The Economic Benefit of Palm Oil to Indonesia

A Report by World Growth

February 2011
**Alleviating Poverty through Wealth Creation**
Palm oil provides developing nations and the poor a path out of poverty. Expanding efficient and sustainable agriculture such as Palm Oil Plantations provides small and large plantation owners and their workers with a means to improve their standard of living.

**Sustainable Development**
Sustainable development of palm oil plantations and growth of the palm oil industry in developing nations can and will be achieved through consultation and collaboration with industry, growers, lobby groups and the wider community.

**Climate and the Environment**
Palm Oil is a highly efficient, high yielding source of food and fuel. Palm Oil plantations are an efficient way of producing fossil fuel alternatives and capturing carbon from the atmosphere.

**Opportunity and Prosperity**
Developing nations must be allowed the chance to grow and develop without political intervention by environmental groups or developed nations. It is crucial that developing nations be given the same opportunities which developed nations have benefited from.

**Property Rights**
Efficient palm oil plantations and the growing demand for palm oil give smaller land holders greater opportunities to make a living off their land, maintain their ownership and support their rights to property and prosperity.
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Executive Summary

Environmental NGO’s have been pushing a “no-conversion” agenda, in an attempt to halt the conversion of forest land to agriculture, including palm oil plantations. This agenda has extended into the operations of international organisations and governments.

In May 2010, the Indonesia and Norway signed a Letter of Intent comprising a framework for Indonesia to receive financial contributions from the Norwegian Government in return for the implementation of emission reducing policies, including a two-year suspension on all new concessions for conversion of peat and natural forest.

In July 2010, The World Bank proposed a framework for its engagement in the palm oil sector, acting at the behest of environmental NGOs to toughen the policies of the Group on the terms financial support is provided to Palm Oil projects. A revised version of the framework was released for consultation in January 2011.

Restrictions on the conversion of forest area will negatively impact economic growth and food security in Indonesia and directly impact those living in poverty. For this reason, developing countries refused to include “no conversion” in the approach to forestry and REDD at the UN Climate Change conference in Cancun in December 2010.

Restrictions on the conversion of forest area will negatively impact economic growth and food security in Indonesia and directly impact those living in poverty.

Economic Benefits of Palm Oil

The palm oil industry has the potential to generate significant economic and social development in Indonesia. Palm oil is Indonesia’s second most successful agricultural product, after rice paddy, and largest agricultural export. It provides a means of income and economic development to a large number Indonesia’s rural poor. The Indonesian palm oil industry is expected to continue its rapid growth in the medium-term; however, its competitiveness will be negatively impacted by the anti-palm oil agenda.

The global market for palm oil has experienced rapid growth in recent decades with current production of palm oil estimated at over 45 million tonnes. Indonesia is one of the world’s largest producers and exporters of palm oil, producing over 18 million tonnes of palm oil, annually.

Agriculture and Regional Poverty

Although only contributing around 14 percent to GDP, agriculture provides employment for over 41 percent of the Indonesian population and provides around two-thirds of rural household income. The palm oil industry is a significant contributor to rural income in Indonesia. In 2008, over 41 percent of oil palm plantations were owned by small land holders, producing 6.6 million tonnes of palm oil.

With over half of Indonesia’s population lives in rural areas—of which over 20 percent live below the poverty line—the palm oil industry provides an incomparable means of poverty alleviation. Limiting the conversion of forest to agriculture or palm denies considerable prospective economic benefits and improvements in living standards to the rural population, condemning them to declining standards of subsistence.

Future Industry Growth

With global demand for palm oil expected to grow further into the future, palm oil offers the most promising economic prospects for Indonesia. World production of palm oil is expected to increase by 32 percent to almost 60 million tonnes by 2020.

Restrictions on the conversion of forests to oil palm plantations Indonesia would reduce the availability of fertile land and impede expansion of the industry. Government policies should aim to improve productivity and not implement anti-growth NGO policies.
I. Introduction

Indonesia is one of the world’s largest producers of palm oil and the industry has been the economy’s most valuable agricultural export sector for the past decade.

The palm oil industry is a significant contributor to production in Indonesia. In 2008, Indonesia produced over 18 million tonnes of palm oil. The industry also contributes to regional development as a significant source of poverty alleviation through farm cultivation and downstream processing. Palm oil production provides a reliable form of income for a large number of Indonesia’s rural poor, with one source suggesting that employment generated from palm oil production in Indonesia could potentially reach over 6 million lives and take them out of poverty. Over 6.6 million tonnes of palm oil is produced by smallholders representing over 41 percent of total palm oil plantations. In 2006, it was found that around 1.7 to 2 million people worked in the palm oil industry.

