THE MYTHS
VS
FACTS

of Indonesia's Palm Oil Industry in Social, Economic and Global Environmental Issues

Third Edition

The Myths Vs Facts of Indonesia's Palm Oil Industry in Social, Economic and Global Environmental Issues

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Preface to the third edition

The Palm Oil Agribusiness Strategic Policy Institute (PASPI) has prepared and published this book *The Myths vs Facts of Indonesia's Palm Oil Industry in Social, Economic and Global Environmental Issues*, with the main goal of discussing important issues related to the Indonesian palm oil industry.

Indonesia's achievement in developing oil palm plantations has brought about a revolution in the world's vegetable oil industry which, among other aspects, is demonstrated by its success in turning palm oil into the world's major vegetable oil, and the emergence of Indonesia as the largest producer of palm oil in the world.

The palm oil revolution has led to unsavory practices among its competitors in the vegetable oil market such as raising social, health, economic and environmental concerns as themes in a negative/black campaign against palm oil.

The issues contained in this book are presented with facts. In this case, invalid opinions, views, accusations and the like are exposed as myths to readers. This is the third edition of the book. The first edition was published in 2015 and the second edition in 2016.

The two previous editions that have been reprinted several times have been published both domestically and abroad. The demand for the book is still growing among avariety of parties, especially people who closely monitor the national palm oil industry.

As in previous years, PASPI has regularly held discussions/book reviews in academic forums attended by lecturers and students in various universities in Indonesia.

In 2015, the first edition of the book was discussed and reviewed in academic forums held at the University of North Sumatra, the University of Riau, SriwijayaUniversity, the University of Palangka Raya, Mulawarman University, Hasanuddin University and the Bandung Institute of Technology.

Meanwhile, in 2016 the second edition of the book was discussed and reviewed in academic forums held at the University of Indonesia, Gadjah Mada University, Syiah Kuala University, Tanjungpura University,the University of Jambi, the University of Bengkulu and Lambung Mangkurat University. A great deal of input was obtained from discussions at various other universities.

The third edition of the book has undergone several changes with the addition of more materials.

In addition to the improvement and updating of the data presented, it also includes input from the discussions and book reviews of the second edition in various universities. Data updates and substantial additions have been made in each chapter in the third edition. New material can be found in Chapters 7 and 9. The third edition also contains the Myths versus Facts of Nutrition and Healthiness of Palm Oil (Chapter 8), which in the previous edition was not included.

We would like to express our gratitude and appreciation to academics and researchers who provided valuable research and insights in the first edition of the book. Prof. Dr. Erwin M.Harahap, Prof. Dr. Abdul Rauf, Prof. Dr.S.B.Simanjuntak (University of North Sumatra), Prof. Dr. Usman Pato, Prof. Dr. Almasdi Syahza, Prof. Dr.Hasan Basri Jumin (University of Riau), Prof. Dr. Andy Mulyana, Prof. Dr. Imron Zahri, Dr. Umar Harun (Sriwijaya University), Dr. Yusurum Jagau, Dr. Suharno, Dr. Masliani (University of Palangka Raya), Dr. Bernaulus Saragih, Dr. Zainuddin (Mulawarman University), Dr. EndahSulistyawati (Bandung Institute of Technology), Prof. Dr.Kaimuddin, Prof. Didi Rukmana (Hasanuddin University).

We would also like to express our gratitude and appreciation to academics and researchers who took part in reviewing the second edition and provided invaluable input for the publication of the third edition: Prof. Dr. Emil Salim, Prof.Dr. Ari Kuncoro, Dr. Widyono Soetjipto, Ahmad Dermawan SP, MSc (University of Indonesia), Prof. Dr. Slamet Hartono, Prof. Dr.Azwar Maas, Dr.Jamhari (Gadjah Mada University), Prof. Dr. Zulkifli Alamsyah, Prof. Dr.Anis Tatik Maryati, Prof. Dr.Dompak Napitupulu (University of Jambi), Dr.Sofyan, Dr.Ashabul Anhar,Dr.Sugianto, Dr.Fazly Syam (Syiah Kuala University), Prof. Dr. Alnopri, Prof. Dr.Priyono Prawito, Dr.Mustafa Ramadon (University of Bengkulu), Dr.Hamdani, Dr.Gusti Rusmayadi, Dr.Taufik Hidayat (Lambung Mangkurat University), Dr.Iwan Sasli, Dr. Jajat Sudrajat, Dr.Adi Suyatno (Tanjungpura University), Prof. Dr. Afrizal MA, Dr. Ir. Ira Wahyuni Syarfi MSi, Prof. Dr. Ir Reni Mayerni MSi (Andalas University).

And all lecturers and university students, local governments, leaders of oil palm farmers' organizations and non-governmental organizations who attended the discussions and book reviews. As we have already mentioned in the previous edition of the book, we hope the third edition can be used as a reference material, and can help promote the Indonesian palm oil industry amid the growing misuse of social, economic and environmental issues by global vegetable oil competitors.

The third edition of the book is still being discussed in various forums, both in universities and in the wider community. The results of these discussions and the updating of new data and empirical evidence will be used for the improvement of the next edition.

Bogor, April 2017
Palm Oil Agribusiness Strategic Policy Institute

Dr. Ir. Tungkot Sipayung
Executive director

FOREWORD

Palm oil production is a strategic industry in the Indonesian economy both at present and in the future. It is called a strategic industry because of its considerable contribution to Indonesia's non-oil and gas exports, employment creation, rural development and poverty reduction.

In addition, the palm oil industry has also become an important part of Indonesia's energy-sovereignty system. Not many sectors of the economy, especially in the commodity sector in which its contribution to the economy is so large, is as inclusive and broad as the palm oil industry.

In the last decade, various social, economic and environmental issues have been misused by anti-palm oil NGOs as the theme of a negative or black campaign against the Indonesian palm oil industry.

If the campaigns are ignored, they will mislead many people. It could also harm the Indonesian palm oil industry. We, therefore, need to promote public education to correct themisleading perception of the palm oil industry in society.

In relation to this, we welcome the Palm Oil Agribusiness Strategic Policy Institute's (PASPI) initiative to prepare and publish *The Myths Vs Facts of the Indonesian Palm Oil Industry in Social, Economic and Global Environmental Issues*.

The book is expected to address the myths ascribed to the Indonesian palm oil industry so far. In addition, this book is also

expected to help inform and educate the public both at home and abroad about Indonesia's palm oil industry.

On behalf of the Supervisory Board of PASPI, I extend my appreciation to the PASPI team led by Dr.Tungkot Sipayung, the executive directorof PASPI, who has accomplished this difficult task.

We hope PASPI will continue to produce the innovations needed to safeguard the Indonesian palm oil industry as contained in PASPI's vision and mission.

Bogor, November 2015.

Prof. Dr. Ir. Bungaran Saragih, MEc.
Indonesian agriculture minister, 2000-2004, and chairman of the supervisory board of PASPI

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Preface to the second edition

At least 10,000 copies of the second edition of the book *Myths Vs Facts of Indonesia's Palm Oil Industry in Social, Economic and Global Environment Issues* have been printed and distributed both at home and abroad.

Demand for the book is still growing from various circles, especially from the people who payclose attention to the national palm oil industry.

The Palm Oil Agribusiness Strategic Policy Institute (PASPI) has also held discussions with students and lecturers in academic forumsat various universities in Indonesia such as the University of North Sumatra, the University of Riau, Sriwijaya University, Palangka Raya University, Mulawarman University, Hasanuddin University and the Bandung Institute of Technology. A lot of valuable input was obtained from the discussions / book reviews held at these universities.

This second edition has undergone numerous improvements. In addition to the improvement and updating of data, the new material includes the results of discussions/book reviews of the first edition in these universities. Data updates and new material are found in each of the chapters in this second edition.

Some of the additions and improvements in the second edition are found in Chapter 4: the Connection of Urban and Rural Economy and Oil Palm Plantations, the Connection between Oil Palm Plantation Expansion and National Rice Reduction; Chapter 5: the Correlation between the Economic Condition of Farmers, Fishermen and Breeders and those of the Communities Working

in Oil Palm Plantations; Chapter 6: the Driver of Global Deforestation; Chapter 7: Indonesia's Palm Oil and Deforestation Expansion, Oil Palm Expansion and Biodiversity Conservation in Indonesia, Soil and Water Conservation and the Potency of Palm Oil to Become Second Generation Biofuel.

We would like to express our gratitude and appreciation to the academics and researchers who have provided valuable input and insights during the book reviews:Prof.Dr.Erwin M.Harahap, Prof. Dr. Abdul Rauf, Prof.Dr.S.B.Simanjuntak (the University of North Sumatra), Prof. Dr. Usman Pato, Prof. Dr.Almasdi Syahza, Prof.Dr.Hasan Basri Jumin (the University of Riau), Prof. Dr. Andy Mulyana, Prof.Dr.Imron Zahri, Dr.Umar Harun (Sriwijaya University), Dr.Yusurum Jagau, Dr.Suharno, Dr.Masliani (Palangka Raya University), Dr. Bernaulus Saragih, Dr.Zulkarnain (Mulawarman University), Dr.Endah Sulistyawati(the Bandung Institute of Technology), Prof. Dr.Kaimuddin, Prof.Didi Rukmana (Hasanuddin University) and other students and lecturers of these universities.

As in the first edition, we hope that the second edition can provide information and data that can help promote the Indonesian palm oil industry in the face of the intensive misuse of social, economic and environmental issues by global vegetable oil competitors. This second edition will be further discussed and updated both with new data and new empirical evidence.

Bogor, June 2016
Palm Oil Agribusiness Strategic Policy Institute

Dr.Ir.Tungkot Sipayung
Executive director

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Preface to the first edition

There has been a negative campaign against the palm oil industry since Indonesia began to develop oil palm plantations under the Nucleus Estate and Smallholders (PIR) scheme in the early 1980s.

The growing concerns of soybean oil producers amid their inability to compete with palm oil have led to intensive campaigns against the palm oil. Originally, the theme of the campaigns were limited only to issues related to nutrition and health in an effort to influence consumers, but in the past 15 years, the negative campaigns have widened to economic, social and environmental aspects especially those related to global public concerns. New scenarios have been developed in order to limit and even to destroy the palm oil industry.
The campaign strategies are well structured, systematic and massive, involving international and local anti-palm oil NGOs. The campaigns are carried out intensively using mass and cyberspace media.

The campaigns are not only designed to influence global public opinion, but have also used all channels from consumers and producers to industries, supporting institutions and governments.

At the consumer level, the negativity and even black campaigns have also called for boycotts such as the use of labeling "Palm Oil Free" by multinational food chains.

At the producer level, in palm oil production centers local people are incited to protest against their operation, and to

require producers to sign the Indonesia Palm Oil Pledge. The supporting industries for palm oil production such as banks also come under pressure not to provide credit. Government agencies also are under strong pressure to issue policies that curb the palm oil industry.

