The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

# Palm Oil -- The Southeast Asia Report

Posted by Dave Cohen on January 30, 2007 - 7:15pm
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In an effort to broaden our coverage at The Oil Drum, this Southeast Asia report focuses on the tragic consequences of cultivating palm oil (mongabay.com) to produce biodiesel fuel.

*Palm Oil plantation in Indonesia. Fires in background.*
*Source: rainforestweb.org*

It is a sad story in which the cure is sometimes worse than the disease. When you see the magic ❗, please pay close attention.

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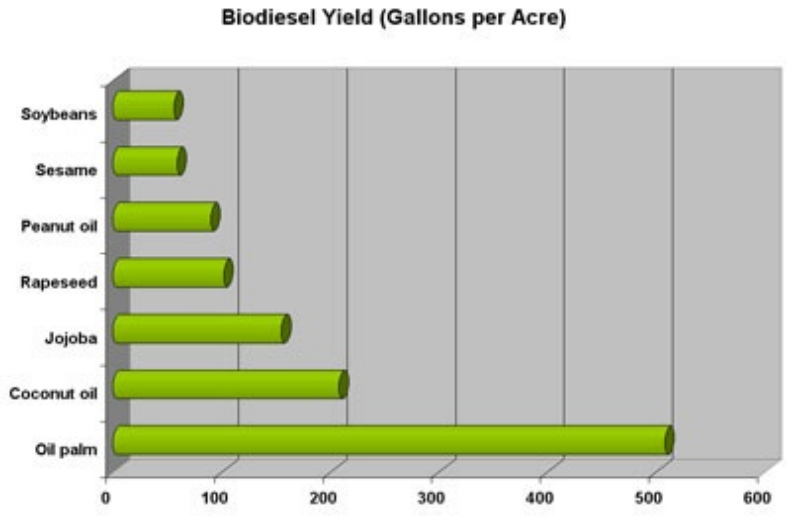
The two largest producers of palm oil are Malaysia and Indonesia. The oil palm grown in southeast Asia, *Elaeis guineensis*, is actually native to tropical Africa. Along with soybean oil, palm oil is a major world commodity. And, just like soybean oil, great plans are afoot to use the crops for biofuels. Here's what the article cited at top has to say —

> So, why is it that oil-palm plantations now cover millions of hectares across Malaysia, Indonesia, and Thailand? Why has oil palm become the world's number one fruit crop, trouncing its nearest competitor, the humble banana?
>
> The answer lies in the crop's unparalleled productivity. Simply put, oil palm is the most productive oil seed in the world. A single hectare of oil palm may yield 5,000 kilograms of crude oil, or nearly 6,000 liters of crude according to data from JourneytoForever [comparative vegetable oil yields per hectare]. For comparison, soybeans and corn —crops often heralded as top biofuel sources—generate only 446 and 172 liters per

hectare, respectively.

Beyond biofuel, the crop is used for a myriad of purposes from an ingredient in food products to engine lubricants to a base for cosmetics. Palm oil is becoming an increasingly important agricultural product for tropical countries around the world, especially as crude oil prices top $70 a barrel. Beyond biofuel, the crop is used for a myriad of purposes from an ingredient in food products to engine lubricants to a base for cosmetics. Palm oil is becoming an increasingly important agricultural product for tropical countries around the world, especially as crude oil prices top $70 a barrel [written in April, 2006].




*Comparative gallons/acre — Source: Mongabay*
*Figure 1*

Some here at TOD will want to know the net energy yield of palm oil. There is little real information, although the EROEI for biodiesel is generally favorable. Some interesting remarks are available at biofuelwatch.

What we know is that, on average, biofuel crops grown in the tropics yield about five times as much energy as those grown in temperate zones.

Corn produces 145 kg of oil per hectare per year, sunflowers 800 and rapeseed 1000.

The tropical jatropha produces 1590 kg of oil per hectare per year, oil palms a full 5000.

This explains why, in a free market, we will have to rely more and more on imports from the tropics - even if were able to meet the official targets from European and US soils (which is, of course, questionable): our crops simply cannot compete with tropical ones.

