

*The region of the Cerrado (a savannah) is as important for its richness in biodiversity as the Amazon--it is shelter for nearly 160,000 species of plants and animals, many of which are endangered species. However, its destruction has not generated much visibility, in spite of the intensity and consequences it has caused. Studies indicate that each year nearly 22,000 square kilometers of savannah are cleared. It is estimated that more than half of the region has already been devastated, and at this rate, its total destruction will be complete by the year 2030. In June of 2008, the Institute of Man and the Environment of the Amazon (Imazon) registered an increase in the deforestation rate in the Amazon, principally in the states of Mato Grosso and Pará, where more than 600,000 square kilometers have been devastated. This number represents a 23% increase from the data gathered in June of 2007. INPE calculates that in the last 20 years, one hectare [metric unit of area equal to 10,000 square meters, or 2.471 acres] of forest disappears every 10 seconds in Brazil. Of a total of four million square kilometers, nearly 700,000 have already been deforested. Predictions from The Institute for Environmental Research in the Amazon indicate that another 670,000 square kilometers will be devastated by 2030 if the current predatory model is maintained in the region.*

## **Impacts of Expansion of Sugarcane Monocropping for Ethanol Production<sup>1</sup>**

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Brazil is the fourth country of the world which most emits carbon gas into the atmosphere. This occurs principally because of the destruction of the Amazon Rainforest, a destruction which accounts for 80% of the carbon gas emissions in the country.<sup>3</sup> The expansion of monocropping for the production of agro-fuels tends to exacerbate this problem, advancing the agricultural borders of the Amazon and the Cerrado.

Diverse studies show that the expansion of monocropping represents a greater risk for global warming than do emissions of carbon coming from fossil fuels. In spite of the Brazilian government's attempts to convince the international community that Brazilian ethanol is "renewable," between 2007 and 2008 there was a significant change with regard to this idea.

The problem of many studies done before was that they excluded the environmental impacts of the model of production, from the use of natural resources (like land and water) to the pressure to use preservation areas, or areas used for food production. One report from *Time Magazine* observes that these studies have calculated the potential to tie up carbon from agro-fuels without taking into account the impact of monocropping in areas where vegetation and soil accumulate a great quantity of carbon. "It is as if these scientists image that biofuels are cultivated in parking lots," said the article.<sup>4</sup>

One of the most important studies about the change in the forms of land use and its relation to the increase in carbon emissions was published in *Science* magazine. The authors affirm that "The majority of the previous studies discovered that replacing gasoline with biofuels could reduce carbon emission. Those analyses do not take into account that carbon emission happens when farmers, throughout the world, respond to

higher prices and convert forests and fields into new plantations, to substitute plantations of grain which were used for biofuels.”<sup>5</sup>

The article cites the increase in soy prices as an influencing factor in the acceleration of deforestation in the Amazon, and estimates that its cultivation for the production of diesel results in a carbon debt from which will take 319 years to recover. According to researcher Timothy Searchinger, from Princeton University, “Forests and fields have much carbon, however, there is no way to reap the benefits by transforming these lands into crops for biofuels.” This study demonstrates that the effects of production of agro-fuels should be evaluated with the whole cycle of monoculture expansion. In Brazil, we know that sugarcane plantations are expanding very quickly, “pushing” forward agricultural borders and, at the same time, preparing the way for the expansion of cattle-raising and soy production. Given this, a true environmental impact study should include the whole agricultural sector and the whole process of ethanol production.

In January of 2008, the Smithsonian Institute of Tropical Research reported that sugar-based ethanol and soy-based agro-diesel cause more damage to the environment than fossil fuels. The research draws attention to the environmental destruction in Brazil, caused by the increase in the production of sugarcane and soy in the Amazon, the Atlantic Rainforest, and the Cerrado. According to researcher William Laurance, “the production of fuels, be it from soy or sugar, also causes an increase in the cost of food, both in a direct and indirect way.”<sup>6</sup>

The release of these studies confirms the denouncements from social organizations and shows the change in tone of the international debate on these issues. As the newspaper *El País* observes, “diverse research centers, and the majority of ecological and human rights groups send out daily declarations affirming that biofuels do not help to combat climatic changes, but provoke serious environmental impacts on regions with high ecological value, alter the price of food, and consolidate an agricultural model based on exploitation of workers and high dependence on big multinational companies.”<sup>7</sup>

### The Expansion of Sugarcane Plantations in the Cerrado

The Cerrado is known as the “father of water,” for it fills up the principal water basins of the country. With nearly two million square kilometers, this biome is located between the Amazon, the Atlantic Rainforest, the Pantanal, the Caatinga, and includes the states of Minas Gerais, Mato Grosso, Mato Grosso do Sul, Goiás, the Federal District, Tocantins, the south of Maranhão, the west of Bahia, and part of the state of São Paulo.

The region is as important for its richness in biodiversity as the Amazon—It is shelter for nearly 160,000 species of plants and animals, many of which are endangered species. However, its destruction has not generated much visibility, in spite of the intensity and the consequences it has caused. Studies indicate that each year nearly 22,000 square kilometers of savannah are cleared. It is estimated that more than half of the region has already been devastated, and at this rate, its total destruction will be complete by the year 2030.