The Indonesian palm oil industry has recently come under fire from a number of NGOs who have campaigned against the industry and its perceived contribution to deforestation, carbon emissions, and biodiversity loss. As a result, there have been widespread complaints that palm oil is not sustainable and proposals to have all future forest land conversion halted or restricted.

In May 2010, the Indonesian Government foreshadowed a two-year moratorium on new concessions to clear natural forests and peatland under a deal signed with the Norwegian Government, aimed at reducing greenhouse gases. In return for the agreement, Norway has agreed to invest $1 billion in forest conservation projects in Indonesia. A year prior, the Indonesian government had announced it would double palm oil production to 40 million tonnes by 2020. The successful growth of the Indonesian palm oil industry will be impacted greatly by any restrictions on land conversion as well as negative campaigns targeting the industry. The achievement of the Indonesian government’s target of doubling oil palm production will also be significantly impacted by the moratorium, as some level of land conversion is required for economic development.

This report has been prepared as an independent assessment of the economic benefits of the palm oil industry to inform policy makers and officials.
II. Global Economic Importance of Palm Oil

Palm oil is a vegetable oil derived from the fruit of the palm tree, it is used for both food and non-food consumption. Total global production of palm oil is estimated at over 45 million tonnes, with Indonesia and Malaysia as the major world producers and exporters. Major importers include India, China and the European Union.

The palm oil industry has experienced rapid growth in recent decades, and has become a significant contributor to the world market for vegetable oils. Demand for palm oil has further increased in recent years as many developed economies are shifting away from the use of trans-fats, to healthier alternatives. Palm oil is often used as a substitute for trans-fat as it is one of the few highly saturated vegetable fats that are semi-solid at room temperature, and is relatively low cost.

World trade in palm oil has increased significantly due to increased global demand. However, there has also been public concern surrounding the impact of palm oil on deforestation, carbon emissions and biodiversity loss. High returns have encouraged investment in the Indonesian palm oil industry, and the resulting industry growth has contributed significantly to rural economic development and poverty alleviation. However, despite the expected increase in future demand, land use restrictions (such as the recent two year moratorium on new concessions to clear natural forests and peatland in Indonesia) may constrain industry development, as some level of land conversion is needed for industry growth.

Trends in the Global Production and Trade of Palm Oil

Originating in Africa, the oil palm was introduced into Malaysia and Indonesia in the colonial period. Current cultivation is concentrated in the tropical areas of the Americas, Africa and Southeast Asia, particularly Indonesia and Malaysia—where the climatic growing conditions are ideally suited for palm oil trees. Other key palm oil producing countries include Nigeria, Thailand, Columbia, Ecuador and other African economies.
Total world production of palm oil has increased almost threefold over the past 3 decades to 2009. In 2009/10, total palm oil production was estimated at 45.1 million tonnes, with Indonesia and Malaysia accounting for more than 85 percent of the world total. Indonesia and Malaysia each produced over 18 million tonnes of palm oil.

Total trade in palm oil and palm kernel oil is over 35 million tonnes, imported and exported. Major exporters of palm oil include Indonesia and Malaysia who exported 15.7 and 15.1 million tonnes, respectively. Key importing economies included India, China and the European Union, who imported 6.7 million, 6.3 million and 4.6 million tonnes, respectively.

Trends in the Global Consumption of Palm Oil

Approximately 80 percent of global palm oil production is used for food purposes including as cooking oil, in margarines, noodles, baked goods etc. In addition, palm oil is used as an ingredient in non edible products including in the production of bio-fuel, soaps, detergents and surfactants, cosmetics, pharmaceuticals and a wide variety of other household and industrial products. In 2009, the world consumed approximately 6.5 kilograms of palm oil per capita, annually. Palm oil and palm kernel oil uses, in both food and non-food products, have been growing significantly. By 2020, global consumption of palm oil is expected to grow to almost 60 million tonnes.

World demand for palm oil is also increasing, and likely to further increase, as developing economies move away from manufactured trans-fats to healthier alter-
natives. Trans-fats are often used in the place of natural solid fats and liquid oils in the production of commercial food, particularly fast food and the snack and baked-good industries. Artificial and synthetic trans-fats are created by the processed food industry from partially hydrogenating unsaturated plant fats. Recently, developed economies have recognised the health risks of trans-fats, and have begun to limiting their use. Countries such as Denmark, Switzerland and some U.S counties have banned the use of trans-fats in restaurants and fast food chains. Other countries such as the United Kingdom, Canada and Brazil have implemented policies aimed at reducing the use of trans-fats, including the requirement for trans-fats to be listed on food labels. In substitute for trans-fats, the demand for palm oil has increased. In addition to being a source of healthy unsaturated fats, palm oil is odourless and tasteless and does not require hydrogenation to achieve a solid state. These characteristics make palm oil ideal for margarine, baked goods and packaged goods, making it a strong competitor with vegetable oils made from soybeans and rapeseed that require hydrogenation to achieve a solid state. In addition, palm oil is tolerant to high heat making it useful in the fried food and fast food industries.

