# From Meals to Wheels:

## The Social & Ecological Catastrophe of Agrofuels

The only goal [of agrofuels] is to maintain current patterns of consumption in the First World and high rates of profit for multinational corporations. **MST (the Brazilian Landless Workers' Movement)**

"The stage is now set for direct competition for grain between the 800 million people who own automobiles, and the world's two billion poorest people." **Lester Brown**

"Biofuel is worse for the planet than petroleum." **George Monbiot**

"By offering financing to poor countries to produce ethanol from corn or any other kind of food, no tree will be left to defend humanity from climate change." **Fidel Castro**

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With concerns over energy security and global warming mounting, governments and industries have begun a headlong plunge towards the development of alternative energy sources including the use of plant biomass to make ethanol (from sugar and starch) and agrodiesel (from oils). Unfortunately, these agrofuels (or biofuels as they are euphemistically called) are not the panacea that we might have hoped for. In fact they are a recipe for global disaster.

Already, many countries have set goals for agrofuel production. Brazil is already producing 40% of transportation fuels from sugar cane ethanol and soya biodiesel. The European Union has mandated that 10% of transportation fuels be derived from plant biomass by 2020. In the United States, George Bush stated a goal of replacing 20% of U.S. transportation fuel with ethanol by 2017. China, Japan, India and other countries are also working towards fueling their burgeoning economies with agrofuels. The result of these mandated targets and goals is a very rapid growth of markets for agrofuel feedstocks and technologies, massive investments and discussions about international trade agreements.

Because the most energy rich plant feedstocks grow in (sub-)tropical climates, the expansion of agrofuel production for export is impacting (sub-)tropical agriculture and the people in (sub-)tropical countries most heavily. Land formerly used to produce food is increasingly being used to produce energy crops (sugar cane, maize, soya, palm oil, jatropha and others) for export to wealthy northern countries, more native forests are being cleared, and Indigenous Peoples and small farmers are being displaced from their traditional lands.

The rapid expansion of agrofuel production over the past few years is alarming and is driven by the financial interests of large corporations and the geopolitical interests of large countries like the US rather than a well thought out strategy for mitigating climate change and providing for the needs of people both north and south of the equator. It is critical that we recognize and put an end to this disaster in the making.

## 1) Agrofuels are not the answer to reducing carbon emissions.

When the entire lifecycle analysis is considered, agrofuels do not reduce carbon emissions as much as we hoped. Agrodiesel (from oils) and agroethanol (from sugars and starch) both involve large energy inputs to produce. A true measure of the savings achieved by switching from fossil to bio fuels must factor in all of these inputs. For example, growing corn requires tilling, manufacture, transport and application of fertilizers, herbicides and pesticides, harvesting, transporting raw biomass to a refinery, processing, which often involves burning coal, and transporting again to point of use. When all of these factors are included, the net savings is drastically reduced. The precise balance of these equations depends very much on what feedstock is being used, how far it must be transported and the farming and refinery techniques.

Even when forested areas are not cleared directly for agrofuel agriculture, the effect is the same. When available prime agricultural lands are used to grow agrofuel crops, food production is pushed to the margins and to the forest frontier where more land is cleared for food production. In the case of China, the reverse is happening: agricultural lands for food production are being preserved as such, pushing agrofuel monoculture into forested land.

## 2) Growing biomass for fuel diverts agricultural lands from food production, at a time when worldwide food reserves are already faltering and a large segment of the population is suffering from malnutrition.

In a 2007 Earth Policy Institute report on U.S. grain diversion for ethanol production, Lester Brown pointed out that in 2006, 16% of the US corn harvest was converted to ethanol. U.S. corn is fundamental both directly as food for people and indirectly as livestock feed worldwide. With a large portion of the harvest diverted to ethanol production, the price of food corn has already risen dramatically. Mexico, which relies on U.S. corn imports, experienced a 60% increase in tortilla prices, causing people to riot in the streets. More than 80 new ethanol refineries are under construction in the U.S. and in 2008, projections are that more than a third of U.S. corn will be used for ethanol rather than food. The consequences, especially for the world's hungry are staggering. This diversion of food for fuel comes at a time when, according to United Nations, as many as 18,000 people (mostly children) die every day from starvation. Eric Holthusen, a senior official with oil giant Shell, agreed, describing the use of food crops to make fuel while people are starving "morally inappropriate."