In the last few years, the Brazilian government has targeted the Cerrado as a priority area for the expansion of sugarcane, for this region is characterized by favorable topography-- it is level, of good quality, and has water-supply potential. Facts furnished by IBGE (Brazilian Institute of Geography and Statistics), show that in the 2007 harvest, sugarcane production occupied 5.8 million hectares of the Cerrado.<sup>8</sup>

The sugarcane industry has expanded rapidly and generated enormous environmental damage. To begin planting sugarcane, it is necessary to clear the native vegetation, and thus all of the trees are uprooted. In August of 2008, an agreement between the Ministry of the Environment and the Ministry of Agriculture resulted in a series of modifications in the Law of Environmental Crimes. One of these results was announced in a decree from President Lula that allows for the construction of sugarcane factories in the Pantanal. According to data from the National Institute for Space Research (INPE), from IBGE and the Ministry of the Environment (MMA), new sugarcane factories are being built in conservation areas, close to natural springs.

One report from the Society, Population and Nature Institute (ISPN) affirms that “Deforestation done for sugarcane production directly harms rural populations who survive off the biodiversity of the Cerrado. The other terminal consequence is that small food farmers leave their lands, having been lured into temporary employment in the sugarcane fields. This will diminish the food production in the area, which only serves to aggravate the migration to urban slums.”<sup>10</sup>

A study from the Center for Studies in Applied Economics, University of São Paulo, estimates that in the next five year, US\$14.6 billion will be spent in the construction of 73 new ethanol companies in the Center-South region. Researcher Sérgio De Zen believes that “Ethanol has become an environmental threat.”<sup>11</sup>

According to professor Antônio Thomaz Júnior of the Department of Geography of the State University of São Paulo (Unesp), “the expansion of sugarcane in Brazil for the production of ethanol may certainly advance over areas currently cultivating food crops, besides placing at risk the integrity of important biomes, like the Amazon and Pantanal.”<sup>12</sup>

Another concern is the demand for water in agro-fuels production. The director of the Scientific Committee of the Stockholm International Institute for Water, Jan Lundqvist, warns that “Currently the quantity of water used throughout the world in food production is approximately 7,000 m<sup>3</sup>. In 2050, the prediction is that this quantity will increase to 11,000 m<sup>3</sup>, almost double of what it is today. And the projections indicate that the demand of water necessary to produce biofuels will increase in the same proportions as the demand of water for food production, which would represent 20 -30 m<sup>3</sup> of water in 2050. This is just not possible.”<sup>13</sup>

One study on the environmental impact of ethanol production on water sources, published by the National Academies Press reveals that “The quality of underground water, rivers,

the coast, and springs can be impacted by the rise in use of fertilizers and pesticides in biofuel production. High levels of nitrogen are the principal cause of the decrease of oxygen in regions known as 'death zones,' which are lethal for the majority of living beings. Pollution sedimented in lakes and rivers can also cause soil erosion.”<sup>14</sup>

### Devastation of Brazilian Amazonia

In recent years, INPE (National Institute for Space Research) has published alarming data on the rate of deforestation in Brazilian Amazonia. Between August 2006 and July 2007 the devastation affected 11,200 km<sup>2</sup>. Between August 2007 and March 2008, the System for Detection of Deforestation in Real Time (Deter) recorded 4,732 km<sup>2</sup> of deforestation.<sup>15</sup> In April 2008 more than 1.1 thousand km<sup>2</sup> of forest were devastated.<sup>16</sup>

In June of 2008, the Institute of Man and the Environment of the Amazon (Imazon) registered an increase in the deforestation rate in the Amazon, principally in the states of Mato Grosso and Pará, where more than 600,000 square kilometers have been devastated. This number represents a 23% increase from the data gathered in June of 2007. According to Paulo Barreto, a representative for Imazon, this increase is a result of the expansion of farming and ranching in the region.<sup>17</sup>

INPE calculates that in the last 20 years, one hectare of forest disappears every 10 seconds in Brazil. Of a total of four million square kilometers, nearly 700,000 have already been deforested. Predictions from The Institute for Environment Research in the Amazon indicate that another 670,000 square kilometers will be devastated by 2030 if the current predatory model is maintained in the region.<sup>18</sup> Another study by the ISPN warns that deforestation may completely destroy the Brazilian Amazon in only 40 years.<sup>19</sup>

In July of 2008, research published by PNAS reveals that Brazil was responsible for 47.8% of the destruction of tropical rainforests in the world. The study was conducted by professor Matthew Hensen of the University of South Dakota (USA), and covered the time period from 2000 - 2005.<sup>20</sup> All recent studies show the biggest level of Brazilian Amazon deforestation happened in the state of Mato Grosso, responsible for 54% of the total. This state is followed by Pará with 18%, and Rondônia with 16%.<sup>21</sup>

This data demonstrates the impact of the expansion of large-scale farming activities on deforestation. This expansion was one of the principal reasons why the former Minister of the Environment, Marina Silva, left her position. She was under great pressure to give in to the demands of large-scale farmers, especially given the increase in price of agricultural commodities due to the rise in relationship of the energy and food markets. The Brazilian government has ignored the dimension of the environmental crises caused by the implementation of a development model based on mono-cropping and exportation. This model has caused the increase in deforestation both in the Amazon and in the Cerrado.

Environmentalist Lester Brown, one of the pioneers in this area, declared in the newspaper *Folha de São Paulo*, that “biofuels are the major threat to the diversity of the

Planet.” He suggests that “Brazil begin to develop other sources of energy, such as sun and wind, which have great potential.” And he asserts, “What we have to do is think of a new economy, with renewable sources of energy, that have a diversified system of transport, and in which we re-use and recycle everything...If we do not restructure the world economy, economic progress will not be sustained.”<sup>22</sup> However, the Brazilian government continues to insist on defending the expansion of large-scale mono-cropping for the production of agroenergy. Besides President Lula's discourses in favor of this model, the government instituted a series of administrative and economic measures to facilitate this expansion.