The themes and materials used in carrying out the black campaigns are no longer based on truth but often contain lies. The paradigm of the campaign of anti-oil palm NGOs is **"lies which are said repeatedly and published through the mass media broadly and intensively, one day, will be accepted by the public as truth."**

Today, many global communities, government officials, students, academics, even young people, children and adolescents have been trapped in the paradigm of the anti-palm oil NGOs. Through such campaigns, people are no longer able to differentiate between facts and myths when viewing the palm oil industry.

This misperception of the palm oil industry could threaten the future of the national palm oil industry as one of the strategic industries in the Indonesian economy. The palm oil industry has become an important source of income for millions of people, involving tens of thousands of family businesses, small and medium companies and the economy of at least 190 regencies in the country. The palm oil industry is also the largest contributor to the country's non-oil and gas exports. They all will bear the brunt of the black campaign against palm oil.

This book is specially prepared and published to address the myths and charges developed by global anti-palm oil NGOs against the palm oil industry. Every myth is countered with facts so that people can see what is the truth and what are falsehoods. For this purpose invalid issues, opinions, views, accusations and the like are exposed as myths.

To facilitate understanding, the book begins with information on the recent development of the Indonesian palm oil Industry, then the descriptions of the myths and facts of palm oil in global vegetable oil competition; the myths and facts of the palm oil industry in the national economy; the myths and facts of oil palm plantations in social issues and rural development; the myths and facts of oil palm plantations and poverty reduction; myths and facts of oil palm plantations in environmental issues, and ends with the myths and facts of governance of Indonesian oil palm plantations. Our gratitude goes to the PASPI research team, which has worked hard to compile this book, and to all those who have provided support, suggestions and encouragement for the preparation of this book.

Bogor, November 2015
Palm Oil Agribusiness Strategic Policy Institute

Dr.Ir. Tungkot Sipayung
Executive director

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Table of Contents

PREFACE TO THE THIRD EDITION ..... **i**

FOREWORD ..... **v**

PREFACE TO THE SECOND EDITION ..... **vii**

PREFACE TO THE FIRST EDITION ..... **ix**

CONTENTS ..... **xiii**

TABLES ..... **xxi**

FIGURES ..... **xxv**

GLOSSARY ..... **xxxi**

CHAPTER 1. THE LATEST DEVELOPMENT OF THE INDONESIAN PALM OIL INDUSTRY **1**

CHAPTER 2. MYTHS VERSUS FACTS OF OIL PALM IN GLOBAL VEGETABLE OIL COMPETITION ... **9**

Myth 2-01. Overly expansive oil palm plantations 10

Myth 2-02. Palm oil plantations are larger than those of other vegetable oils. 11

Myth 2-03. Fertilizer use and pollution from oil palm plantations are greater than those of other vegetable oils. 13

Myth 2-04. Oil palm plantations are monocultural..... 16

Myth 2-05. Palm oil biodiesel does not produce low GHG emissions 17

Myth 2-06. Palm oil imports disadvantage developed countries 19

Myth 2-07. Palm oil disadvantages poor countries …… 21

Myth 2-08. Oil palm plantation expansion is unnecessary …. 22

Myth 2-09. Anti-palm oil NGOs protect the environment ……25

CHAPTER 3. MYTHS VERSUS FACTS OF PALM OIL INDUSTRY IN INDONESIA'S ECONOMY .....

Myth 3-01. Oil palm plantations make no contribution to the economy 31

Myth 3-02. Palm oil industry is extractive..... 34

Myth 3-03. Indonesian palm oil industry only exports raw materials..... 35

Myth 3-04. Foreign exchange generated from the Indonesian palm oil industry is relatively small compared to what is generated by other Indonesian export commodities. So, the export of Indonesian palm oil is not too important for the national economy..... 37

Myth 3-05. Palm oil industry does not contribute to government revenues..... 38
Myth 3-06. Palm oil industry does not have a downstream policy so the added value created does not grow..... 39
Myth 3-07. Palm oil industry employs few workers 41
Myth 3-08. The replacement of diesel fuel with palm biodiesel brings losses to Indonesia 42
Myth 3-09. Oil palm plantations reduce rice farming 43

CHAPTER 4. MYTHS VERSUS FACTS OF PALM OIL PLANTATIONS IN SOCIAL ISSUES AND RURAL DEVELOPMENT 45

Myth 4-01. Oil palm plantations exploit local resources and create backwardness in rural areas..... 45
Myth 4-02. The benefits generated by oil palm plantations are exclusively enjoyed by those directly involved in the oil palm plantations, i.e., plantation owners, employees and laborers .. 49
Myth 4-03. Oil palm plantations do not contribute to regional economic growth..... 52
Myth 4-04. Oil palm plantations do not contribute to the revenues of oil palm plantation areas. 53

Myth 4-05. The manpower required and employed at oil palm plantations does not fit with labor conditions in the regions' rural areas 55

Myth 4-06. The development of oil palm plantations violates human rights and is related to human rights violation in the area 56

Myth 4-07. Oil palm plantations create agrarian conflicts..... 58

Myth 4-08. The transportation of fresh fruit bunch (FFB) and crude palm oil (CPO) causes severe damage to roads in oil palm plantations 60

Myth 4-09. Oil palm plantations employ child workers 62

CHAPTER 5. MYTHS VERSUS FACTS OF PALM OIL PLANTATIONS AND POVERTY REDUCTION 65

Myth 5-01. Oil palm plantations in Indonesia are owned only by large corporations..... 65

Myth 5-02. Oil palm plantations neglect small and medium enterprises (SMEs) in the regions 67

Myth 5-03. Oil palm plantation companies do not engage in partnerships..... 69

Myth 5-04. Plantation companies do not channel corporate social responsibility (CSR) funds to surrounding communities 71

Myth 5-05. Oil palm plantations have no role in reducing unemployment in rural areas. 73
Myth 5-06. The income of non-oil palm farmers is higher than that of oil palm farmers 74
Myth 5-07. Oil palm plantations do not contribute to poverty reduction in rural areas 76
Myth 5-08. The income of oil palm farmers is only slightly above the rural poverty line and is not sustainable 80

CHAPTER 6. MYTHS VERSUS FACTS IN GLOBAL ENVIRONMENTAL ISSUES 83

Myth 6-01. Global warming is caused by oil palm plantations 84
Myth 6-02. Indonesia is world's largest GHG emitter 86
Myth 6-03. Consumption of fossil fuels is not the biggest contributor of GHG emissions 87
Myth 6-04. Indonesia is the world's largest fuel GHG emitter 88
Myth 6-05. Indonesia's population is the world's largest GHG emitter 90
Myth 6-06. Deforestation is the largest source of GHG emissions in the world 92
Myth 6-07. Indonesia has the highest deforestation rate in the world 93

Myth 6-08. Expansion of oil palm plantations biggest cause of global deforestation 95
Myth 6-09. The development of oil palm plantations in Indonesia has reduced the amount of forests in the country to be less than its minimum ecological requirement, like in other countries 96
Myth 6-10. Indonesia has the largest peat land areas in the world so they need to be maintained as global carbon reserves 97
Myth 6-11. Indonesia is the largest country deforesting and converting its peat land into agricultural areas ... 98
Myth 6-12. Most global peat land is in the form of peat land forest and only Indonesia uses peat land for agriculture 99
Myth 6-13. Indonesian agricultural sector is the biggest global agricultural GHG contributor 101
Myth 6-14. Utilization of peat land for agriculture constitutes the biggest GHG emission source from global agriculture 102
Myth 6-15. Global climate change is caused by expansion of oil palm plantations 103
Myth 6-16. Forest and land fires in Indonesia are larger than in other countries 104

Myth 6-17. Forest fires are caused by oil palm farming 107
Myth 6-18. Forest fires occur in oil palm concessions 109
Myth 6-19. Forest and land fires in Indonesia in 2015 was caused by palm oil producers 110
Myth 6-20. Oil palm plantations cause flooding 112
Myth 6-21. Oil palm plantations cause drought 114
Myth 6-22. Oil palm plantations are the biggest GHG emitters in the farming sector 115
Myth 6-23. Oil palm plantation development on peatland raises peatland GHG emissions 116
Myth 6-24. Development of palm oil industry is against GHG emission reduction program 118

CHAPTER 7. MYTHS VERSUS FACTS OF PALM OIL PLANTATIONS AND ENVIRONMENTAL ISSUES 121

Myth 7-01. Oil palm plantations are the main trigger for conversion of forests to non-forests in Indonesia 121
Myth 7-02. Indonesian oil palm plantations equal deforestation 124
Myth 7-03. Oil palm plantations are the main trigger of conversion of forest into

non-forest areas on Sumatra Island 125
Myth 7-04. Oil palm plantations are the main trigger of conversion of forest into non-forest areas in Kalimantan 127
Myth 7-05. Oil palm plantation is the main trigger of forest conversion into non-forest areas on Sulawesi Island 128
Myth 7-06. Oil palm plantations are not environmentally friendly as they do not conserve soil or water 130
Myth 7-07. Oil palm water consumption is larger than that of other forest plants 133
Myth 7-08. Oil palms are a vegetable oil plant more wasteful of water than other plants ... 135
Myth 7-09. Oil palm plantations change land into desert 136
Myth 7-10. Oil palm plantations do not absorb carbon dioxide 139
Myth 7-11. Forest energy production is better than that of oil palm plantations 141
Myth 7-12. Water systems of oil palm plantations are poorer than those of forests 143

Myth 7-13. To replace fossil fuels, oil palm plantations only produce the first generation of biofuel (biodiesel), which is unsustainable because it competes for land with food production..... 144

CHAPTER 8. MYTHS VERSUS FACTS OF PALM OIL ON HEALTH AND NUTRITION 149

Myth 8-01. Global society still prefers soybean oil, rapeseed oil and sunflower oil over palm oil..... 150

Myth 8-02. The palm oil products being offered in the market are palm kernel extractions that are of the same quality as coconut oil..... 151

Myth 8-03. Palm oil contains unstable fats that are not good for health..... 152

Myth 8-04. The vitamin A content in palm oil is much lower than in other food sources..... 153

Myth 8-05. The vitamin E content in palm oil is much lower than in other vegetable oils 154

Myth 8-06. Palm oil contains cholesterol..... 156

Myth 8-07. Palm oil does not contain essential fatty acids for the human body 157

Myth 8-08. Palm oil consumption increases blood cholesterol levels and triggers heart diseases: cardiovascular and arteriosclerosis 159

Myth 8-09. Palm oil contains trans-fatty acids 160
Myth 8-10. Palm oil is carcinogenic 161
Myth 8-11. Palm oil consumption may lead to diabetes 162
Myth 8-12. Palm oil use is limited to cooking oil 163

CHAPTER 9. MYTHS VERSUS FACTS OF THE NATIONAL POLICY AND GOVERNANCE OF PALM OIL PLANTATIONS 167

Myth 9-01. Indonesia does not have a national policy for sustainable development 168
Myth 9-02. Indonesia does not have a conservation system for natural biodiversity 170
Myth 9-03. Indonesia has no biodiversity conservation system 172
Myth 9-04. Oil palm plantations reduce animal populations 175
Myth 9-05. Biodiversity is being destroyed on Sumatra island 176
Myth 9-06. Biodiversity is being eliminated in Kalimantan 187
Myth 9-07. Oil palm plantations endanger wildlife 190
Myth 9-08. Indonesia needs to adopt HCV and HCS concepts 193