There is very little scientific information about growing biofuels in the tropics, except for basic data on energy balance (i.e. energy input compared to energy yields). The life-cycle assessments which have been done for biodiesel and bioethanol in the US and Europe will not apply to the tropics:

1. A much higher energy and oil content from tropical crops means that the energy

> balance will be more positive for, say, jatropha or palm oil than it is for, say, rapeseed oil....

Please read this resource for additional details.

Pressures to expand palm oil production to grow biofuels have added "fuel to the fire", so to speak. Here are the major issues covered below.

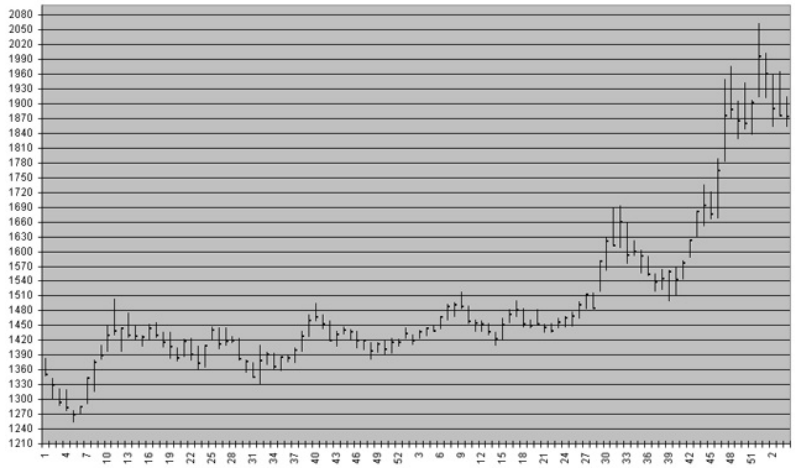
- Food versus Fuel, rising commodity prices
- Destruction of rainforests, peat forests, $CO_2$ emissions
- Unsustainable monocultural agriculture

These issues are summed up nicely in two news stories. First, there is Alternative-energy boom roils Asian environments — originally from WSJ online, December 5, 2006 — and Concern for rainforest forces RWE to scrap palm oil project from the UK's Times Online. From the latter —

> A leading German utility has abandoned plans to convert a British power station to run on palm oil, in a blow to the promotion of biofuels in Europe...
>
> Widely used in processed foods, such as margarine, and in cosmetics, palm oil is burning bright on commodity exchanges. The price in Rotterdam soared to an eight-year high last week of $620 per tonne...
>
> The Indonesian Government has signalled that 40 per cent of its palm oil crop will be designated for biofuel production in an attempt to reduce the country's reliance on crude oil.
>
> RWE npower had hoped that palm oil would produce electricity in a carbon-neutral process that would not add to greenhouse gas emissions.
>
> According to a spokesman for RWE npower, the process works but the company was unable to guarantee that enough palm oil could be bought from sustainable plantations.
>
> "There wasn't enough palm oil that we could demonstrate was sustainable," the spokesman said. "The bottom line is: are you contributing to global warming by chopping down rainforest?" The company hired independent auditors to establish whether palm plantations in Malaysia could be accredited to standards set by the Round Table on Sustainable Palm Oil, an organisation committed to promoting a sustainable palm oil industry....

## Palm Oil Economics

As of January 29, 2007, the crude palm oil price for February delivery on the Bursa Malaysia Derivatives exchange was 1899 MYR/ton, where MRY abbreviates *Malaysian Ringgit*. The ringgit/dollar exchange rate is 3.50 : 1 — so the front month price is ≅ $543/ton, down from a Christmas spot (cash) price high of over $600/ton. *Figure 2* shows the two-year trend.



*Crude Palm Oil (CPO) prices, 2005 — 2006*
*Figure 2 — Click to enlarge*

With rising CPO demand due to additional pressure on supply for biofuels, the upward price trend shown in *Figure 2* is the expected outcome. Naturally, there are predictions that the CPO price will continue to rise.