Palm oil’s increasing contribution to the bio-fuels industry is also stimulating further demand. However, this demand is relatively low as compared with other sources as palm oil currently accounts for less than 5 percent of the world’s bio-diesel production. Approximately 95 percent of the world’s energy consumption is sourced from fossil fuels; by 2030 energy consumption is expected to increase by a further 50 percent. Many economies are setting targets to convert reliance on fossil fuels to greater use of renewable energy in efforts to reduce GHG emissions. One such renewable energy source that has grown significantly over the last decade is bio-fuel. Palm oil is widely used as a feedstock in bio-diesel production. Although dependent on government policies, the increased use of bio-fuels is expected to facilitate further demand growth for palm oil. The OECD is expecting the global usage of vegetable oils in bio-diesel production to more than double between 2006-08 and 2018. Palm oil is the most cost competitive vegetable oil for producing bio-diesel. Many economies are currently adopting policies that encourage the use of bio-fuel. If such blending mandates are enforced an extra 4 million hectares of oil palm would be needed to meet European Union requirements alone. A further one million hectares may be needed to satisfy China’s requirements, making bio-fuel production even more attractive.

Investment in bio-diesel processing capacity is increasing; the Indonesian and Malaysian governments have introduced policies to develop a bio-diesel industry and targets of allocating 6 million tonnes of palm oil to the industry each year.

5 Sheil et al (2009)
6 Sheil et al (2009)
7 OECD-FAO (2009)
8 Thoenes (2006)
9 Sheil et al (2009)
10 Thoenes (2006)
11 Neste Oil (2007)
12 Darby Sime
palm oil as the European Union is the world’s largest consumer of bio-fuels.

**Trends in the Global Consumption of Vegetable Oils**

Over the past 3 decades, there has been a substantial growth in the global consumption of vegetable oil. Between 1980 and 2008 consumption increased more than threefold from 40 million tonnes to over 130 million tonnes. In addition, there has been a significant shift in the relative market share of different vegetable oils. In 1980, the market share for palm oil was 11 percent; the main vegetable oil on world markets was soybean, accounting for approximately a third of total consumption. The market share of soybean has since fallen, with palm oil becoming the major consumed vegetable oil. In 30 years, palm oil consumption has increased tenfold from 4.5 to 45 million tonnes (including growth of 100 percent in the last decade) and now comprises 34 percent of the world market. In 2009, despite consumption of soybean oil increasing by 22.5 million tonnes, its market share had fallen to 27 percent. Rapeseed and sunflower oil’s market shares were 16 percent and 10 percent, respectively.
The structural composition of the Indonesian economy has changed significantly in the past four decades. As with most economies in the region, it has shifted from a primarily agrarian economy towards the industry and services sectors. Nowadays, Indonesian production is largely dominated by the industrial sector, contributing just over 48 percent to total economic activity, including the oil and gas which contribute to over 10 percent of GDP.\textsuperscript{14} The services sector and agriculture sector contribute 38 percent and 14 percent, respectively.\textsuperscript{15}

### Agriculture’s Contribution to the Indonesian Economy

Indonesia’s major agricultural products include rice paddy, palm oil, chicken meat, coconuts and rubber, with major exports including Indonesia’s palm oil, rubber, palm kernel oil, cocoa and coffee. The contribution of agriculture to GDP has steadily decreased over the past 20 years. In 2008, the agriculture sector contributed 14.4 percent of GDP (as compared with around 22.5 percent in 1988 and 18.1 percent in 1998).

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\textsuperscript{13} UN Data (2010)

\textsuperscript{14} Statistics Indonesia (2010)b

\textsuperscript{15} OECD (2010)
Palm Oil's Contribution to the Indonesian Economy

Palm oil is Indonesia’s second largest agricultural product; in 2008, Indonesia produced over 18 million tonnes of palm oil. For the last decade, palm oil has been Indonesia’s most significant agricultural export. In 2008, Indonesia exported over $14.5 billion in palm oil related products. The Indonesian palm oil industry has experienced significant growth in recent years with approximately 1.3 million ha of new area dedicated to palm oil plantations since 2005, reaching almost 5 million ha in 2007 (representing 10.3 percent of the 48.1 million ha of agricultural land). This substantial expansion is due to higher returns driven by stronger demand. The majority of Indonesia’s palm crop is located in Sumatra, with over 75 percent of total mature palm area and 80 percent of total palm oil production. Key Indonesian production provinces include Riau, Sumatera Utara, Sumatera Selatan, Jambi and Sumatera Barat.

