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INDONESIA'S CRUDE PALM OIL (CPO) AGAINTS BLACK CAMPAIGN

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Abstract

Crude Palm Oil (CPO) is the best vegetable oil in the world in quality and productivity. Increasing number of population causes increasing demand of CPO as ingredient and sustainable energy resource, so CPO has good business prospect. However, non-tarif barrier restrict Indonesia Palm Oil development and operation through environmental issues . This paper aims to clarify the issues according to the research.

Keywords: Crude Palm Oil (CPO), Non-Tariff Barrier

1. THE GLOBAL PERCEPTION OF PALM OIL

There are 13 vegetable oils internationally produced, traded and consumed, i.e. palm oil, soybean oil, sunflower oil, rapeseed oil, coconut oil, peanut oil, cottonseed oil, olive oil, castor oil, sesame oil, and linseed oil; from which only four vegetable oils produced, traded and consumed on a large scale by the world community namely palm oil, soybean oil, rapeseed oil, and sunflower oil. In 2008, the four vegetable oils provided 85.3% market share of total world vegetable oil production. The four vegetable oils' high production is one of the preference reasons for international community to use them.

Selection to a particular commodity to produce vegetable oil product cannot be separated from its efficiency and effectiveness factors; reflected by a simple indicator, i.e. productivity which is usually calculated in production per hectare per year. Out of the four vegetable oils, palm oil has the highest productivity, i.e. 4.27 tons/hectare/year; while soybean oil, rapeseed oil and sunflower oil have 0.45 tons/hectare/year, 0.69 tons/hectare/year and 0.52 tons/hectare/year, respectively (Oil World, 2008). The numbers indicate that palm oil is the most efficient and effective commodity to produce vegetable oil. It is very important to note because high production will eventually minimize number of land use and production cost. Table 1 shows productivity of palm oil, soybean oil, rapeseed oil, and sunflower oil.

Table 1. Major Vegetable Oils Productivity

Vegetable Oils	Productivity (tons/ha/year)
Palm Oil	4,27
Rapeseed Oil	0,69
Sunflower Oil	0,52
Soybean Oil	0,45

Source: Oil World (2008)

Based on the data, palm oil is six times more productive than rapeseed oil, eight times more than sunflower oil and nine times more than soybean oil. Such high productivity leads to high production, planted area smaller than other vegetable oils and lower production cost.

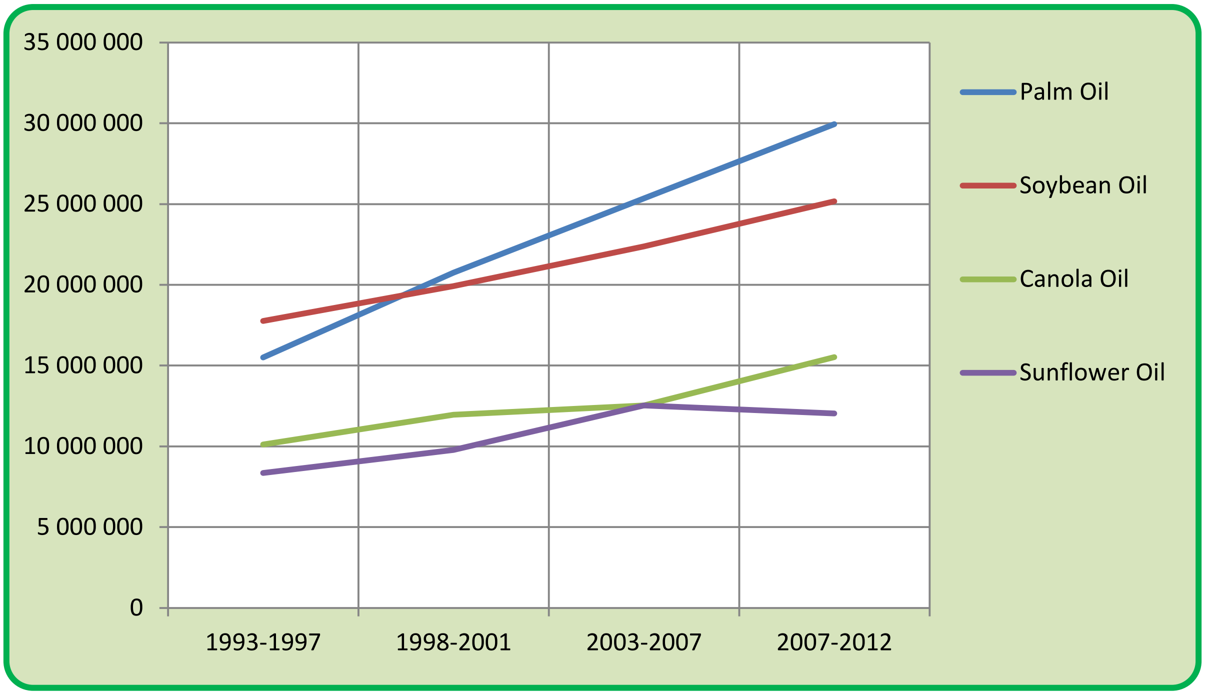
In 1998-2001, world palm oil production increased from 24.7% to 27.8%, surpassed soybean oil production which in previous years always ranked first. This was due to palm oil's production rate per year higher than other vegetable oils. Table 2 shows comparison between palm oil and palm kernel oil productions and production of soybean oil, canola oil, sunflower oil, and others in 1993 to 2012.

Table 2. Major Vegetable Oils Production (1993-2012)

Vegetable Oils	**1993-1997**	**1998-2001**	**2003-2007**	**2007-2012**
Total Production (Ton)	70.778.000	83.680.000	95.624.000	108.512.000
Palm Oil	15.500.382	20.752.640	25.340.360	29.949.312
Soybean Oil	17.765.278	19.915.840	22.376.016	25.174.784
Canola Oil	10.121.254	11.966.240	12.526.744	15.517.216
Sunflower Oil	8.351.804	9.790.560	12.526.744	12.044.832
Other	19.039.282	21.254.720	22.854.136	25.825.856

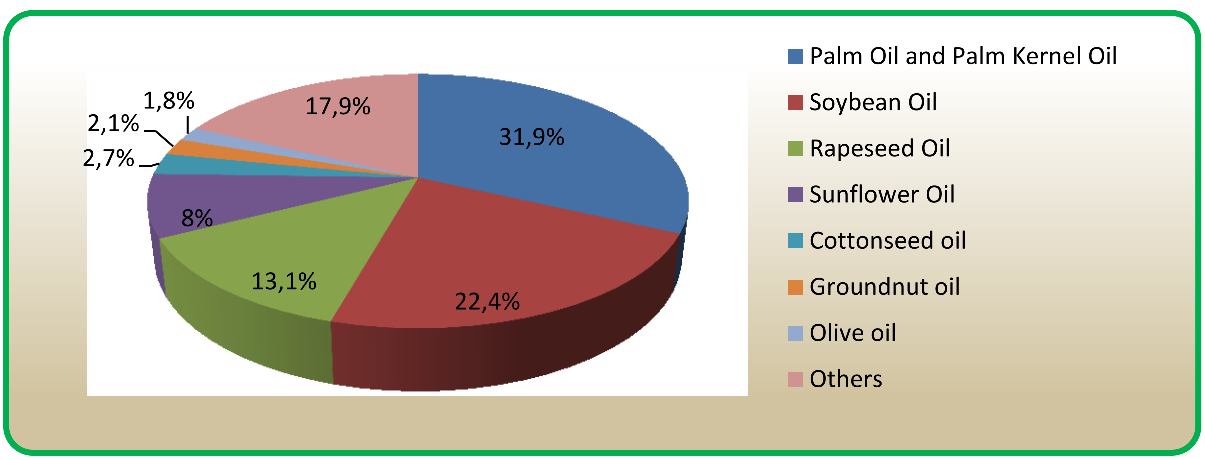
Source: General Director of Agroindustry and Chemistry of Industrial Department, 2013