Myth 9-09. Indonesia does not have a sustainable palm oil plantation management policy 195
Myth 9-10. Oil palm plantation encroaches on forests 198
Myth 9-11. No governance of oil palm plantation on peatland 200
Myth 9-12. Palm oil refinery industry has no waste management system 201
Myth 9-13. No governance of oil palm plantations in Indonesia 203
Myth 9-14. Sustainable palm oil certification lower compared to other vegetable oil 205
Myth 9-15. Sustainable palm oil certification slow 206
Myth 9-16. Indonesia has the lowest sustainable palm oil certification.. 207

REFERENCES 211

Tables

Table 2.1. Changes in plantation area of world's major vegetable oil producers 1965-2016 10

Table 2.2. Comparison of the productivity of various crops producing vegetable oil 12

Table 2.3. Fertilizer consumption in various countries 14

Table 2.4. Comparison of input and soil/water pollution among palm oil, soy bean and rapeseed for every ton of vegetable oil 15

Table 2.5. Economic benefits of using palm oil on the economy of the EU 21

Table 2.6. Projection of the world's vegetable oil needs and additional new areas toward 2050 23

Table 3.1. Multiplier index of oil palm plantations 32

Table 3.2. Top 10 growing economic sectors caused by growth of output, income and added value from oil palm plantations 33

Table 3.3. Composition of Indonesia's palm oil exports..... 36

Table 3.4. Export value of palm oil and net export value of non-oil and gas in Indonesia..... 37

Table 4.1. Rural sectors that develop as a result of oil palm plantations..... 50

Table 4.2. Top five provinces originating human rights complaints to Komnas HAM, 2011-2016..... 57

Table 4.3. Number of agrarian conflicts in Indonesia..... 59

Table 4.4. Percentage of damaged roads in each province ... 61

Table 5.1. Growth of labor in oil palm plantations.. 73

Table 5.2. Rural economy sector whose employment absorption increases as a result of CPO growth ... 74

Table 5.3. Comparison of income of oil palm farmers and poverty line (Rp million/capacity/years) 80

Table 6.1. Indonesia's position in global energy GHG-emitting countries..... 89

Table 6.2. Indonesia and its comparison with other countries in CO2 emissions per capita..... 91

Table 6.3. Global deforestation 93

Table 6.4. Cause of global deforestation 1990-2008 95

Table 6.5. Share of forest and agricultural land compared to total land area in various countries 96

Table 6.6. Area of forest fires in Indonesia and other countries..... 105

Table 6.7. Vastness of forest and land fires in Indonesia 2010-2016..... 107

Table 6.8. Losses suffered by oil palm plantations due to drought and haze..... 111

Table 6.9. Accumulated number of major floods in Indonesia from 2010-2016..... 113

Table 6.10. Oil palm plantations on peatland reduce peatland CO2 emissions (degraded peatland) 117

Table 6.11. Comparison of the carbon stock in upper levels of peatland and on peatland with oil palm plantations 118

Table 7.1. Origin of palm plantations in Indonesia 124

Table 7.2. Water requirement to produce one gigajoule of bioenergy in various plants 136

Table 7.3. Volume of biomass and carbon stock In oil palm plantations..... 138

table 7.4. carbon dioxide absorption and oxygen production of oil palm plantations and tropical forests 141

Table 7.5. Effectiveness of the solar energy harvesting of oil palm plantation and tropical forest. 142

Table 7.6. Comparison of water system functionality between oil palm plantations and tropical forest 143

Table 8.1. The composition of fatty acid in palm oil..... 152

Table 8.2. The comparison of vitamin A (retinol level) of palm oil and other food..... 153

Table 8.3. The comparison of vitamin E content (Tocopherols and Tocotrienols) in palm oil to other vegetable oils 155

Table 8.4. The comparison of palm oil fatty acid composition and breast milk (percentage) 158

Table 8.5. The use of palm oil for food products, pharmaceuticals, health, toiletries and cosmetics 164

Table 9.1. Policies and governance of national sustainable development in Indonesia 169

Table 9.2. Biodiversity conservation system Indonesia..... 173

Table 9.3. Function of high conservation value (HCV) of protected land in Indonesia 176

Table 9.4. Land usage on Sumatra Island 177

Table 9.5. In situ conservation of biodiversity in North Sumatra province... 178

Table 9.6. In situ conservation of biodiversity in Riau province... 183

Table 9.7. Land usage on Kalimantan Island 188

Table 9.8. In situ conservation of biodiversity in East Kalimantan province 189

Table 9.9. Policy and governance of sustainable palm oil plantation development in Indonesia..... 197

Table 9.10. Implementation of sustainable palm oil plantations at company level... 204

Table 9.11. Sustainable palm oil certification (CSPO&CSPK) in global vegetable oil 2015 206

==========

Figures

Figure 1.1. Growth of Indonesian oil palm plantation area 1980-2016... 3

Figure 1.2. Growth of Indonesian CPO production 1980-2016..... 3

Figure 1.3. Changes in Indonesia's share of world palm oil production 4

Figure 1.4. Indonesia's CPO for exports and domestic consumption 4

Figure 1.5. Consumption of CPO by domestic industrial users 5

Figure 1.6. Production, consumption and export of Indonesia's biodiesel..... 6

Figure 1.7. Volume of Indonesia's CPO and processed palm oil exports excluding biodiesel 6

Figure 1.8. Composition of Indonesian palm oil exports and derivatives 7

Figure 1.9. Value of Indonesia's palm oil exports and derivatives 8

Figure 2.1. Changes in size of plantations areas of four main global vegetable oils 11

Figure 2.2. Changes in production shares of four major global vegetable oils 13

Figure 2.3. Soybean area (monoculture) area in major global countries 17

Figure 2.4. Reduction of CO2 emissions in different types of biodiesel raw materials compared to diesel emissions 18

Figure 2.5. Indonesia's palm oil exports by countries of destination 19

Figure 2.6. The use of CPO by sector in the EU 20

Figure 2.7. Comparison of palm oil prices with those of other vegetable oils (World Bank, 2017) 22

Figure 3.1. The comparative contributions of the increase of per-hectare productivity and area size to CPO production in Indonesia 35

Figure 3.2. Government revenues from palm oil export duty 39

Figure 3.3. Development of added value of Indonesia's palm oil industry 40

Figure 3.4. Workforce growth in oil palm plantations 41

Figure 3.5. Accumulated saving of diesel imports, reductions of CO2 emissions and improved foreign exchange based on the implementation of mandatory biodiesel in Indonesia 42

Figure 3.6. The expansion of rice fields on Java and outside Java..... 43

Figure 4.1. Component of early investment into oil palm plantations in rural areas..... 47

Figure 4.2. The process of oil palm plantation development from an isolated area into a new economic growth center..... 48

Figure 4.3. The value of transactions between people on oil palm plantations and the rural and urban economies. 51

Figure 4.4. Impact of CPO production on regional gross domestic product..... 52

Figure 4.5. Comparison of non-oil and gas regional gross domestic product in oil palm centers and in non-oil palm centers..... 53

Figure 4.6. Comparison between the education of manpower in rural areas and those employed on oil palm plantations in Indonesia..... 55

Figure 5.1. Changes in the share of small holders' oil palm plantations in the national palm oil plantations... 66

Figure 5.2. Growth of business units of oil palm farmers 67

Figure 5.3. Growth of small-scale enterprises supplying goods and services to oil palm plantations (business unit/100 thousand ha) 68

Figure 5.4. Composition of transaction value in oil palm plantation partnerships 69

Figure 5.5. Average index of the transaction value between plantation companies and local partners 70

Figure 5.6. Distribution of CSR for SMEs fostered by Indonesia's oil palm plantations 72

Figure 5.7. Distribution of CSR programs of oil palm plantation companies in Indonesia 72

Figure 5.8. Comparison of revenue of oil palm farmers and non-oil palm farmers 75

Figure 5.9. Transaction value between oil palm plantation community, fishermen, breeders and food farmers 78

Figure 5.10. Impact of CPO production on rural poverty 79

Figure 6.1. Mechanism of greenhouse gas effect 85

Figure 6.2. GHG emission sources. 86

Figure 6.3. World's top 10 GHG emitters 87

Figure 6.4. Global GHG contributors 88

Figure 6.5. Global GHG emissions by sectors 92

Figure 6.6. Global deforestation 1990-2008 94

Figure 6.7. Distribution of global peat land 1990-2008 98

Figure 6.8. Global peat land conversion 1990-2008 99

Figure 6.9. Global peat land use for agriculture and forest 100

Figure 6.10. Global peatland distribution 100

Figure 6.11. Indonesian agriculture's share of global agricultural GHG emissions 101

Figure 6.12. Sources of global agricultural GHG emissions 102

Figure 6.13. Global warming impact mechanisms on global climate change 104

Figure 6.14. Forest fire distribution by sector in Europe and Africa 2014 106

Figure 6.15. Distribution of hot spots on peatland and outside peatland in the July-November 2015

period in Indonesia..... 108

Figure 6.16. Spread of hot spots November 2015 period in Indonesia..... 109

Figure 6.17. Five severest drought disasters in provinces in Indonesia 2010-2016 114

Figure 6.18. Indonesia's farming GHG emission sources..... 116

Figure 6.19. Reduction of Indonesia's CO2 emissions due to mandatory biodiesel 2014-2016..... 120

Figure 7.1. Oil palm plantation in land use change in Indonesia..... 122

Figure 7.2. Oil palm plantation in land use change on Sumatra Island..... 126

Figure 7.3. Oil palm plantation in land use change on Kalimantan 128

Figure 7.4. Oil palm plantations in land use change on Sulawesi Island..... 129

Figure 7.5. Bio-pore percentage of oil palm plant root system..... 131

Figure 7.6. Rate of water infiltration into oil palm plantations rises in line with the age of oil palm trees..... 132

Figure 7.7. Comparison of water needs of oil palm and forest plants 133

Figure 7.8. Percentage of annual rainfall used by oil palm and forest plants 134

Figure 7.9. Content of organic and c-organic ingredients in oil palm rooting zone increases with growing oil palm age 138

Figure 7.10. Oil palm plantation as "lungs" of ecosystem 140

Figure 7.11. Sustainable oil palm plantation generating first- and second-generation renewable energy 145

Figure 7.12. Installation of liquid waste processing of palm oil plant with biogas technology to produce bioelectric in East Kalimantan province 146

Figure 8.1. Changes of appetite of consumers of four major global vegetable oils 150

Figure 9.1. "Spatial harmony of the modern sector, agricultural/plantation sector and protection/forest conservation sector in Indonesia" 171

Figure 9.2. Procedures and stages of land acquisition mechanisms of oil palm plantations in Indonesia 199

Figure 9.3. Biogas/methane electricity generation, the palm oil waste treatment plant in Riau province 202