> Crude palm oil price in 2007 will likely rise on account of a high demand for the commodity in the world market when all the while its production capacity is not on par with the demand, an official said.
>
> The possible high demand for CPO this year may come from India and China as well as European countries, Indonesian Oil Palm Businessmen Association (GAPKI) executive chairman Derom Bangun said here Tuesday.
>
> "Today, in some countries CPO has not only become raw material in food industry but also in biofuel producing sector," he said.
>
> He predicted Indonesia would produce 16.4 million tons of CPO in 2007 and the demand for the commodity may be greater than the production.

The higher prices are not without harmful effects on poor consumers. In the suspiciously titled article Food or fuel? The world has enough for both by Naveen Thukral and Sambit Mohanty, we learn what is happening.

> "There is no shortage of edible oil at the moment but prices have been driven higher by this talk of biofuels," M.R. Chandran, an independent industry analyst and a former head of the Malaysian Palm Oil Association, told Reuters.
>
> "It has already made palm oil out of reach for many people in India and China where purchasing power is less," he told the Reuters Global Biofuels Summit...
>
> "*I would think that there is enough palm oil in the world which can be used for biofuels and you could also have enough left over for the food industry," said a leading commodity trader who attended the Reuters Summit in Singapore.* ❗

It is good to know that we can have biodiesel from palm oil and, as a bonus, there will be enough left over for food, not to mention lipstick. Furthermore, the competitiveness of the palm oil biofuels industry depends on the conventional oil price, which is now comparatively low.

> Industry experts said spiraling prices of vegetable oils against a backdrop of declining petroleum prices could weaken the competitive footing for the biofuel industry and slow expansion, freeing up availability for edible oils for the food sector.

At the current price quoted above, CPO costs about $74/barrel (using the standard conventional oil conversion 1 ton = 7.3 barrels). However, future prices could also fall if a lot more land is converted to palm oil plantations. Alternatively, the conventional oil price could rise enough to make palm oil competitive, even without subsidies. At this time, however, the price balance does not appear favorable for biofuels derived from palm oil. That could change quickly and many are betting that it will — back in July of 2006, conventional crude was $74/barrel and palm oil was going for $58/barrel.

The situation is complicated by Indonesian fuel subsidies. From the Christian Monitor's Faced with soaring oil prices, Indonesia turns to biodiesel —

> The dampening effect of the high cost of CPO on private investment in biodiesel in Indonesia [in July, 2006] is compounded by the low price of regular diesel sold in the country. Billions of dollars in government subsidies offset the high price of fuel bought overseas. Indonesian consumers buy some of the cheapest petrol in the world - around 50 cents per liter ($1.90 per gallon) for gasoline and diesel.
>
> Indeed, the rising cost of fuel subsidies is what is spurring government interest in biodiesel.
>
> "The government is looking for alternatives a lot right now," says Tara Khaira, a manager at EcoSecurities, a developer and trader of carbon credits on the global market. "The only real reason is to reduce the subsidies."

Indeed, the CSM goes on to note that "mass protests ... sparked by subsidy cuts" led, in part, to Suharto's ouster in 1998. So, Indonesia's government is spending money to build biodiesel refineries and develop new palm oil plantations. Both the Indonesian and Malaysian governments have set aside palm oil reserves for biodiesel, anticipating large future demand from the EU and elsewhere if conventional oil prices continue to climb. As of now —

> Rapeseed oil now makes up between 80 and 85 percent of the biodiesel produced by the EU, with soybean oil and a marginal quantity of palm oil accounting for the rest.
>
> "We may be the new kid on the biofuel block, but the demand from Europe itself will keep palm diesel going strong against any other rival," said S.J. Dhass, marketing manager at Bell Group, operator of Malaysia's largest private palm oil mill.
>
> The EU imports about 3.5 million tonnes of refined and crude palm oil every year, chiefly from Malaysia and Indonesia, and could supply up to a fifth of EU biodiesel demand by 2010, Fediol, a vegetable oils trade organisation, said in May.

Some private investors are now scrambling to supply the nascent palm oil biofuels industry. At this time, southeast Asia's palm oil biofuels business is where Brazil's sugar cane industry was 10 or 15 years ago. Regarding the food or fuel problem, there is enough palm oil to go around for the time being, but the balance may change should an economically viable industry ramp up in future years. This will all depend on conventional oil prices or government policies subsidizing biofuels use or production through tax breaks or direct investments.

