeast and other locations in search for better conditions of life.

The successful today are those who left the South in good financial condition, with a few exceptions to this rule. In general, already producing grains and with enough funds to settle on lands much broader in Mato Grosso. In addition, they benefited from government programs that included tax incentives, provision of infrastructure, subsidized credit, technical assistance and other benefits, as in the case described here called Prodecer.

Gaúchos

As Betty Rocha explained, "the *gauchos* who migrated to Mato Grosso are mostly German or Italian descendents of immigrants who believe that they are continuing the saga of their migrant ancestors" (Rocha, 2010). Ignoring the previous existence of other peoples in the region, they consider themselves as pioneers and explorers able to successfully repeat, like their ancestors, the experience of migrating to new lands, meet new challenges, and reap success.

For good or for evil, Blairo Maggi, the former governor of Mato Grosso, which at the time was the largest single producer of soybeans in the world, defined very clearly the supposed superiority of the chosen people from the South of the country over the others:

> "Here in Mato Grosso, people are not picking coconuts in the forest to live. They are farmers who came from Southern Brazil and brought agriculture with them. People who live in Northern Brazil are the ones with this culture of picking coconuts."

Maggi is currently Senator for the State of Mato Grosso. He assumed in February 2013 the Commission for the Environment.

The financial success of soy entrepreneurs translates not only in economic power, but also in political power at the state and municipal levels. In the case of Lucas do Rio Verde, the businessman Otaviano Pivetta, who occupied the post of mayor between 1997 and 2004 was again elected in 2012. Between these two periods he managed to elect Marino Franz, his deputy in the previous period. In the last elections, Otaviano fought a millionaire duel with his cousin Rogério Pivetta Ferrarin. Otaviano accumulates, between his own areas and partnerships, 330,000 hectares of land. According to Folha de São Paulo newspaper he is the richest mayor of Brazil among those elected in 2012. His heritage is equivalent to twice the annual revenue of the municipality with taxes. [21]

This concentration of political power in the hands of big soy agribusiness does not just happen in Lucas do Rio Verde. The state of Mato Grosso was ruled for eight years by Maggi, the largest individual entrepreneur of soybeans in the world at that time. In the neighboring municipality of

[21] Fábio Leite. Interior de MT terá o prefeito mais rico do país. Folha de S. Paulo, 04/11/12. http://www1.folha.uol.com.br/poder/1179979-interior-de-mt-tera-o-prefeito-mais-rico-do-pais.shtml.

Nova Mutum, also in 2012, the brother of Otaviano, Adriano Pivetta, was elected mayor. As shown in the Folha de São Paulo newspaper, the involvement of millionaire busin in politics is not a phenomenon restricted to the Pivetta family. A survey by Folha indicates that Mato Grosso has the highest concentration of the richest mayors in the country. In other words, the concentration of land, wealth and income characteristics of agribusiness also extends to political power.

The "others"

The residents of the settlements created over the past decades in Lucas do Rio Verde and in neighboring counties, relegated to the margins of the process of improving the quality of life that evolved the major grain-producers in the region, have received special attention in our study.

The region of Lucas do Rio Verde according to the municipal government, although known as the breadbasket of the world producing and exporting grain and meat, brings over 90% of the food consumed by local population from distant locations such as Sao Paulo and Curitiba. On the highway, the city of São Paulo is located more than 1,118 miles (*1,800 km*) from Lucas do Rio Verde and Curitiba more than 1,242 miles (*2,000 km*).

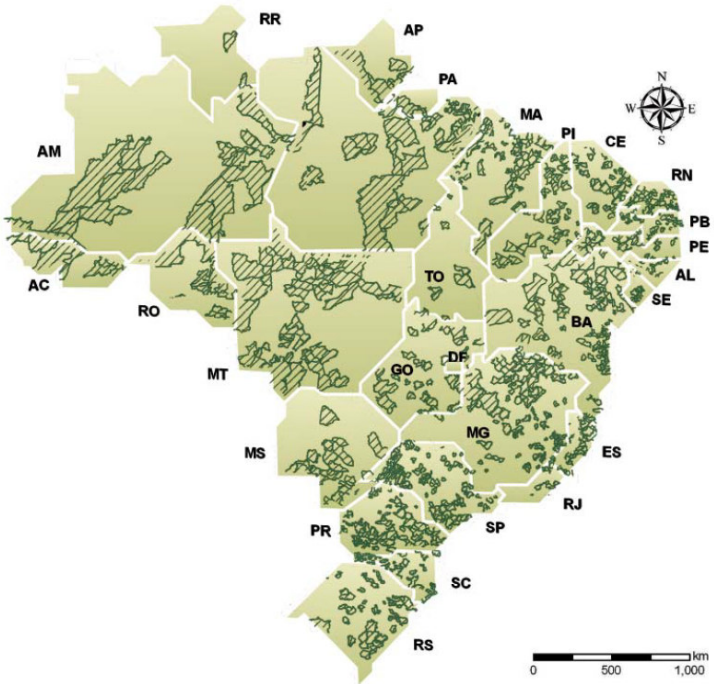
The federal government offers several programs to encourage the purchase of family farm production in partnership with state and local governments: the most important are the Food Acquisition Program (PAA, acronym in Portuguese) and the National School Feeding Program (PNAE, acronym in Portuguese).

PAA –the Food Acquisition Program

Through the PAA the municipalities can purchase food from family farmers until an annual limit per producer currently fixed at R$ 4,500, individually, R$ 4,800, through organizations, R$ 8,000 in the case of institutional acquisition. In 2012 food purchased through PAA in Brazil totaled R$ 597 million, benefiting about 129,000 family farmers (Conab, 2013).

The map prepared by the National Food Supply Company (Conab), responsible for the operation of the PAA, shows that the program is not used in most municipalities in the region which is analyzed in this study. Checking the database of the Ministry of Social Development, responsible for the financial management of the PAA, we find the value zero for the use of PAA in 2011 and January-September 2012 in the municipalities consulted: Lucas do Rio Verde, Nova Mutum and Sorriso.

Map of the municipalities served by PAA in 2012



Source: Conab, 2013.

PNAE –The National School Nutrition Programme

The Program provides the use of at least 30% of the funds transferred by the National Fund for Education Development (FNDE) for school feeding in the purchase of products of family farms and rural family entrepreneur's or their organizations, prioritizing agrarian reform settlements, indigenous and *quilombolas* traditional communities. In 2012 the total program budget was R $ 3.3 billion. Ie, R$ 990 million should be invested in the direct purchase of products from family farms in 2012.

Each farmer can sell up to R$ 20 thousand annually to the program. The FNDE transfers the funds to the implementing entities (states, Federal District and municipalities). The bidding is waived since prices do not exceed those charged in the local market.

At the website of the Program information is available indicating that through PNAE approximately R$ 533,000 to the municipality of Lucas do Rio Verde has been transferred. However, in our conversations with government officials and local family farmers it became evident that the food is not, at least in significant amounts, acquired from local family farmers.

Why do the food acquisition programs not work in Lucas do Rio Verde?

In the view of Edu Laudi Pascoski, Municipal Secretary of Agriculture and Environment of Lucas do Rio Verde, the first major difficulty arises from the individual qualities of family farmers. Disorganized, lazy and vagabond, they would not be able to live the hard life of an agricultural producer:

"They are disorganized. We're helping, but for them everything is bad. They only know how to complain and the culprit is always the city hall. But I understand that they have lots of vagabonds in the group, very lazy people. Lazy! They have the land, but they are too lazy to produce. They cannot pay for the land, they cannot afford it."

When asked if the City provides technical support to the settlers, the Secretary explains:

"I have an agronomist here, and I have Empaer (Company of Research, Assistance and Rural Extension of Mato Grosso) which belongs to the city hall, and have one technical analyst. She visits all of them. But, do you know what they want her to do? Get the hoe, dig and plant for them. Most of them want it. I cannot provide my Secretariat technical team to do production for them. "

Another reason, according to Pascoski, is related to problems of operational programs, which hinder their application.

"I already asked the staff of Ministry of Education, responsible for the school meal program, who came here. How difficult is this Brazilian law on school food. They can only sell R$ 8,000 - 9,000 a year for each CPF (*income id*). I told the woman from the Ministry of Education, 'ask President Dilma to sign a decree so that anybody can sell R$ 20,000 or 30,000 per year for school meals. Now there is a bureaucracy of law which obligates the purchase from associations and companies. There are no purchases even if the farmer has a CPF. You have to open a bid to buy these products."

"We have the Fiscal Responsibility Law, which is supervised by the Court of Accounts, by the City Council and by the government. During the city hall rendering of accounts, the Court complains when you present that you bought from a CPF because you have to buy from an association of producers that have CNPJ (corporate taxpayer registry). However the family farmers do not organize themselves. They fight among one another and are not united. They have an association in Lucas de Rio Verde called *Associação Trinta de Novembro*. Do you know how many members of the Association there are from 30 families? Six or seven."

The vision of family farmers

According to Nilfo Wandscheerr, also a member of the *Associação Trinta de Novembro*, seventeen families are affiliated to the Association of Producers. They work together and produce various agricultural foods like fruits, vegetables and milk. The creation of the Association is only one chapter of the struggle of the family farmers to facilitate the production and commercialization of the food produced by them.