Figure 9.4. Indonesia's sustainable palm oil plantation governance system 204

Figure 9.5. Sustainable production of sustainable palm oil production 207

Figure 9.6. Producing countries of certified sustainable palm oils 208

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GLOSSARY

APBN/APBD	: State budget/local budget
APROBI	: Association of Indonesian Biofuel Producers
ASA	: American Soybean Association
BBF	: Fossil-based fuels
BBM	: Fuel oil
BNPB	: National Agency for Disaster Management
BPS	: Central Statistics Agency
BUMN/D	: State-owned/provincial government-owned enterprises
CFC	: Chlorofluorocarbons
CH4	: Methane
CO2	: Carbon dioxide
CPO	: Crude palm oil
CSPO/K	: Certified sustainable palm oil/kernel
CSR	: Corporate social responsibility
DAU/ K	: General/Special Allocation Fund
EU	: European Union
FAME	: Fatty acid methyl ester
FAO	: Food and Agriculture Organization
GDP	: Gross domestic product
GHG	: Greenhouse gases
GRK	: Greenhouse gases (Indonesian term)

H2O	: Water
HAM	: Human rights
HCS	: High carbon stock
HCV	: High conservation value
HDL	: High density lipoprotein
HGU	: Land cultivation permit
HPH	: Forest concession rights
HTI	: Industrial forest plantation
IEA	: International Energy Agency
INPRES	: Presidential instruction
IPCC	: Intergovernmental Panelon Climate Change
IPOP	: Indonesia Palm Oil Pledge
ISO	: International Organization for Standardization
ISPO	: Indonesia Sustainable Palm Oil
KKPA	: Credit cooperative for members
LCKS	: Palm oil fluid waste
LDL	: Low density lipoprotein
LOI	: Letter of intent
NGO	: Non-governmental organization
LULUCF	: Land use, land use change forestry
MUFA	: Monounsaturated fatty acid
N2	: Nitrogen
N2O	: Nitrogen oxide

NES	: Nucleus estate and smallholders
NTB	: West Nusa Tenggara
NTT	: East Nusa Tenggara
O2	: Oxygen
OECD	: Organization for Economic Co-operation and Development
PBB	: Land and building tax
PBSN	: National large private plantations
GRDP	: Gross regional domestic product
PIR	: Indonesian abbreviation for Nucleus Estate Smallholders (NES)
PKO	: Palm kernel oil
PKS	: Palm oil factory
PLTB	: Biomass power plant
PN	: State plantation
PO	: Palm oil
POME	: Palm oil mill effluent
PPh	: Income tax
VAT	: Value added tax
PR	: Smallholder plantations
PS	: Private plantation
PUFA	: Poly unsaturated fatty acids
RED	: Renewable Energy Directives
REDD	: Reduction of Emissions from Deforestation and Forest Degradation
RFS	: Renewable Fuels Standard

RI	: Republic of Indonesia
ROW	: Rest of the world
RPO	: Red palm oil
RSPO	: Roundtable Sustainable Palm Oil
SD	: Elementary school
SLTA	: Senior high school
SLTP	: Junior high school
SNI	: Indonesian National Standard
TBS	: Fresh fruit bunches
TM	: Producing plants
UKM	: Small and medium enterprises
UKMK	: Small and medium enterprises and cooperatives
UNDP	: United Nations Development Program
USA	: United States of America
USDA	: United States Department of Agriculture
UU	: Law
WHO	: World Health Organization

(***)

Chapter 1
The Recent Development of The Indonesian Palm Oil Industry

Indonesia's palm oil industry has, in the past few years, attracted the attention of the world community because of its rapid development, which has changed global competition over vegetable oil, and also because of a number of related social, economic and environmental issues.

The Indonesian palm oil industry has a long history as it has existed in the country since the colonial era.

The palm oil story began with the planting of four oil palm seeds brought by Dr. DT Pryce in 1848 to be planted as part of the collection of the Bogor Botanical Gardens. Two of the seeds came by way of the islands of Bourbon and Mauritius and the other two seeds, of the Dura type, came by way of Amsterdam. Seeds from the resulting oil palms at the Bogor Botanical Gardens were then planted as ornamental plants and as experiments to test suitable growth locations in Java, Sulawesi, Kalimantan, Nusa Tenggara, Maluku and Sumatra. In North Sumatra the main site was on the Deli Tobacco Plantation.

In 1878, an oil palm plantation covering an area of 0.4 hectares was developed as an experiment in the Deli district by the Deli Maatschappij.

The experiment's results as reported by J. Kroll, the manager of the Deli Maatschappij, were quite encouraging. The production was better than in its origin habitat in West Africa. However, the

processing of the oil palm fruit was still a problem at that time. In 1911 a Belgian company opened the first commercial oil palm plantations in Pulau Raja (Asahan) and Sei Liput (Aceh) and a German company also opened an oil palm plantation in Tanah Itam Ulu. Therefore, 1911 is considered as the beginning of oil palm plantations in Indonesia. The Belgian and German investors' ventures into oil palm plantations were latter followed by other foreign investors, including some from the Netherlands and Britain.

In 1916 there were 19 oil palm plantation companies in Indonesia and the number increased to 34 companies in 1920. The first palm oil mill (PKS) in Indonesia was built in the Sei Liput in 1918 and the second in Tanah Itam Ulu in 1922.

Indonesia's palm oil industry began its rapid growth after the successful establishment of large national private plantations (PBSN I,II,III) and the introduction of cooperation between oil palm farmers and corporations known as the Nucleus Estate and Smallholders (PIR) program. After the successful trial of the World Bank-financed PIR program (PIR I-IV), it was further developed into various other PIR models.

Special PIR and Local PIR were introduced from 1980 to 1985 in order to develop the local economies; PIR Transmigration was developed from 1986 to 1995 in line with the opening of new territory and PIR Primary Credit Cooperatives for Members were started in 1996, associated with the development of rural co-operatives. Through these PIR schemes, oil palm plantations expanded rapidly from North Sumatra and Aceh to Riau, Kalimantan and other parts of Indonesia. The total area of oil palm plantations in Indonesia increased from about 300,000 hectares in 1980 to about 11.6 million hectares in 2016 (Figure 1.1). Meanwhile, CPO production increased from about 700,000 tons in 1980 to 33.5 million tons in 2016 (Figure 1.2).

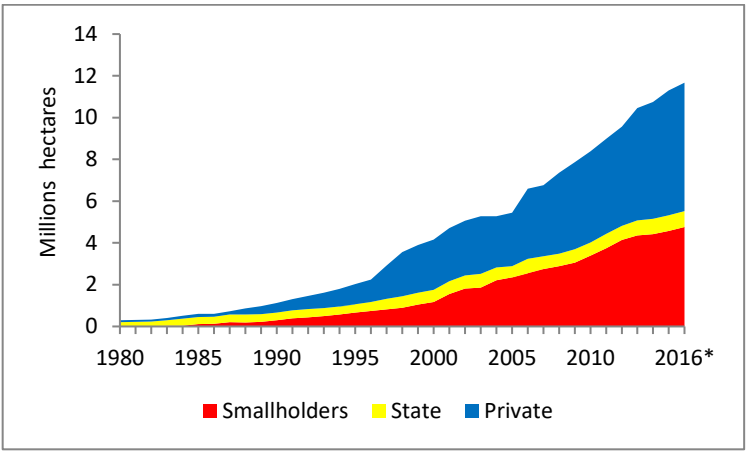


Figure 1.1: Growth of Indonesian Oil Palm Plantation Area 1980-2016 (Agriculture Ministry, 2016)* Estimate

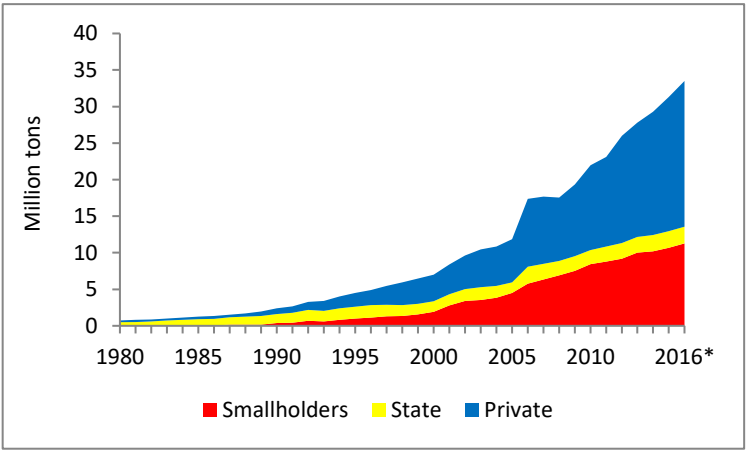


Figure 1.2: Growth of Indonesian CPO Production 1980-2016. (Agriculture Ministry, 2016)* Estimate

The rapid growth in Indonesia's CPO production has changed the country's position in the world's palm oil market. In 2006, Indonesia succeeded in replacing Malaysia as the world's largest CPO producer and by 2016 Indonesia's share reached 54

percent in the world's CPO production (Figure 1.3), while Malaysia was in second position with a 32-percent share.

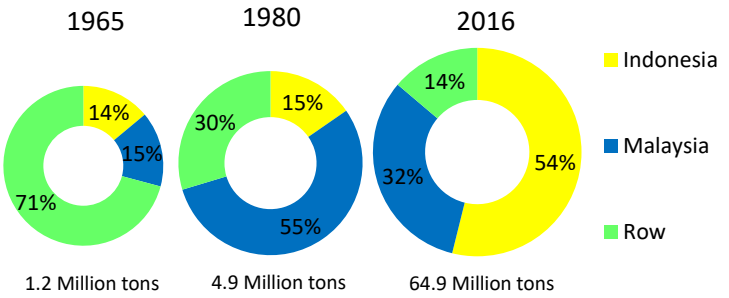


Figure1.3: Changes in Indonesia's Share of World Palm Oil Production (Oil World, USDA 2017)

Indonesia mostly produces palm oil for export and only about 20 to 25 percent is for domestic consumption (Figure 1.4) in, for example, the oleo food industry and for oleo chemicals, detergents, soaps and biodiesel (Figure 1.5).