## The Environmental Consequences

Even as Malaysia and Indonesia hope for a booming palm oil biodiesel export market, the EU is getting cold feet because of the destruction of southeast Asia's forests. Indeed, the environmental news is very bad. As the Wall Street Journal reports (*op. cit.* above), an EU parliamentary committee recommended a ban on all biofuels from palm oil. And, as noted above, RWE npower cancelled their plan to use palm oil to generate electricity in England. However, the EU now plans to use 20% renewable power by 2020, with 10% of vehicle fuels coming from biofuels. So, the EU is in a bind concerning biofuels from palm oil. Their Hobson's Choice is this — they can cut CO2 emissions and thus avoid disastrous climate change using biofuels from palm oil, or they can increase CO2 emissions and promote disastrous climate change using biofuels from palm oil. Perhaps there is much larger overshoot and sustainability problem?

For some background on the CO2 emissions from clearing peat swamp forests, see my story Burning Buried Sunshine. The WSJ article focuses on the environmental damage.

> Here on the island of Borneo, a thick haze often encloses this city of 500,000 people. The cause: forest fires that have blazed across the island, some of which were set to clear land to produce palm oil -- a key ingredient in biodiesel, a clean-burning diesel fuel alternative...
>
> Among other problems, the fires set to clear forest land spew millions of tons of carbon dioxide and other greenhouse gases into the atmosphere, experts say. In doing so, they exacerbate the very global-warming concerns biofuels are meant to alleviate.
>
> "Let's be brutally frank: (The push for alternative fuels) is going to cause significant changes for the environment," says Sean Darby, an equities analyst and expert on alternative-energy companies at Nomura International in Hong Kong. *He is most worried about the strain on water resources caused by accelerated crop production. Water, he says, is "just as precious" as oil.* ❗

It's good to know that fresh water and oil are considered equally important. However, the WSJ mentions a study presented last November at a United Nations climate conference in Nairobi, which showed that Indonesia is the world's third-biggest carbon emitter behind the U.S. and China, when emissions from fires and other factors are considered. The press release, Shocking climate impact of wetland destruction in Indonesia, references Peatland degradation fuels climate change (MS Word document), which provides some of the details. From the press release — of the estimated 2 gigatons of CO2 emitted by deforestation in Indonesia alone:

> 600 million tons is caused by decomposition of dry peat (a process that will continue until all peat has disappeared) and 1400 million tons is lost through the annual fires.

> These amounts change the global picture concerning carbon emissions. In the ranking of countries based on their total CO2 emissions, Indonesia comes 21st. However, if peatland emissions are included, Indonesia is ranked third. The country emits more than India, more than Russia, and several times more than the UK or Germany. It emits more than all the efforts of western countries to reduce greenhouse gases under the Kyoto Protocol.

And from the more detailed document — relating to palm oil:

> Western countries see oil palm as a good source of biofuel, a 'clean' alternative for fossil fuels. The European Union implements all kind of legislation for a large scale use of biofuels. Export of palm oil to European countries is growing rapidly. However, more than 26% of all Indonesian oil palm concessions are on peatlands, and similar figures apply to Malaysia. It is estimated that production of one ton of palm oil will result in an average emission of 20 tons of CO2 from peat decomposition alone – not taking into account the emissions from fire and other CO2 emissions during the production cycle. *The Netherlands alone imported at least 400,000 tons of palm oil to meet its Kyoto target for 2005, thus actually increasing [its] greenhouse gas emissions.*

Whoops! Although these huge numbers would have to be verified by further study and fit into the overall planetary carbons emissions budget, there is little doubt that there are very substantial CO2 emissions from land use changes that destroy the rainforests and peat forests of southeast Asia.

Palm oil monoculture in tropical ecosystems has other harmful consequences. From the WSJ (*op. cit*) —

> As residents are discovering, though, the spreading plantations have deleterious effects. They can alter water-catchment areas, destroy animal habitats and contribute to the months-long bouts of haze that spreads hundreds of kilometers across Southeast Asia.

