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## **Palm Oil in Indonesia: A Source of Energy and Economy**

Every action in this world requires energy. Whether it is our human bodies or technology and machines, neither could function without a source of energy. In both cases, this energy is not as abundant as we would like to think. The world current situation requires its inhabitants to realize this, and to find a solution. Poverty in rural regions prevents the humans living there from accessing sufficient amounts of food, the energy source for their bodies. Comparatively, the primary energy source for our machines, fossil fuels, is steadily decreasing. Many solutions for each of the problems have been tried and proved effective, but bio fuels offer a unique idea in that they could potentially provide an energy solution for both our bodies and our technology. As for our technology, bio fuels are a renewable supplement, or even replacement to fossil fuels. And for the world's hungry, the cultivation of bio fuel producing crops is an economic opportunity that could provide the poor with enough income to supply themselves with nutrients. A prime example of this is Indonesia and its production of palm oil. The cultivation of oil palm, if properly regulated, can be environmentally friendly and socially beneficial.

The region in which Indonesia is located, Southeast Asia, also includes Vietnam, Thailand, Malaysia and more. This region's population was roughly 541,000,000 according to a 2003 estimate (UN Statistics). From 2000 to 2005 the growth rate was 1.4% with a death rate of .7% and a birth rate of 2.1% so now the total population is likely near to 571,000,000. Southeast Asia contains about 4,495,000 square kilometers of land, and thus its current population density according to these estimates would be 127 people per square kilometer (UN Statistics). In 2002, the portion of the population considered undernourished in this region was 13%, and that statistic applied to the above 2007 population estimate amounts to 74,230,000 people (Millennium Development Goals report 2005). The portion of the population living under the international poverty line, or living on less than one dollar a day is 6.8% (MDG report 2007). This is a 2004 estimate, but applied to today's population, would be about 38,828,000 people. The situation for children is severe, as 22% of the under five population of this region is considered underweight (MDG report 2007). Also, the under-five mortality rate is 41 deaths per 1000 live births (MDG report 2007). Education on the other hand is high, as the portion of children enrolled in a primary education is 94% (MDG report 2007). This region and its surrounding region's economy are rapidly improving, as the average per capita GDP for East Asia has increased from \$875 in 1970 to \$4,413 in 2000, and for South Asia has increased from \$1,051 in 1970 to \$2,216 in 2000 (ERD). This economical development, if properly regulated, should propel this area towards its Millennium Development goals.

Indonesia, the southernmost country in the Southeast Asian region, has the highest population in the region. The nation is an archipelago made up of more than 17,000 islands, 6,000 of which are populated. The capital, Jakarta, is on Java, one of the larger landmasses. Indonesia has 1,904,569 square kilometers of land. Fifty-eight percent of that land is covered by biologically diverse rainforests (MDG report 2005). The current population of Indonesia is roughly 235 million (IFAD). According to World Bank, the average population growth in 2005 was 1.36%. In 2004, 8% of the population or about 18.8 million people were living on less than a dollar a day as reported by the Millennium Development Goals paper in 2005. According to that same report, 6% of the Indonesian population was considered undernourished in 2002. Applied to today's estimated population, this amounts to more than 14 million people. Also in 2004, the portion of under weight children was 26%, and the under-five mortality rate was 41 deaths for every 1000 live births (MDG report 2005). Indonesia however, is doing well in education, as 92% of student age people were enrolled in primary education (MDG report 2005). The life expectancy from birth for males is 66.4 years, and for females is 71 years (UN Statistic). These statistics show that

Indonesia is making progress toward its millennium development goals, but there are still problems that need to be addressed and resolved.

Like the rest of Southeast Asia, the economy of Indonesia has been growing. From 1960 to 1990 the Indonesian economy grew rapidly due to new biological techniques. In 1973 the average per capita GDP was \$500 and in 1990 was \$3200 an average growth of 9% per year. This growth was checked in 1997 by the East Asian Economical crisis. In 1998, inflation in Indonesia rose 50%, and the average per capita GDP fell 14%. The crisis situation was worsened by reduced agricultural output due to El Niño. The food insecurity during this period was quite severe, as 7.5 million Indonesians suffered from acute food shortage (Anderson and Slater). Indonesia's economy quickly recovered and in 2000, the average GDP per capita was \$2,882, and inflation had returned to normal (ERD). The economic growth has continued to grow since, but poverty has actually been increasing in recent years. In 2005, 16% of the population was considered in a state of poverty, but a year later, in 2006, that had increased to 18%. The World Bank argues that this increase in poverty has been caused by artificially high rice prices. These prices are a result of the Indonesian government's ambition to become self-sufficient in the production of rice (Economist).