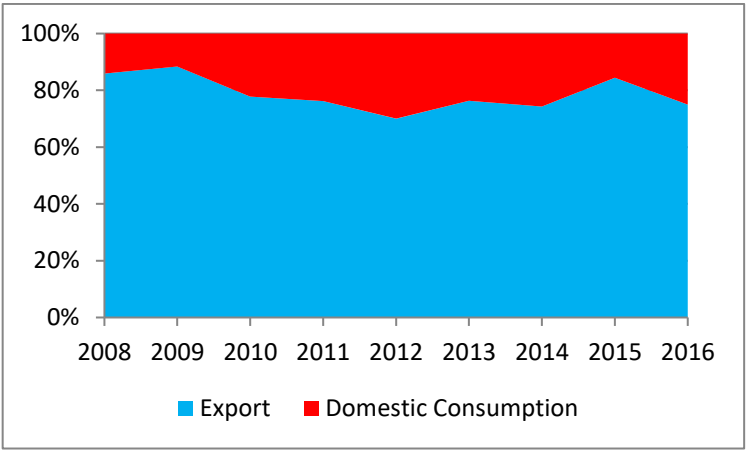


Figure 1.4: Indonesia's CPO for Export and Domestic Consumption (BPS, PASPI)

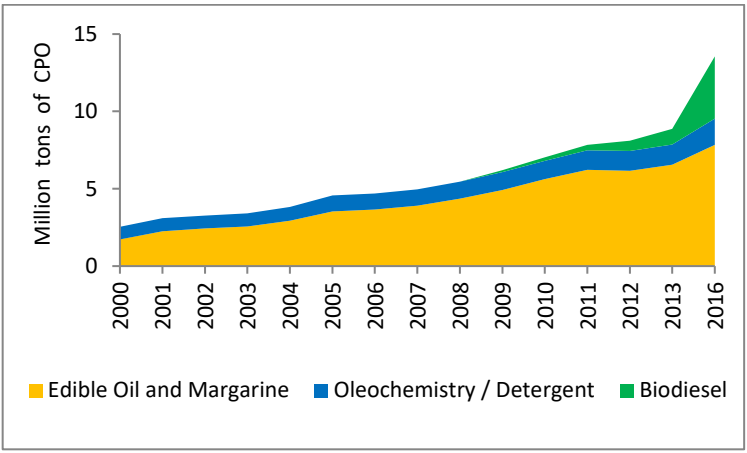


Figure: 1.5. Consumption of CPO by Domestic Industrial Users (APROBI, GIMNI, BPS)

In 2011 Indonesia began to promote the downstream palm oil industry through the development of the oleo food processing industry, the oleo chemical processing industry and biofuel production. In addition to adding value, the development of the downstream industry is also meant to reduce Indonesia's dependence on the world CPO market.

The downstream biofuel industry was developed to support the policy of mandatory use of of B-5 (2010), B-10 (2012), B-15 (2014) and B-20 (2016) biodiesel. The goal is to reduce Indonesia's dependence on fossil fuel imports and to reduce its emissions from fossil fuels. To implement the mandatory policy, the production of palm oil-based biodiesel (FAME: fatty acid methyl ester) was increased to meet both domestic and export demand (Figure 1.6).

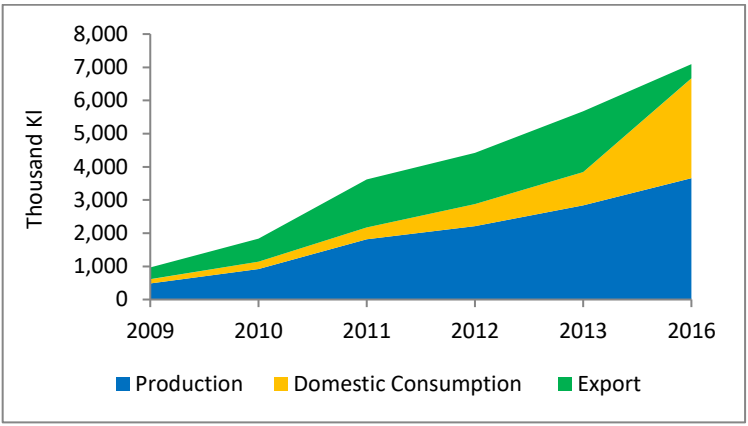


Figure 1.6: Production, Consumption and Export of Indonesia's Biodiesel (APROBI; Ditjen EBTKE)

The volume of Indonesian palm oil exports has increased sharply in the past several years in line with the increase in production. Indonesia's palm oil exports, which totaled 15 million tons in 2008, increased sharply to 25 million tons (CPO equivalent) in 2016 (Figure 1.7). The sharp increase in the volume of Indonesia's palm oil exports has also changed the composition of export products.

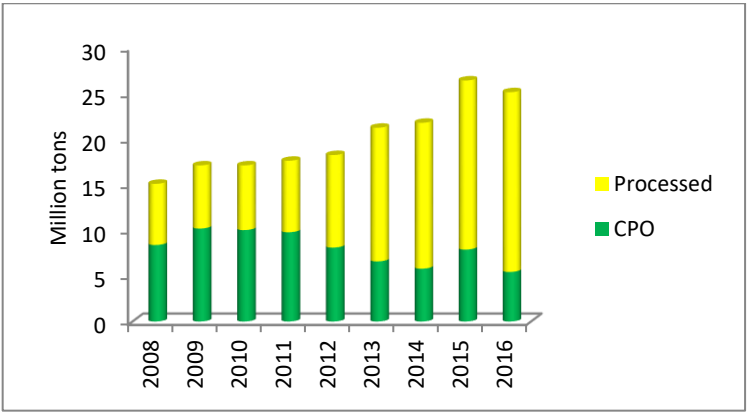
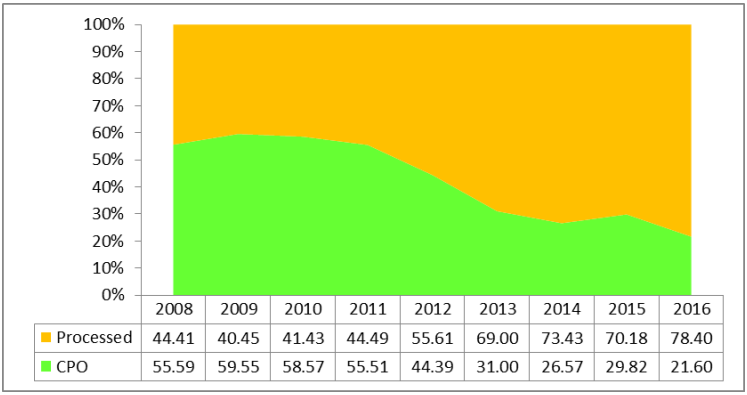


Figure 1.7: The volume of Indonesia's CPO and Processed Palm Oil Exports Excluding Biodiesel (PASPI)

The policy to promote the domestic downstream palm oil industry has successfully improved the composition of Indonesia's palm oil exports from mostly CPO to mostly processed palm oil products. In 2008, CPO accounted for about 55 percent of Indonesia's palm oil exports. In 2016, the figure underwent a major change as the share of the processed palm oil products in total palm oil exports increased sharply to 78 percent (Figure 1.8).



	2008	2009	2010	2011	2012	2013	2014	2015	2016
Processed	44.41	40.45	41.43	44.49	55.61	69.00	73.43	70.18	78.40
CPO	55.59	59.55	58.57	55.51	44.39	31.00	26.57	29.82	21.60

Figure 1.8: Composition of Indonesian Palm Oil Exports (PASPI)

Indonesia's palm oil exports have generated a significant amount of foreign exchange for the national economy. CPO and derivative products have made a significant contribution to the country's non-oil exports and the country's economy as a whole.

The export value of CPO and its derivative products (Figure 1.9) increased sharply from US$15.4 billion in 2008 to $21.6 billion in 2011. However, because of a decline in global CPO prices, the export value dropped to $18.1 billion in 2016.

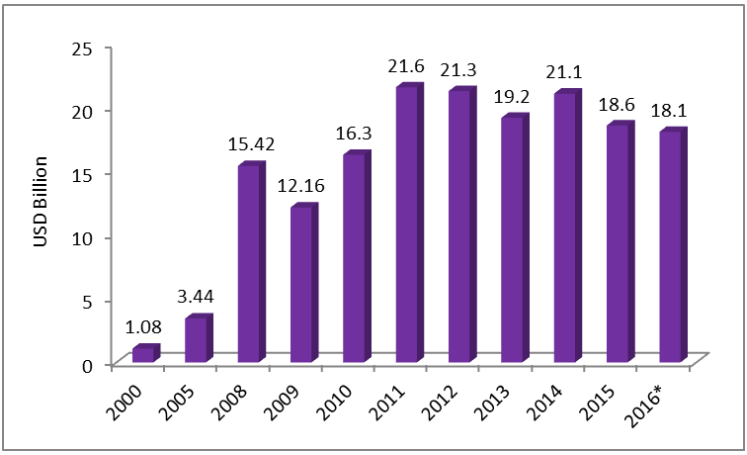


Figure 1.9: The value of Indonesia's Palm Oil Exports and Derivatives (PASPI)

With its high export value, palm oil has become the largest export commodity in the country. From the standpoint of economic development, the foreign exchange generated from palm oil exports is more sustainable and beneficial for the economy because (1) it is produced from oil palm plantations in 190 districts in Indonesia, (2) about 41 percent is produced by smallholder oil palm plantations, (3) there is an increase in processed products from the domestic downstream industry and (4) it is produced through plantation owners' own efforts as they do not receive subsidies from the government.

Chapter 2
Myths Vs. Facts of Palm Oil in Global Vegetable Oil Competition

The development of palm oil around the world especially in Indonesia has led to an increase in global competition among vegetable oils. Soybean oil, sunflower oil and rapeseed oil that previously dominated the world vegetable oil market have had to face head-to-head competition from rapidly growing palm oil not only in terms of production and but also in consumption.

Various forms of unfair competition through negative and even black campaigns have been carried out against palm oil since the early 1980s.The revolution in the development of Indonesia's palm oil has attracted the attention of the global community. The change in the position of palm oil to become the world's main vegetable oil replacing soybean oil, which had dominated the world's vegetable oil market for more than 100 years, has triggered a new dynamic in global vegetable oil competition.

Various forms of campaigns have been launched by exploiting social, economic and global environmental issues against palm oil plantations in the world, especially in Indonesia.

Various social, economic and environmental issues related to the development of the Indonesian palm oil industry that will be described below have become the topics of discussion both around the world and in Indonesia

This chapter presents some of the myths that palm oil competitors have raised as part of this negative campaigning.

MYTH 2-01

Overly Expansive Oil Palm Plantations.

FACTS

The development of palm oil plantations around the world, which has been said to have undergone revolutionary growth in recent years, has actually been exaggerated.

The data show that the expansion of the oil palm plantations is far lower than that of other vegetable oil crops such as soybean, sunflower and rapeseed (Table 2.1)

Table 2.1: Changes in plantation area of world's major vegetable oil producers 1965-2016

Vegetable Oils	Areas (Million ha)			
	1965	2000	2016	Increase 1965-2016
Soybean	25.82	75.49	121.99	96.17
Rapeseed	7.07	24.74	33.66	26.59
Sunflower	7.54	19.76	24.69	17.15
Palm oil	3.62	10.03	20.23	16.61

Source: Oil World, USDA (2017)

In the period 1965-2016, the world's soybean crop area increased by 96.17 million hectares. Similarly, rapeseed and sunflower plantations increased by 26.59 million and 17.15 million hectares, respectively, in the same period. The increase in the area of oil palm plantations is only about 16.61 million hectares or only 17 percent of the additional soybean area. Thus, the most expansive vegetable oil crop plantations are soybean, rapeseed and sunflower. The expansion of oil palm plantations is relatively small compared to other vegetable oil-producing plantations.