The situation this set of small ranches of little more than two hectares each, acquired through the National Land Credit Programm from Ministry of Agrarian Development, is much better than the average family farmer in the state of Mato Grosso. There is also in Lucas de Rio Verde the Quatá settlement with 30 families, deployed through the same kind of credit.

Some examples of what we saw in Lucas do Rio Verde, however, reflect very well the vision of local government who considers that food production must be now in the hands of big farmers and agribusiness entrepreneurs. The Secretary of Agriculture and Environment uses as an example the horticultural production:

"Small producers lack the will to put their product into the market. But there are some business men here that bought small plots and are producing items such as a case of hydroponic lettuce. The person is a big producer and distributor. He delivers two thousand units per day to the BRF, and delivers to all markets from Nova Mutum until Alta Floresta. The consumer market here is very large, but we do not have entrepreneurs as in regions of São Paulo and Curitiba. Many have already started to produce; you can go in *Associação Trinta de Novembro* to see, it is a spectacle. But it's on a small scale. Each plot has only two hectares, and our range of action in the region has 400,000 inhabitants."

Milk production

Some families of the *Associação Trinta de Novembro* have been developing a project for production and processing milk which is one of the products being sold for use in school meals. As Nilfo explains,

"We think this issue of school meals: a small farm will produce fruit, another produces vegetables, and mine, for example, produces milk. Today, there is a dairy here that buys milk from settlers at R$ 0.55 cents a liter. They just process, pack and sell it for schools for R$ 1.65."

"Then we went to look for resources in More Food Program (*Programa Mais Alimentos*), from the Ministry of Agrarian Development.[22] The idea is to get these resources, buy machinery and sell straight to the school meals program. We have been seeking this credit for one year and we have got nothing. They kill us through fatigue with all the bureaucracy. And we live close to the bank. How is it for people who live 99 miles/160 km from the city - who have to go many times to the bank in order to take care of this paperwork? Now, the big farmers make a voluminous operation and in one or two days get their money. The manager of the *Banco do Brasil* said that it is much more practical to make a transaction of R$ 1 million with a producer then to do two or three hundred transactions with small farmers. It isn't worth the work for the bank."

"The City Hall is buying through an auction where nobody came, only Lactvit. This company is joined with Coagril in the dairy industry and for school meals the milk is sold at R$ 1.65. If we receive R$ 1.50 we will gain a lot of money."

The Secretary of Agriculture and Environment reports that the city hall is working on a project to expand production in Lucas. The plans, however, do not provide better remuneration to family farmers:

"Here a large dairy company will be created. We need ten to fifteen big investors to fund the business in the model of integrated production. Then, we have to get there to talk with Nilfo, Antonio, Joaquim, who each have two hectares and have about five little heads of cattle to milk and take to the dairy. But that demands a lot of work because dealing with milk is labor-intensive. We have to break paradigms because the farmers do not want to work all day milking to deliver. If he milked 10 liters from each cow, he would have 50 liters every day to deliver to the dairy. At R$ 0.50 to R$ 0.60 a liter, do the math there."

[22]. The More Food Program is a line of credit of Pronaf that finances investments for the modernization of the family farm.

But Nilfo and his comrades did not think like that.

"The same company that purchases from small milk producers for R$ 0.55 came here to the farm with a proposal to put a milk cooler here then move it to the truck and leave. But we did not want that. What we want is what some fruit growers are achieving in relation to the provision of school meals. By law, the county has to buy at least 30% from family farming. Close to Tapurah the supermarket managers wanted to know why the biddings do not include fruit pulp. The state coordinator replied that they had already bought all the pulp from the family farmers. The Secretary has no notion of where we are headed as cooperative. We will dispute the bidding as a company."

"It is true that we must get organized. And for that we need to receive technical assistance to do all the planning. I agree that there are people who think the technical analyst has to stay there all the time. But our view about technical assistance is not that. It should be given in a group and not repeated a hundred times in the same day. What we want is, for example, if many producers want to plant tomatoes one of them will go to Embrapa and be trained to be a multiplier. He will specialize in this culture and Embrapa will come here from time to time to monitor. "

Other locations in the region

In the neighboring municipalities, the situation of agrarian reform settlers is often more difficult than in Lucas do Rio Verde, since many of these settlements were installed in areas far away from major highways and consumption centers.

Gastão Vasconcelos and Olanizio Ferreira da Silva, also called Nenão, from the Family Farmers' Association of Corrego Fundo in Sinop say that the lack of technical assistance, infrastructure, and other basic requirements such as the effective support of INCRA forces many settlers to migrate to the cities, in the absence of alternatives.

"Today these people are in a condition where they have to leave their land. If they had assistance then they certainly would not be leaving their lots. They need financial resources. The Pronaf came here some time ago, but they were not well guided on the implementation of the resources and at that time there were no conditions for the flow of production. The situation grew so bad that today the only option the family farmers have is to sell their plot and move to the city. "

According to them Sinop is a regional hub, a city that lives today mainly from provision of services in the areas of education and health, and the city has almost 120,000 inhabitants. Therefore it should create incentives for food production by family farmers, especially for perishable foods such as horticultural products. There is a significant production of milk and dairy products by a cooperative of family farmers.

"But the products from family farms that would come in open-air markets or in school meals comes from outside of the region. Today even the manioc flour comes from Pará or Rondônia. The Mayor is a great farmer. He never gave assistance to us. He cuts the credit, does not give alternative to the settlers, and at the end they leave the land. The mayor is like that. If someone goes there to ask for help, he says, if you want, I will send a truck to make the move for you. "

Claudius, from settlement Ena in Feliz Natal city, tells us that he has on his lot a chicken coop, an orchard, and several trees:

"I have forty-something types of fruit trees. All the trees I have here are: tamarind, orange, lemon, *cupuaçu*, cashew, *inga*, *jenipapo*, *pupunha/peach palm*, soursop, coconut, star fruit, jaboticaba, and pineapple. I also have trees of the region such as: mastic, cedar rose, and *baru*. The soy is damaging it. It makes me sad because one time when they sprayed the poison all the leaves turned to yellow and the fruit rot and withered. I have cashews which are the most beautiful thing in the world. When the planes spray poison it affects all crops. The crops are all fenced in. We are in the middle of the crossfire."

Elisabeth, also a resident of the settlement Ena, adds that because of the difficulties of production, commercialization, and transportation, many people often lose their production. Also that they have sold food to school meals but the delivery was done informally because the City did not want to accept the purchase by PNAE.

"And now it is also because of this invasion of soybeans and these poisons on the edge of settlements. And the mono culture plantations keep growing. We produce vegetables, manioc, and maize. I, by myself, was delivering my produce to school but there was a fight in the government, one questioned the authority of another. Then the City prevented us to deliver straight to the school."

"We did all projects, everything, we delivered all documents, but when the time came the city hall would not accept our vegetables. The City does not use any federal program. (...) The Conab spent two years helping us and expecting us to regularize our association documents and we always hit roadblocks. When we would get documents to complement our documentation, we did not find the mayor to sign, we do not find anything. Everything is very difficult for us."

With some particularities this scenario is repeated in other municipalities. In Nova Mutum, explains Jorge Dalla Rosa from the Rural Workers Union of the municipality, the street market, originally organized to sell the production of local family farmers, had little produce from small farms located around the city. Also most of the food is brought from São Paulo and Paraná. The Settlement Ribeirão Grande, which we visited in the company of Jorge, already has several lots leased to soybean producers. Alvaristo Rodrigues, who has a lot there, already lost several crops due to the impossibility to sell the production:

"I started with two and a half hectares of pineapple with the intent to sell for school meals, but my production was not bought by the county government. I already planted two, three hectares of watermelon, one hectare of pumpkin, passionfruit thousand feet which produced very well, but could not sell. We can provide working conditions to sell for school, for fairs, for those who want to buy. We need here a policy for family farming or will continue only GMO soy and GMO corn. Politics has but only for the bigs. If you arrive at the Bank of Brazil, you will tread into a million things. But if you get a cooperative soy and ask for seeds to plant 30 hectares they give to you fast."

Alvaristo Rodrigues and Ivanilde from the Settlement Ribeirão Grande said:

"Here there is a settler who won some money from his son-in-law, a kick start, and began planting soybeans. He became a small farmer and today is planting 120 hectares of soybeans. I'm leasing a

portion of my land to him. Today INCRA does not prevent me to lease my land to a settler. I by myself could plant soybeans because for soybeans they have all but I don't want it. Even the manager of the Bank of Brazil came here and said: you have R$ 180,000 of funding to buy a tractor, a harvester. But only if you plant soybeans. I feel that we are being suffocated. In ten years, this settlement will turn a large farm. I have not found yet the way to live as a family farmer in this region. If anyone knows, let me know."