Figure 1. Major Vegetable Oils Production (1993-2012)



Source: General Director of Agroindustry and Chemistry of Industrial Department (2013)

Figure 2. World's Vegetable Oils Production (1993-2012)



Source: Oil World (2013)

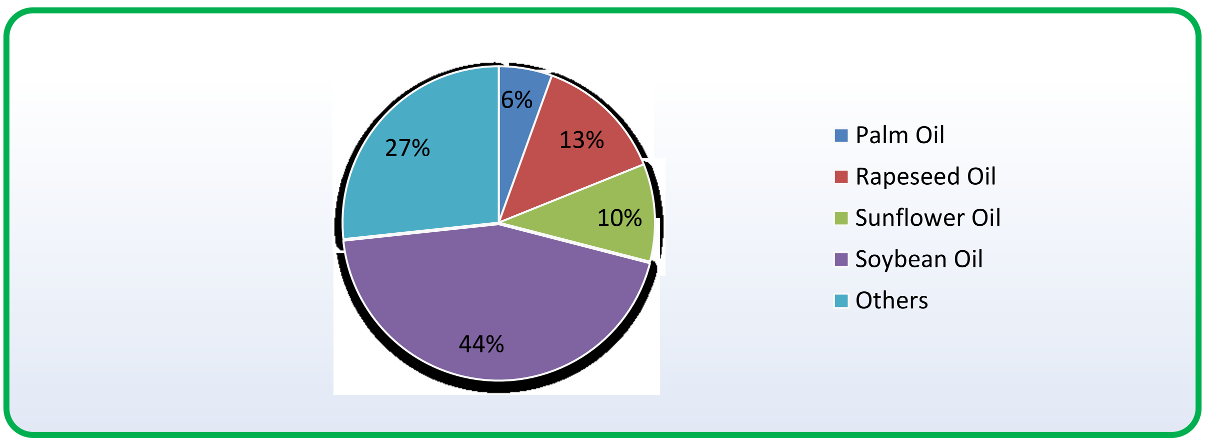
Although has been in the first place of market share of global vegetable oil production, land use for oil palm is lower than other vegetable oils. Based on data published by Oil World (2008), total area of oil palm (palm oil) globally is 12.8 million hectares with market share of 5.52% out of all vegetable oils' total area. On the other hand, soybean oil land use is 102.7 million hectares; rapeseed oil 31.07 million hectares; and sunflower oil 23.40 ha. This also indicates that palm oil is the most efficient and effective commodity to produce vegetable oil. Table 3 shows the number of land use for each vegetable oil.

Table 3. The Number of World's Vegetable Oils Land Use(2008)

Vegetable Oils	Land Use	
	(000.000 ha)	Contribution (%)
Palm Oil	12,80	5,52
Rapeseed Oil	31,07	13,40
Sunflower Oil	23,40	10,09
Soybean Oil	102,70	44,60
Others	61,86	26,69
Total	231,83	100,00

Source: Oil World (2008)

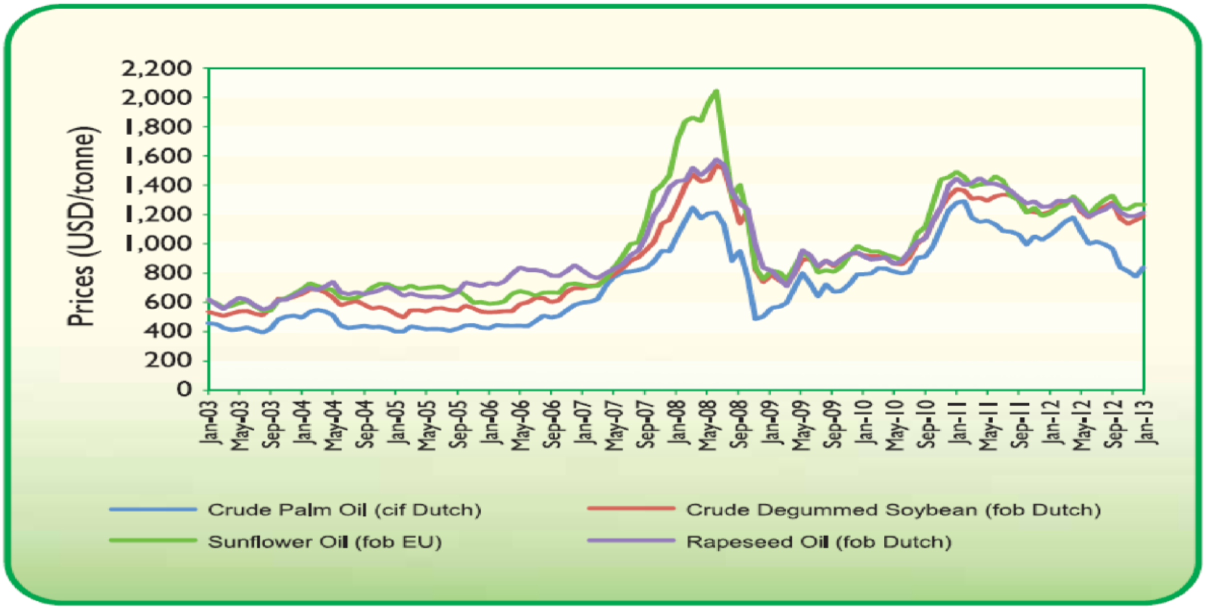
Figure 3. The Number of World'sVegetable OilLand Use (2008)



Source: Oil World (2008)

Other advantage from high productivity of palm oil is its production cost lower than other vegetable oils. Zimmer (2009) stated that palm oil's production cost is USD 300/ton crude palm oil (CPO); while soybean oil USD 400/ton and rapeseed oil USD 500/ton. Its low production cost leads palm oil price more competitive than any other vegetable oils. Figure 4 shows comparison between prices of major world's vegetable oils from January 2003-January 2013. It is shown that world palm oil price is the lowest among other vegetable oils.

Figure 4. Comparison between Prices of Major World's Vegetable Oils from January 2003-January 2013 (USD/ton)

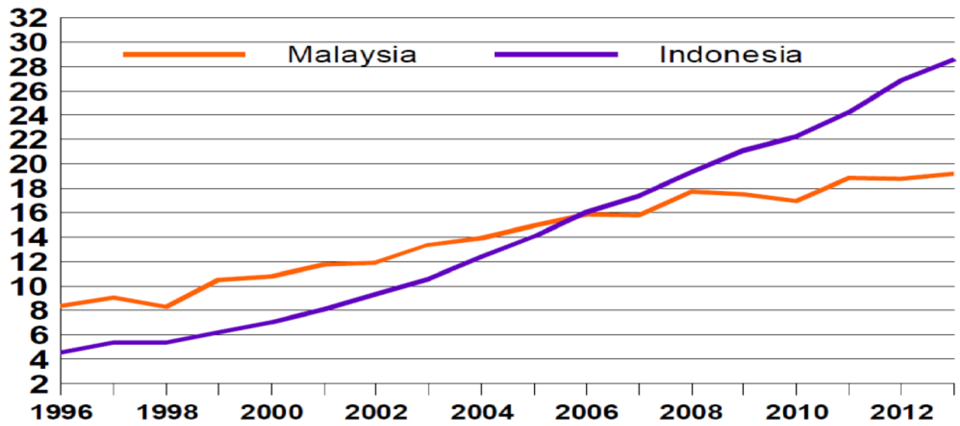


Source: Oil World (2013)

2. ROLE OF PALM OIL IN INDONESIA

Indonesia is the world's highest palm oil producing country. This achievement has been recorded since 2006; exceeded Malaysia production that had always been ranked first in precious years. Based on Figure 5, it is shown that growth trend of Indonesian palm oil increases steadily while Malaysia has a fluctuated trend.