The above data also show that internationally, the largest land use change including deforestation (land use, land use change forestry/LULUCF) occurred on soybean plantations, followed by rapeseed plantations and sunflower

MYTH 2-02

Palm oil plantations are larger than those of other vegetable oils, making world palm oil production higher than other vegetable oils.

FACTS

The area of the world's four largest vegetable oil producing plants (palm oil, soybean, sunflower and rapeseed) reached about 200.5 million hectares in 2016. Of this area, 61 percent (121 million hectares) comprises soybean plantations. While the area of oil palm plantations is only 10 percent (Figure 2.1).

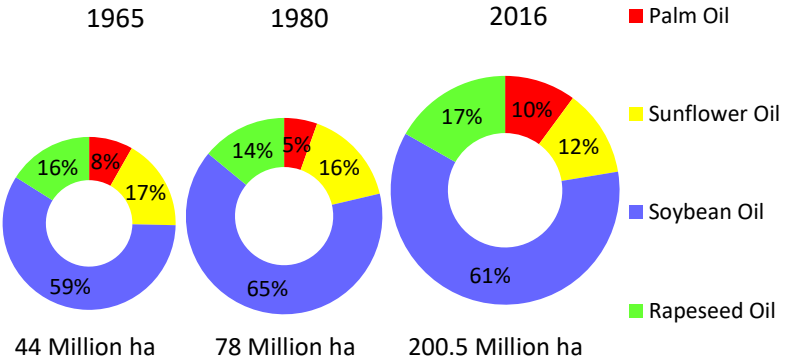


Figure 2.1: Changes in size of plantation areas of four main global vegetable oils (USDA 2017)

But in terms of oil production, with 121 million hectares, soybean plantations produce only 53 million tons of oil or only 33

percent of the world's top four vegetable oil production. On the contrary, oil palm plantations with an area of 20 million hectares, can produce 65 million tons of oil or 40 percent of the world's top four vegetable oils.

This is due to the high productivity of palm oil plantation, which is far higher than the productivity of other vegetable oil producing plants (Table 2.2).

Table 2.2: Comparison of the productivity of various crops producing vegetable oil

Crops	Productivity (Ton/Ha/Year)
Palm Oil	4.27
Rapeseed	0.69
Sunflower	0.52
Peanut	0.45
Soybean	0.45
Coconut	0.34
Cotton	0.19

Source: Oil World (2008) Oil World Statistic ISTA Mielke GmBh Hamburg

The productivity of palm oil per hectare of land is much higher (eight-10 times) than the productivity of other vegetable oils. Thus, with less land, oil palm plantations can produce more vegetable oil. The vegetable oil productivity data also reveal that oil palm plantations are the most efficient crops in converting solar energy into vegetable oils.

Because of this difference in oil productivity per hectare, there has been a major change in the share of palm oil and soybean oil production in the world vegetable oil market (Figure 2.2)`

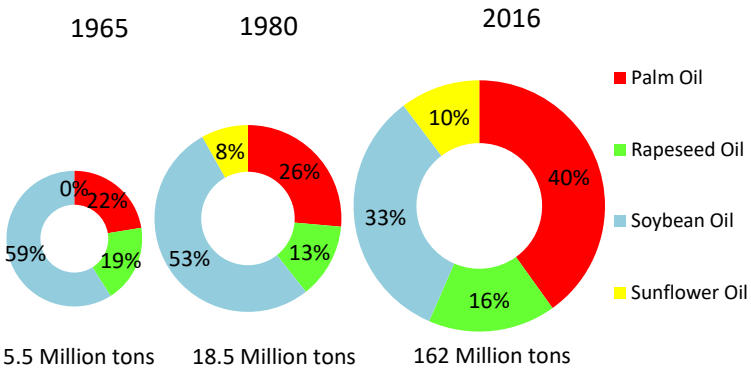


Figure 2.2: Changes in production shares of four major global vegetable oils (USDA 2017)

The share of palm oil increased from 22 percent (1965) to 40 percent (2016), while the share of soybean oil fell from 59 percent to 33 percent in the same period. Thus, it is quite clear that the large share of palm oil in the world's vegetable oil production is not due to the large size of oil palm plantations but due to higher palm oil productivity than other vegetable oil-producing plants.

MYTH 2-03

Fertilizer use and pollution from oil palm plantations are greater than those of other vegetable oils and the plantations use more chemical (inorganic) fertilizers than other vegetable oil-producing plants, and produce more residues (pollution) that pollute soil and water.

FACTS

Agricultural activities generally use chemical fertilizers such as nitrogen fertilizer, phosphorus and kalium (potassium) and pesticides. FAO data (2013) shows the fertilizer use rate in each country/region (Table 2.3).

Table 2.3: Fertilizer consumptionin various countries

Countries	Fertilizer Use (Kg/Ha)			
	Nitrogen (N)	Phospor (P)	Kalium (K)	Total
World	69.3	25.8	14.8	109.9
Africa	11.0	4.4	1.5	16.9
S. America	49.2	20.8	18.3	88.3
North America	58.9	18.1	17.4	94.4
Asia	128.1	47.6	21.3	197
Europe	44.1	11.4	11.7	67.2
West Europe	111.3	19.5	23.9	154.7
The Netherlands	205.6	9.1	15.7	230.4
Germany	129.2	19.4	29.9	178.5
UK	166.8	30.2	41.2	238.2
Norway	115.3	24.4	50.2	189.9
France	98.3	20.6	21.3	140.2
China	296.8	109.4	39.7	445.9
Malaysia	127.0	8.8	46.9	182.7
Indonesia	68.8	11.9	19.8	100.5
US	65.9	20.4	21.4	107.7

Source: FAO, 2013

In general, the countries with the highest use of fertilizer for agriculture are European countries (which are also producers of sunflower oil, rapeseed oil and soybean oil).

The use of fertilizer generally has a correlation with the pollution from residues of fertilizer, both in soil and in water. The fertilizer consumption per hectare in Indonesia's agricultural land including oil palm plantations is still relatively low. The relatively low use of fertilizers also means the pollution resulting from the residues of fertilizers is lower.

Vegetable oils that use most fertilizers can produce greater pollution in water and soil. This can be calculated by comparing the fertilizer consumption and soil and water pollution (residues) in the production of every ton of vegetable oil (Table 2.4).

Table 2.4: Comparison of input and soil/water pollution among palm oil, soy beans and rapeseed for every ton of vegetable oil

Indicator	Palm Oil	Soybean Oil	Rapeseed Oil
Input			
N (kg)	47	315	99
Phosphor (kg P_2O_5)	8	77	42
Pesticide/Herbicide (kg)	2	29	11
Energy (GJ)	0.5	2.9	0.7
Pollution (Soil, Water)			
N (kg)	5	32	10
Phosphor (kg P_2O_5)	2	23	13
Pesticide/Herbicide (kg)	0.4	23	9

Source: FAO, 1996

Based on the above data, soybean oil uses the highest amount of fertilizers NPK, pesticides and fossil energy. In the second place is rapeseed oil. As a result, pollution from the residues of fertilizers and pesticides in soil and water is also higher in plantations producing soybean oil and rapeseed oil. As palm oil makes relatively low use of fertilizers, pesticides and fossil energy so pollution from the residues of fertilizers and pesticides in soil and water in oil palm plantations is also relatively low.

MYTH 2-04

Oil palm plantations are monocultural and Indonesia's oil palm plantations are the largest monocultures in the world.

FACTS

All of the world's agricultural commodities cultivated in agricultural areas are monocultures. Wheat, corn, beans, rice and

others throughout the world are cultivated by monoculture. According to USDA (2017) data, of the 224.28 million hectares of the world's wheat cultivation, 30.2 million hectares are located in India, EU has 26.9 million hectares, China has24.3 million hectares, Russia, 26.9 million hectares, the US 17.7 million hectares and Australia has 12.9 million hectares. Meanwhile, of about 177.45 million hectares of corn cultivation in the world, 35 million hectares are located in the US. China has 36 million hectares, Brazil 16.4 million hectares, and India 9.5 million hectares. Meanwhile, of about 159 million hectares of rice cultivated in the world, 44.5 million hectares are located in India. China has 30.3 million hectares and Indonesia12.1 million hectares.

Of the world vegetable oil production, Indonesia's palm oil plantations cover an area of 11.6 million hectares in 2016, smaller than soybean farms of major soybean-producing countries (Figure 2.3). In the United States, the soybean-cultivation area reached 33.6 million hectares in 2016, and in Brazil it is about 33.8 million hectares, which is three times larger than Indonesia's oil palm plantations. In Argentina, the area under soybean cultivation reached 19.5 million hectares and in India about 11.4 million hectares.

Thus, Indonesia's oil palm plantations are not the largest monoculture commodity in the world, either among all commodities or in the world's vegetable oil commodity group. For a comparison, Indonesia's palm oil plantation area is onlyone-third of the land area of soy bean productionin the United States or Brazil. While in Indonesia, the rice-farming area is still larger than oil palm plantations.

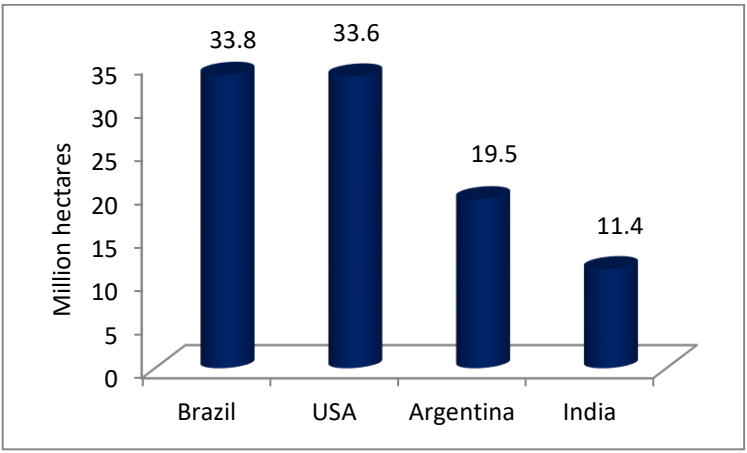


Figure 2.3: Soybean area (monoculture) area in major countries (USDA, 2017)

MYTH 2-05

Palm oil biodiesel does not produce low GHG emissions. For fossil-based diesel replacements, biodiesel made from soybean, rapeseed or sunflower vegetable oils reduces GHG emissions more thanbiodieselmade from palm oil.

FACTS

Various studies both in Indonesia and in Europe show that using Life Cycle Analysis, diesel-fuel replacement with palm biodiesel will reduce greenhouse gas (GHG) emissions from diesel engines by 50-60 percent.

Even according to the EuropeanCommission, if the palm oil biodiesel is produced from palm oil plantations with methane capture technology, the reduction of GHG emissions can reach 62 percent (Figure 2.4). The results of the studies made by Mathews and Ardyanto (2015) also support the European Union's findings that the use of palm oil-based biodiesel as a substitute for diesel can lower GHG emissions by above 60 percent.