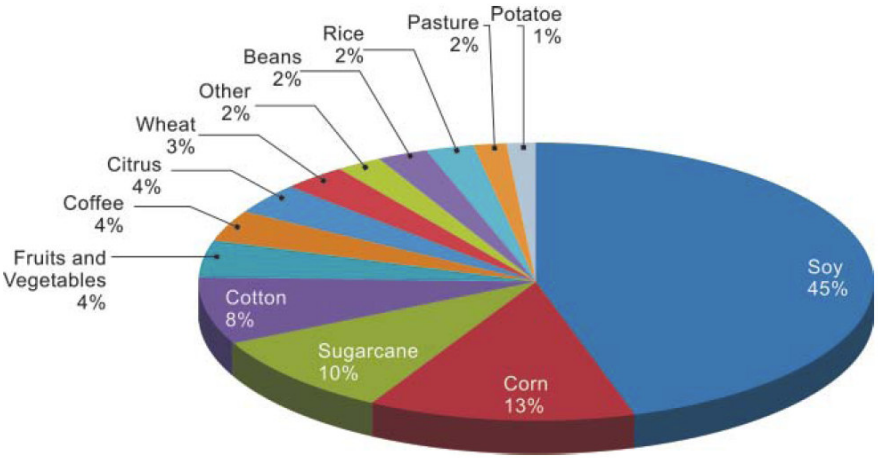
Pesticides and population health

For its vast extension in Brazilian territory, soy is the culture that consumes more pesticides. The most intensely applied in soybean are herbicides, followed by insecticides, fungicides and miticides. According to Danielly Palma, the national exposure of the population to pesticides is 3.66 liters per capita. In Mato Grosso, this number corresponds to 29.80, an exposure eight times higher than the national average. In Lucas do Rio Verde the resident population is exposed to 136.35 liters per capita, five times greater than the state average and thirty-seven times greater than the national average. (Palma, 2011)

Spraying pesticides is done by tractors and agricultural aircraft, and the mists of pesticides, in addition to achieving the targets, also affect workers, air, soil, water, villagers, animals and other plants in the vicinity of crops. Thus, the daily population is living with tractors, sprayers and their noises and odors of fertilizers and pesticides. Maria Lucia, from settlement Ena located in Feliz Natal city, tells us:

"In a rice plantation that they made (to prepare the land for soybeans) in the settlement, they were planting close to the school and spent poison. It makes an itch on my grandson and white spots appeared all over his body. The entire body itched. He lives very close to soybean farm. The doctor said it was allergy to the pesticide. But we have no way to prove."

Brazil is the world leader in the use of pesticides since 2008



Source: Andef

Furthermore, there is also the deforestation which reduces the amount of water available to these populations and, along with the dumping of pesticides, cause a number of other problems such as Elisabeth describes:

"It's sad for us to see. The streams that we had within the settlement nowadays are all dry. It has no more fish. It was a stream that until four or five years ago supported all the neighbors. Water for livestock, to wash clothes, making food, everyone took only water from this river. Then came the Pronaf and many people drilled wells. And this year I heard they killed the head of the river, took the woods that were there. "

"When the time comes to use the pesticide *secante* (pesticide used to shorten the time to harvest) and to hit the poison for soybeans and corn, our land fills with grasshopper and other insects. At night, if we do not close the house early, all the bugs come into the house. Now the whole settlement was surrounded by soybeans farms, and people became very sick and with headache too because they spray poison by the airplanes."

The Abrasco dossier

The contamination of water in the region of Lucas do Rio Verde has been object of analysis, as described in the second part of the Dossier Abrasco on the Impacts of Pesticides on Health (Augusto et al., 2012). Besides the effects of airplane spraying, of contamination of water and breast milk, the amphibians contamination by environmental exposure to pesticides was also subject to assessment. Wanderlei Pignati, professor of the Federal University of Mato Grosso, doctor and PhD in toxicology, developed in partnership with the Oswaldo Cruz Foundation (Fiocruz) researches on the impact of pesticides in the region. He explains that in the case of water, the contamination problem goes far beyond the limits of the municipality:

"Mato Grosso has several basins. The basin of Pantanal which is of the Paraguay River and born here in the state. It has the Araguaia basin of which one of its major sources is the Rio das Mortes, in Campo Verde. And the Amazon basin in Lucas do Rio Verde whose sources are the rivers Verde and Teles Pires. Therefore, when you are using pesticide and chemical fertilizer in Mato Grosso, you are messing with the three major basins of Brazil: the Araguaia, the Amazon and the Pantanal. The Pantanal basin is an even more serious issue because it will affect other countries, such as Paraguay, Argentina and Uruguay. The headwaters of these rivers basins are within the soybean plantations. The same is the case of the Xingu basin, the largest indigenous park in Brazil. Its headwaters are in the cities around where it is full of soybeans, corn and cotton plantations."[23]

The spraying of pesticides on the municipality

The pesticide Paraquat, widely used as herbicide in soybean cultivation, was sprayed by airplane over the county seat in March 2006. The damage extended from the dozens of small private gardens, fruit trees and ornamental plants, until to the Garden of Medicinal Plants. Locals complained of diarrhea, vomiting and hives.

Paraquat is a highly toxic poison that is no longer used in developed countries. In humans it can cause the development of malignant tumors such as prostate, testis, ovary, and breast cancer. Data collected by Abrasco, the Brazilian Association of Collective Health show:

[23] Manuela Azenha. Wanderlei Pignati: Até 13 metais pesados, 13 solventes, 22 agrotóxicos e 6 desinfetantes na água que você bebe. http://www.viomundo.com.br/entrevistas/wanderlei-pignati-dinheiro-para-a-vigilancia-de-boi-e-sojatem-para-a-saude-do-homem-nao.html.

• contamination with residues of various pesticides was found in 83% of 12 drinking water wells in schools, in 56% of samples of rain and in 25% of samples of air in the courtyard of the school, monitored for 2 years;

• residues of various types of pesticides were found in sediments of two ponds similar to those found in the blood of frogs, and the incidence of congenital malformation in these animals was four times higher than in the control pond;

• spraying of pesticides by aircraft and tractor were carried out within 10 meters of drinking water sources, streams, livestock, homes and suburbs of the city, disregarding the law which limited 500 meters aerial spraying of pesticides on those locations.

This legislation brought into force in 2008 and 2009, due to the large impact that the spraying of pesticides had on the population of Lucas do Rio Verde in 2006 did not last long, however. In September 2012, the state government through a new decree reduced the minimum distances for terrestrial application to 90 meters from towns, cities, neighborhoods and springs of water abstraction, isolated dwellings , grouping of animals and springs, still if intermittent.

In previous decrees the measures ranged from 300 to 150m. About the contamination of rainwater, air, rivers and lakes and backyards of schools identified in the study of the Brazilian Association of Collective Health (Abrasco), the Secretary declined to comment because he said that he did not know the contents of the document.

Contamination of breast milk

Part of agrochemicals can accumulate in the human body, including in the breast milk. When the contaminated milk is consumed by infants it can cause damage to their health as they are more vulnerable to chemical agents present in the environment. Also because of their physiological characteristics and by feeding almost exclusively on breast milk until six months of age.

A research was conducted by the Federal University of Mato Grosso (UFMT), aiming to determine pesticide residues in milk from mothers living in Lucas do Rio Verde. Milk samples were collected in 62 nursing mothers. Ten of these substances have been found.

Regarding the environmental and breast milk contamination, Marcio Pandolfi, Secretary of Health of Lucas do Rio Verde, interviewed by us said there was no evidence that the problem is related to the use of pesticides in the municipality.

"Everything is done within the strict control of the law. I do not see those problems here. Some person said that it was contaminated. The contamination was by food? The food that we consume is not produced here. And these soybeans are for export in the vast majority. Soybeans in Mato Grosso go to the European market. Our chicken produced here in BRF is for export. What is consumed here in Lucas do Rio Verde comes from Curitiba and São Paulo. All our greens, vegetables, fruits, rice, beans, potatoes, everything comes from other regions. I think is difficult to make a relation to this and the contamination of breast milk. Some woman said that breast milk is contaminated. But why is that? Because she consumed some food and that food comes from the market. And the market bought from Curitiba, São Paulo or Rio de Janeiro. The inspection of food purchased outside is a role

of the state, not of the city. For example, this woman came here three, four years ago. This contamination can come from the past."

Pesticides and food production

All farmers who seek to produce in areas close to the monoculture talk about the damage caused by the intensive use of pesticides in areas planted with soybeans. As Nilfo said:

"They dry our cultures, but that is not the worst. With the use of pesticides in soy the animals come and go all to our production and end up with everything. Leaves all die, there is nothing left. What happens then is that whoever wants to save something has to use pesticide as well. And the use of pesticides causes a great imbalance. Many insect predators disappear. The toughest that create defenses against pesticides end up dominating the entire area. Furthermore, bees come here in the flowers and then many of them die. We found a lot of dead bees in front of the box."

The pesticides, as well as deforestation, caused the almost total disappearance of the major fish species that populate the rivers of the region. Jorge Dalla Rosa, who arrived from Rio Grande do Sul in 1994, witnessed the gradual disappearance of these fishes.