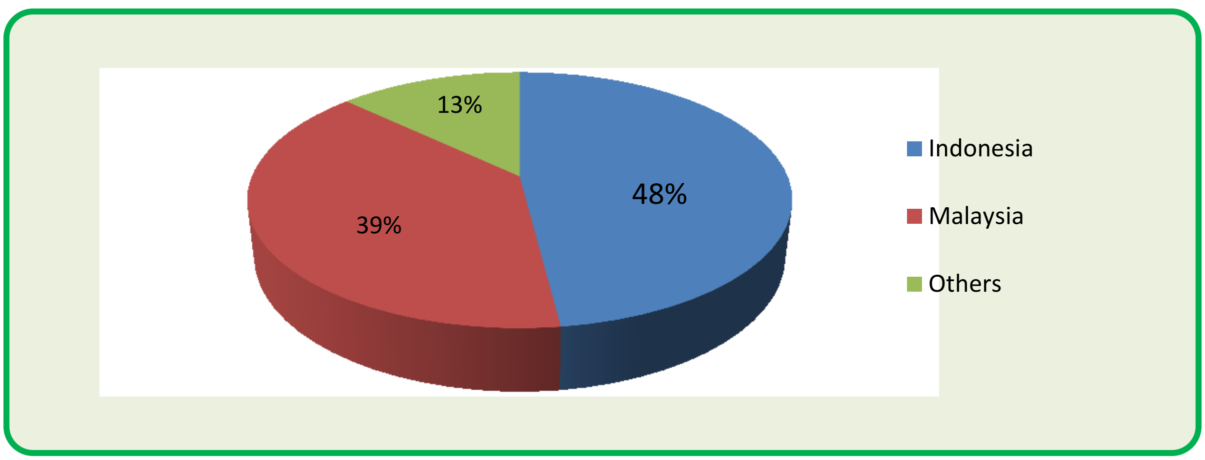
Figure 5. Indonesian and Malaysian Palm Oil Production (1996-2012)



Source: Oil World (2013)

In 2010, Indonesian contribution for palm oil production reached 48% or around 19,844,900 tons; followed by Malaysia with share market of 39%. The two are the world's highest palm oil producing countries covering 77% of world's share market. The other 13% consists of Nigeria, Colombia, Ecuador, Papua New Guinea, Ivory Coast, Honduras, Brazil, Costa Rica, etc.

Figure 6. Indonesian Contribution of Wolrd's Palm Oil Production (2010)



Source: Tungkot Sipayung (2012)

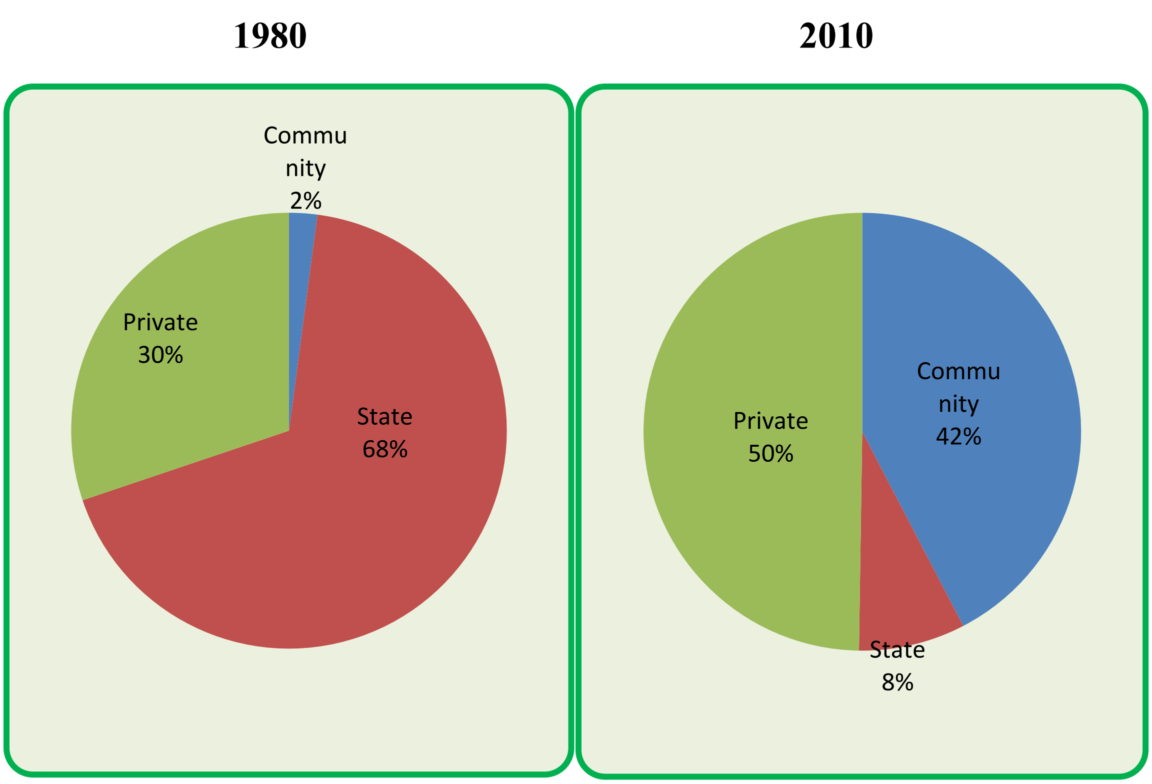
The success of Indonesian palm oil agribusiness to stand as the world's highest palm oil producing country cannot be separated to other parties in plantations. Indonesian palm oil plantation is divided into three, namely community, state and private plantations. In 1980-2010, there was a major change on plantation ownership occurred. In 1980, community plantation was only 2.09% out of a total 294.560 ha of oil palm plantation in Indonesia. However in 2010, community plantation was 42.36% out of 7.824.623 ha or around a total 3.314.663 ha of oil palm plantations cultivated by the community. Such a rapid change occurred due to the result of Nucleus Estate Smallholder (NES) policy in 1980, a policy implementing partnership between farmers as scheme and state plantation as nucleus. Table 4 shows oil palm plantation area run by community, state and private in 1980-2010.