In 2008, approximately 49 percent of palm oil plantations were owned by private plantations, 41 percent by small shareholders and the remaining 10 percent by Government plantations. Private plantations represent the largest producers of palm oil in Indonesia, producing over 9.4 million tonnes of palm oil valued in 2008. In the same year smallholder plantations produced 6.7 million tonnes of palm oil and Government plantations produced 2.2 million tonnes of palm oil.

Palm Oil and Rural Development in Indonesia

Poverty in Indonesia is largely a rural occurrence. In 2009, of 32.5 million Indonesians living below the national poverty line, 20.6 million were located in rural areas. For the last decade, palm oil has been Indonesia’s most significant agricultural export. In 2008, Indonesia exported over $14.5 billion in palm oil related products.

17 As measured by the FAO (2010)
18 USDA (2009)
areas. The percentage of poor in rural areas of Indonesia vastly outweighs that of their urban counterparts, with over 17.3 percent of the rural population below the poverty line, as compared with 10.7 percent in urban areas. This overall poverty rate doesn’t account for the millions who live just above the poverty line. The International Fund for Agricultural Development (IFAD) found that the poorest people in rural areas tend to be farm labourers working on other peoples land, and smallholders on small plots of land less than 0.5 hectares.

Over half of Indonesia’s population is located in rural areas. In 2002, agriculture represented two thirds of rural employment and contributed to almost half of rural household income (wages and farming income). A 2004 study showed that agricultural GDP growth in Indonesia is beneficial in reducing poverty, particularly in rural areas. Specifically, annual growth of 1 percent was found to reduce total poverty by 1.9 percentage points (urban poverty by 1.1 percentage points and rural poverty by 2.9 percentage points). World growth (2009) noted that over the past decade, industry expansion—specifically palm oil—has been a significant source of poverty alleviation through farm cultivation and downstream processing.

Significant growth in the palm oil industry, has led to palm oil becoming component of economic activity in regional economies. In certain regions, palm oil is the dominant estate crop and major contributor to economic development. In the past decade, the palm oil plantation areas of Kalimantan and Sulawesi have experienced strong development, averaging 13 percent and 8 percent annual growth rates, respectively. The plantation and harvesting of oil palm is labour intensive, as such, the industry contributes a significant portion of

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19 Statistics Indonesia (2010)
20 IFAD, accessed September 2010
21 ADB (2006), pg 3
23 USDA (2009)
employment in many regional areas. Goenadi (2008) estimates that employment generated from palm oil production in Indonesia could potentially reach over 6 million lives and take them out of poverty. Additional benefits to palm oil workers have included secure incomes, access to healthcare and education. Palm oil production provides many of the rural poor with a sustainable income; with key palm oil developments such as Sumatera and Riau also having a significant percentage of rural poor. Annex 1 outlines palm oil production and poverty statistics for key Indonesian provinces.

The Contribution of Palm Oil to Local Economies and Small Land Holders

Palm oil provides employment for many small landholders, with over 6.7 million tonnes of palm oil produced by smallholders in 2008. In 2006, it was found that around 1.7 to 2 million people worked in the palm oil industry. In 2008, the Indonesian palm oil commission found that over 41 percent of total palm oil plantations were owned by smallholders, with a further 49 percent owned by private plantations—the remaining 10 percent is owned by government. The palm oil industry makes a substantial contribution to rural incomes, particularly small land holders. In 1997, the average net income of oil palm smallholders was seven times that of farmers involved in subsistence production of food crops.

Goenadi (2008) estimates that employment generated from palm oil production in Indonesia could potentially reach over 6 million lives and take them out of poverty.
Indonesian Government has previously implemented a series of rural and socio-economic improvement programs directed at small oil palm landholders. Until 2001, the use of palm oil 'nucleus estates' was suggested to raise the income of over 500,000 farmers. Zen et al (2006) have also found initiatives by commercial palm oil enterprises aimed at improving the socio-economic status of many rural populations. For example, in 1996, a Sumatran company distributed three cows to the families of each of its 500 employees to graze on oil palm waste and kernel cake. By 2003, the number of cattle had doubled, area harvested per worker had increased from 10 to 15 hectares, and worker incomes had been proportionately increased. Other commercial initiatives have included community palm oil areas and nucleus estates.

**Returns from Palm Oil Production**

In terms of land-use, oil palm gives the highest yield per unit area as compared with any other crop-based oil seeds. The average oil yield from 1 ha of oil palm is 4.09 tonnes, as compared with soybean, sunflower and rapeseed which yields 0.37, 0.5 and 0.75 tonnes, respectively. Modern high-yielding varieties of palm, under ideal climate conditions and good management are able to yield 5 tonnes of palm oil per hectare, annually.