"Today you have to raise fish in tanks. Previously, you could stay one or two hours with a hook in the river and brought a bag of fish. Nowadays, the rivers have nothing. "

Biodiesel of soybean

The National Program for Production and Use of Biodiesel, besides seeking an alternative to fossil fuels, has been launched with the aim to encourage family farming as a supplier of raw materials. The Ministry of Agrarian Development (MDA) established and regulated the concession of the Social Fuel Seal which provides tax incentives for biodiesel producer. To get it, the producer, in the case of the Midwest Region, must acquire at least 15% of raw materials produced by family farmers.

Being the largest producer of soybeans in the country, the Midwest region is also the largest producer of biodiesel and one whose plants have the largest installed capacity. According to data from the MDA, the Midwest is the third region with more families benefited by the program: about 3,500 from a total of 104,295 in the country. Together they produced about 430,000 tons of raw materials in 2011. The region has 19 plants holding the Social Fuel Seal.

Soybean oil is responsible, in recent years, for 70% to 80% of the biodiesel produced in Brazil, according to the National Petroleum Agency (ANP). In the case of the Midwest, this percentage was about 85% followed by bovine fat (8%) and cottonseed oil (3%) in December 2012 (ANP, 2013).

Soybean production in the region of Lucas do Rio Verde takes place today in large continuous areas whose extension is much greater than the size limit of the properties encompassed in the category of family farming, which is less than 400 hectares in the region. The question that arises from this is: how can biodiesel industries in the region buy at least 15% of the total processed soy of family farmers and thereby obtain the Social Fuel Seal?

One answer lies inside of many of the settlements located in areas of soybean production, where many lots are leased for large producers. This procedure is irregular since these properties should be

used only for food production by families residing therein. However what is actually happening in the settlements of the region is the lack of alternatives for survival, as demonstrated in this report by many testimonies.

The situation is not different for the 280 families living in the settlement Ena, situated about 100 km from the Feliz Natal town, connected by a dirt road in difficult conditions. According to Maria Lucia Rosa and Claudio Marques da Silva,

"The soybean has surrounded the settlement and took over all it. There are programs to lease plots to produce soybean. This will impact the small family farm. Some of them lease the land from their neighbors to also grow soybeans. There are some companies that are funding this process such as Fiagril ".

"You are obliged to lease your land. The alternatives are two: quit or quit. There is no other alternative. We do not have political support or technical assistance program. The Pronaf, when you get the funding a certain amount will be taken for technical assistance but they never appear. What you going to do? You have no guidance, no machines, you cannot do anything. Whoever has some income from salary or pension will manage to stay. There are people who sell the plot to R$ 5000, 10 000. The value of the lot established by INCRA is around R$ 100,000."

"This year (2012) we have a very serious problem in the settlement with Agroextra[24]. They are buying som plots, three, four, five, even ten plots together for soybean planting. One of the agronomists (Agroextra partner) bought about seven plots. The president of the union and I are raising this information to notify him: either he delivers the plot or INCRA comes to expropriate. If the association and the union do not have ways to do that, INCRA can because we do not have any document saying that the settlement is ours."

Coperrede, a hope

To resist against the dominium of agribusiness and to preserve family farms and their plots in the settlements, farmers of several regions surrounding the city of Lucas do Rio Verde, gathered in associations of settlements small farmers and other family groups, organized into the creation of a network of producers. The idea is to strengthen each and create real possibilities for production and commercialization. Hence was born in March 2011, the (Coperrede - *Cooperativa Regional de Prestação de Serviços e Solidariedade*). Their initial goal is to articulate around 500 families organized by associations and other cooperatives in the Middle North region of Mato Grosso.

The Coperrede is the result of work that began a few years ago during which farmers working through their rural workers' unions in several municipalities in the region, met in training activities and leadership training. This led to the creation in the region, a number of associations of family farmers, and the idea of creating a collective institution, able to represent them at the regional level. In addition to the municipalities considered in this study, others also participate as Tapurah, Itanhangá, Tabaporã, Porto dos Gauchos, Juara, Matripá, Carlinda and Guarantã do Norte.

[24] It is a reference to Agroextra Insumos Agrícolas based in Sorriso and with an office in Sinop

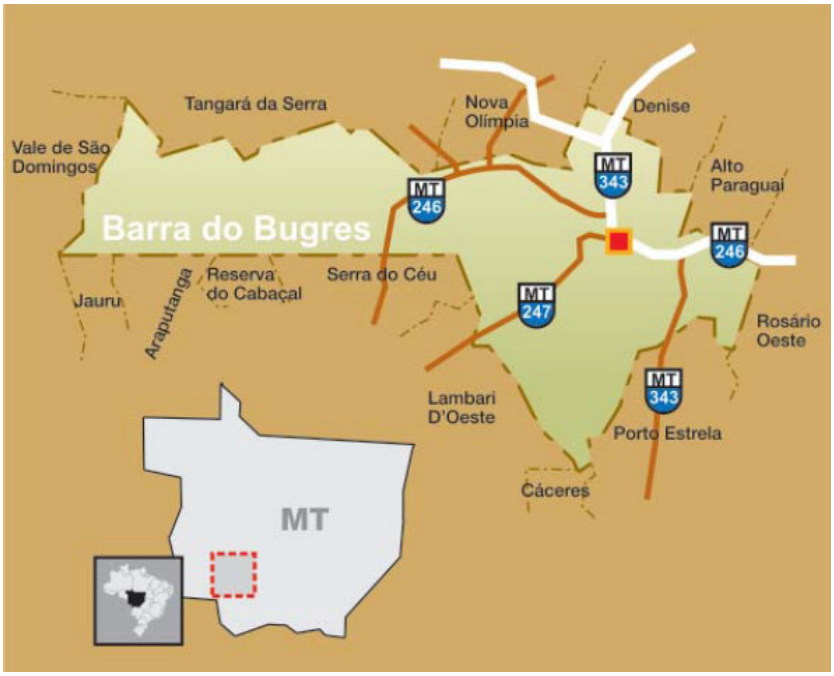
It was being woven, gradually, this network of associations, which resulted in the creation of Coperrede. The cooperative aims to provide services to member institutions, further training activities and training, harder to charge the government obligations in providing technical assistance for household production. It also seeks to improve communication with its members, and these with the whole of society.

Another objective of the cooperative is to legalize farms along the environmental agency, MDA and INCRA, obtaining all documentation necessary to produce and market the production, also accessing public programs of food acquisition. And, with the cooperative work, gain greater access to the consumer market and also have the ability to industrialize its production going to sell final products, and no more raw materials.

3.4 Sugarcane in Barra do Bugres

There are ten municipalities in the state of Mato Grosso with more than ten thousand hectares of cultivated area with cane sugar. Among them we highlight Barra do Bugres, with 53,000 hectares in 2012, and Denise, 40 thousand hectares. According to the MT-Sindalcool *(Sindicato das Indústrias Sucroalcooleiras do Estado de Mato Grosso)* eight of the eleven plants in operation in Mato Grosso cannot expand their production as they are within the areas of the Pantanal, Upper Paraguay River Basin and Amazon biomes.

Barra do Bugres is located in the South Central region of Mato Grosso state and is one of the 14 municipalities that is part of the Upper Paraguay River Basin region.



The main economic activity of Barra do Bugres is the production of sugar and ethanol. In the city is located Barralcool headquarters, which, besides the plant, also has a wide planting area of sugar cane. The city is one that has the highest proportion of sugarcane planted in Mato Grosso, in relation to its total area and also where is the largest portion of the sugar cane farming in the state, with about 40 000 hectares.

There are other plants in nearby towns such as the closest Itamarati plant in Nova Olímpia which is, alongside of Barralcool, responsible by higher environmental impacts resulting from ethanol production on Barra do Bugres.

ACERVO BARRALCOOL

Barralcool – Barra do Bugres

The cattle rising on large properties is another feature. In the recent years, county's cattle herd of the city has fluctuated around 250 thousand head, according to IBGE. The cattle and sugarcane are, by far, the agro-livestock activities which occupy the larger surfaces of the territory.

According to a study held by MDA (Ministry of Agrarian Development) in 2010, the family farmers of Barra do Bugres are currently undercapitalized and with very low investment capacity. Further land regularization in the land title and environmental aspects is required. The socioeconomic information raised show the presence of a large number of settlers and small farmers struggling to access rural credit lines, as Pronaf. "This fact stems from the lack of property title, lack of cooperation among family farmers or even due to debt problems with the banks." (MDA, 2010)

Based on this information and other collected in preparatory meetings, special attention was given, in our study, to the situation of the rural population of Barra do Bugres. This also because of the proximity of these populations to the sugarcane planting areas as well as greater reliance on the use of natural resources for the performance of economic activities. Thus, the Rural Workers Union, the Fishermen Association, indigenous peoples and *quilombolas* were visited and interviewed. We also looked for, but unsuccessfully, hearings with representatives of Barralcool and government.