Table 4. Oil Palm Plantation Area Run by Community, State and Private (1980-2010)

Year	Community		State		Private		Total	
	ha	%	ha	%	ha	%	ha	%
1980	6.175	2,09	199.538	67,74	88.847	30,17	294.560	100
1985	118.564	19,85	335.195	56,11	143.603	24,04	597.362	100
1990	291.338	25,86	372.246	33,04	463.093	41,10	1.126.677	100
1995	658.536	32,52	404.732	19,98	961.718	47,50	2.024.986	100
2000	1.166.758	28,06	588.125	14,14	2.403.194	57,80	4.158.077	100
2005	2.356.895	43,21	529.854	9,71	2.567.068	47,08	5.453.817	100
2010	3.314.663	42,36	616.575	7,88	3.893.385	49,76	7.824.623	100

Source: Tungkot Sipayung (2012)

Figure 7. Change on Plantation Ownership (1980-2010)



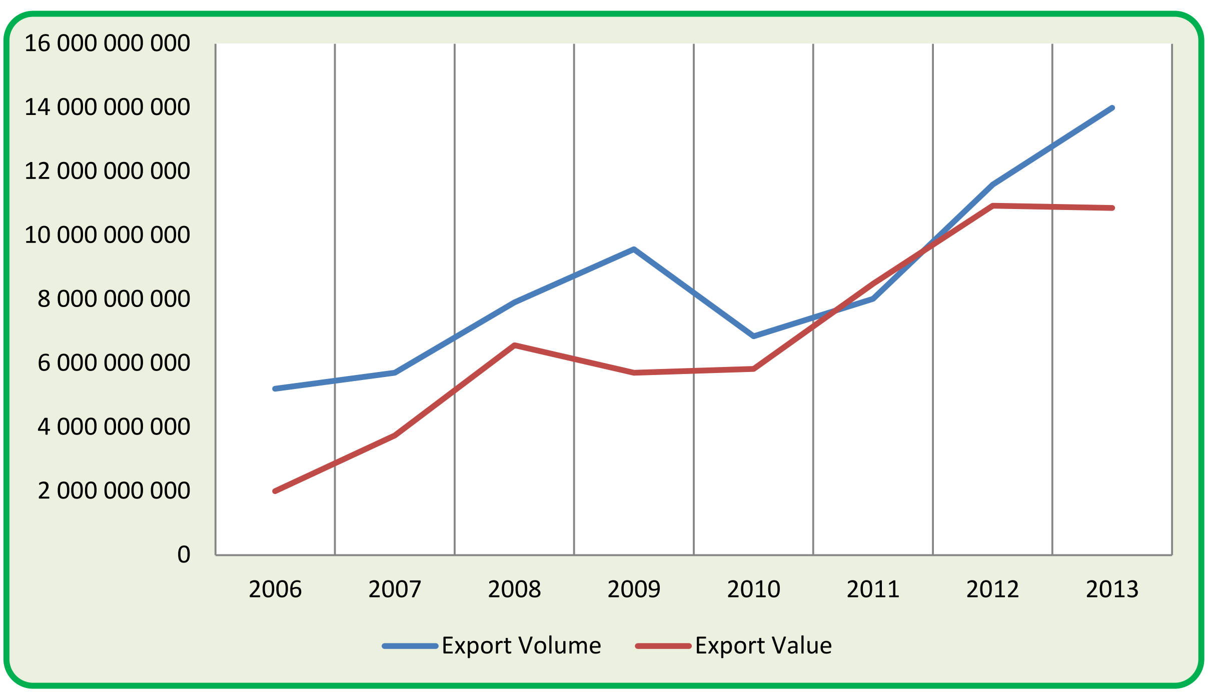
Indonesian palm oil provides high foreign exchange through exports. Indonesian palm oil export value increased from USD 1.99 billion in 2006 to USD 10.86 billion in 2013 or increase 5.45 times over eight years (Table 4). In 2006-2008, palm oil export volume and value increased. However, in 2009, increase in export value was not followed by increase in previous year's export value. Oil palm export volume increased from 7.9 million tons in 2008 to 9.56 million tons in 2009; while export value decreased from USD 5.65 billion to USD 5.7 billion in the same period. This is one of the causes world palm oil price dropped in September 2008-January 2009, i.e. USD 500 per ton. Table 5 shows Indonesian palm oil export volume and value in 2006-2013.

Table 5. Indonesian Palm Oil Export Volume and Value (2006-2013)

Year	Volume (kg)	Progress Percentage (%)	Value (USD)
2006	5.199.286.871	-	1.993.666.700
2007	5.701.286.129	9,65	3.738.651.600
2008	7.904.178.630	38,60	6.561.330.500
2009	9.566.746.050	21,03	5.702.126.200
2010	6.847.685.771	-28,44	5.819.000.500
2011	8.012.164.749	17,00	8.484.231.900
2012	11.592.500.794	44,68	10.925.664.200
2013	13.993.243.669	20,71	10.860.317.300

Source: UN Comtrade, 2014

Figure 8. Indonesian Palm Oil Export Volume (2006-2013)



Source: UN Comtrade (2014)

3. BLACK CAMPAIGN AND ITS EFFECT ON INDONESIAN PALM OIL ECONOMY

The success of palm oil that has been achieved up to now is not without any obstacles. In the last few years, Indonesian palm oil has faced trade barrier, particularly non-tariff barrier. One of non-tariff barrier hindering Indonesian palm oil trade is the emergence of issues on Indonesian palm oil product is unhealthy and its management is not environmentally healthy.

Such issues are really hazardous to Indonesian palm oil economy because after the emergence several trade barriers start to be applied for Indonesian palm oil products. This makes Indonesian palm oil product cannot be easily traded in Europe, United State, Australia, and New Zealand markets.

3.1 Trade Barriers in Europe:

(a). *Registration, Evaluation, and Authorisation Chemicals* (REACH)

REACH is a trade barrier hindering processed palm oil finished product to enter European Union (EU), so that only CPO in the form of semi-finished product (raw material) can enter the market without registration. As for finished products, they are obliged do registration through importer or the only representative residing in EU. Both complicated and high cost registration process hinder Indonesian palm oil processed product to be traded in EU markets.

(b). *Renewable Energy Directive* (RED)

RED is a trade barrier regulating obligation on renewable energy use. There is RED criterion namely sustainability that has to be met before entering EU market so that the product can be processed into raw material of renewable energy. In addition to that, there is also calculation of greenhouse gas emissions.

(c). *Reducing Emissions from Deforestation and Forest Degradation* (REDD)

REDD is a trade barrier regulating demand to mitigate global climate change. There is a criterion to reduce emissions due to the decrease in forest number and area (deforestation).

3.2 Trade Barriers in America:

(a) *Notice of Data Availability* (NODA)

NODA is an analysis on life cycle of greenhouse gas emissions from the use of biodiesel and other renewable fuels to implement Renewable Fuel Standard (RFS). The analysis result shows that biodiesel and other palm oil based-renewable diesels do not meet the minimum requirement of greenhouse gas emissionsreductionthreshold of 20%, as palm oil is only at 11-17% level.

3.3 Trade Barriers in Australia/New Zealand:

(a) *Truth in Labelling Bill*

On November 23th 2009, Community Affairs Legislation Committee (CALC) gave recommendation to Australian government to amend its standard for food (truth in labeling-palm oil) by reasons as follows: (1) Consumers should be provided with correct information. Printing palm oil on product package as vegetable oil is considered misleading consumers; (2) Palm oil is considered containing saturated fat; (3) Industrial sector is required to use well-processed palm oil for its production process and then use certified sustainable palm oil. Such labeling policy is only applied for palm oil; while other vegetable oils are not subject to the policy.

Clarification from Indonesia regarding issues emerging through comprehensive research and international publication is necessary so that trade barriers for Indonesian palm oil can be suppressed. Such clarification through published research can bring facts about palm oil products, e.g. the product is healthy and environmentally friendly.