Poverty exists in the urban areas of Indonesia, but it is less severe and widespread than in the rural areas (IFAD). Seventy-five percent of Indonesia's population makes their living through agriculture (Economist). Sixty percent of the population lives in rural areas. The most severe poverty is located in the remote eastern islands. The populations of those areas are almost all poor, as 95% of the people are considered as such. The families living in this area practice subsistence farming to survive, but are not able to generate enough food to fully sustain themselves. Unsustainable farming and livelihood systems are the primary cause of this problem, but environment degradation and a lack of maintained infrastructure also contribute (IFAD). Introducing new forms of income and an increase in government attention should allow for a sustainable economy.

The Indonesian government hopes that by creating income generating opportunities, empowering communities, developing human capital and capacity, and improving social justice, poverty will be reduced. They will accomplish these goals through decentralization and district level committees (IFAD). The World Bank is supporting these government measures. It has provided grants to aid in decentralization which brings control of resources closer to communities so they can be applied more efficiently. To increase the development of infrastructure, the World Bank has promoted investment in rural areas. As portions of governance have been reassigned to smaller communities, the Bank has been providing grants to support the development of education and health. Also, to reduce the negative affects of natural disasters, the bank has used grant money to set up reconstruction measures.

Another way to address the problem, the cultivation of oil palm, has the potential to improve or harm the current condition of poverty and food security in Indonesia. Oil palm, scientific name *Elaeis guineensis*, requires a wet tropical environment to be cultivated, making Indonesia an ideal environment for its growth. Oil palm plantations start to produce fruit, and later oil, in about four to five years, when the plant reaches maturity. The fruit of the oil palm are oval shaped, three to five centimeters long, and arranged in bunches. The crude palm oil is extracted from the fleshy part of the fruit and the kernel. The fleshy portion is mechanically pressed at a mill, resulting in a red liquid, crude palm oil, which is then further refined. Palm fruit must be extracted from the fruit within 24 hours to prevent the build up of fatty acids, so those mills must be located near the plantations and within the producing countries. The kernels are crushed resulting in crude palm kernel oil and meal. These mills can be located in either the producing or consuming countries. The meal is made into animal feed, and the crude oil is refined. The refineries of both the Palm oil and the palm kernel oil can be located in either the producing or consuming countries. Palm oil and palm kernel oil is used in food products in the form of cooking oil and margarine, manufactured goods like candles, soaps, and cosmetics, and in the production Bio diesel (VanGelder).

In 2005, 5.3 million hectares of Indonesia were devoted to the cultivation of oil palm (world rainforest movement). The fruit yield per hectare is ten to thirty-five tons per hectare. Furthermore, the recoverable oil content from the fruit is, on average, 20%. This is much higher than other oil seed crops, at about 3.2 tons of oil per hectare in Indonesia specifically. In addition to that is the product derived from the kernel, of which, 45% is palm kernel oil and 55% is palm kernel meal. Therefore, the average output in Indonesia from one hectare of oil palm plants is 3.2 tons of palm oil, .34 tons of palm kernel oil, and .42 tons of palm kernel meal (VanGelder).

Indonesia's market portion of palm oil grew from 1995 to 2002 by 114%, and in 2002 made up 36% with about nine million metric tons. About 3 million metric tons of that was used domestically by Indonesia, and 6.38 million metric tons was exported. The price per ton at that time was \$438 US dollars (VanGelder). Although palm oil is the most cost efficient oil seed crop, only one percent of the world bio diesel is produced using it. This is primarily caused by competition with other vegetable oils. In Europe, domestically grown rapeseed oil is widely used, and bio diesel made from palm oil is not viable in cold temperatures due to its relatively high melting point. In India, tariffs at the moment prefer soybean oil, but if they were to change, a large new market would open for Indonesian palm oil.