Historically, smallholder plantations have been less productive than other palm oil plantations. In 2008, production per hectare for smallholders was estimated at 3.04 tonnes/ha as compared with 3.7 tonnes/ha for government plantations and private plantations. World Growth (2009) found that there is considerable potential for small holders in Indonesia to expand output on existing acreages through the use of fertiliser and new genetic stock.

Goenadi (2008) suggests that, because of the growing climate in Indonesia, palm oil yields may potentially be as high as 6-7 tonnes per hectare. However, in 2008, Indonesia was averaging between 3-4 tonnes of palm oil per hectare. Increasing the yield of palm oil production gives Indonesia the potential to increase the production without requiring additional land conversion.

Land-use returns from oil palm are significant as compared with many other forms of land-use. In 2007, a report prepared for the Stern Review estimated the return from palm oil land-use as ranging from $USD960/ha to $USD3340/ha. This was in comparison with smallholder rubber, rice fallow, cassava, and one-off timber harvesting which yielded $USD72/ha, $USD28/ha, $USD19/ha and $USD1099/ha, respectively. Specifically, land-use returns for palm oil were estimated as including:

- $USD960/ha for low yield independent growers;
- $USD2340/ha for high yield independent growers;
- $USD2100/ha for supported growers; and
- $USD3340/ha for large scale growers.

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28 Sustainable Development Project (2010) and Oil World (2010)
29 FAO (2002)
30 Indonesian Palm Oil Commission (2008)
31 World Growth (2009), pgs 13 and 14.
32 Indonesian Palm Oil Commission (2008), pg 25.
33 Greig-Gran M (2008)
IV. Future Prospects for Palm Oil

Future Prospects for Global Palm Oil Demand

Increased returns from a strong global demand for vegetable oils are expected to encourage investment in the palm oil industry leading to continued growth over the medium term, with global consumption expected to increase over 30 percent in the next decade. By 2020, global consumption and production of palm oil is expected to increase to almost 60 million tonnes.

The health characteristics and cost competitiveness of palm oil, coupled with its potential contribution to renewable energy, is expected to contribute to a growth of over 30 percent in the next decade. Growth in the palm oil industry has been contributed to by the production cost advantages in oil palm cultivation. Oil palms are a highly productive tree crop in comparison to crop based oil seeds—oil yields are 5 to 9 times higher than the yields achieved by soybean, rapeseed and sunflower. There are cost advantages in oil palm from lower land prices and lower energy inputs.

As developed economies shift away from trans-fats towards healthier alternatives, the demand for palm oil will also likely increase relative to its competitors. In the last few years, many developed economies have moved towards reducing and banning trans-fats, as a result many food manufacturers have replaced trans-fats with palm oil. In addition to being cost competitive, palm oil is high in mono-unsaturated fats which are considered to be advantageous for a lower risk of heart disease.

As well as total increased total consumption, per capita consumption of vegetable oils has been increasing in some major developing economies due to strong income growth. Palm oil has benefited from this development due to its relatively high energy per gram of food. In 2009-10 China and India accounted for over 40 percent of the net imports in world trade. Future economic growth in these countries will increase the demand for imported vegetable oils.

Global Palm Oil Production and Opportunities

By 2020, FAPRI estimates that Indonesia will produce almost 30 million tonnes of palm oil, including exports of almost 23 million tonnes. This growth will be achieved through increased yields and further land conversion.

Malaysia appears to have limited opportunity for

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Fig. 4.1

Projections of World Palm Oil Supply and Utilization

<table>
<thead>
<tr>
<th></th>
<th>2009/2010 ('000 tonnes)</th>
<th>2019/2020 ('000 tonnes)</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>44,330</td>
<td>58,639</td>
<td>32%</td>
</tr>
<tr>
<td>Production</td>
<td>45,132</td>
<td>59,264</td>
<td>31%</td>
</tr>
<tr>
<td>Trade</td>
<td>30,760</td>
<td>41,649</td>
<td>35%</td>
</tr>
</tbody>
</table>

Source: FAPRI 2010

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34 OECD-FAO (2009)
35 Malaysian Palm Oil Council (2008)
36 FAPRI (2010)
expansion through land conversion due to land zoning restrictions. Limited land availability is expected to slow palm oil production growth, particularly in Peninsular Malaysia and Sabah.

Yield gains on existing cultivation areas are another way to expand output. But there are signs that improvements in plantation yields are slowing in Indonesia and Malaysia. The cost of establishing new plantations is also increasing because of environmental requirements. If these trends continue and land use constraints become more restrictive there will be opportunities for other suppliers. FAPRI predicts that Malaysian palm oil production will increase by 26.5 percent, to 23.4 million tonnes by 2020, slightly less than the predicted Indonesian production of 28.5 million tonnes. The favourable outlook for palm oil demand will encourage industry investment in other countries including Nigeria and Thailand who each produced over around 1.3 million tonnes, in 2008. Recent reports suggest Chinese companies are negotiating for land in DR Congo and Zambia for oil palm plantations. There are also reports of investors looking at plantation growth in West Africa and Malaysian companies are looking at expansion opportunities in Brazil.