4. FACTS ABOUT INDONESIAN PALM OIL

4.1 Health

(a) Palm Oil Comprises Saturated and Unsaturated Fatty Acid in a Balanced Proportion

Palm oil's fatty acid composition comprises about 40% oleic acid (monounsaturated fatty acid), 10% linoleic acid (polyunsaturated fatty acid), 44% palmitic acid (saturated fatty acids) and 4.5% stearic acid (saturated fatty acid). Therefore, in general, palm oil has saturated and unsaturated fatty acid in a balanced proportion. Table 5 shows composition of palm oil fatty acid.

Table 6. Palm Oil Fatty Acid Composition

Fatty Acid	Percentage of Total Fatty Acid (%)	
	Range	Average
Laurat Acid (C12:0)	0,1-1,0	0,2
Miristat Acid (C14:0)	0,9-1,5	1,1
Palmitat Acid (C16:0)	41,8-45,8	44,0
Palmitoleat Acid (C16:1)	0,1-0,3	0,1
Stearate Acid (C18:0)	4,2-5,1	4,5
Oleat Acid (C18:1)	37,2-40,8	39,2
Linoleiat Acid (C18:2)	9,1-11,0	10,1
Linolenat Acid (C18:3)	0,0-0,6	0,4
Arakidonat Acid (C20:0)	0,2-0,7	0,4

Source: Purwiyanto Hariyadi (2013)

Based on the data, palm oil is special because it cannot be categorized into saturated or unsaturated oil. Physically, palm oil has semi-solid nature and can be fractionated into several oil types, whether it saturated or unsaturated oil. Each oil types can be specifically used for particular purpose.

(b) Palm Oil Contains No Trans-fatty Acid

Because of its fatty acid composition, palm oil has semi-solid nature with melting point of around 33-39°C. Having such melting point, natural state of palm oil can be used for various formulations without hydrogenation process. Hydrogenation process, particularly partial hydrogenation, in addition to increase oil density, it will also change configuration of unsaturated fatty acid from cis to trans. Classification on saturated and unsaturated fatty acid is also has potential to mislead because not all saturated fatty acids have the same configuration. Naturally, unsaturated fatty acids contain cos configuration. However, hydrogenation process, particularly partial hydrogenation, will change unsaturated fatty acid configuration from cis to trans. Unsaturated fatty acid content in hydrogenated-soybean oil can reach 13-30%. Trans-unsaturated fatty acid is known has adverse health effects. Therefore, information on the amount of this fatty acid should be provided to customers. Several countries even provide guidance for food industry to reduce fat or oil containing trans-fatty acid due to health reason.

(c) Palm Oil is a Natural Source of Vitamin E

Palm oil is a natural source of Vitamin E, particularly tocopherols and tocotrienols. These components are important in diet because they act as antioxidants, i.e. compound preventing oxidation. Free radicals are naturally found in body as result of normal metabolism but they can increase under stress and hard work. In addition, free radicals also can be from pollutant and food and they act as powerful antioxidants against fatty acids' components on cell membranes. Damage occurred is known as oxidative damage and it can cause irregularities in cell functions. Palm oil's tocopherols and tocotrienols can act as natural antioxidants by capturing free radicals and at the same time protecting cells from damage. There are a lot of studies to prove that these two components can protect cells from aging and degenerative diseases such as atherosclerosis and cancer.

(d) Crude Palm Oil (CPO) Contains Very High Carotenoids Content (Pro-vitamin A)

Naturally, palm oil actually has more potential as carotenoids (pro-vitamin A) source than other well known-carotenoid sources. Carotenoids have double functions, i.e. as antioxidants and source of vitamin A for the body. According to Guideline for Food Fortification with Micronutrients published by World Health Organization (WHO)/Food and Agricultural Organization (FAO), carotenoid compounds, particularly beta-carotene, is fortificant for vitamin A with a good stability, even if it is added to oil and fat. WHO/FAO Expert Group stated that 1 IU vitamin A/g oil = 0.6 µg beta-carotene/g oil.

4.2 Deforestation

(a) Global Definition of Forest

Each country in the world has different definition of forest. Lund (1999,2005) observed that there are 786 definitions of forest and 199 definitions of tree, which are different between a country and another. This affectsto different definition of legal aspect/administration, land use, land scope and forest scope in each country. Several conversion forest cases occurred in many countries, as for example Indonesian conversion forest defined as forest that can be converted into plantations, rice fields and settlements is also classified as natural forest. This is supported by the fact that rubber, bamboo and palm oil plantations are considered forest (FAO, 2005, 2010; Lund, 1999). In Africa and Middle East countries, palm plantations (oil palm in Africa, date palm in Middle East) are defined as forest. Indonesian people think that forest and plantation are the same entities (Soemarwoto, 1992). Teak forest is considered forest, thus rubber plantation is considered forest too. The definition of forest according to FAO (2005,2010) is a land with size of more than 0.5 hectares, trees higher than 5 meters and canopy coverage of more than 10%. However, FAO's definition does not always serve as reference by other countries. Based on survey conducted by Lund (1999), in Czech Republic, a land with the size 0.01 hectares is considered forest. In some other countries, vegetation consisting trees of 1.3 meters in height is also considered forest. Different definition of forest causes different data of total forest area in each country. For example, before 1990, report shows that only a few remaining natural forest existed in Europe (Soemarwoto, 1992). On the other side, FAO reported that natural forest in Europe shows increased numbers. This is due to unprocessed agricultural land is also defined as primary forest. in Europe. This condition also leads to different definition of deforestation, reforestation and afforestation. FAO defines deforestation, reforestation, and afforestation as activities to change land use. However, this definition has yet to become a standard reference, because the published data used statistical data gathered from all countries with different definitions.

(b) Global Development of Forest and Indonesian Forest Condition

Based on data published by FAO (2010) in Global Forest Resource Assessment, the world's total forest area decreased from 4.16 billion hectares in 1990 to 4.03 billion hectares in 2010. Forest areas in Asia and Europe increased; meanwhile in Africa, America and Oceania decreased. Table 6 shows the number of forest areas by continent.

Table 7. The Number of Forest Areas by Continent (000 ha) selama Tahun 1990-2010

Continent	1990	2000	2005	2010
Africa	749.238	708.564	691.468	674.419
Asia	576.110	570.164	584.048	592.912
Europe	987.471	998.239	1.001.150	1.005.001
North Amerika	708.383	705.497	705.296	705.393
Oceania	198.743	198.381	196.745	191.384
South Amerika	946.454	904.322	882.258	864.351
Total	4.168.398	4.085.168	4.060.954	4.033.060

Source: FAO (2010)

In 1990-2010, the world lost forest areas of total 167.27 hectares. Africa'slost forest area reached 74.8 million ha; North and Central America 2.99 million ha; Oceania 7.36 acres; and South America 82.1 million ha. On the other side, Asia's number of forest areas increasedup to 16.8 million ha and 15.5 million ha for Europe.

(c) Indonesian Forest

Based on data published by Directorate General of Planing, Indonesian Ministry of Forestry, in 2012 total area of Indonesian forest is129,02 million ha, 30.5 million ha of it isprotected forest. Table 7 shows total Indonesian forest area by function.

Table 8. Total Indonesian Forest Area by Function (2012)

Function	Forest Area (ha)	%
Conservation Forest *)	21.780.624,14	16,88
Protected Forest *)	30.539.822,36	23,67
Production Forest	58.778.394,84	45,56
Convertion Forest	17.924.534,81	13,89
Total Forest Area	129.023.378,15	100,00
Others	60.613.324,15	-
Total	189.636.703,00	-

Source: Dirjen Planologi, Kemenhut (2012)

*) = Primary Forest

(d) Global Deforestation

Deforestation becomes a global environment issue as it relates closely to greenhouse gas emissions. It is also a threat to biodiversity. Up to now, deforestation has closely related to community development. A study to determine how many lost forest areas as well as which area give the most significant impact on the lost can be observed in Table 9.