In the environmental aspect, we devoted special attention to the impacts of sugarcane production on the rivers of the region. For its strategic importance, the Upper Paraguay River Basin along with the Amazon and the Pantanal Basin was considered closed area for sugarcane planting expansion in the Sugarcane Agroecological Zoning established by the federal government in 2009, precisely because the impacts that had already occurred by that date, especially in respect to siltation of rivers and water contamination from vinasse. According to Sindalcool, about 70% of the sugarcane produced in Mato Grosso is localized on the Upper Paraguay River Basin and Pantanal Basin.[25]

It is in the Upper Paraguay River Basin that the Pantanal biome lies. The preservation of this ecosystem is highly dependent on the Basin conservation. There the major rivers of the Pantanal are born. There is also a great concern with the construction of dozens of dams on tributaries of the Paraguay River, which is the backbone of the *pantaneiro* system. The Pantanal is recognized as National Heritage by the Brazilian Constitution, such as Wetland of International Importance under the UN Convention on Wetlands and has received by UNESCO the title of World Heritage Site and Biosphere Reserve.

The issue of Sugarcane Agroecological Zoning, however, is still considered open matter by agrobusiness caucus in Brazilian Congress. In March of 2013 a special committee to discuss the implementation of the zoning was created by the House of Representatives, by initiative of the Congressional Agro-Livestock Group (*Frente Parlamentar Agropecuária - FPA*). Created by presidential decree in 2009, the zoning still need to approve the bill sent to Congress at this time. The deputy and former mayor of Sinop Nilson Leitão (PSDB), member of the FPA, said:

"We want to plant sugarcane in consolidated areas of second planting: if the producer does not want to create more ox and wants to plant cane, then he plants cane in the area which is already open".[26]

Rio Paraguai

[25] Mariana Peres. Lula confirma proibição do plantio em 81% do território. http://www.diariodecuiaba.com.br/detalhe.php?cod=356253.

[26] http://www.noticiasagricolas.com.br/noticias/sucroenergetico/119205-criada-comissao-especial-para-discutir zoneamento-da-cana-de-acucar.html#.UVNPkRxlk0c, acesso em 02/03/13.

Brief history of the region

The diamond exploration near the Paraguay River during the 19th century revealed the existence of ipecac which miners, following the indigenous knowledge, used to cure a number of diseases. Ipecac was a native plant in extensive territory located between the basins of the rivers Paraguay and Guaporé, highlighting regions of Cáceres, Barra do Bugres, Tangara da Serra, Vila Bela and Cuiabá.

After its properties had been researched in Europe, the plant now has importance as an export product, stimulating the growth of Cáceres, where production was drained, and settlement of the region. The labor use of black and indigenous people enslaved by ipecac landowners producers explains, in part, the presence of *quilombos* in several municipalities in the region, including in Barra do Bugres. Unlike traditional indigenous peoples, the collectors of ipecac did not perform replanting.

This practice, as well as the progressive deforestation, led to the almost extinction of ipecac, thus ending their cycle of production and export, which gave rise to the production of rubber as well as hardwoods.

Another remarkable fact of occupation of the region was the installation at the beginning of the 20th century of the Strategic Telegraph Line from Mato Grosso to Amazonas, commanded by Marechal Rondon.

At the same time the Indian Protection and National Workers Location Service (SPI) was created. The purpose was "to promote the attraction and pacification of hostile indigenous, their gradual acculturation and integration into the national society through agricultural colonies where they would live along with the backcountry dweller as laborers" (MDA, 2010). Economic interest for natural resources has resulted in the removal of the indigenous peoples from the region to current indigenous land called Umutina.

The region begins in the 1960s to receive migrants from the states of São Paulo, Bahia, Ceará and Alagoas, attracted by the relatively small charge of the land, the possibility of further exploring the ipecac and by the facilities for livestock. The construction of MT-246 highway in the 1970s, linking Barra do Bugres to Cuiaba, encouraged the implementation of large projects of agricultural, cattle and agribusiness. In the following years, the city earned its characteristic shape until the early 1980s. The landscape was dominated by large cattle ranches and small farms as described by Conceição Martins Rocha, who lives nowadays in the settlement Cabaças in Barra do Bugres:

"When we arrived here in 1972 the city was all formed by *cuiabanos* people. It had also riparians with their ranches on the riverbanks and those who had their farms. They had sharecroppers and their relatives with each one with its on small piece of land, his orchard with banana, mango. The *cuiabano* people like living under the mango trees. They lived well, healthy and were very happy."

This scenario was changed with the arrival of sugarcane plants. In 1975, in response to rising oil prices, the federal government launched Proálcool. The program, aimed at reducing the cost of oil imports, has granted tax incentives, cheap credit and other facilities to stimulate the production of ethanol. It attended to the interests the mill owners who pressed the government due to falling sugar prices in the international market.

In 1980, a group of owners of large cattle ranches created in Barra do Bugres the Barralcool company and initiated the planting of sugarcane on a large scale. The production of the plant began in 1983. Among these founders René Barbour stood out, he was one of the largest farmers in the country which had about 300 000 head of cattle. The Barralcool has also in Barra do Bugres a biodiesel production plant, inaugurated in 2006, which owns the MDA Social Biodiesel Certification.

In the same period in the neighboring city of New Olympia the Itamaraty Plant was implanted, owned by Olacyr de Moraes known as the king of soy. In the Upper Paraguay River Basin and the Pantanal biome plants as Libra (São José do Rio Claro), Cooprodia (Diamantino) and Alcopan (Poconé) were also established.

In the early years of Barralcool, the cattle gave way to the planting of sugarcane as shown by the IBGE Census as you can see in the chart below. Between 1982 and 1988, the reduction of the herd in the county was almost continuous. The number of cattle heads decreased from 250 to 99 thousand. But from there the herd grew back despite the continued expansion of sugarcane.

Between 1994 and 2004 a strong expansion of the planted area with sugarcane took place, which rose from 13.400 to 40.000 hectares. In the same period, the cattle herd in the Barra do Bugres grew from 158.000 to 253.000 heads.

Meanwhile, agricultural production of staple foods reduced. IBGE data highlight the fact that the expansion of sugarcane cultivation occurs at the expense of the main food crops in case of Barra do Bugres. Rice production, which occupied 1,750 hectares in 1990, has been reduced to only 100 hectares in 2010. In the case of beans, the area was reduced 360 to 30 hectares for the same period. And the corn fell from 1,000 to 600 acres.

Acreage of major crops in Barra do Bugres (in hectares)

Year	Sugarcane	Rice	Bean	Corn
1990	10,700	1,750	360	1,000
1995	15,779	1,200	50	400
2000	19,834	670	30	400
2005	37,077	700	5	660
2010	39,827	100	30	600

Source: IBGE – Produção Pecuária Municipal

Thus, the planting of sugarcane and its processing are by far the predominant economic activities. According to the IBGE, there was a total area of 53,000 hectares for sugarcane in 2012. In addition to the planting areas oriented to the production of the local plant, there are other intended to Itamaratí plant, in Nova Olímpia.

Impacts on the population

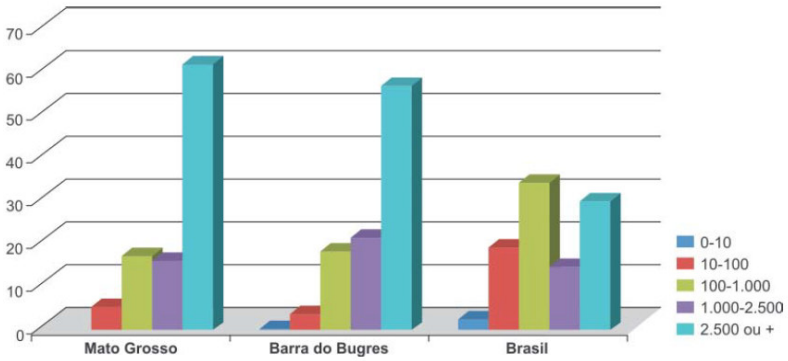
For reasons of logistics regarding the transportation of sugarcane, the cultivation area is usually located in a radius of between 30 and 40 km from the processing sugarcane plant. Consequently, this entire area can become the target of interest of the company, according to the installed capacity for industrial production and full utilization. From this activity the majority of the social problems result. When moving the livestock to other locations, the planting of sugarcane will also cause new social and environmental impacts in other areas. In the case of Barralcool, this occurs also because their owners are at the same time large cattle holder.

In fact, the rural population was being moved from their original properties. Without government support many farmers are now settlements, most unable to live of their agricultural production. Quilombolas people who live in more remote areas of the cane had much of their lands occupied by the expansion of grazing areas of large landowners. In the indigenous area of Umutinas the situation of their residents is similar, despite living on demarcated reserves. Degradation and contaminating rivers, the sugarcane also brings serious difficulties for fishermen of Barra do Bugres.

The inhabitants of *quilombo* areas tell us that the forced reduction of the areas occupied by them took place in two stages. The first one corresponds to the implementation of the plant in the 1980s. And second, in the mid 1990s. In the specific case of the *quilombolas* residents in remote areas of the plant that are not of interest to the planting of sugarcane, the reduction of their land was caused by the expansion of the cattle.

The simultaneous growth of the area planted with sugarcane and pasture areas are concentrating more land ownership in Barra do Bugres. In the city, this concentration is much higher than the national average, as shown in the data from the 2006 Agricultural Census, IBGE, in the graph below.