Key Challenges and Opportunities for the Indonesian Oil Palm Sector

Environmental Challenges

Increasing global palm oil production, particularly in Malaysia and Indonesia has generated gained the attention of some major NGOs, including Greenpeace, WWF and Friends of the Earth. Initially, the major opposition to palm oil was over deforestation with more recent concerns surrounding the impact of oil palm expansion on loss of biodiversity (including orang-utan habitat) and CO2 emissions. The central claim of the environmental campaign against the palm oil industry is that deforestation, especially the conversion of forest land to palm oil, is a major contributor to CO2 emissions. Palm cultivation on peat land and indirect land use changes are often cited as the major threat to climate change. However, there is consider-

37 Thoenes (2006)
38 FAO (2010)
39 Economist (2009)
40 Reuters (2010)
Malaysia appears to have limited opportunity for expansion due to land zoning restrictions.

Limited land availability is expected to slow palm oil production growth, particularly in Peninsular Malaysia and Sabah.

Figure 4.3 depicts total forest areas and the annual rate of change in forest area in Indonesia from 1990.

Specific data on the contribution of palm oil to deforestation is limited, and estimates vary significantly. Some statistics of the contribution of palm oil to defo-

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41 World Growth (2010) states that many of these claims are made with little or no substantiation and rely almost solely on absolute statements and unfounded appeals to the emotions of consumers in developed nations. There is limited data on the relative size of Indonesian forest and oil palm area. There is no standard definition for what constitutes deforested land in Indonesia and estimates of the rates of deforestation are often based on very weak science; consequently available statistics can differ greatly. Current calculations of carbon sinks and deforestation are generally based on satellite imaging which takes into account broad-area samples only and estimates are often over stated and out-of-date.

42 FAO (2010)

43 FAO (2010):c
estation assume that all growth in oil palm area is attributed to the conversion of forestland into palm plantations, calculating the industry’s contribution to deforestation as the change in oil palm area to the level of deforestation, over a given period. This gives a misleading image of palm oil’s contribution to deforestation, as some expansion would be on degraded land.44

In 2008, the relative contribution of global CO2 emissions from deforestation and forest degradation was estimated at approximately 12 percent.45 In 2006, Indonesia emitted 1.5 metric tonnes of CO2 per capita, less than the average of both East Asia and the Pacific and other lower middle income economies, and significantly less than the United Kingdom and the United States who emitted 9.3 metric tonnes and 19.3 metric tonnes, respectively.46 Despite the campaign against the palm oil industry, the production of palm oil is more sustainable than any other crop based vegetable oils. Palm oil production consumes considerably less energy, uses less land and generates more oil per hectare than any other oil seeds, has a comparatively smaller carbon footprint and is an effective carbon sink.47 The impact of deforestation on biodiversity loss, particularly the loss of orang-utan habitat is also a commonly raised concern. The pressure on biodiversity stems from a variety of sources including poverty, agricultural/forestry activity, institutions and technology. Habitat loss is not solely due to the conversion of forest lands to oil palm plantations. Between 2000 and 2007, palm oil land use increased by 2.9 million hectares in comparison to other land uses which increased by 9.4 million hectares. Orang-utan habitat is also preserved through protected areas in Indonesia that have been established and are subject to a range of different laws. Over 23 percent of Indonesia is reserved for forest conservation, including 42 percent in Aceh and 40 percent in Kalimantan.48

**Land Availability Constraints**

The limited availability of land for conversion to oil palm estates poses a significant challenge for the growth of the Indonesian palm oil industry as some land conversion to oil palm plantations will be required for continued industry growth. A number of NGOs have initiated a campaign against the palm oil industry and the conversion of Indonesia’s rainforests to oil palm plantations. As a consequence, the
The Indonesian Government has introduced a series of programs to tackle deforestation—the most significant is the 2 year moratorium on forest conversion. In May 2010, the Indonesian government signed a deal with the Norwegian Government, to impose a two-year moratorium aimed at reducing greenhouse gases; in return Norway will invest $1 billion in forest conservation projects in Indonesia. In addition, the government has also introduced a number of deforestation programs with the financial support of several developing economies. For example, the United Nations’ REDD (Reducing Emissions from Deforestation and Degradation) program contributed over $US2.6 million to Indonesia between 2009 and 2011 in an attempt to reduce deforestation.

The successful growth of the Indonesian palm oil industry will be impacted greatly by restrictions on the conversion of land to oil palm plantations, as some level of land conversion is needed for economic development.