Declining agricultural productivity is also likely in the future due to the increasing severity of droughts resulting from global warming. South African countries like Zambia and Malawi, for example, are producing biodiesel (from Jatropha) for export, while they are unable to feed their populations and depend on external food aid. Food aid is becoming less available as competition for grain for agrofuel production increases.

China recently scaled back grain ethanol production in recognition of the conflicting need to feed a large population. In that country, arable land has shrunk by 8 million hectares between 1999 and 2005 from desertification. However, China's alternative plan to fuel a very rapidly growing number of automobiles, is to convert 13.3 million hectares of sensitive native forest land into monoculture plantation of jatropha and oilpalm for biodiesel.

If the U.S. were to divert its' entire annual corn and soy harvest into agrofuel production, the resulting agrofuel would replace only about 3% of the current annual U.S. fossil fuel demand. The impact on food supply, however, would be catastrophic. Feeding the world's population rather than fueling excessive automobile use in the north must be the priority for agriculture.

## 3) Agrofuel demand is primarily in the rich countries of the north, while the most productive agrofuel crops are grown in the tropical South. People in the developing southern countries are losing their agricultural lands and forest resources as industrial agrofuel production encroaches on their lands.

Soy production is responsible for more deforestation in the Amazon than logging or cattle ranching, and demand for biodiesel is increasing the pressure to clear more land for soy. As a result, pressure on Indigenous Peoples is mounting. In Brazil's Atlantic Forest state of Mato Grosso, the remaining 420 or so Enawe Nawe Indians declare that "soya is killing us", as their traditional forested lands have been converted to soy plantations.

Also in Brazil, desperately poor migrant workers travel to towns like Palmares Paulista where they work in miserable conditions virtually as slaves to the cane plantation owners. Many have died from exhaustion in the camps.

In Argentina, Some 150 Ava Guarani families now live on just two hectares of flood-prone lands, while the Tabacal

mill uses one million hectares to produce sugar cane on indigenous territories. Their resistance has been met with indifference.

In Ecuador. The Awa live in the last remaining large tract of coastal lowland rainforest, part of the Chaco area biodiversity "hotspot". They have lived peaceably with neighboring Afro-Ecuadorian peoples until recent pressures from logging and palm oil plantation companies have claimed much of the indigenous lands. Ecuador is the second largest producer of agrodiesel in Latin America, and intends to increase production over 50% in the next 5 years.

In Colombia, paramilitary operations,(backed by U.S.) have displaced Afro-Columbian communities (Narino Province) to clear the way for large oil palm plantations on their land.

In Paraguay, it is expected that soy production will increase from the current 2.4 million to more than 4 million hectares due to the current agrofuel boom and rapidly rising agrocultural commodity prices. This has caused mass exodus from rural communities as large scale soya monocultures, with their attendant agrochemicals take over. People move to the edges of urban centers and over half the population lives in poverty, often extreme. Here too, soy expansion is threatening Indigenous Peoples, including as yet uncontacted tribes of Ayoreo people in the Chaco region.

In Indonesia and Malaysia, conflicts between oil palm plantation developers and indigenous people including the Dayak, Penan and Iban are common and violent, often involving the military. According to one analysis from 2001, close to 500 people were tortured, some killed, and many more injured, arrested and terrorized while attempting to defend community land rights.

As in Brazil, workers on Asian palm oil plantations, often children, are virtually slaves, working in miserable conditions for about $US1.60-$1.80 per day, below minimum wage standards with no access to health care, education or basic rights.

In India and many other countries, pastoralists peoples are being threatened as their lands are being classified as "degraded" lands and subsequently destined for large-scale agrofuel plantations.

In general, the impacts of agrofuel monocultures are particularly negative for Indigenous Peoples and women, as they are more dependent upon access to biologically diverse ecosystems like forests and grasslands for their daily survival, while they are marginalized and discriminated against in the paid labour and monetary economy that these monocultures bring.

## 4) Growing biomass for energy requires massive amounts of tilling, fertilizer, pesticide and herbicide use, all of which are bad for the environment, the climate and people.