#### “Grilagem” (Illegal Land Appropriation)

In July of 2008, the Senate approved a Provisionary Measure proposed by the government increasing the area of public lands in the Amazon which can be sold without auctioning, from 500 to 1,500 hectares. According to former Minister of the Environment, Senator Marina Silva, who voted against the measure, “This will increase illegal land appropriation and consequently deforestation in the Amazon. It will encourage the privatization of public forests, without having to answer to any kind of process of auctioning.”<sup>23</sup> On August 6, 2008, President Lula signed a law regulating this Provisionary Measure, and besides confirming the increase of areas which can be sold without auctioning, also vetoed an article which restricted this measure in certain preservation zones.

The term “grilagem” refers to fraudulent practices of public and private land appropriation. Historically, this mechanism was utilized to guarantee dominion of the “colonels” or large-landowners over the vast extension of territories. With the modernization of agriculture, besides political dominion, land property made possible the increase of economic and technological dominion, including the advance of multinational companies which appropriate public lands to produce commodities on a large scale. The principal mechanisms used in “grilagem” of land are illegal registers made in cooperation with corrupt registry offices and members of the judiciary system.

The practice of “grilagem,” or illegal possession of public lands, represents a serious problem in the Amazon, for it serves predatory activities, like illegal extraction of wood, followed by the implantation of intensive farming and cattle-raising. In July of 2008, a study by Imazon estimated that nearly 42 million hectares of land in the Amazon are illegally possessed. According to forestry engineer Paulo Barreto, coordinator of the study, “this practice is like a free privatization of the forest.”<sup>24</sup> Barreto estimates that besides cases of fraudulent documents, there are nearly 40 million hectares of land with duplicate titles. Finally, he concludes that the area of illegal possession of land in the Amazon amounts to at least 80 million hectares.

The majority of irregularities are to be found in the states of Pará, with 16 million hectares of “grilagem”, and Mato Grosso, with 9.6 million. These states also register the highest indices of deforestation. Even INCRA (National Institute of Colonization and Land Reform), which is responsible for the managing of public lands in the Amazon,

admits that it does not have control over the 710.2 thousand square kilometers of the Amazon. This territory is equivalent to 14% of the region, and 65% of all the lands regulated by INCRA. The biggest share of this land, the equivalent of 288.6 thousand square kilometers, is in the state of Pará.<sup>25</sup>

According to Professor Ariovaldo Umbelino, of the University of São Paulo (USP), “more than 212 million hectares of public land, used or not, are not in the records of INCRA, nor in the states' Institutes of Lands, nor in the notary publics' Registry of Real Estate. So even though they are fenced off, to the State they do not exist. Another 84 million hectares are registered at INCRA as being owned, and among these, only 21 million hectares are legally possessed through current legislation. It is important to clarify that the Constitution of 1988 permits ownership regularization of only up to 50 hectares, and only exceptionally up to 100 hectares. Any occupied area greater than this cannot be legalized.”<sup>26</sup>

### The Expansion of Sugarcane Cultivation in the Amazon

On July 29, 2007, Minister of Agriculture Reinhold Stephanes declared to *O Globo* newspaper that, “There is no sugarcane in the Amazon. We know of no such projects, old or new, in the region.” This affirmation was been repeated many times by President Lula, who wants to avoid criticism, especially from countries which plan to import Brazilian ethanol. In June of 2008, in his speech to the UN's Food and Agriculture Organization, President Lula affirmed that there was no production of sugarcane in the Amazon.

However, even the National Supply Company (CONAB)—an organ linked to the Ministry of Agriculture—registered an increase in the production of sugarcane in the Amazon from 17.6 million tons to 19.3 million tons between 2007-2008.<sup>27</sup> In Tocantins, there was a 13% increase (from 4.5 thousand to 5.1 thousand hectares), followed by Mato Grosso with a 10% increase, and the state of Amazonas with 8% (from 4.8 thousand to 5.2 thousand hectares). In Pará, sugarcane plantations occupy around 10.5 thousand hectares. According to research from the University of São Paulo, Pará is seen as one of the principal areas of expansion for the production of ethanol.<sup>28</sup>

In 2006, CONAB demonstrated that the Northern region has the highest indices of increase in sugarcane production in the country. The expansion was 68.9% in Tocantins, 55.1% in Amazonas and 34.3% in Pará. The production from the three states was 1.6 million tons, representing an increase of 46.8% in relation to the previous harvest.<sup>29</sup>

This data has generated concern in Brazil and in other countries. According to researcher Écio Rodrigues, from the Federal University of Acre (Ufac), “The carbon from the destruction of the forest will not be recuperated by planting sugarcane. For this reason the world is very worried about the transformation of Brazil into a major exporter of biofuels.”<sup>30</sup> Pressured by criticisms from various sectors, the Brazilian government decided to create a zoning project for the expansion of sugarcane plantations. However, the government did not explain what it will do with current sugarcane plantations in the Amazon, Pantanal, and Cerrado.

### The expansion of sugarcane plantations in states located in the Amazon and Cerrado

**Acre:** The Álcool Verde plant planted more than 2,000 hectares of sugarcane along the BR-317 highway, and has plans to reach more than 30,000 hectares in the region, with the capacity of producing 3 million tons of sugar per harvest.<sup>31</sup> Álcool Verde predicts a production of 36 million liters of ethanol in the first harvest, and plans to increase its production of sugar fivefold by 2015.<sup>32</sup> Embrapa (Brazilian Institute for Agriculture Research) predicts that in the municipality of Capixaba, sugarcane production will increase tenfold by 2012. Currently, there are nearly 45 square kilometers of sugarcane in Capixaba, which is 70 kilometers from Rio Branco. Some see this as a strategic state, for it could serve as a bridge for ethanol exportation to the Pacific Ocean through the Transoceanic Highway, which connects Brazil and Peru.