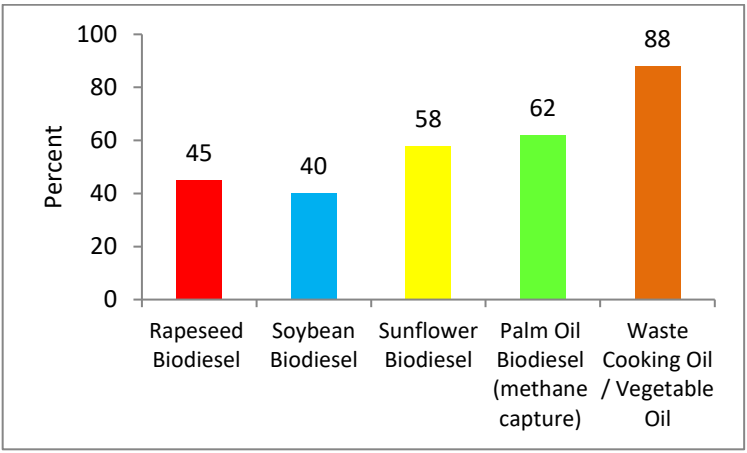


Figure 2.4: Reduction of CO2 emissions in different types of biodiesel raw materials compared to diesel emissions. (European Commission Joint Research Center)

The reduction of GHG emissions caused by the use of biodiesel made from palm oil is higher than those from biodiesel made from rapeseed oil, soybean oil or sunflower oil. In other words, the use of palm oil-based biodiesel as a substitute for diesel can more greatly reduce GHG emissions than biodiesel made from soybeans, rapeseed or sunflower oil.

MYTH 2-06

Palm oil imports disadvantage developed countries.

FACTS

The benefits of Indonesia's palm oil are not only enjoyed by the Indonesian people, but almost all the people of the world through that country's palm oil exports. The main destinations of Indonesia's palm oil exports are India, China, the European Union and other countries (Figure2.5).

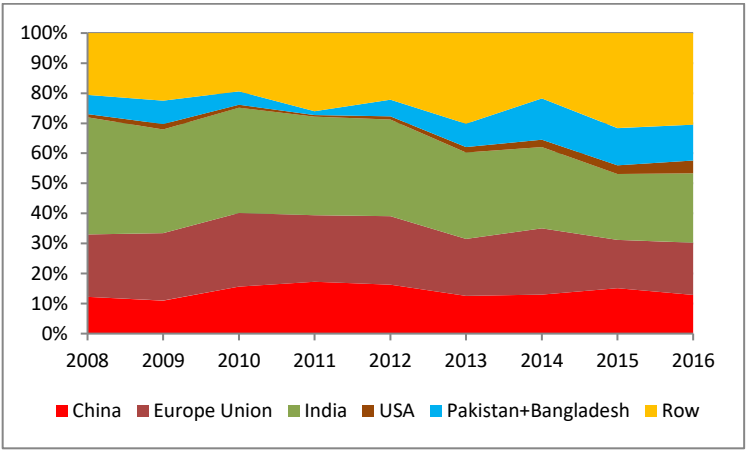


Figure 2.5: Indonesia's palm oil exports by countries of destination (database PASPI)

Palm oil as a vegetable oil is available in sufficient volume globally and at competitive prices. This is why palm oil is consumed in almost every country in the world.

The presence of palm oil also has reduced the problem of food-fuel tradeoff faced by developed countries including in the European Union. Based on an OECD analysis (2007), if the EU reduces 10 percent of itsfossil fuel consumption and replaces it with biofuels (as per the EU energy directive), the EU must convert 70 percent of its agricultural land into vegetable oil plantations.

Meanwhile, to substitute 10 percent of diesel with soy oil-based biodiesel, the United States must convert 30 percent of its agricultural land to soybean farming, which could disrupt the food security of the United States and the EU, even globally.

With the availability of palm oil in the world, the program to substitute fossil fuel with biodiesel can be done in the EU and United States, without having to convert agricultural land. This has been confirmed in the EU (Figure 2.6) where about 38 percent

of EU palm oil imports are used for energy both biodiesel and electricity.

The availability of palm oil in developed countries has also created economic benefits for importing countries. In the EU, for example, the economic benefits created by the annual consumption of palm oil raised the EU's GDP by 5.7 billion euros, providing government revenues of 2.6 billion euros and creating employment opportunities for 117,000 people (Table 2.5).

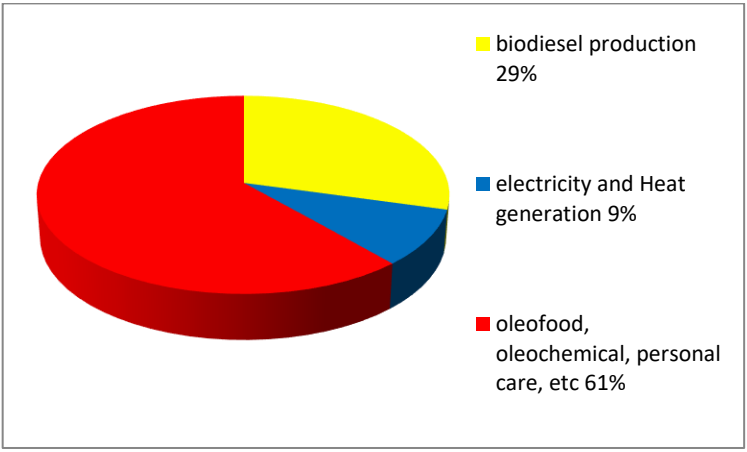


Figure 2.6: The use of CPO by sector in the EU

Table 2.5: Economic benefits of using palm oil on the economy of the European Union

Description	Value
Impact on GDP (euro million)	
Indirect impact	2,703
Indirect impact + consumption induction	5,764
Impact on government revenues (euro million)	
Indirect impact	1,227
Indirect impact+ consumption induction	2.617
Impact on job opening (000 orang)	
Indirect impact	67.1
Indirect impact + consumption induction	117.2

Source: Europe Economics, 2014 the Economic Impact of Palm Oil Import in the EU

MYTH 2-07

Palm oil disadvantages poor countries.

FACTS

Palm oil prices in international markets are cheaper than other vegetable oils (Figure 2.7). With more competitive prices, the palm oil gives more benefits to the world community especially in low-income countries.

First, with the relatively cheap price and availability of its supply in the world market, palm oil can prevent excessive increases in prices of other vegetable oils such as soybean oil, rapeseed oil and sunflower oil.

Second, the low palm oil prices help people in low-income countries such as in Africa and Central Asia and third, with the low prices, people in low-income countries are still able to consume much vegetable oil.

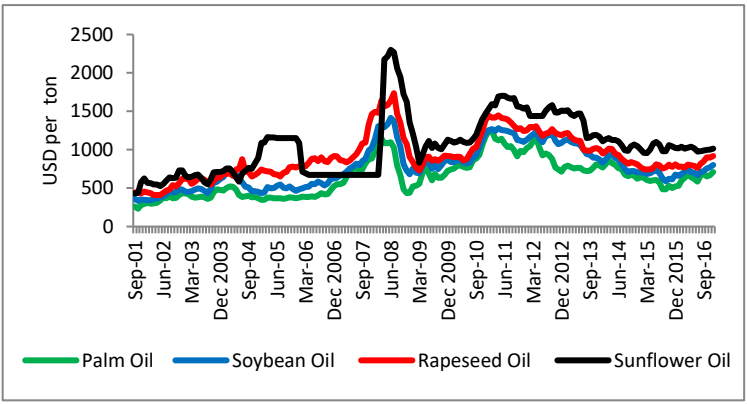


Figure 2.7: Comparison of palm oil prices with those of other vegetable oils (World Bank, 2017)

MYTH 2-08

Oil palm plantation expansion is unnecessary.

FACTS

The projection of the global vegetable oil demand in the future should be based on the estimates of the world population and the per capita consumption of vegetable oils by 2050. The estimate of the world population based on the medium-term projection of UNPD data on the world population is 9.2 billion people by 20150.

The projected per capita consumption ofvegetable oils in the world by 2050 can be made throughthree scenarios: In the first scenario, the oil is based on the nutritional recommendations of FAO (1994) for edible use and non-edible use (21 kg /capita/year).

In the second scenario, the demand is based onworld vegetable oil consumption (food and non-food, other than biofuel) inaccordance with the projected average consumption of vegetable oils in India and China, which is expected to reach 25 kg/capita/year by 2050. But the first and second scenarios are less realistic because in developed countries such as the United States and Europe, consumption in 2008 had already reached more than 37 kg/capita/year. Of course,people in developed countries are not willing to reduce their consumption.

And in the third scenario, it is assumed that by 2050, the average consumption of vegetable oil (food and non-food, besides biofuel) in the developing world will match the consumption level in Europe and United States in 2008, which reached 37 kg/capita/year.

The third scenario is based on the assumption that there will be no significant increase in the consumption of vegetable oils in developed countries by 2050.

With the above scenario, the world vegetable oil demand by 2050 is as presented in Table 2.6. The increase in the world vegetable oil production by 2050 ranges between 24 million tons and 170 million tons. Toward 2050, it will likely be difficult to further increase the production of other vegetable oils (other than soybean oil and palm oil) from the level recorded in 2014 (fixed production). This means that theworld consumption of vegetable oils will be dominated by soybean oil and palm oil.

Table 2.6: Projection of the world's vegetable oil needs and additional new areas toward 2050

Scenario of per capita consumption by 2050 (kg/capita)	Demand for vegetableoils in the world by 2050 (million tons)	Increase in production of vegetable oils2014-2050 (million tons)	Additional new areas to meet the increase in demand for vegetable oils by 2050	
			If only fromsoybean oil (million ha)	If only from palm oil (million Ha)
21	194	24	48	4.8
25	230	60	120	12
37	340	170	340	34

Source: PASPI (2016)

Increasing the production of soybean oil especially through area expansion is still possible in South America as it has been in the past 10 years. Similarly, the expansion of oil palm plantations is still possible in Indonesia as well as in the Central African region.

The question is whether, people will choose to expand the production of soybean oil or palm oil in order to meet the rise in demand. If the world communityprefersincreasing soybean oil production to meet demand by 2050, it will require 340 million additional hectares of soy plantations in the world (assuming 0.5 tons/hectare productivity). This means, the world community will lose 340 million hectares of forest in South America. If the world community chooses to increase palm oil production

to meet the world vegetable oil demand by 2050, the new area needed will only be about 34 million hectares (assuming 5 tons of oil/hectare productivity).

In other words, increasing the production of palm oil production to meet the demand for vegetable oils by 2050 will require less forest (only 34 million hectares) compared withthe new areas needed for the expansion of soybean farming (340 million hectares).

The expansion of the world's oil palm productionwill give more benefits to the world than the expansion of soybean plantations. Moreover, palm oil expansion can also prevent greater global deforestation, especially in South America.

MYTH 2-09

Anti-palm oil NGOs protect the environment

FACTS

So far, Western countries, both directly and indirectly (through NGOs), have intensively attacked the world palm oil industry, especially in Indonesia. The expansion of oil palm plantations in Indonesia is perceived as having caused considerable GHG emissions.