Mato Grosso, Barra do Bugres and Brazil
Size scales of productive property in hectares: percentage



Source: Inácio Werner, based on IBGE, 2006

Similar to Lucas do Rio Verde, Barra do Bugres has the presence of various health problems arising from the intensive use of pesticides in sugarcane. Conceicao Rocha Martins from settlement Cabaças studied homeopathy and herbal medicine in non-formal courses and treated the residents of the municipality. She has a good sense of these problems.

"The people who planted sugarcane began to have colic kidneys and spine problems. When they were attended by doctors here, the doctors said it was something that they ate or that they were already very ill. We know that it is the poison that they spray by plane because they are not only spraying on top of the cane. They dive over the city. It also has a lot of sugarcane cutters retiring on State Social Security (INSS) because of back problems."

The settlements

There are several settlements in the municipality: Cabaça, João e Maria, Antônio Conselheiro, Buriti, Fundo, Jatobá, and Campo Verde. In the beginning of these settlements are found precisely the loss of land from former residents to the big cattle ranchers and then for the sugarcane, explains Sebastião de Lima, president of the Rural Workers Union of Barra do Bugres.

"The people who occupied these areas and did not come to the city stay lost. Only a few managed to work on farms, others work in areas far from the city which is not applicable for the planting of sugarcane and neither to make pastures. Many had possession of the land, but had no title of property. As they had no knowledge and had not received guidance from the government, the mill owners and farmers convinced the small farmers by telling them that they would not survive in small areas or have access to funding. Then, the people would surrender their possessions for nothing. This happened a lot here. "

"The municipality would have had from 4-5 small rural producers if the destruction didn't happen. But today we have more or less fifteen hundred of them and this is only because of a very persistent resettlements work. At the same time we also have in the rural area over 400 head of household unemployed, rural workers who have neither employment in the sugarcane area nor conditions to produce on the land."

"In a radius of 30 to 40 kilometers from the city, the lands are highly valued because of the sugarcane. One cannot plant anything on a farm neighboring a sugarcane plantation because of the poisons overspray contaminating and killing any crop. This is what is happening with the streetvendors that have some small farms around here. This is a pressure on those families for which they sell their property at any price to them. It is a part of the strategy of the sugarcane growers. In this area near the city they have yet to have taken the indigenous land."

About the progressive mechanization of harvesting sugarcane (more than 70% of the harvest is already being performed by machines), Sebastião recalls the problem of those sugarcane cutters who also are losing their jobs. These jobs, though requiring inhuman physical exertion, are their only alternative income.

"The public authorities are not worrying about it and the way the process is being conducted, some of these workers who only know how to do this labor will have to find another way, because here there is no alternative. Most are people who have no education, career, or other employment option. Our struggle is for our municipality to seek out ways to employ such personnel in the rural areas. I think these people have to be taken from the sugarcane areas, because of both the inhuman physical exertion and the exposure to pesticides. We have to worry about their survival here. "

Conceição Rocha Martins is from the Cabaças settlement, situated about 50 km from the town since 1998 when its current area was occupied by families who lived on the outskirts of the city. She tells us that before the creation of the sugarcane plant, the local production met the food needs of the population of Barra do Bugres. Scattered around the city there were several communities with 20 to 25 families, mostly from Cuiabá, which produced a wide variety of foods.

"They came to the city to buy oil, things like that. They came bringing their wagon a bunch of bananas, peanuts, manioc, flour, for sale. However the big farmers came to plant sugarcane and were sending these people out. There was no more space to plant, or for cattle. So they started selling their cattle and were leaving and going to the city. The lands were not registered in their name, they never applied for it. In the suburb of the city, they remembered the old days when the waters did not give us a bellyache. Now we can no longer take water straight from the tap because it gives us diarrhea. Several of these communities were destroyed. In Santa Fe city, for example, there was only the empty shell of the church left which was overthrown by the formation of pastures into sugarcane plantations; and the people living in these communities moved to the suburbs."

Food access and support programs for family farmers

As in Lucas do Rio Verde, family food production both for our own consumption and for sale, is becoming increasingly difficult. The problems are the same: destruction of crops and fish mortality caused by pesticides, difficulties for regularization of property and production, lack of technical assistance, lack of access to official credit and federal programs for the acquisition of food, which depend on the action of the local government. Just as in Lucas do Rio Verde, the total value of *PAA* purchase between January and September 2012 is equal to zero.

Thus, this population which is already impoverished must now pay dearly for food from afar. They also depend on the owners of the sugarcane plant, if the population wants to buy the food in Barra do Bugres. Unlike other cities not dominated by plants, Barra do Bugres does not have units of chains

of supermarkets present in other municipalities. Its markets belong to the plant owners or their families and everything is sold at much higher prices than in other cities.

This practice of captive market reproduces, to some extent, the old systematic farmers and sugar mills that requiring the employees to carry out their purchases on the farm. Thus, these employees at the end of the month were in debt to the boss and did not receive a salary, remaining in a situation similar to that of slaves. The solution is to do the shopping in another city, as told Conceição:

"You can afford the ticket, catch a bus, go to Cuiaba for shopping (this is 99miles/160 km away) and still have money in your pocket. Here we do not enter other supermarkets. It is only 'Super Barra' and 'Regional'. The Big Master (regional network) could never enter. They bought land but lost to the family of a plant owner. Then they bought a building where a problem happened with Banco do Brazil and they lost it again to the same family."

Fishing

Fishing in Barra do Bugres is an important activity for the survival of other segments of the local population, as well. José Carlos dos Santos, an agronomist resident in the municipality for decades remembers the time when the river Bugres was clean and its residents went to the old wooden bridge over the river to watch the spawning season.

"They were shoals of *pacu*, gold fish, and they made a lot of noise. The river was alive and talking. It was like that until the early '80s, when they installed a packaging plant on the riverside and began commercial fishing, professional networking, selling out of here. Until then, everyone could catch their fish in the river. That's when the fish started to get difficult and it got a lot more with the arrival of the plant.

Likewise, José Viana, president of Fishermen's Colony Z-10, Barra do Bugres, blames sugarcane plants for most of the damage to the fishing activity in the region:

"We have a great concern with our river we're seeing the water level declining. I'm sure it's because of these two plants which are causing a lot of problems such as soil compaction, for example. When the rain comes, it flows at once. And then it takes the pesticides, the residues from burning cane straw, vinesse that is disposed close to the rivers for sugarcane irrigation, and all that goes inside the bays which are nurseries for Fingerlings. 30 Years ago it was different: the rain stopped in the woods and then the rivers did not raise or lower as fast. These areas of the riverbed, which were the breeding of Camboatá, Traira, and other species, have been drying by the plants owners to plant sugarcane and pasture."

For José Viana, there is not a genuine concern of the government for the rivers and their fish or with water quality. The poor quality of the water often makes the water which supplies the county insufficient for the consumption by its inhabitants. Likewise, reducing the volume of rivers will also inhibit the fishing tourism, another important economic activity for Barra do Bugres:

"You can no longer go out boating with three to four people because the river is very low and it is difficult to navigate."

Despite all the evidence that most of these problems are a result of sugarcane monoculture, government measures to supposedly defend the preservation of fish, end up penalizing fishermen. It often imposed bans or reductions in the amount of fishing allowed. Moreover, these measures are not followed by other measures that allow new activities for those who can no longer live from fishing, as pointed out by José Viana:

"The government closed the fishing here for over 15 days. The fishermen are concerned without going to the river, unable to be taking sustenance for their family. There is no concern to promote a professional course for fishermen, so they can have another kind of job like buy a popcorn cart or plant a garden."

He believes that it is necessary to conduct studies for the implementation of a project of fishing focused in the professionals that during the closed season have a very low income. Also, that a systematic monitoring of the rivers water quality in the region is needed with special attention to the rainy season.

"There is no study of the impacts. The fisherman drinks this water that is harmful to his health. It gives frequent gallstones, cancer, and kidney problems, especially for fishermen."

He also criticizes the state law 9.794/2012 that by changing the provisions of the Fisheries Law in Mato Grosso, prohibits angling fish for three years and imposes restrictions on commercial fishing, reducing the capture of 150 to 100 kilograms (330 to 220 pounds) per week. The law goal is to repopulate the fish watersheds.

"This law is to favor those big fish farmers, to leave the supply of fish in their hands. It is not a concern about the environment or the population, much less about the fisherman. If this continues two years from now we'll close the fishery. If the river will run dry they have to do some project for fishermen so they can farm fish and not just the big farmers. "

Quilombolas

According to the state Department of Education, there are in the state of Mato Grosso 123 *quilombolas* communities identified. In the state, slave labor was present in mines, in the productive activities of the farms, and in the domestic and urban work. From these, 11 communities are located in the municipality of Barra do Bugres. Rafael Bento from the *quilombol*a Community of Baixio explains the history of the population of the region:

"People came from Cuiabá in search of wood and gold. They found good land to farm on and would not go back. They brought black people, indigenous and other imprisoned people for working these jobs. And then when they got here, these slaves revolted and every man fled to someplace. This group came as refugees. So these people were later recognized as descendents from *quilombo (remanescentes de quilombo)*. Meantime with the innocence that was at the time, the people had no idea that one day their land would be invaded. Here the whole land was my grandfather's. Then the farmers were coming, coming, and what happened we already know and so there is today: we all are stranded by the farmers."