Table 9. Comparison of Global Deforestation Between Tropical and Non Tropical Forest (Pre Agriculture Era - 2005

Periode	Tropical Forest (000.000 ha)	Progression	Non Tropical Forest (000.000 ha)	Perubahan	World's Forest Area (000.000 ha)	Progression
Forest Area (Pre Agriculture Era) *)	1.277	-	3.351	-	4.628	-
Forest Area (1980) *)	1.229	- 48	2.698	- 653	3.927	- 701
Forest Area (2005) **)	1.630	+ 401	2.430	- 268	4.060	+ 133
Total Progression	-	+ 353	-	- 921	-	- 568

Source: *) Matthews, E (1993)

**) FAO (2005,2010)

Since pre-agriculture era until 1980, the world has lost forest area of 701 million ha, from lost tropical forest of 48 million ha and non-tropical forest of 653 million ha. In 1980-2005, total tropical forest area increased 401 million ha; meanwhile non-tropical forest decreased 268 million ha. These data indicate that deforestation is mainly occurred in non-tropical forest.

4.3 Biodiversity

Although palm oil plantation's spatial and primary function plan is not developed to support biodiversity, its implementation shows that the plantation contributes to the sustainability of biodiversity, both flora and fauna. This is carried out through the following mechanism:

(a) Prohibition on using leased land for oil palm plantation if the land has no optimum capability to be planted. Most of these lands are located in riparian area. Determination of riparian area as area bearing high conservation and biodiversity makes it well-protected and borders between plantation area and riparian area are established.

(b) Established palm oil plantation provides spacious area for various species of flora and fauna to live.

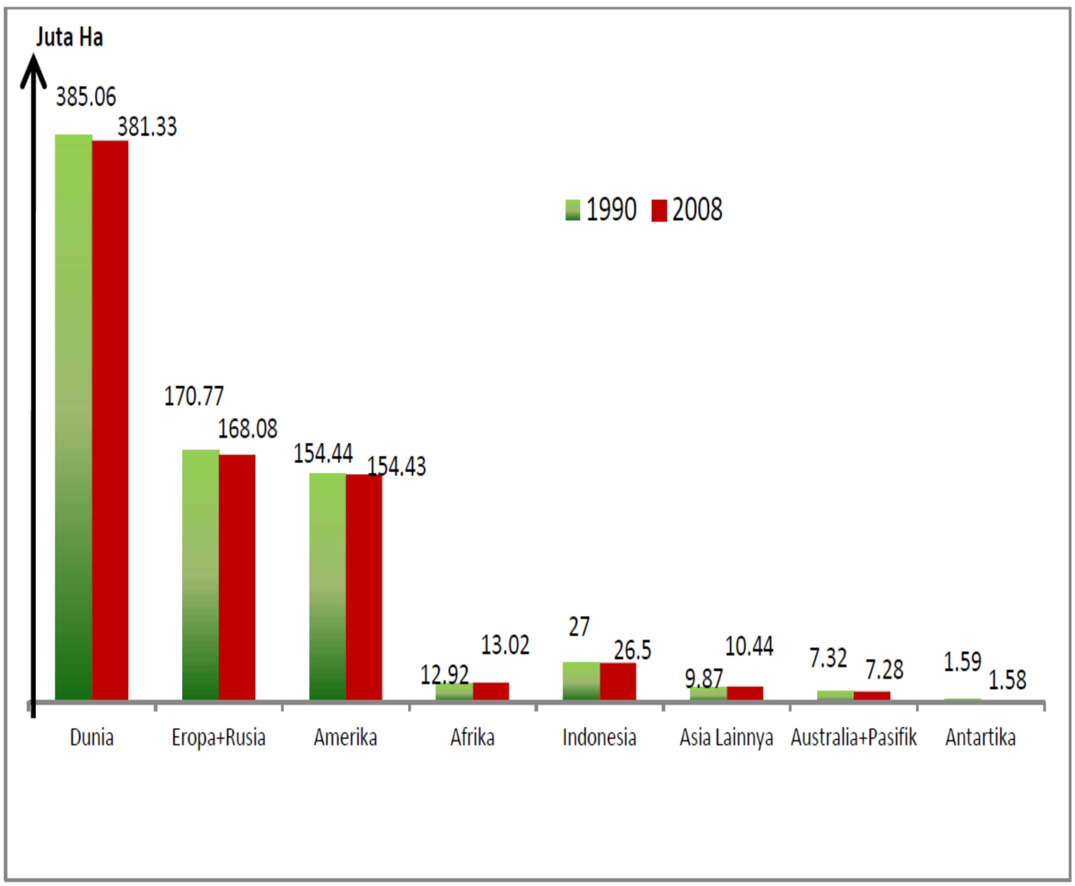
(c) Palm oil plantations has supported own biodiversity for themselves with huge benefits particularly from economic, social, and environment aspects.

4.4 Peatlands

(a) Global Development of Peatlands

Discussion on peatlands in the world, including peatlands in Indonesia, has become a global issue. Beside to store carbon stocks, peatlands also produce greenhouse gas emissions in worldwide term. This is considered a result of peatlands conversion intoagriculture and other uses. Based on the data published by Wetland International (Joosten, 2009) world's total peatland areas is 385 million ha in 1990 and about 381 million ha in 2008. The biggest contributors of world peatlands are Europe, Russia, and USA. Combination of the three countries' peatlands is 80% out of world peatlands. The remaining 20% spreads across Asia, Africa, Australia, Pacific and Antarctica. Figure 9 shows the distribution of peatland areas.

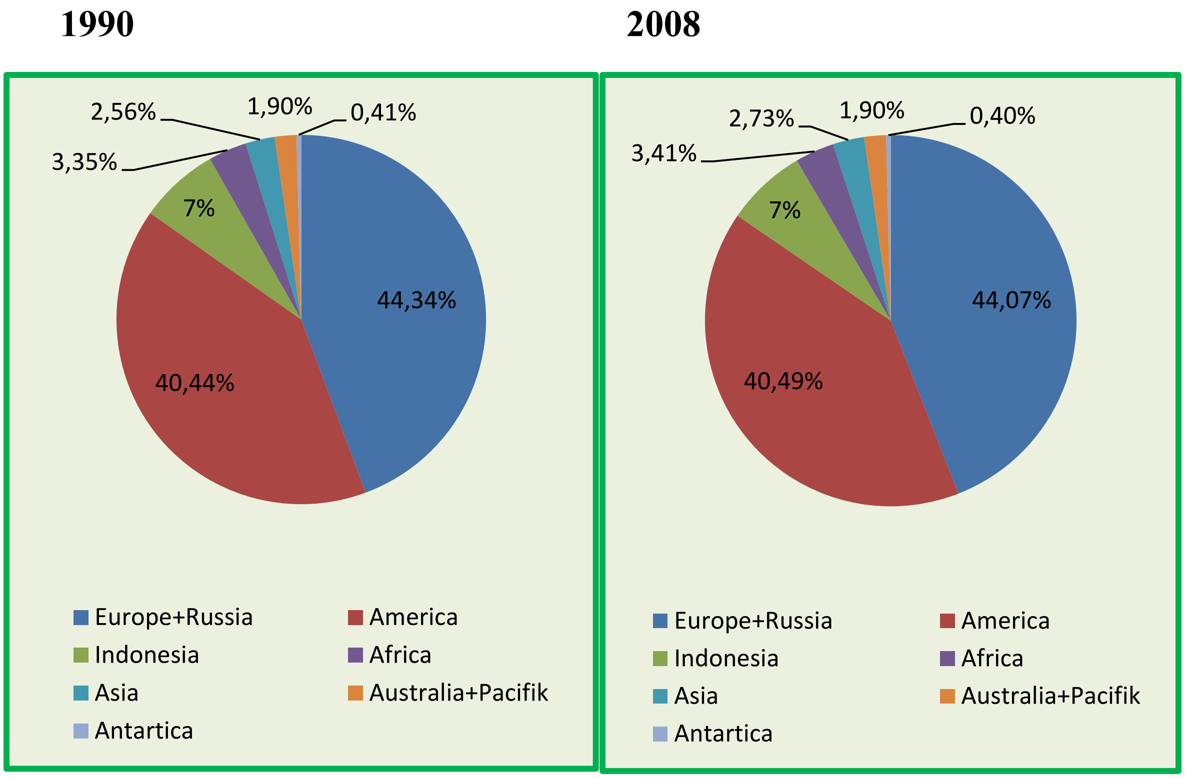
Figure 9. Distribution of Peatland Areas(1990-2008)