Peat forest wetlands catch the rain and store the water. Without them, the water runs off, leading to erosion of precious topsoils and even freshwater shortages in some areas. Waste from palm oil production is also a problem. From mongabay.com (*op. cit*) —

> Beyond the loss of forest ecosystems, the production of palm oil, as currently practiced, can be quite damaging to the environment. In 2001 Malaysia's production of 7 million tons of crude palm oil generated 9.9 million tons of solid oil wastes, palm fiber, and shells, and 10 million tons of palm oil mill effluent, a polluted mix of crushed shells, water, and fat residues that has been shown to have a negative impact on aquatic ecosystems.

Finally, there is the tragic loss of Orang Utan forest habitat.

*Threatened with extinction*

## A Note on Jatropha

Another tropical source of vegetable oil, jatropha, seems to offer many comparative advantages over palm oil.

*Jatropha Beans — Source: Ecofriend*

Europe Adopts Biodiesel: Can an African Bean Crack Europe's Biodiesel Blockage? is an excellent source of information.

> One UK-based company, D1 Oils plc, has put itself at the forefront of efforts to fill this [EU biofuels] gap with Jatropha oil. Jatropha grows quickly, is hardy, establishes itself easily even in arid land, and is drought-tolerant, requiring only 300mm of annual rainfail. It grows especially well in South and West Africa, and South East Asia. Jatropha can even be grown on semi-arid land using waste water, making it a useful tool in the prevention of desertification. Each Jatropha tree can produce an average of 3.5 kilos of beans each year depending on irrigation levels. According to D1's estimates, if 2,200

> Jatropha trees are planted per hectare, each hectare could yield up to 7 tonnes of beans per annum. Jatropha beans can produce oil yields of up to 40% and D1 expects each hectare to deliver about 3,000 litres of biodiesel.

For all these reasons, Jatropha looks promising as a biodiesel source.

## Some Reflections

Now, it is easy for the EU, the Wall Street Journal and the author to take pot shots at Malaysia and Indonesia for attempting to lift themselves up economically by cultivating palm oil for biofuels. In fact, the Malaysian Palm Oil Council issued a rebuttal to some topics reviewed in this story. And although some of it is ridiculous, it does point out obviously hypocritical things like this —

> Britain has little forest left, as most land has been converted to agriculture. Such a paucity of forest cover and the preponderance of agricultural land have resulted in reduced biodiversity and caused the loss of fauna and flora.
>
> According to data from the Food and Agriculture Organisation, Britain has less than 12 per cent of its land under forest cover compared with 64 per cent for Malaysia. Agricultural land makes up 71 per cent of its total land area compared with less than 19 per cent in Malaysia, of which oil palm accounts for two-thirds.

In the 19th century, Europeans were despoiling southeast Asia for the rubber and timber trades. From the WSJ, peaking of Borneo —

> In the 1800s, Dutch and British traders began carving up parts of the island to produce rubber and other commodities. Later, Malaysian and Indonesian timber barons devastated millions of hectares of forest logging tropical hardwoods. Today, only a little more than half of Borneo's once-ubiquitous rain-forest cover remains, according to WWF, the global conservation organization.

As a citizen of the United States — the world's largest natural resource consumer driving much of the planet's freefall — and largest abuser of the global commons, which is the environment upon which we all ultimately depend, I must add this apologetic to my criticisms of land use practices in southeast Asia. After all, people are just trying to feed themselves, raise their families and prosper economically as far as that is possible. Quoting the WSJ concerning Indonesia, "the arrival of new palm-oil plantations has meant jobs and opportunities for many Dayak families [of Kalimantan], and some have even taken ownership stakes in the operations." There are environmentalists in southeast Asia just as there are here among the NGOs in America — I have quoted some of them. At the same time, John Q. Suburban in the United States is just trying to feed himself, raise his family and prosper economically as far as that is possible.

So, in the short run, some will win, some will lose and everyone wants to live. Over the longer term, however, the underlying problem is too many people (wherever they live) consuming too much energy and other natural resources. Overshoot and unsustainable modes of living are not confined to southeast Asia, as any American should know.

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