AMERICA: BURNING FOOD AS AUTO FUEL

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The Disastrous Local and Global Impacts of Tropical Biofuel Production

By Lucas J. Patzek and Tad W. Patzek

Last November, Patricia A. Woertz, the CEO and president of Archer Daniels Midland, outlined a new growth strategy for the food-processing giant. ADM, America's biggest producer of corn ethanol, will expand its biofuel production, moving into Brazilian sugarcane for ethanol and Indonesian palm oil for biodiesel.

Woertz, a former high-ranking official at Chevron, said ADM will get "long-term growth and returns by capitalizing on our global strengths and the changing dynamics of the global energy and food markets."

As ADM, one of the world's largest food companies, seeks to increase profits, the continuing push into the tropics by it and other biofuel producers will only accelerate a potential ecological catastrophe. Vast tracts of Malaysian and Indonesian forest have already been lost, and the increasing demand for palm oil for biodiesel will cause further losses of tropical forests in these and other equatorial countries.

This deforestation will likely be devastating. And yet, despite the global push for biofuels, the potential damage – increased soil erosion, huge carbon dioxide emissions, biodiversity loss, and desertification – is largely being ignored.

Here in the U.S. there has already been ample discussion about biofuels in Brazil, so let us concentrate on Indonesia and the oil palm.

The oil palm (Elaeis) is the most productive oil crop in the world, with an average annual yield of 3 to 4 tons of crude palm oil per hectare for major producer countries. While the soybean is currently the world's leading source of vegetable oil, with 30 percent of global vegetable oil consumption in 2004, the oil palm is a close second with 29 percent of the market. The fruit of the oil palm consists of a kernel (seed) within a hard shell that is surrounded by a fleshy pulp, the mesocarp. Commercial palm oil is derived from this mesocarp. The palm kernel oil is different. These two oils have distinct fatty acid compositions and hence differing uses. Palm oil is an even 50/50 split between saturated and unsaturated fat, while palm kernel oil's saturated/unsaturated ratio is 82/18. After oil from the kernal is extracted, a proteinaceous residue remains, palm kernel cake, which is a valuable animal feed.

Traditionally, about 80 percent of palm oil is for edible use. Common food products made from palm oil and palm kernel oil include cooking oils, shortenings, vegetable ghee, margarines and spreads, and confectionery and non-dairy products. Palm oil has several properties that contribute to a long shelf life for end products: it is resistant to oxidative deterioration, suffers lower polymer formation, and has vitamin E as a natural antioxidant. The oil, therefore, is particularly suitable for use in hot climates and as a frying fat in the snack and fast food industry. As for its non-edible use, it is a good raw material for producing oleochemicals, fatty acids, fatty alcohols, glycerol, and other derivatives for the manufacture of cosmetics, pharmaceuticals, bactericides, and other household and industrial products.

Palm Oil Fruit photo by M.J. Silvius

Demand in the 18th century persuaded Europeans to plant oil palm plantations. The first large plantation was established in Indonesia around 1911, and can be traced back to four seedlings planted at Bogor Botanical Garden. From these seedlings the Deli dura (thick-shelled) palms developed, with better fruit composition and a larger proportion of mesocarp than in African palms. Southeast Asia, and specifically Malaysia, has dominated the industry ever since. Malaysia and Indonesia together currently account for 86 percent of global palm oil production and 91 percent of its global exports. Malaysia produces 42 percent and remains the leading exporter with 48 percent of the world market. Indonesia produces 44 percent of the world's palm oil and is a close second in exports, with 43 percent of the market.

Indonesia is a far larger country than Malaysia with a correspondingly larger work force, and the expectation is that Indonesia will eventually surpass Malaysia as an exporter. As long as there is political and economic stability, Indonesia will remain the largest producer in the world.

The present success of the oil palm industry in these two countries can be attributed to their favorable climatic conditions, well-established infrastructure, and an unsurpassed knowledge base, both in the oil's actual production and in its upstream and downstream industries. Oil palm plantations are being established at a rapid rate in several other Southeast Asian nations, including Thailand, the Philippines, and Papua New Guinea. However, by far the largest developments are found in Indonesia. These developments are chiefly funded by Malaysians, although China, Europe, and the U.S. are also key players.

Burning Peat Swamp photo by M.J. Silvius

The attention given to biodiesel by the U.S. and E.U. governments has spurred the demand for palm oil for biodiesel. The E.U. recently ordered that 5.75 percent of all vehicle fuels come from renewable sources. The U.S. Internal Revenue Service has deemed oil palm as a feedstock for biodiesel, and therefore it is eligible for the biodiesel tax credit of a penny per percent of biodiesel blended with petroleum diesel. These moves by the world's biggest motor fuel markets have led to a surge of investment in Malaysian and Indonesian palm oil plantations. Indonesia's largest plantation company, PT Astra Agro Lestari, has seen its shares jump by about 80 percent over the past year.