Ambrosio, from Morro Redondo Community, tells us:

"Our grandfather started here. Everything was so quiet that no one cared to demarcate the land. They worked quietly. We lived in the Jauquara riverside and we farmed here and where else we wanted. Then they came and told us to live here. But today we do not have title to the land. We the oldest, have the demarcated piece, but do not have the title. The others, the youth, who were born here, have nothing."

Without the regularization of land there is no way to get funding for agricultural production. The *quilombolas* have been trying to solve the problem with various public institutions such as the National Institute of Colonization and Agrarian Reform (INCRA), the Institute of Land of Mato Grosso (Intermat) and the Palmares Cultural Foundation. [27] Along with Justice they try also the recognition of land tenure through the instrument of usurpation. Because of this, agricultural production is small and limited to a few products such as manioc, maize, rice and beans. It is also not possible, as in the past, to live by hunting or fishing:

"We cannot hunt anymore. Previously, we lived from this. We also cannot fish because the farmer does not let us go. If you want to fish you have to go so far that it is not worth it. There are no more fish where it is closer and does not belong to the farmer. You can stay until tired but you get nothing. The fish we fished was just for us to eat: *pacu*, golden fish, had a lot, but we never fished to sell. "

Pedro Maciel – Camarinha Community

The problem of the emergence of new agricultural pests due to the release of pesticides in the plantation areas of sugarcane is also present in the *quilombos* village:

"Earlier we used to plant beans and the harvest was good. Today, if you do not use poison, planting is not worth it. And it also has cicadas which kill the corn and rice."

Given all of this difficulty, many *quilombolas* can no longer keep their tradition of taking sustenance from the territories where they live. Some are employed as civil workers, bus drivers and other urban work, or are employees in the neighboring ranches. The poorest depend on the Bolsa Família program or rural retirement to keep living.

[27] Founded in 1988, the Palmares Cultural Foundation is a public institution under the Ministry of Culture whose purpose is to promote and preserve the culture african-Brazilian.

Guided by Rafael we visited, besides the Baixio comunity, the Morro Redondo and Camarinha communities. Relatively far from sugarcane plantation, these populations still are affected by problems such as water contamination, which reduces the amount of fish available for fishing. Indirectly, the expansion of sugarcane area supports an unequal struggle for the preservation of their land, coveted by cattle ranchers, many of them owners of Barralcool and interested in the occupation of new land for cattle, moving their herds earlier present where today is cultivated cane sugar.

Camarinha Community

Nowadays, these *quilombolas* communities, for not having documentation to ensure the ownership of land, are often squeezed between a pasture and a hillside, living in areas insufficient for their agricultural activities. This siege of cattle gained new momentum in the mid-1990s, according to the testimonies of the residents of the Community Camarinha.

"I married my wife and she was 14 years old, now she is 42. So, it was 1994, I remember. Here everything was ours until the river. Then came a farmer and said that now he was the owner, bought the land, expulsed us and sent us here. They said: you stay there because this land will turn into pasture. "

And indeed, when we checked the official data for the cattle raising and sugarcane in Barra do Bugres, we found that between 1991 and 2001, while the area planted with sugarcane grew from 8,500 to 30,800 hectares, the cattle raising also grown from 146,000 to 211,000 heads.[28]

The Umutinas

The Umutina Indigenous Reserve, located in Barra do Bugres, houses in its 28,000 hectares of various other ethnicities: Bakairi, Kaiabi Paresi, Irantxe, Nambikwára, Terena and Bororo. In the midst of a region taken by the planting of sugarcane and raising of cattle, the area may also be considered a forest reserve. Of its total area, only 500 hectares are open. The rest is a huge area of forest in a

[28] IBGE: Municipal Agriculture Survey and Municipal Livestock Survey.

transition range of the Amazon and the Cerrado, which retains the original flora and fauna (Monzilar Filho, 2007).

Seeds, plants and flowers are sources of income for the artisans of the indigenous reserve. Deborah Tanhuare, from Otopé Association (Women Warriors) and Mary Alice Cupudunepá, president of the Organization of Indigenous Women Takiná, explain that for decades the craft was dormant. But today the young are learning to make pieces of wood, palm leaves and clay. Umutina village has a school of its own and now they can recover their language and other traditions prohibited at the time of the creation of the Reserve.

Difficulties obtaining sustenance, however, are many. Just as the settlers, the indigenous did not receive technical assistence or the material and financial resources needed. With the installation of Barralcool and Itamaratí plants, fishing, and traditional indigenous activity, will decline.

The Umutinas also speak about the frequent vinasse spills in rivers that delineate the area of the Reserve. In 2007, a leak of vinasse from the Itamaratí plant's had caused the death of large numbers of fish and other species, reaching the stream of Bracinho and the rivers Bugres and Quebra Cadeira. According to the testimonies, besides the stench and the death of fish and other animals such as birds, turtles and alligators, the Indigenous residents could not drink the river water for several days.

The Umutinas denounced the outpouring of vinasse to Public Ministry. This institution, in turn, has initiated a process that has not yet produced results. And Mary Alice laments the consequences of inaction:

"The impacts continue. Every year the same thing happens, the community was never compensated for anything and lived at the mercy of this situation. "

Deusdete also heard by us, told that the river water is continuously declining. And that siltation caused by deforestation for the expansion of sugarcane and cattle is also worrying:

"Where it was deep, today is shallow and flat. Local inhabitants have to turn the engine off the boat and go pushing. Before you crossed the river swimming, today, you walk across it. We took 50, 80 kilos of fish per week. Today, 10 kilos of fish is a miracle. "

Umutina Indigenous People

This high volume fish that was once enough to feed everyone, today is very low, as stated by Luciana Rodrigues Chaves, who is white, married to an indigenous and lives in the village for 16 years:

"Previously, we lived just of fishing. You could pay the bills and invest in crops. Nowadays there's more. We do not want to go, we want to stay here, but we need help. In the absence of fish, we live from farming, but it has no money, no loan, no nothing. You have to look for something else. Many indigenous leave the reserve for work, because they can't afford to work in the village. "

4. Brief description of the monitoring tool

The project aimed to develop a monitoring tool to get more and improved independent and verifiable information on the social and environmental impacts of the production of sugarcane and soy in Mato Grosso State. It also aimed to enhance capacity of civil society organizations to monitor impacts and to participate effectively in policy dialogues; and to undertake steps with Dutch importers to contribute to sustainable biomass production.

So the tool was to be designed to fit the purpose of ensuring a participatory process in which the knowledge and experience of local populations were to have a prominent role. This includes participation of groups with divergent interests. We would not have a true project without the broad participation of society, the market and the state, in all its complexity.

The following impacts were identified as the main social and environmental impacts of the introduction and expansion of the large scale, monocultures of soy and sugar cane in Mato Grosso:

Environmental impacts:

- Deforestation of both Cerrado and Amazon biomes: over the last ten years Mato Grosso has been continuously the number one in deforestation, only alternating with the state of Pará;
- Pollution by extreme use of agro toxics with severe health and environmental impacts;
- Fish stocks have plummeted as a result of (agrotoxic) pollution;
- Erosion, siltation and land degradation as a result of the intensive use of the land and water scarcity because of irrigation and usage in sugar mills
- Reduction in biodiversity as a result of pollution, deforestation and pre-harvest burning (sugar cane);
- Emission of green house gases, mainly as a result of deforestation and pre-harvest burning

Social Impacts:

- Land concentration of both virgin Amazon and Cerrado territory as well as of small farmers' lands and traditional communities' territories;
- Rural exodus as a result of loss of land, unemployment and absent state policies in support of small- and family farming;
- Overall decline in employment in agricultural sector. The large scale mechanized monocultures provide – on average – less then one tenth of jobs compared to small scale and diversified agriculture;
- Poor working conditions, like dangerous conditions when working with agrotoxics, extreme physical work (sugar cane cutters), low wages, seasonal labour;
- Health problems as a result of pollution by agrotoxics, both among direct employees and population of neighbouring communities and cities;
- Food security compromised as local production of traditional food staples is overtaken by export oriented monocultures;
- Lack of technical and financial support for small farmers and traditional communities to maintain and develop their productive activities as local, regional and national governmental policies prioritize large-scale monoculture production over small farmers in matters of technical and financial support

To systematize this complexity of findings of both qualitative and quantitative data, it was decided to build on **Statplanet and the FORMAD Website** as a data-repository:
Quantitative data were to be inserted in the Statplanet tool, developed by one of the lead organizations of FORMAD, ICV (http://www.formad.org.br/?page_id=2515); and the qualitative data were to be published on FORMAD's website (http://www.formad.org.br/).