**Amazonas:** CONAB estimates that the production of sugarcane in the state will increase from 273.1 thousand tons to 303 thousand tons between 2007-2008, representing an increase of 10.90%.<sup>34</sup> There is a plan for the production of ethanol at a company named Jayoro, which includes the cultivation of 60,000 hectares of sugarcane in regions of native forests.

**Goiás:** The sugarcane plantations occupy 339.2 thousand hectares. In 2005, the planted area was 174,756 hectares; in 2006 it rose to 256,998 hectares, which represents an increase of 47.06%. According to the Union for the Sugar Industry of the State of Goiás (Sifaeg), in the 2008/2009 harvest, there are 27 plants in operation, with a predicted increase to 55 plants by 2012. In total, there are 97 projects for new plants, with fiscal incentives approved by the state government.<sup>35</sup> The increase in the production of ethanol in this year's harvest will be 78%, producing 2.12 billion liters.<sup>36</sup> Besides the destruction of native vegetation, the sugarcane industry replaces areas of food production and cattle-raising, expanding the agricultural borders through the Amazon.

**Maranhão:** Data from IBGE indicate that between 2005-2006 the cultivation of sugarcane in the state increased by 20.93%.<sup>37</sup> In September of 2006, the state government created the Maranhão Program for the Production of Biofuel, which plans for the construction of 45 new plants, with estimates to produce between 4-7 billion liters of ethanol.<sup>38</sup> The government cites [as part of the program] the advantages of the facilities of the Port of Itaqui, and two railways, the Carajás railway, and the Railway Company of the Northeast. The first part of the project plans for the construction of 20 plants in five years, which would represent an expansion of 15% in the national production of ethanol. According to the governor of Maranhão, the state would be able to use 500,000 hectares for sugarcane plantations.<sup>39</sup>

**Mato Grosso:** Currently, there are 11 functioning plants in Mato Grosso. The sugarcane plantations occupy the regions of the Pantanal, the Cerrado, and the Amazon, an area of 214,511 hectares. In the last harvest, the plants processed around 16,750,000 tons of sugarcane, achieving a production of 538,139 tons of sugar and 844,395 m<sup>3</sup> of ethanol.<sup>40</sup>

The sugarcane harvest in 2008 should increase by 6%, and the plantations will occupy 216,037 hectares.<sup>41</sup> The Secretary of Planning hopes to triple the current 800 million liters of ethanol. According to Sindalcool-MT, expansion of sugarcane plantations by nearly 2 million hectares is anticipated around the municipality of Alto Taquari. A new plant will cultivate 35,000 hectares in the region beginning in 2009, with the capacity to process 3 million tons of sugarcane.<sup>42</sup>

**Mato Grosso do Sul:** CONAB estimates an increase of 51,000 hectares of sugarcane plantations in Mato Grosso do Sul in the 2007/2008 harvest, which signifies a 32% increase over the previous harvest which already included 160,000 hectares. Thus, the state will have 211.1 thousand hectares of sugarcane production.<sup>43</sup> There are nine plants installed in the state, and nearly 50 new projects, with solicitations for fiscal incentives, which may occupy up to 800,000 hectares in the next few years. This according to predictions from the state's Secretary for Agrarian Development.<sup>44</sup> In August of 2008, Governor Antré Pucicnelli affirmed that "Mato Grosso do Sul will be the world's biggest producer of ethanol in seven years."<sup>45</sup>

**Minas Gerais:** Data from CONAB indicate that the sugarcane harvest in 2008 will be 60.2 million tons. This quantity is 47% more than last year's harvest of 46 million tons. With this increase, the state becomes the second biggest producer of the country, with a planted area of 467 thousand hectares. The production of ethanol in Minas Gerais should be around 2.2 billion liters this year. According to the Union for the Sugar and Ethanol Industry, there are 36 plants functioning in the state. By 2012, the prediction is that there will be 52 plants with a production of 5.5 billion liters of ethanol.<sup>46</sup> The Secretary of Agriculture and Environment of the municipality of Luz, Dario Paulineli, describes the other impacts on the region: "Sugarcane has expanded rapidly in the last few years. Companies make contracts with farmers to rent their land, and the environmental impact is enormous. They apply toxins from planes which affects the populations of the cities. They destroy protected species of trees, plant sugarcane next to natural springs which feed the rivers, and they do not respect environmental impact studies. Many animals are dying with the devastation of the vegetation."

**Pará:** According to the Luiz de Queiroz Higher School of Agriculture (Esalq) of the University of São Paulo, Pará may dedicate 9 million hectares to the production of sugarcane, which would mean an increase of 136% in the production of ethanol in Brazil. CONAB estimates that Pará will harvest nearly 736,000 tons of sugarcane in the 2007/2008 harvest. The biggest part of the production (648.3 thousand tons) will be used for the production of ethanol, and only 36.8 thousand for the production of sugar. The Pagrisa plant, located in the municipality of Ulianópolis, has the biggest plantation in the state, with 11.6 thousand hectares, and produces 50 million liters of ethanol per year.<sup>47</sup> According to a communication from the Ministry of Foreign Relations, "It is with good reason that the era of biofuels has arrived full-force in Legal Amazonia. We have no doubts that Pará will have Brazil's most competitive platform for the exportation of ethanol, providing for huge profits for the investors."<sup>48</sup>