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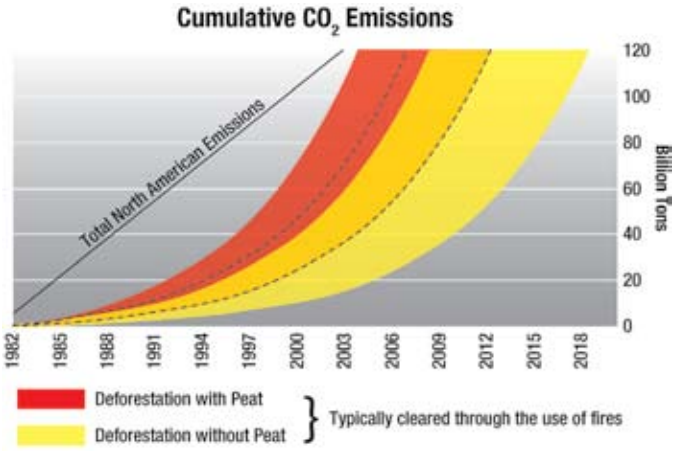
In Indonesia, the oil palm plantations are owned and operated by many of the same companies that operate logging, wood-processing, and pulp industries. (The Salim Group, the Raja Garuda Mas Group, and the Sinar Mas Group are all prime examples.) A natural result of this conjoining has been an increase in illegal and damaging land use. A company with a plantation concession may only be interested in the land's timber. The trees will be cut down and hauled away, no replanting effort will ensue, and the land will be left deforested and degraded.

Companies commonly set fires to clear land for plantations. Besides being illegal in many countries, including Indonesia, the fires are hard to control and spread easily to affect adjacent forests and communities. In 1997 and 1998 fires raged through 6 percent of Indonesia, burning 11.7 million hectares of land. The majority of the fires occurred on plantation company land, and three-quarters were oil palm plantations. The government accused 176 companies of starting these fires, of which 133 were oil palm plantation companies. Just 5 companies were actually taken to court and only one was penalized.

The widespread tropical forest and peat fires in Indonesia during 1997, combined with the fires in Central and South America and in the boreal regions of Eurasia and North America, emitted 7.7 billion tons of carbon dioxide. The cumulative emissions from these forest fires rival the world's total anthropogenic emissions. Tropical forest and peat burning in Indonesia has continued unabated. And these oil palm plantations can never sequester back the carbon dioxide that is released in forest and peat burning.

The results of all this forest clearing can be seen by looking at Indonesia's carbon dioxide emissions. Indonesia is now the third-leading producer of carbon emissions after the U.S. and China, according to a recent study done by two Dutch entities, Wetlands International, a non-profit agency, and Delft Hydraulics, a consulting firm. The study also found that degraded peatlands in Southeast Asia produce some two billion tons of carbon "which is equivalent to almost 8 percent of the total carbon dioxide emissions from fossil fuels." It goes on to say that these carbon emissions are a "major obstacle to meeting the aim of stabilizing greenhouse gas emissions."



Beyond the problems that arise from forest clearing, the replacement of primary forest with a monoculture plantation is disastrous for biodiversity. A 1969 study showed that primary forests in the tropics contain 75 mammalian species, while disturbed forest, oil palm and rubber plantations, and scrubland contain only 32, 13, and 11 respectively. Naturally, plant diversity is more severely affected by the plantations. Since oil palm plantations can only be established in equatorial countries, the most biologically diverse in the world, these issues hold particular weight. An examination of Indonesia will put this into context. Although Indonesia occupies 1.3 percent of the earth's land surface, it is home to 11 percent of the earth's plant species, 10 percent of its mammal species, and 16 percent of its bird species.

Following deforestation and the subsequent conversion to agriculture, soil erosion on steep mountain slopes in Indonesia can be 30 times higher than the nominal soil erosion in U.S. agriculture, 10 tons per hectare.

It is the sheer scale of the deforestation in many equatorial nations that is most worrisome. Indonesia again is a prime example. Forty percent of the forests extant in 1950 were cleared in the subsequent 50 years. (In 1950 there were 162 million hectares of forest, and in 2000 there were 98 million hectares.) The island of Borneo has lost 80 percent of its primary forest in the last 20 years. Official Indonesian statistics state that up to 2.4 million hectares of forest are leveled each year. Since in the 1980s the average was 1 million hectares per year, it is clear that the rate of forest loss is skyrocketing. Deforestation continues to be an immense problem – and the recent biofuel fervor has only made it worse.

One of the major benefits touted by plantation companies is their substantial generation of employment, especially in rural areas, which in turn drives rural development. Since oil palm plantations are currently less mechanized than other types, they require a larger labor pool. For example, oil palm plantations employ about 1 person per 10 hectares. In comparison, the larger soy plantations in Brazil employ an average of 1 worker per 200 hectares. A 20,000 hectare oil palm plantation would thus employ 2,000 people, while the same size soybean plantation would only employ 200.

It is possible, however, that such claims of increased employment are a disingenuous measure for community improvement. Oil palm plantations, like all other tropical plantations, exist in the world's most biologically diverse terrestrial regions, ones that have supported human communities for a long time. In fact, human beings are tropical animals who originated from these regions, so it is safe to say that as a species we have more experience creating a livelihood from tropical forests than from any other habitat. The loss of these forests to giant monoculture plantations creates a previously non-existent dependency on external factors. A local community may no longer be self-sufficient, for instance having plentiful quantities of local fruits, vegetables, bushmeat, and lumber, and find themselves at the mercy of market forces to provide work and wages, imported foodstuffs, and housing materials. As circumstance has shown, this pattern of stripping away a community's once viable subsistence lifestyle and replacing it with an alien wage-based existence is detrimental and debilitating.

Communities once considered poor by Western standards often become utterly impoverished by their forced dependence on a market economy, which holds no real niche for them other than as cheap labor. There are factors beyond a mere sustenance autonomy that must be considered as contributing to a quality of life. One must also take into account a people's ancient cultural and spiritual ties, as well as their legal rights to their land.

Source data for graph: *Impact of oil palm plantation estabishment on greenhouse gas balance* by Germer, J. and Sauerborn, J.