Based on the field research results, and through an iterative process, the most important impacts (and indicators) have been prioritized upon which to continue monitoring (Of the prioritized impacts, the ones in bold will be integrated into the StatPlanet tool):

- **Deforestation** of Cerrado and Amazon in the State of Mato Grosso
- Displacement of food production, resulting from the **application of pesticides** in the large monocultures;

- The lack of support for small-scale and family farming production by state and local governments, that are permanently occupied by agribusiness entrepreneurs;
- The resulting difficulty to obtain environmental regulation certificates for the production and other documents necessary for the legal production of food by family farming;
- **The impossibility to access the federal programs for the acquisition of food produced by family farming, such as the Food Acquisition Program (PAA) and the National School Nutrition Programme (PNAE);**
- **The impossibility for family farmers of the region to the National Program for the Strengthening of the Family Agriculture (PRONAF);**
- The reduction of fish stocks in rivers and lakes, resulting from the use of pesticides and sedimentation caused by development of large monocultures;
- **The increased frequency of a number of diseases related to exposure to pesticides in the populations of the municipalities studied**

5. Conclusions and recommendations

The overall goal of this project was to work towards sustainable biomass production in Mato Gross State. For this to happen, it was proposed to look not at a single supply chain, but rather understand the entire context in the production area. In the view of the participating entities and people, one can speak of sustainable production when negative social and environmental effects be mitigated. The current model of production (large scale monoculture and sugarcane) does not comply with the set of indicators as conceived by the local population, in terms of people's health, providing employment opportunities, providing for livelihoods, maintaining healthy soils, in sum: it threatens the ability of the local people surrounded by the large scale soy- and sugarcane producing areas to maintain their own livelihoods. For smallholders in Mato Grosso it is not viable to produce for the biofuel market. Important to these smallholders is respect for the role of family farmers regarding the food security of the region. Small-scale farmers are not able to produce for their region because of the pressure on land and the intensive use of agrochemicals. Import of food from other regions of Brazil is therefore necessary.

Their proposal, therefore, rests on two premises:

1) Ensure actual large-scale production of soy and sugarcane does occur according to sustainable principles
2) Allow the local population surrounded by the large scale soy- and sugarcane producing areas to maintain their own livelihoods, ie. allow them to continue their activities in their culturally, economically and socially fit manner, leaving enough space for local food production.

From that perspective, observing that the majority of public funding is being spent on the first model of production, they advocate to have national programs designed to support the second model of production actually reaching their regions.

The continued expansion of sugar cane production, expected as a result of growing exports and foreseen by the sugar cane sector, will cause huge impacts under the given circumstances. Moreover, it is suspected that the expansion of sugar cane will result in the displacement of cattle breeding, food production and even large soy growers from the Cerrado, forcing part of these activities to migrate to the area of the Amazon forest. It means that the remains of the Mato Grosso Cerrado vegetation and Amazon forest are at risk.

The Netherlands wish to ensure that their biomass imports are sustainable. For that to happen, it has to be understood that the entire context in the production area needs to be taken into account. If the local producing sectors and policies are not set to work towards a sustainable production, one can perhaps improve a single supply chain but – in the opinion of the project team – not truly speak of sustainable exports from that region.

In order to work towards sustainable biomass production in Mato Grosso, the following issues need to be tackled:

Of the various problems caused by the production of soy and cane sugar, here we highlight two aspects common to these and other monocultures: the occupation of vast areas of land and continuous intensive use of pesticides. Some of the consequences are:

• The concentration of ownership and use of land which is used to produce mostly for the export market;

• displacement and marginalization of local populations, preventing the family food production, whether for local or regional supply;

• the lack of access of these populations to official programs to support the family farm's production through land and environmental regularization, agricultural credit, technical assistance toward the production of healthy food that at the same time preserves the environment;

• reducing the overall supply of food at the national level, which results in general price increases of the items that compose the basic food basket;

• poisoning and destruction of these foods affected by pesticides or attacked by new pests;

• the use of other chemical inputs such as fertilizers and GMO seeds;

• the reduction of fisheries production also affected by pesticides, the destruction of the springs and the silting of rivers;

• the many health problems caused by pesticides;

• the extensive deforested areas, land degradation, biodiversity loss and the reduction of available water.

By directly affecting the environment and quality of life of neighboring populations, these issues should be taken as an index of soybean production and sugarcane sustainability. For some of them, such as production volume and the prices of basic foods, there is no official data available to prove the facts. For others, whose information should also be produced by the government, we only have

the evidence and the testimony of the population: the reduction of fish production, water pollution and increased incidence of diseases due to exposure to pesticides are examples.

Immediate measures

From these results, the project participants residing in the study areas indicated the need for the following immediate actions:

- The EU should put a strong limit on the contribution of biofuels produced from soy, sugarcane and other land based crops to the 10% transport target.
- The EU needs to include adequate social criteria in its renewable energy policies.
- The EU needs to improve its monitoring of the sustainability impacts of its renewable energy policies.
- The EU needs to ensure that selected certification systems provide robust environmental and social safeguards, and have a high level of assurance.
- The EU and its governments, companies and NGOs should provide adequate funding and support for the awareness and capacity building needs of Indigenous Peoples and communities in Brasil.
- The EU and its governments, companies and NGOs should provide adequate funding and assistance for supporting small farmers in Brasil to get better organized and improve their yields and incomes.
- European importing companies should only buy soy and sugarcane certified under a certification system for sustainable biomass with robust social and environmental safeguards, and with a high level of assurance.

Regarding the Brasilian government the recommendations are as follows:

• Continuous analysis of water quality, checking for contamination by pesticides and the vinasse, in the case of Barra do Bugres;

• Study of the incidence of diseases related to exposure to pesticides, comparing these data with those of other areas where this is not the monoculture;

• public agencies to collect all necessary measures to facilitate the production and marketing of food by family farms, above mentioned;

• Strict regulations on the use of pesticides and other pollutants as a first step towards permanent ban of the use of these products;

• Zoning integrated all agricultural activities, and not only sugarcane which prevents the establishment of monocultures in areas which is necessary for ecosystem protection and strategically important regions for the production of food in order to ensure food security at the local, regional and national levels.

Combating monoculture

In the case of sugarcane, ethanol production is primarily responsible for the expansion of the area planted. In the case of soybeans, the use of oil as a feedstock for biodiesel production is just an added incentive for producers, since it increases their profit margin. But it is the consumption of the meal for the production of feed which determines the amount of soy consumed in the world. Given the unsustainability of this production model, we need to turn to technology research to obtain new sources of renewable energy permitting the abandonment of the use of land and other natural resources needed to produce goods essential for this purpose. The way they are produced, the bioenergy destroy the environment and food production, with huge social losses.

The solution to the problem also includes the reduction of fuel consumption, especially automotive. We must discourage private transport, increasing the supply and quality of public transport.

Sustainable production of healthy food

We advocate replacing the monoculture model by another, based on family food production, which follows the principles of agroecology. Producing organic food in harmony with the natural resources around them, agroecological agriculture creates more jobs in the field, while ensuring the food security of the families involved and for the local and regional communities. Using inputs extracted from neighboring natural vegetation itself, this model moves further to the local economy, creating more jobs and distribute income fairly.

From an environmental standpoint, agroecological farming preserves the most of the original vegetation and water resources, worrying sustainably to meet the needs of water consumption and people's own natural resources. Using natural fertilizers and pesticides, maintains the ecological health of soil, water and air.

The production of healthy food and friendly to the environment requires further advancements and achievements in the field of public policy is necessary to reformulate the traditional standards of service, stimulating the production of specific technical knowledge and appreciation of agroecological products through acquisitions preferences the official programs of buying food.

The preservation of culture

One cannot forget, finally, that the traditional peoples of these regions have the right to preserve their way of life, their cultural values, which are well off the material wealth that agribusiness can provide.

"We live here in the village for freedom. We don’t have a boss ordering us, have free time, children also have the freedom to play wherever they want, you can leave the door open since we do not have thieves. Not in the city: it has concerns of theft, and murder. We want to stay here, planting, fishing, hunting, without having that addiction to money, cars, or anything. In the city, the people always looked stressed and worried. We see this in their soul, it is too sad. "

Luciana Rodrigues Chaves, Umutina indigenous land

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The Mato Grosso Forum for the Environment and Development (Formad) is a network that brings together a diversity of socio-environmental segments of the state of Mato Grosso in the defense and promotion of the environment. Develops collective action related to public policy and promotes debates for the construction of alternatives of development.

The Formad was founded in 1992, aiming to defend the sustainable development of Mato Grosso under the principle of social inclusion, democratization of access to land, sustainable exploitation of natural resources, conservation of biodiversity of the biomes Pantanal, Cerrado and Amazon and valorization of cultural diversity.

The Forum is composed by entities that operate in the areas of human rights, environment, indigenization, family agriculture, health and popular knowledge, education, and labor rights. This diversity reflects the identity of Formad which is to design the environmental and social issues in an integrated manner.

The mission of the Forum includes:

• Articulate the civil society organizations with common ideologies to collective mobilizations;

• Develop network actions;

• Monitor public policies in a critical and propositional way;

• Mobilize civil society to intervene in socio-environmental political issues and to transform the reality of vulnerable populations;

• Being opposed to the development model sticking by agribusiness, monoculture and land concentration;

Formad has as main targets family farming, and the traditional and indigenous populations in Mato Grosso.

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