**Rondônia:** There are two projects for ethanol distilleries in the municipalities of Cerejeiras and Santa Luzia d'Oeste. There is another plant in the municipality of São Felipe, 530 kilometers from Porto Velho. According to Cléber Calixto, the mayor of Cerejeiras, “the city has extremely fertile land and will have an ethanol factory by April of 2009.”<sup>49</sup>

**Roraima:** There are two plant projects underway, with a prediction of cultivating sugarcane in an area of 90 square kilometers by 2009, with the first harvest being 3 million tons.<sup>50</sup> The governor of Roraima is giving incentives to this sector by offering exemption from the Tax on Circulation of Merchandise (ICMS) until 2018.<sup>51</sup> The Ministry of Industry and Commercial Development indicates that the eastern part of Roraima would be one of the principal areas for the expansion of sugarcane plantations.<sup>52</sup> Local politicians are pressuring the federal government to transfer public lands to come under the authority of the state. Congressman Francisco Rodrigues (DEM) said, “We are demanding from the Federal Government nearly 5 million hectares to implement development in Roraima.”<sup>53</sup> The Biocapital company began to plant seedlings and hopes to produce 6 million tons of sugarcane by 2014, which would serve as a base to process 530,000 liters of ethanol. The Camaçari Agroindustrial Company cultivated 200 hectares of seedlings on the São Sebastião farm, and plans to expand its production of seedlings by 1,000 hectares by August of 2009. The company was able to obtain 100% tax exemption, and anticipates producing 3 million tons of sugarcane by 2009.<sup>54</sup>

**Tocantins:** The Secretary of Agriculture, Cattle-raising and Provisions (Seagro) affirms that there are plans for 16 new plants to be installed in the state. According to the governor of Tocantins, the state would be able to use 650,000 hectares for the cultivation of sugarcane. The Bioenergética Brasileira Company has cleared an area for seedlings occupying 150 hectares, which will supply seedlings for a 10-year production. For the 2008 harvest, the area of cultivation reached 2.4 thousand hectares and the company plans to occupy 5,000 planted hectares. The prediction is to produce 2 million tons of sugarcane by 2014. Grupo Cucaú acquired an area of 1,300 hectares when it began production in 2006, with a harvest of 250,000 tons, and hopes to expand this to 500,000 tons.<sup>55</sup> Maity Bionergia is planning the construction of three ethanol distilleries, each with a process capacity of 2.4 million tons of sugarcane.<sup>56</sup> According to CONAB, there was an increase of almost 16% in the production of sugarcane in Tocantins, between 2007 and 2008. The harvest increased from 252,100 tons to 291,100 tons in the state.<sup>57</sup> In the harvest between 2006 and 2007, the biggest regional expansion was in Tocantins, where there was a 68.9% increase.<sup>58</sup>

#### The False Concept of “Degraded” Lands

According to the government, the expansion of sugarcane plantations happens on land that is “degraded,” and there are no impacts on the environment or on food production. The data given to justify this theory tries to support the idea that in Brazil there are millions of hectares of land that are simply “abandoned” or “marginal.” However, the government has yet to explain what exactly it means by “degraded land”. If there really is

such a thing, it would not make sense for companies and public banks to heavily invest in a sector in which there is no possibility to plant on level ground, of good quality land, with access to water and infrastructure.

Even when sugarcane production replaces other agricultural activities, or even cattle-raising, there is a much greater degree of devastation because large-scale sugarcane plantations do not thrive with other types of vegetation. If there really were so much land available in Brazil, there would not be the necessity for the size of the destruction of the Amazon Rainforest. Therefore, there is no logical reason to say that the expansion of sugarcane production does not exert additional pressure on preservation areas.

Official data indicates that there has been a great increase in cattle-raising in the Amazon, pushing for the expansion of the agricultural borders. According to IBGE, cattle-raising in the Amazon has practically doubled in the last ten years. The 2006 Farming Census showed that since 1996 the increase in agricultural expansion in the Northern Region was 275.5%. Between 1990 and 2006, there was an annual increase in soybean plantations of 18%, and an 11% increase in cattle-raising in the Amazon.<sup>59</sup> Between 2006 and 2007, the soy harvest in the Northern Region had a 20% increase.<sup>60</sup>

The strong pressures to push forward agricultural borders have created doubts about the ability to monitor the zoning laws for sugarcane production and the implementation of efficient punishment mechanisms in cases where the laws are broken. Sérgio Leitão, coordinator of Greenpeace in Brazil, explains that only 2% of those convicted of illegal cutting in the Amazon receive fines.<sup>61</sup>

Professor Antônio Thomaz Júnior of the Geography Department from the State University of São Paulo (Unesp) states that “No one has technical authority to say that there will not be impacts. Up until now, not one thorough study has been done concerning the consequences of expanding sugarcane plantations.”<sup>62</sup>

Congresswoman Rose de Freitas (PMDB-ES) is proposing a bill (number 2323/07) which plans to end financing and tax incentives for the production of ethanol in the Amazon, including the states of Acre, Amapá, Amazonas, Pará, Rondônia, Roraima and part of Mato Grosso, Tocantins and Maranhão. According to her, “The cultivation of sugarcane is extremely harmful because of the deforestation it can promote, and also through the practice of monocropping which, even in degraded areas, results in serious environmental damage.” For her, the zoning project proposed by the government, “not only will permit but also give incentives for planting sugarcane.”<sup>63</sup>

#### Health Risks for Workers and the Local Population

There is also a series of studies concerning the increase of environmental pollution in regions where there is the burning of sugarcane. One technical opinion from the Public Ministry of Labor of Mato Grosso do Sul, published on May 6, 2008, (REF:OF/PRT24<sup>a</sup>/GAB-HISN/N<sup>o</sup>134/2008) concluded that the burning of sugarcane “results in the formation of potentially toxic substances, like carbon dioxide, ammonia,

and methane, among others, with the fine material, containing particles smaller or equal to 10 micrometers (PM10) (particles that are able to be inhaled), being the pollutant that has the greatest toxicity and has been the most studied. The majority of it (94%) is made up of fine and ultrafine particles, that is, particles that affect the deepest portions of the respiratory system, crossing the epithelial barrier, reaching the pulmonary interstitium, and are responsible for the triggering of serious illnesses.”