Source: Joosten (2009)

Changes in world's peatlands area occurred in 1990 to 2008. Europe and Russian peatland decreased 60.000 ha; while Africa and Antarctica 270.000 ha. Total opposite condition occurred in America and several countries in Asia except Indonesia. Peatlands increased 50.000ha in America and 170.000 ha in Asia. Figure 10 shows the comparison of peatlands distribution in 1990 to 2008.

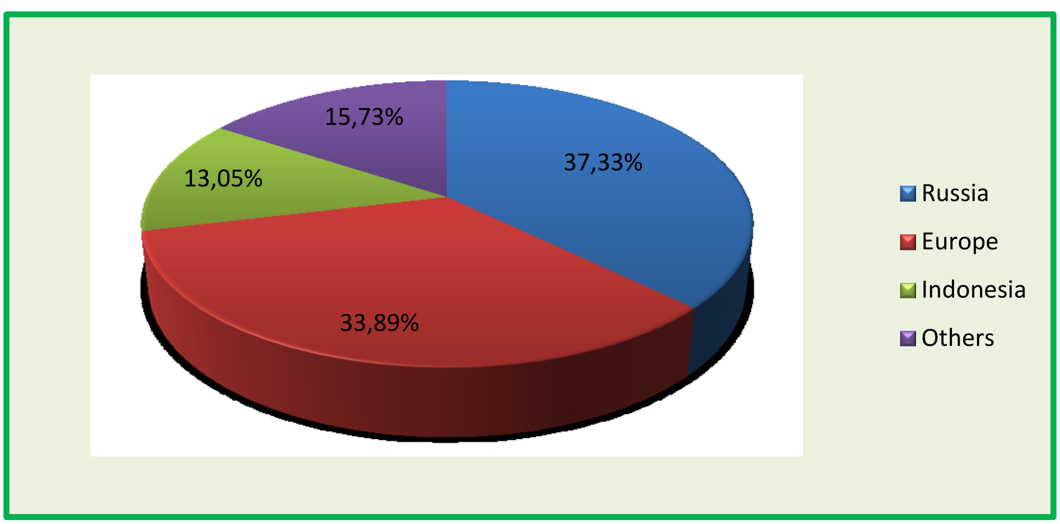
Figure 10. The Comparison of Peatlands Distribution(1990 dan 2008)



Source: Joosten (2009)

In 1990-2008, the conversion of world peatlands reached 3.83 million ha. The biggest contributor is Russia (37%); followed by Europe (33%) and Indonesia (13%). The remaining 16% is distributed in other countries. Figure 10 shows the distribution of peatlands in the world in 1990-2008 by region.

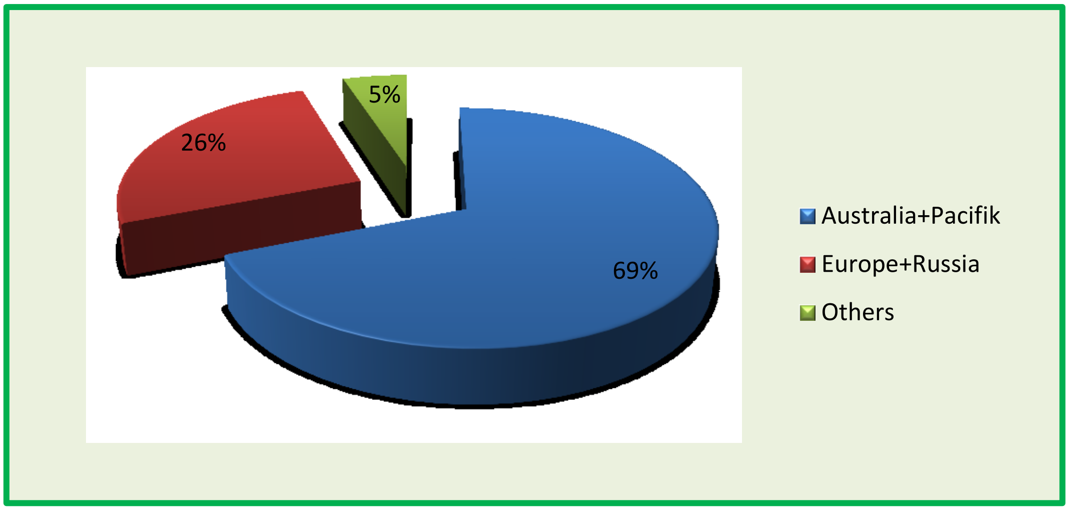
Figure 11. The Distribution of Peatlands in the World (1990-2008)



Source: Joosten (2009)

Peatlands'forest area also decreased 6.5 million ha in 1990-2008. The biggest loss occurred in Australia and Pacific (26%); followed by Europe and Russia (26%). On the other hand, Asian peatlands increased 7.8 million ha. Based on the data, converted peatlands in Indonesia are 450.000 ha. From macro perspective, Indonesia only contributes 13% of the total world peatlands conversion. Figure 12 shows the los tpeatlands area due to land use change.

Figure 12. The Lost Peatlands Area Due To Land Use Change (1990-2008)