Tilling soil causes the release of carbon that is normally stored by soil microorganisms. This is more dramatic in (but not limited to) tropical soils, and increases with the addition of fertilizers. The use of nitrogenous fertilizers in agriculture has caused a doubling of available nitrates in the biosphere. This has had disastrous consequences, causing large "dead zones" in marine ecosystems and the eutrophication of lakes and waterways. Excessive nitrogen from agricultural runoff is considered one of the greatest threats to marine ecosystems worldwide. Nitrous oxide is

310 times more effective as a greenhouse gas than carbon dioxide and takes much longer (around 120 years) than CO2, to break down in the atmosphere.

Crops used for agrofuels like corn and soya, are treated heavily with herbicides and pesticides which are toxic to beneficial insects and weeds as well. GE varieties are "designed" for repeated and extensive use of herbicides like Roundup (glyphosate) which is a common cause of poisoning for agricultural workers. Roundup also poisons waterways and is lethal to many amphibians, encourages resistant strains of weeds and destroys native and beneficial plants growing adjacent to sprayed areas. Growing "Roundup Ready" crops for agrofuels will result in more use herbicides and pesticides.

Paraquat, a highly toxic insecticide that has been banned in many countries, is used on oil palm and soya. It is a persistent toxin, builds up in soils,and can be fatal if inhaled, ingested or absorbed through the skin. Its effects are irreversible. Agricultural workers, often women, are exposed daily and many workers have died from poisoning. Pesticide runoff enters and contaminates waterways.

## 5) Competition for increasingly precious water resources.

Fresh water resources have already been dangerously depleted in many parts of the world, and climate change models predict that some areas will experience increasing droughts and desertification. Crops grown for agrofuels in areas without ample rainfall, draw down water reserves and leave less water available for other uses. It is therefore extremely unwise to develop an energy policy dependent on ample water supplies. Diverting huge amounts of remaining freshwater reserves into agrofuel plantations would be disastrous.

The World Bank estimates that demand for fresh water in India will exceed all supply by 2050. Yet, in the state of Maharashtra, for example, farmers are scrambling to grow more cane to take advantage of the high prices even though existing plantations already take two- thirds of the state's water and have lowered water tables by up to 50 meters in places.

In China, the worlds' third largest producer of ethanol, over 400 cities are currently facing water shortages, and large areas of land have already experienced desertification. Demand for water is growing along with the economy. Eliminating native forests for agrofuel plantations will only increase competition for water, and ultimately impact food resources.

## 6) Deforestation, monoculture plantations and loss of biodiversity.

Agrofuel markets are driving the destruction of native forests to make way for monoculture plantations of fuel crops like sugar cane, oil palm, soya, eucalypt and jatropha. This eliminates the current and future carbon storage potential of native forests and is further contributing to the loss of biodiversity. Monoculture plantations are biological deserts that do not provide habitat for native species.

In Brazil, 6 million hectares are currently under sugar cane production, and the National Agroenergy Plan has classified an additional 200 million hectares as "degraded" and therefore available for expansion of agrofuel production. Many of these lands classified as "degraded" are in fact used for subsistence farming or cattle ranching, and the expansion of sugar cane will lead to an expansion of cattle ranching into primary forests. One hectare of land may save 13 tons of CO2 emission if it is used to grow sugar cane for ethanol, but that same hectare can absorb 20 tons of CO2 if it remains forested. If sugarcane and soy plantations continue to spur deforestation, both in the Amazon and in Brazil's Atlantic coastal forests, any climate advantage is more than outweighed by the loss of the forest.

Already a large portion of the "Cerrado", a unique, biodiverse ecosystem, has been converted to cane plantations. Large areas of forest are currently being cleared for soya production, with the rate of deforestation directly linked to the price of soya. Forested areas are often first burned off, releasing all of the carbon stored in the forest biomass. Brazil expects to triple ethanol production in the next 7 years. In Argentina, more than 500,000 hectares of forested land were converted to soya agriculture between 1998 and 2002. In Nicaragua, an area of 200,000 hectares of land within the Region Autonoma del Atlantico Norte (RAAN), is slated for development of monoculture plantations of palm oil for biodiesel.

In Asia, particularly Indonesia and Malaysia, oil palm plantations, partly for agrofuel production, have expanded at alarming rates, devastating forests and peatlands alike, pushing already threatened populations of orangutans, rhinoceros, tigers and many other indigenous animals to the brink of extinction.

In Brazil, sugar cane is a fast growing, low labor feedstock, and the waste byproducts are burned to fuel the refineries, making it a relatively efficient process. In the U.S., corn is used as feedstock. Corn requires much more input to produce, and thus far refineries are fueled with coal, making corn ethanol very inefficient. In some cases, per unit of energy, agrofuels produce more carbon than fossil fuels.