The document sites diverse scientific studies, like those from Dr. Marcos Abdo Arbex, which “revealed that atmospheric pollution generated from burning sugarcane created a significant increase in hospital treatments for asthma.” Also other heart, artery and cerebrovascular illnesses were cited, both acute cases (increase in hospital stays and deaths due to arrhythmia, cerebral and myocardial ischaemia illness), and chronic cases due to long-term exposure (increase of mortality due to cerebrovascular and cardiac illness).”

In relation to social problems, the report highlights “the disregarding of worker legislation, and the intoxications of the workers through chemical products; workers' deaths through the inhalation of carcinogenic gases; the indices of respiratory problems, as the burning releases carbon gas, ozone, nitrogen, and sulfur (responsible for acid rain); and also undesirable soot released from burning dried sugarcane leafs (which contains carcinogenic substances).” The study concludes that “the data above shows evidence that exposing sugarcane cutters to particulate material generated from the process of burning sugarcane constituted an important risk factor to be considered in the analysis and association of the possible causes of sudden death of some of these workers.” And it adds, “The work conditions expose sugarcane cutters to pollutants that increase the potential risk of illnesses, principally, respiratory problems and lung cancer.”<sup>64</sup>

### Conclusion

A change in the energy source that may really look to preserve life of the planet would have to mean also a profound transformation in the current standards of consumption, in the concept of “development,” and in the very organization of our societies. To discuss new sources of energy, in the first place, is to think about whom these new energy sources will serve.

The agricultural model should be based on ecological systems and on diversification of production. It is urgent to rescue and increase the experiences of small, traditional farmers, beginning from respecting the diversity of the ecosystems. These are not simple solutions. Neither is it sufficient to only have changes in individual habits of consumers, like to buy another type of car, to change light bulbs, etc. The greatest responsibility for global warming lies exactly with large corporations that destroy the forests and pollute the environment—the same oil, automotive and agricultural companies, among others, who plan to profit from agroenergy. It is necessary to guarantee subsidy policies for the production of food that comes from small farms, and to strengthen rural social organizations that uphold a new model based on diversified production, in order to achieve food sovereignty.

## End Notes

- 1 This text was prepared with the help of Isidoro Revers, Marluce Melo and Plácido Júnior and was extracted from the report “Impactos da produção de cana no Cerrado e Amazônia” (“Impacts of the production of sugarcane in the Cerrado and the Amazon”), published by The Pastoral Land Commission and the Network for Social Justice and Human Rights. It was translated into English by Sheila Rutz, with the support of Global Exchange.
- 2 Maria Luisa Mendonça is the director of the Network for Social Justice and Human Rights.
- 3 *Seedling Magazine*, July, 2007, [www.grain.org/seedling](http://www.grain.org/seedling)
- 4 *Time Magazine*, April 14, 2008, *The Clean Energy Myth*.
- 5 *Science Magazine*, February 28, 2008 *Use of U.S. Cropland for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use change*.
- 6 Lusa, 09/01/2008, *Estudo da “Science” diz que etanol pode ser mais nocivo ao Ambiente do que a gasolina* (“Science” study says that ethanol can be more harmful to the Environment than gasoline), [www.ultimahora.publico.clx.pt/noticia](http://www.ultimahora.publico.clx.pt/noticia).
- 7 El País, *Biocombustíveis perdem o rótulo ecológico* (Biofuels lose their ecological label), 31/3/2008.
- 8 PrimaPagina, *Cana pressiona área de proteção no Cerrado* (Cane pressures protected area in the Cerrado), 09/04/2008, [http://www.pnud.org.br/meio\\_ambiente/reportagens/index.php?id01=2902&lay=mam](http://www.pnud.org.br/meio_ambiente/reportagens/index.php?id01=2902&lay=mam)
- 9 PrimaPagina, *Plantio ocupou, em 2007, 162 mil hectares do bioma que hoje o governo indica como áreas de conservação* (Planting occupied, in 2007, 162,000 hectares of the biome that the government today says are conservation areas), 08/04/2008.
- 10 O Estado de São Paulo, *Cana coloca em risco o cerrado brasileiro* (Cane puts the Brazilian Cerrado at Risk) 03/12/07, 01:54, <http://conexaotocantins.com.br/noticia/cana-coloca-em-risco-o-cerrado-brasileiro/926>
- 11 O Estado de S. Paulo, *Cana invade os pastos e expulsa os rebanhos* (Cane invades fields and drives out livestock), 15/04/07.
- 12 *Cana pode prejudicar meio ambiente e produção de alimentos* (Cane may harm the environment and food production), 03/04/2007, <http://www.reporterbrasil.com.br/exibe.php?id=984>
- 13 BBC Brasil, *Biocombustível causaria falta de água* (Biofuel could cause water shortage), 13/08/07.
- 14 National Academies Press, *Report Considers Impact of Ethanol Production on Water Resources*, 10/10/07 <http://www.nationalacademies.org/morenews/20071010.html>
- 15 Folha de São Paulo, 15/5/2008. “Inpe prevê desmatamento maior em 2008 (INPE anticipates greater deforestation in 2008)”.
- 16 Radioagência Notícias do Planalto, 03/06/08, *Amazônia sofre com crescimento acelerado do desmatamento* (Amazonia suffers from accelerated increase in deforestation).