The Conversion of Degraded Land

In May 2010, in order to reduce deforestation, the Indonesian Government announced a policy to develop oil plantations on degraded land instead of further converting forest or peatland. Indonesian officials suggested that the palm oil industry could still expand through the acquisition of six million hectares of degraded land. The current oil palm area is 7 million hectares. However, the success of the use of degraded land depends on the extent of degradation.

There is currently no single formal definition of degraded land; however, land degradation generally indicates a decline in the productive capacity of the land. Estimates of area affected by degradation vary widely. The FAO estimates that degraded land in Indonesia is largely water and wind erosion caused by deforestation and chemical deterioration. Approximately 38 percent (71 million hectares) of Indonesian land is affected by degradation (including 32 percent of land which is severely degraded and 6 percent which is very severely degraded); of this, 30 percent is human induced degradation due to agricultural activities, representing 11 percent of total land.

Government restrictions on the conversion of forestlands to oil palm plantations will increase the need for Indonesia to utilise other forms of land, including degraded land. However, the success of palm oil production on degraded land depends largely on the quality of available land. Currently, there is a lack of common methodology, and accurate and timely spatial data, for identifying acceptable degradation areas for sustainable oil palm plantation area. As part of the 2010 agreement between Indonesia and Norway, the Indonesian government has agreed to establish a degraded land database, providing the necessary information to identify areas of land acceptable for the establishment of economic activity, including oil palm plantations.

Land Rights and Degradation

The use of degraded land for oil palm plantations is dependent on the severity of degradation and the quality of land available. Land degradation occurs due to land clearance, overgrazing, poor farming practices, extensive agricultural activities, poor land management and inadequate conservation. In order to reduce the severity of land degradation, land users need incentives to manage and conserve land appropriately.

50 UN-REDD (2010)
51 Reuters (2010)
52 FAO/AGL (2010), in the 1980’s the Global Assessment of Human Induced Soil Degradation (GALSOD) estimated 16.53 percent of land area (31.4 million hectares) in Indonesia was affected by degradation.
53 World Resources Institute (2010)
Land-use in Indonesia is generally established under temporary rights for cultivation, clearing etc. Since decentralisation, rights for land cultivation and clearing are issued at various levels of government. The decentralisation of authority over forest resource management has resulted in confusion and a lack of accountability for land management. Djogo and Syaf (2003) suggest that decentralization of authority to manage forests, coupled with laws retaining the responsibility of conservation and rehabilitation of forests to central government has left many district government officials ambivalent toward forest rehabilitation and conservation. There are also conflicts of authority between institutions such as the National Park Agency, the National Land Agency and the provincial and district level forest services. Conflicts between spatial planning maps developed by provincial and district governments, in some instances, have resulted in unauthorized land conversions endorsed by district governments without the approval of provincial or central governments. Limited or insecure land tenure is a key driver of land use changes leading to deforestation and forest degradation. Tenants without secured land tenure have little incentive to maintain and protect their land as compared with those with secure tenure. The strengthening of land tenure and use rights is needed in order to provide incentive for land users to invest in land improvement. The incentive for land users to maintain and rehabilitate land—such that the severity of degradation is reduced and land is rehabilitated—requires effective, secure and transparent land rights and accountability processes.

Closing the Productivity Gap

A significant challenge for the palm oil industry is the large productivity gap between actual and achievable yields of palm oil plantations. In Indonesia, palm oil yields averaged 3–4 tonnes/ha, however, various estimates of potential yields are up to 8.6 tonnes/ha. Almost year long sunshine, abundant rainfall, rich
volcanic-derived soils and familiarity with the production of palm oil give Indonesia an advantage in the production of agricultural products and palm oil. Goenadi (2008) suggests that these resources coupled with new palm oil breeds with superior characteristics and the current planting materials available, the genetic potential of annual production is around 6-7 tonnes of palm oil per hectare. However, in reality the average attainable yield only reaches around half of this. In 2008, the Indonesian palm oil commission measured palm oil yield as averaging between 3-4 tonnes per hectare. There needs to be substantial effort in order to reduce this gap, Goenadi suggests that such an effort would include step-by-step land preparation, routine field management and adaption of new technologies. Improvement in productivity, particularly among smallholders, provides the greatest challenge. Variations in the yields of smallholder plantations are also significant, likely due to difference in farming practises and inputs than the genetic potential of plants. Improving the productivity of palm oil producers improves the profitability of the sector without significant increases in land use or costs of production. An increase of 20 percent in production could produce an additional 3.7 million tonnes of palm oil in Indonesia, equivalent to current production from around 1.07 million hectares. Other key challenges for the productivity of the Indonesian palm oil sector, particularly in Kalimantan, include low soil fertility, a periodic dry season and potential land conflict.