The effect bio fuels will have on different societies is hard to foresee. IFPRI makes several predictions that will likely hold true in Indonesia. It says that because the production of bio fuels requires resources such as land, water, and labor, they will lower the production of food crops. The result would be higher food prices which would hurt the poor but help the farmers. The poor would suffer from the higher food prices, but benefit from the lower energy costs. The rural poor could also benefit from increased employment in cultivation, transportation, and processing. IFPRI also predicts that bio fuel production on the small scale will have a more positive impact on the rural poor than on a large scale. The Indonesian government would say that the pros of bio fuels hold true for Indonesia, like increased employment and lower fuel prices, but this is not always the case, and many of the cons are evident. So far improvements to the price of energy have not occurred. Palm oil bio diesel is being looked to as a way to reduce government subsidies on fossil fuels. The absence of subsidies has caused a 126% increase in petrol prices and subsequently has increased inflation to 18% (economist). To lower fuel prices would require an increase in oil palm cultivation which threatens the already shrinking Indonesian rain forest and the livelihoods of rural peoples. The plantations, processing mills, and refineries do provide important employment for rural and urban poor, as it directly employs over 800,000 workers and indirectly creates 2 million more (VanGelder). The problem is that when new land for plantations is needed, local subsistence farmers are generally forced off their land. This reduction in food producing agriculture will have a negative affect on many Indonesian citizens. The Indonesian government is hoping to make Indonesia self sufficient in the production of rice, but rice cultivation is not increasing enough to meet the demand. About 75% of the population are consumers of rice, and the number of rice producers is lowering (Economist). The combination of increases tariffs on rice imports and the lowering supply have resulted in an increase in the price of rice. This has hurt the poor and poverty is on the rise. Also, fuel prices have actually gone up due to the lack of government subsidies, but, with the increase in bio diesel production, the price should gradually lower.

Additionally, the growth of oil palm plantations continuously encroaches on the Indonesian rainforest. The area of oil palm cultivation is rapidly increasing, from 600,000 hectares in 1985 to 6 million in 2007 (Butler). In contrast, the area of rainforest shrunk from 162 million to 98 million in only 50 years (Anderson and Slater). The Indonesian government states that there are 20 million unproductive hectares of land that could be converted into oil palm plantations. The World Wildlife Fund contends that much of this land is essential to biodiversity. According to IFPRI, bio energy producing crops like oil palm are more similar to natural environments than regular agriculture, and can act as corridors for wildlife between segments of forest. But, as WWF points out, the monocultures in the current oil palm

plantation system do not allow for bio diversity in animals and even more so in plants as such environments can only support 20% of a region's bio diversity. Bio diversity is important in Indonesia as it is home to many endangered species such as the Sumatran rhinoceros, orangutan, and the Bornean clouded leopard.

Rhett A. Butler, the producer and maintainer of [mongabay.com](http://mongabay.com), offers ideas in regards to the cultivation of oil palm and how it can be ecologically friendly and socially beneficial. As for the environment, Butler proposes that the consumers of palm oil offer a financial incentive to plantations producing palm oil in a way that is not harmful to the rainforest. They could make the plantations aware that they are willing to purchase a certain amount of "green" palm oil, or even offer price floors. This method could also be applied to palm oil that is produced in a manner that did not do harm to the rural poor. Butler also points out that because of the 4 to 5 year period needed for a palm field to start becoming profitable, it is very difficult for rural farmers to invest in the cultivation of palm oil. If they do set one up they will likely have to work at a large plantation and purchase resources needed for their fields, and in that process become in debt to the plantation. Butler's suggestion is an increase in social justice, so the rural poor will not be subject to unfair lending practices. Judging from the current status of Indonesia and its rate of progress, the country as a whole is moving toward its millennium development goals steadily. As for palm oil, it is plain to see that there is quite a potential for social benefits in both its cultivation and its use. The cultivation will provide employment and strengthen the Indonesian economy. Its use will provide a renewable energy source for both Indonesia and the world. However, palm oil could also prove to be detrimental to the environment and social justice if its development and expansion is not effectively regulated. This type of regulation must include the application of innovative cultivation techniques such as the reduction of monocultures. To ensure that the rural poor are not further harmed but uplifted through the cultivation of this bio fuel crop, the government must insure social justice to encourage rural farmers to start their own oil palm fields, and ensure that they will profit from it. These regulations and improvements are possible, and palm oil can be part of the solution to both the problem of lower fuel supply and rural poverty.

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