17 Radioagência Notícias do Planalto, *Desmatamento na Amazônia registra alta no mês de junho* (Deforestation in Amazonia reaches record high in June), 29/07/08.

18 Adital – 15/02/08, *Amazônia devastada* (Amazonia devastated), article by Frei Betto.

19 Última Instância – 16/06/2008, *O Ministério Público e a expansão da atividade sucroalcooleira* (The Public Prosecutor and expansion of sugar-alcohol activity), article by Jefferson Aparecido Dias.

20 Folha de São Paulo, 01/07/2008, *“Brasil é líder total em desmatamento, mostra novo estudo”* (New study shows Brazil is the leader in deforestation)

21 REBRIP – Rede Brasileira pela Integração dos Povos, 28/1/1008, Press note. *Desmatamento na Amazônia revela insustentabilidade do modelo agroexportador* (Deforestation in Amazonia reveals unsustainability of the agri-exportation model).

22 Folha São Paulo, 2/7/2007. Interview/Lester Brown, *“Biocombustíveis são maior ameaça à diversidade na Terra”* (Biofuels are greatest threat to diversity on Earth), <http://www1.folha.uol.com.br/fsp/brasil/fc0207200721.htm>

23 Diário de Pernambuco, 10/07/2008, *Mais area pública na Amazônia* (More public area in Amazonia). [http://www.pernambuco.com/diario/2008/07/10/brasil10\\_0.asp](http://www.pernambuco.com/diario/2008/07/10/brasil10_0.asp)

24 O Estado de São Paulo – 6/6/2008, *Amazônia: 8,5% das terras tem posse ilegal* (Amazonia: 8.5% of lands held illegally).

25 Folha Online 27/06/2008, *País ignora o que ocorre em 14% da Amazônia, diz Incra* (Country ignores what happens in 14% of Amazonia, says INCRA).

26 Brasil de Fato, *Lula é o presidente companheiro dos grileiros da Amazônia* (Lula is the President-buddy of the Amazon grileiros), article by Ariovaldo Umbelino, 08/08/2008, <http://www.brasildefato.com.br/v01/agencia/analise/lula-e-o-presidente-companheiro-dos-grileiros-da-amazonia>

27 Adital – 11/02/08, *Amazônia, ecocídio anunciado*, (Amazonia, Ecocide Announced) article by Frei Betto.

28 [http://www.paranegocios.com.br/anterior\\_cont.asp?id=1670](http://www.paranegocios.com.br/anterior_cont.asp?id=1670)

29 Jornal Valor Econômico, 01/06/2006.

30 *Cana-de-açúcar avança na Amazônia com recursos públicos* (Sugar Cane Advances in Amazonia with public funds), 16/06/2008. <http://www.reporterbrasil.org.br/agrocombustiveis/clipping.php?id=25>

31 AGÊNCIA AMAZÔNIA, *Acre deve ampliar cultivo de cana para produzir etanol* (Acre to widen cane cultivation to produce ethanol). [http://www.jbrasilbiodiesel.com.br/index.php?option=com\\_content&task=view&id=192&Itemid=60](http://www.jbrasilbiodiesel.com.br/index.php?option=com_content&task=view&id=192&Itemid=60)

32 O Estado de São Paulo, *Usineiro paulista vai para o Acre* (Paulista sugar mill goes to Acre), 02/03/2007 [http://www.riosvivos.org.br/canal.php?canal=19&mat\\_id=10304](http://www.riosvivos.org.br/canal.php?canal=19&mat_id=10304)

33 Folha de São Paulo, *Embrapa relata expansão de cana na Amazônia* (EMBRAPA reports cane expansion in Amazonia), 1/6/08.

34 [http://www.paranegocios.com.br/anterior\\_cont.asp?id=1670](http://www.paranegocios.com.br/anterior_cont.asp?id=1670)

35 Jornal O Popular, *Estado tem 97 projetos aprovados para implantação ou expansão de usinas de álcool e açúcar* (State has 97 projects approved for startup or expansion of alcohol and sugar factories), 04/06/08.

36 Jornal O Popular. *Produção de álcool em usinas goianas vai crescer 78% este ano* (Alcohol production at Goiana plants to increase 78% this year).

37 Plantações de cana aumentam 20% no MA (MA cane fields increase by 20%), 5//2/06.  
<http://www.badaueonline.com.br/2006/2/5/Pagina6662.htm>

38 Maranhão lança projeto para produção de etanol (Maranhão begins ethanol production project), 04/09/2006, <http://www.unica.com.br/noticias/show.asp?nwsCode=%BF75855B0-0595-40CB-9DB7-78D4AB15E488%7D>

39 Radiobrás, *Maranhão terá programa de incentivo ao plantio de cana-de-açúcar para geração de energia* (Maranhão to have incentive program for planting sugar cane for energy production),  
<http://www.radiobras.gov.br/abrn/brasilagora/materia.phtml?materia=234630>

40 IBGE, <http://www.sidra.ibge.gov.br/bda/tabela/protabl.asp?z=t&o=1&i=P>

41 Jornal A Gazeta, *Mato Grosso terá a maior safra de cana este ano* (Mato Grosso will have the largest cane harvest this year), 11/3/08. [http://www2.afcop.com.br/boletim\\_informativo/2008/03/mato-grosso-tera-maior-safra-de-cana.html](http://www2.afcop.com.br/boletim_informativo/2008/03/mato-grosso-tera-maior-safra-de-cana.html)

42 Google News, *Cana-de-açúcar avança em Mato Grosso* (Sugar cane advances in Mato Grosso), 24/03/2008 – 19:20.

43 Correio do Estado, *Cana espalha-se por mais 51 mil hectares em MS* (Cane spreads by 51 thousand hectares in MS), 31/08/07.