The net carbon release from producing agrofuels is drastically and dangerously increased when native forests are first cleared to make way for monoculture energy crops, as this releases the stored carbon in the forest biomass and eliminates future storage potential. For example, Southeast Asian peat forests are the earth's largest carbon storage ecosystems, and are being cleared and burned for palmoil planting. As a result, 2 billion tons of CO2, equivalent to 8% of the global annual total of fossil fuel emissions are released from this area which accounts for only 0.2% of the earth's surface area. This has made Indonesia the third largest emitter of CO2 in the world, topped only by the U.S. and China, even though much of the population lives in poverty, and the palm oil is exported to Europe.

## 7) The rush to develop agrofuel technologies is hastening the introduction of poorly considered GE (genetically engineered) and "synthetic biology" solutions.

Biotechnology and agribusiness industries are eager to capitalize on agrofuels. Already, they are promoting and profiting tremendously from the use of herbicide tolerant varieties of soy, corn and oilseed rape.

Growers must purchase seed and sprays from companies like Monsanto, Syngenta Bayer and DuPont. Varieties of maize, cassava and other crops normally used for food are now being engineered specifically for agrofuel production. Cross contamination with food crops is virtually inevitable given the record for GE contamination of food crops to date.

Technologies for deriving ethanol from cellulose rich feedstocks like wood (poplar, willow, eucalyptus), switchgrass, or agricultural byproducts are being pursued aggressively, including GE and synthetic microbes. At first glance cellulosic technologies may seem appealing since potentially more energy can be extracted and competition between food and fuel use is avoided. However, the technologies are not yet available, are not likely to be available on the time scale needed to mitigate climate change and will lead to deforestation for monoculture plantations of GE trees.

Biotechnology industries are now working to develop GE trees that will grow more rapidly, produce less lignin (the material that provides rigid structure), or grow in poor conditions. Trees are long-lived and undergo various metabolic changes during their lifespan. Controlling the expression of genes is therefore more difficult than in annual crops.

Additionally, trees spread their pollen and seeds very widely, often hundreds of miles. Cross contamination between GE trees and native forest varieties is virtually inevitable and the consequences could be disastrous to forest ecosystems. Replacing native forests with monoculture plantations of genetically engineered trees will result in biologica deserts devoid of wildlife.

Industries that stand to profit are pushing genetically engineered agrofuel crops, capitalizing on the fact that 1) agrofuel crops are not intended for human consumption, and thus resistance to GE agrofuel crops may be less intense, and 2) there is very strong support for measures perceived to be countering global climate change. They are banking on the notion that this may clear the path to testing and commercialization of GE agrofuel crops, enzymes and trees.

## Conclusions

The wealthy countries of the north consume a vastly disproportionate share of the world's energy supplies and are most responsible for damage to the global climate. Yet developing countries in the south will likely suffer more from the effects of climate change. The rapid and heedless charge to develop markets for agrofuel feedstocks will result in further degradation of lands and water and loss of food sovereignty for people in the south as their lands are put to the task of growing fuel for automobiles. Standards and certification systems will not be able to secure sustainability in the agrofuel sector, as they are unable to deal with the numerous indirect effects of rapidly rising agricultural commodity prices caused by large-scale agrofuel production.

Instead, we must call upon wealthy nations to reduce consumption of energy through strict and extensive conservation measures, and to develop more benign energy alternatives, such as solar, wind and geothermal. Biomass has always been an important source of energy for the world's rural poor, especially for women, and it will continue to have a place in the world's energy future, but only on a small local scale, certainly not as a "replacement" for the current fossil fuel regime

## For further information, visit the following:

Biofuelwatch
www.biofuelwatch.org.uk

World Rainforest Movement
www.wrm.org.uy

Wetlands International
www.wetlands.org

Massive diversion of U.S. grain to fuel cars is raising world food prices, by Lester Brown, Earth Policy Institute
www.energybulletin.net/27762.html

Disaster In The Making: A Statement on Biofuels from the Global Forest Coalition
www.energybulletin.net/21845.html

The Landless Workers Movement of Brazil (MST)
www.mst.org.br

Global Forest Coalition
www.globalforestcoalition.org

Global Justice Ecology Project
www.globaljusticeecology.org