**Indonesian Bio-diesel Industry**

Although palm oil currently accounts for less than 5 percent of the world’s bio-diesel production, demand is likely to increase as economies adopt policies that encourage the use of bio-fuel. Despite a relatively low market share, palm oil is often used as feedstock in bio-diesel production, and as feedstock represents the major cost of production, a bio-diesel industry is a viable option for Indonesia. Many economies are setting targets to convert reliance on fossil fuels to greater use of renewable energy, including bio-fuel, in efforts to reduce GHG emissions increasing global demand for alternative fuel options. Increased demand coupled with Indonesia’s abundance of labour and status as a global oil and petroleum producer, places Indonesia in a relatively good position for the production of bio-diesel. The Indonesian government has already made a firm commitment to the development of bio-fuel, including the development an integrated strategy for implementation of a bio-fuel program. For example, countries including the European Union, China, the USA, etc, have set fuel blending targets for bio-diesel ranging from 2 percent in the Philippines to 10 percent in the European Union, by 2020.

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58 Henson (1990)
59 Goenadi (2008), pg 2
60 Hai Teoh (2010)
61 Calculated from Indonesian Palm Oil Commission data
63 Sheil et al (2009)
64 Bio-fuel Indonesia (2010)
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Annex: Palm Oil Production and Poverty by Province

The following table outlines palm oil production statistics for Indonesia’s top five palm oil producing provinces (Riau, Sumatera Utara, Sumatera Selatan, Jambi and Sumatera Barat) and five poorest palm oil producing provinces (Irian Jaya Barat, Sulawesi Tenggara, Sulawesi Tengah, Lampung and Bengkulu).

Table 1

<table>
<thead>
<tr>
<th>Name</th>
<th>GRDP (RP trillions)</th>
<th>Pop* (millions)</th>
<th>% of Poor</th>
<th>Severity Index</th>
<th>Private</th>
<th>Small Holder</th>
<th>Govern.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riau</td>
<td>210.0</td>
<td>4.45</td>
<td>12.9</td>
<td>0.67</td>
<td>2,131,450</td>
<td>2,054,854</td>
<td>335,245</td>
<td>4,521,549</td>
</tr>
<tr>
<td>Sumatera Utara</td>
<td>181.8</td>
<td>12.99</td>
<td>13.63</td>
<td>0.51</td>
<td>1,664,575</td>
<td>1,022,472</td>
<td>1,025,005</td>
<td>3,712,052</td>
</tr>
<tr>
<td>Sumatera Selatan</td>
<td>109.9</td>
<td>7.45</td>
<td>18.43</td>
<td>0.83</td>
<td>855,521</td>
<td>759,034</td>
<td>140,346</td>
<td>1,754,901</td>
</tr>
<tr>
<td>Jambi</td>
<td>32.1</td>
<td>3.09</td>
<td>7.81</td>
<td>0.32</td>
<td>434,899</td>
<td>709,242</td>
<td>133,531</td>
<td>1,277,672</td>
</tr>
<tr>
<td>Sumatera Barat</td>
<td>59.8</td>
<td>4.85</td>
<td>13.01</td>
<td>0.52</td>
<td>548,316</td>
<td>326,580</td>
<td>40,998</td>
<td>915,894</td>
</tr>
<tr>
<td>Irian Jaya Barat</td>
<td>10.4</td>
<td>0.76</td>
<td>48.84</td>
<td>7.29</td>
<td>15,915</td>
<td>25,366</td>
<td>32,087</td>
<td>73,368</td>
</tr>
<tr>
<td>Sulawesi Tenggara</td>
<td>18.0</td>
<td>2.23</td>
<td>25.84</td>
<td>1.52</td>
<td>0</td>
<td>0</td>
<td>102,74</td>
<td>102,74</td>
</tr>
<tr>
<td>Sulawesi Tengah</td>
<td>19.3</td>
<td>2.63</td>
<td>24.97</td>
<td>1.6</td>
<td>97,077</td>
<td>8,180</td>
<td>9,173</td>
<td>114,430</td>
</tr>
<tr>
<td>Lampung</td>
<td>49.1</td>
<td>7.60</td>
<td>23.7</td>
<td>1.12</td>
<td>149,262</td>
<td>162,590</td>
<td>36,376</td>
<td>348,228</td>
</tr>
<tr>
<td>Bengkulu</td>
<td>11.4</td>
<td>1.71</td>
<td>21.66</td>
<td>0.92</td>
<td>208,923</td>
<td>217,022</td>
<td>8,072</td>
<td>434,017</td>
</tr>
<tr>
<td>Indonesia</td>
<td>3,950</td>
<td>237.56</td>
<td>17.35</td>
<td>n.a.</td>
<td>9,263,089</td>
<td>6,358,388</td>
<td>2,174,897</td>
<td>17,796,374</td>
</tr>
</tbody>
</table>

Note: * As measured by the 2010 census