44 Correio do Estado, *Cana inflaciona preço de terras no Mato Grosso do Sul* (Cane inflates land prices in Mato Grosso do Sul), 04/06/07.

45 Diário do MS, 23/08/08.

46 Agência Safras, *Minas Gerais colhe safra recorde em 2008* (Minas Gerais reaps record harvest in 2008), 11/09/08 16:10,  
[http://ultimosegundo.ig.com.br/economia/safra/2008/09/11/cana\\_de\\_acucar\\_minas\\_gerais\\_colhe\\_safra\\_recorde\\_em\\_2008\\_1768933.html](http://ultimosegundo.ig.com.br/economia/safra/2008/09/11/cana_de_acucar_minas_gerais_colhe_safra_recorde_em_2008_1768933.html)

47 [http://www.paranegocios.com.br/anterior\\_cont.asp?id=1670](http://www.paranegocios.com.br/anterior_cont.asp?id=1670)

48 Ministério das Relações Exteriores: Seleção Diária de Notícias Nacionais (Foreign Relations Ministry: Daily Selection of National News),  
[http://www.mre.gov.br/portugues/noticiario/nacional/selecao\\_detalhe3.asp?ID\\_RESENHA=361026](http://www.mre.gov.br/portugues/noticiario/nacional/selecao_detalhe3.asp?ID_RESENHA=361026)

49 Correio Braziliense, *Governo estuda limite para plantio da cana* (Government studies limit for cane planting), 27/8/07.

50 Folha de São Paulo, 1/6/08.

51 Radiobrás, *Roraima pode virar nova fronteira agrícola da cana-de-açúcar* (Roraima may become new sugar cane frontier), 11/09/2007 – 02h48min. <http://www.radiobras.gov.br>

52 Ministério do Desenvolvimento (Ministry of Development), *Governo incentiva plantio de cana na Amazonia* (Government offers incentives for cane planting in Amazonia), 28/09/07.  
Exterior [http://www.amazonia.desenvolvimento.gov.br/index.php?option=com\\_content&task=blogcategory&id=1&Itemid=59&limit=9&limitstart=9](http://www.amazonia.desenvolvimento.gov.br/index.php?option=com_content&task=blogcategory&id=1&Itemid=59&limit=9&limitstart=9)

53 <http://deputados-democratas.org.br/noticias/?nid=974>

- 54 Jornal Folha de Boa Vista, *65% do lavrado roraimense têm potencial para a cana-de-açúcar*, (65% of Roraimense land has potential for sugar cane), 28/01/08  
[http://www.folhabv.com.br/noticia.php?pageNum\\_editorias=28&editoria=cidades&id=34765](http://www.folhabv.com.br/noticia.php?pageNum_editorias=28&editoria=cidades&id=34765)
- 55 Government of Tocantins: *Usina de cana-de-açúcar fará primeira colheita em maio* (Sugar cane factory will make its first harvest in May) 10/4/06, article by Kelly Costa
- 56 Grupo sucroalcooleiro pode instalar destilaria no Tocantins (Sugar-Alcohol Group may set up distillery in Tocantins), 28/06/2006, <http://www.portaldoagronegocio.com.br/conteudo.php?id=14403>
- 57 [http://www.paranegocios.com.br/anterior\\_cont.asp?id=1670](http://www.paranegocios.com.br/anterior_cont.asp?id=1670)
- 58 SECOM TO, *Tocantins comprova vocação para a produção de cana-de-açúcar* (Tocantins shows a vocation for sugar cane production), 13/7/06.  
<http://portalamazonia.globo.com/noticias.php?idN=37147&idLingua=1>
- 59 Adital – 15/02/08, *Amazônia devastada* (Amazonia Devastated), article by Frei Betto.
- 60 Radioagencia Notícias do Planalto, 5/5/08.
- 61 Agência Brasil, *Cana e rebanho bovino impulsionam desmatamento na Amazônia* (Cane and cattle push deforestation in Amazonia). [http://www.malima.com.br/amazonia/blog\\_commento.asp?blog\\_id=55](http://www.malima.com.br/amazonia/blog_commento.asp?blog_id=55)
- 62 *Cana pode prejudicar meio ambiente e produção de alimentos* (Cane may harm the environment and food supply), 03/04/2007. <http://www.reporterbrasil.com.br/exibe.php?id=984>
- 63 Tribuna do Juruá, *Projeto proíbe incentivo à cana-de-açúcar na Amazonia* (Plan prohibits incentives for sugar cane in Amazonia), 29/7/2008  
[http://www.tribunadojuruá.com/index.php?option=com\\_content&task=view&id=561&Itemid=40](http://www.tribunadojuruá.com/index.php?option=com_content&task=view&id=561&Itemid=40)
- 64 Ministério Público do Trabalho, *Parecer técnico, Ref.:OF/PRT24<sup>a</sup>/GAB-HISN/No. 134/2008*. Authors: Sônia Corina Hess, Professor at the Federal University of Mato Grosso do Sul, and Heiler Ivens de Souza Natali, attorney in the Public Ministry of Labor of Mato Grosso do Sul, 06/05/2008.