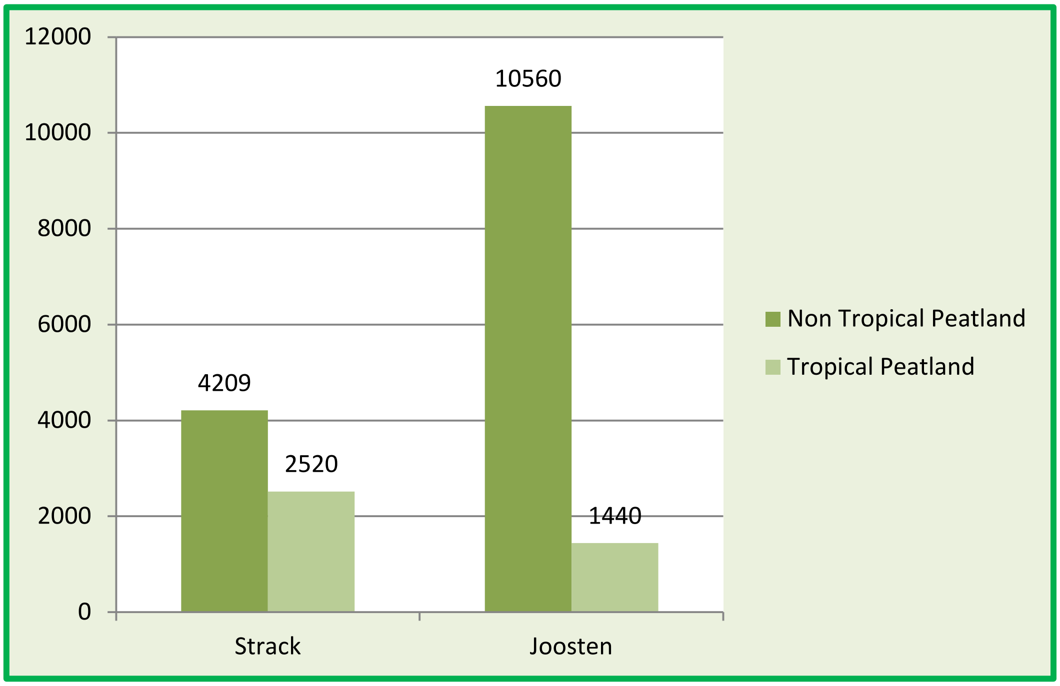
Source: Joosten (2009)

The data shown above indicates that the largest peatland conversion does not occur in Indonesia; but rather in Australia and Pacific region, Europe and Russia. Approximately 70% of the world's peatland conversion occurred in Europe and Russia.

(b) Greenhouse Gas Emissions from Global PeatlandAgriculture

Various studies on global peatland shows that greenhouse gas emissions from peatlands amounts vary depending on several factors, i.e. peat-forming material, land area, plant types, drainage management and cultivation techniques (Oleszcuk *etal.,* 2008; Kheong *et al*., 2010; Melling *et al.,*2005;2007;2010; Hirano *etal.*, 2007; 2011; Kohl*et al.,* 2011; Jauhiainen*et al.,* 2004; Hooijer *etal.,*2006). Peatlands naturally produce CO_2 emissions (and CH_4) from organic decomposition process and respiration of microorganisms inhabiting the peatlands (Perish *et al*., 2007; Fahmuddin *et al.,*2008). In other words, even without human intervention to develop agricultural land in peatlands (plantations), peatlands will still produce CO_2 emissions from decomposition and respiration of microorganisms. This process actually is a part of sustainability mechanism for microorganism living in the peatlands. Microorganism as a part of germ plasm also has the right to life. About 300 million ha of total peatlands in the world (385 million ha) has been used for agriculture, with tropical region contributes 12% and non-tropical region 88% (Strack, 2008). Based on Strack's calculation, CO_2 emission from tropical peatlands is 70 tons per hectare per year (bigger than Joosten's estimation in 2009, i.e. 40 tons per hectare per year). Although CO_2 emission from agricultural activities in non-tropical peatlands is only 15 tons per hectare per year (less than Joosten's estimation in 2009, i.e. 25-35 tons per hectare per year), the number of non-tropical peatlands is higher than the tropical, and this causes CO_2 emission in non-tropical areas is much higher.

Figure 13. The Comparison of CO2Total Emission Between Tropical and Non Tropical Peatland Area



Source: Strack (2008); Joosten (2009)

(c) Palm Oil Enterprises on Peatlands

There have been many studies conducted on CO_2 emissions from tropical lands in Indonesia and Malaysia, including research by Murayama and Bakar (1996); Hadi, *et al*., (2001); Melling, *et al*., (2005, 2007) and Germer and Sauaerborn (2008); Sabiham, *et al.,* (2012); (2013). Results of these studies indicate that CO_2 emission from tropical peatlands is vary based on peatland type and the difference in plant vegetation. Generally, the resultsshow that CO_2 emissions from peatlands and secondary peat forests are higher than from peatlandconverted into agriculture area (rice and oil palm). CO_2 emission from palm oil plantation is lower than from peat forest. Research conducted by Melling, *et al.,* (2007) showed that oil palm plantations on peatlands are not sources or absorbers of CO_2 emissions (if it is agreed that the CO2 emission is from decomposition and respiration of microorganisms naturally existed in the peatlands). Peatland management through technology of adding ameliorant mineral containing FE_2 and O_3 from surface plants (as technical planting standard for oil palm cultivation in Indonesia's peatlands) can reduce CO_2 emissions (Sabiham, *et al.,* 2012).

Table 10. CO_2Emission

Peatland Use	Average of CO2 Emission/ha/year (ton)	Researcher
Tropical Peatland Forest	78,5	Melling, e.al. (2007)
Secondary Peatland Forest	127	Hadi, et.al. (2001)
Peatland	88	Hadi, et.al. (2001)
Palm Oil Plantation in Peatland Area	55	Melling, e.al. (2007)
Palm Oil Plantation in Peatland Area	54	Murayama dan Burn (1996)
Palm Oil Plantation in Peatland Area	31,4	Germer & Sauaerborn (2008)

Then, opinion on peatlands conversion will lead to reduction in carbon stocks emerged. But such opinion is not always correct. Carbon stock of palm oil plantation in peatlands gradually increased (on surface area) following the growth of oil palm. At the age of 14-15 years old, underground carbon stock exceeds carbon stock in secondary peatlands.

Table 11. The Comparison of Carbon Stock Between Peatland Forest and Palm Oil Plantation in the Peatland

Peatland Use	Carbon Stock (Ton C/ha)
Primery Peatland	81,8
Secondary Peatland	57,3
Palm Oil:	
a.Under 6 year	5,8
b.Between 9-12	54,4
c.Between 14-15	73,0

Source: Sabiham, S (2013)

This indicates that by performing correct and accurate cultivation technique, peatland use for agriculture, including for palm oil plantation, can reduce CO_2 emission from conversion. Therefore, peatland use for agriculture, including plantation,is allowed in Indonesia as regulated in the Ministry of Agriculture Regulation No.14/Permentan/PL.110/2/2009 on Guidance for Peatland Use for Palm Oil Plantation. Furthermore, to ensure its implementation, Ministry of

Agriculture set regulation No.19/Permentan/OT.140/3/2011 on Guidance for Indonesian Sustainable Palm Oil (ISPO).

5. COLLABORATIVE ATTEMPT FOR INDONESIAN SUSTAINABLE PALM OIL

Indonesia is the world's biggest palm oil producing country by contributing more than 50% of total world palm oil production. The increase in population and shifting patterns of energy consumption from fossil fuels to biofuels creates great opportunity for the future development of palm oil. Nevertheless, the glory of palm oil is not without obstacles. There are several factors responsible for the fluctuation in palm oil export volume. One of the obstacles is the emergence of health issues of Indonesian palm oil products and environmental issues of oil palm plantation management. Several regions, particularly EU and America have adopted regulations hindering Indonesian palm oil trade to the region so that it is very detrimental to Indonesia. Through positive campaign based on research and studies, Indonesia tried to clarify the emerging issues. Government can contribute in ensuring law implementation and security in Indonesian palm oil management, providing good service in supplying infrastructures and licensing, conditioning the monetary policies such as interest rate and exchange rate, and fiscal policies such as taxation for both export and VAT taxes. Academic practitioners as party who are always doing research can apply their research results for today's palm oil management. Its implementation is mainly in the application and development of technology and policy analysis. Indonesian palm oil industries can contribute mainly in the palm oil management itself that adapts to the breakthroughs discovered by academic practitioners; while the public can contribute mainly to meet labor demand that directly relates to plantation and supporting and downstream sectors.

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