The anti-palm oil movement began in the early 1980s. In the early years, the movement used health issuesas the theme of their protests, such as by spreading rumors that the tropical oil containedcholesterol. Then in the 1990s, the theme was focused on claims that palm oil could cause cardiovascular disease. In the early 2000s, the theme shifted to the environmental problems caused by oil palm plantations.

In addition to the smear campaigns, many other methods are also used to suppress the development of Indonesia’s palm oil industry, through the use of import duties, the requirement for

the certification of sustainable palm oil products and intervention in government's policy.

Campaignsfor a forest-conversion moratorium, peat management regulations, palm oil waste management, the Indonesia Palm Oil Pledge (IPOP), "Palm Oil Free" labeling havealso been launched by Western countries through NGOs in Indonesia.

Is it true that anti-palm oil protests made by these NGOs are intended to preserve the environment, especially reducing Indonesia's GHG emissions? The empirical facts prove that the movement lacks sufficient rationality (see Chapters 6 and 7)

According to the IEA (2016), 68 percent of global GHG emissions are sourced from fossil fuel consumption. The world's largest GHG-emitting countries are China, the United States and India. These three countries account for about 50 percent of global GHG emissions. Indonesia's contribution to global GHG emissions is only 1.3 percent.

FAO data (2013) show that global agricultural contributions account for only 11 percent of global GHG emissions. About 95 percent of global agricultural GHG emissions are contributed by the livestock sector, rice farming and fertilizer use. Global peatland utilization's contribution is only about 2 percent. Indonesia's largest agricultural GHG emission source is rice farming and livestock activities. About 66 percent of Indonesia's agricultural GHG emissions come from rice and livestock farms. The contribution of peatland use for agriculture/plantation accounts for only about 19 percent of Indonesia's agricultural GHG emissions or only about 1 percent of Indonesia's GHG emissions.

It is the same thing with global deforestation. The greatest deforestation occurring before 1980 was in Europe and North America (Matthew, 1983). Later, in 1990-2008, the deforestation was largest in South America for the expansion of cattle ranches,

soybean, corn and sugarcane plantation (European Commission, 2013).

Based on the above facts it is clear that the protests against the palm oil plantations are not made for the sake of environmental conservation/GHG emissions and are not supported by empirical facts.

If the purpose is to reduce Indonesia's GHG emissions then NGOs would need to encourage the reduction of fossil fuels as the biggest contributor of GHG emissions in Indonesia. In the agricultural sector, NGOs should encourage cuttingthe GHG emissions of rice and livestock farming as the largest contributors (66 percent) of Indonesia's agricultural GHG emissions.

Similarly, if the policy on the requirement forsustainability certification is intended to reduce Indonesia's agricultural GHG emissions, rice farming and livestock farming, not oil palm plantations, should be the first to be required to carry green labelling.

Based on the composition of GHG-emitting countries, reductions in global GHG emissions should be first made by major emitters such as China, India and the United States. Why do global NGOs not use their energy to suppress the largest GHG-emitting countries? And why are global NGOs more interested in questioning the GHG emissions of Indonesian oil palm plantations that contribute so very little to global GHG emissions?

Reductions in GHG concentration in the earth's atmosphere need not only to be made in the production sector, but more importantly in the consumption sector.

Romanian economist Georgescu-Roegen (1971) states that what should be done by developed countries is not sustainable development, but sustainablede-growth.

The world’s major GHG emitters should reduce consumption (energy and food) to reduce GHG emissions. Unfortunately,

reducing consumption is tantamount to reducing the welfare of the people in developed countries. Are the people in developed countries willing to reduce their living standards? If the reason for the anti-palm oil movement is not an effort to reduce global GHG emissions, what is the motive behind the movement? The motivation of the Western-sponsored anti-palm oil movement may constitute one or a combination of the two following reasons.

First, it could be a part of the global vegetable oil competition strategy, and second, a shift of the responsibility for the increase in the global GHG emission from Western countries to developing countries including Indonesia.

If competition is the motive, it is a continuation of the movement that has been ongoingsince the 1980s. An increase in global palm oil production especially in Indonesia has reduced the dominance of soybean oil, sunflower oil and rapeseed oil,both in the production and consumption of global vegetable oil (PASPI, 2014; Sipayung and Purba, 2015).

The main producer of soybean oil is the United States, while the biggest producers of sunflower and rapeseed oil are in the EU. The decline in the market share of soybean, rapeseed and sunflower oils in the global vegetable oil market, for the United States and the EU, is not just a mere business issue butalso concerns the fate of the enormous subsidies given by the EU and United Statesto their farmers every year.Therefore, in addition to vegetable oil producer associations, the governments of both countries also protect their farmers through the introduction of import restrictions on other vegetable oils, particularly palm oil.

Shifting the responsibility for the rise in global GHG emissions from Western countries (as the largest emitters of GHG) to developing countriesseems to be the more probable motivation. This is the logical consequence of the unwillingness of people in Western countries to reduce their standards of living, which is needed, if they want to reduce GHG emissions.

Western societies have per capita incomes more than 10 times those in Indonesia. Their per capita food and energy consumption is also more than 10 times those of Indonesia. If we want to reduce global GHG emissions, the per capita consumption of energy and food of Western countries should be reduced. In fact, Western societies are unwilling to reduce their consumption and choose to transfer these responsibilities to developing countries including Indonesia.

With their superiority in almost all fields, it is easy for the West to pressure developing countries to assume that responsibility.

With their financial power, Western countries can easily influence officials and even local experts so that developing countries are urged to repeat the West'spast mistakes,which have resulted in the destruction of their own forests (including their inhabitants) and for the West to be able to maintain its own GHG emissions so that their living standards are not affected.

Chapter 3
Myths Vs. Facts of Palm Oil Industry in Indonesia's Economy

It is commonly believed that the palm oil industry is exclusively beneficial to the producers and not to the Indonesian economy as a whole. Although the palm oil industry has succeeded in making Indonesia the world's largest producer of CPO, as well as the world's largest vegetable oil producer, there are many questions regarding the contribution of the palm oil industry to the economy and to national economic development. The following are some of the myths often claimed about the palm oil industry. They need to be answered with data and empirical evidence.

MYTH 3-01

Oil palm plantations make no contribution to the economy.

FACT

An economic activity is said to be exclusive if it only brings limited benefits to the actors and does not affect the public. To prove whether the palm oil industry is exclusive or inclusive, it can be seen through some multiplier effect indicators, such as on output, income, value added and labor. The data presented on the following input-output table about Indonesia's economy in 2008 shows the multiplier index of oil palm plantations (Table 3.1). The multiplier indexes of output, income, labor and added value of oil

palm plantations are each greater than one. This means the multiplier impact of oil palm plantations is greater than the average multiplier impact of all national economic sectors. It also means that the development of oil palm plantations triggered by increased consumption, investment and exports will create greater benefits in terms of output, income, added value and employment creation, not only on oil palm plantations but also in the economy as a whole.

Table 3.1: Multiplier index of oil palm plantations

Multiplier index	Oil palm plantations
Output	1.71
Income	1.79
Labor	2.64
Added value	1.59

Source: Table I-O, Statistics Indonesia, (2008)

The sectors of the national economy that get benefits (output, income, added value and employment creation) from the growth of oil palm plantations are presented in Table 3.2.

If an increase in palm oil exports directly leads to increased revenues for oil palm plantations, it also increases the income through indirect effects and induced consumption effects of some sectors of the national economy, especially in 10 major economic sectors. Similarly, through the same mechanism, the creation of new employment opportunities does not only occur in oil palm plantations, but also in those sectors of the national economy.

Table 3.2: Top 10 economic sectors that enjoy growth from the output, income and added value of oil palm plantations

Rank	Output impact	Income impact	Added value impact
1	Finance	Other services	Agriculture service
2	Other services	Finance	Trade, hotels and restaurants
3	Trade, hotels and restaurants	Trade, hotels and restaurants	Husbandry, forestry and fishery
4	Chemical industry, fertilizers and pesticides	Chemical industry, fertilizers and pesticides	Other services
5	Oil and gas and mining industry	Transportation	Food agriculture
6	Transportation	Infrastructure	Transportation
7	Infrastructure	Oil and gas and mining industry	Finance
8	Food industry	Agriculture infrastructure	Other plantations
9	Machinery and electricity	Agriculture services	Chemical industry, fertilizer and pesticide
10	Other sectors	Other sectors	Other sectors

Source: Table Input-Output, Statistics Indonesia, BPS

Therefore, oil palm plantations are not exclusive economic activities but inclusive ones. The growth of oil palm plantations will either directly or indirectly create "economic cakes" for some sectors of the national economy.

MYTH 3-02

Palm oil industry is extractive.

FACTS

An economic sector is called extractive if it only takes or harvests what is available in nature. This includes hunting, fishing, logging and mining. In contrast to these activities, oil palm plantations are non-extractive economic activities because CPO is obtained by cultivating oil palm and further processing the oil, using modern management and science and technology. An increase in CPO production is achieved both by increasing the size of plantation areas and expanding oil productivity per hectare. The per-hectare productivity of Indonesian oil palm plantations had generally increased year by year until 2016 (Figure 3.1).

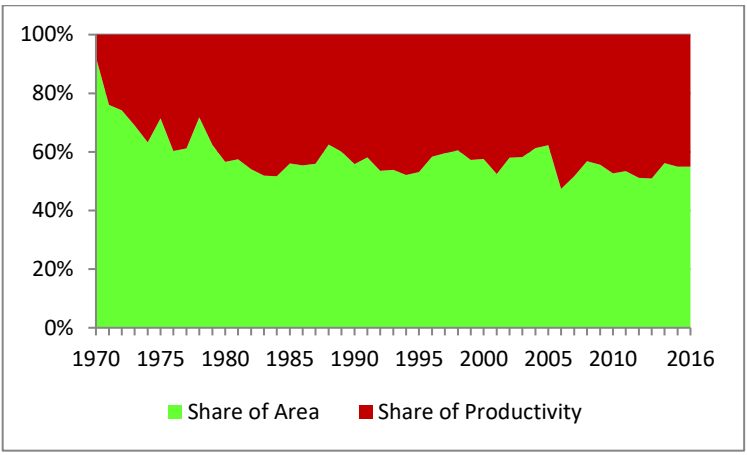


Figure 3.1: The comparative contributions of the increase of per-hectare productivity and area size to CPO production in Indonesia (Agriculture Ministry, various data)

From 1970 to 1990 the contribution of per-hectare productivity to overall CPO productivity was still about 39 percent. Then it increased to 44 percent from 1991 to 2000 and to 45 percent from 2000 to 2016. In other words, the increase in Indonesia's CPO production is not only caused by an increase in the production area but also from increased productivity in the area.

In the future, the contribution of per-hectare productivity is expected to increase and become a source of growth for national palm oil production. CPO production growth from increased per-hectare productivity is more sustainable than that from the expansion of plantation area. On the 100th anniversary of Indonesia's first oil palm plantation in 2011, it was agreed a long-term productivity of 35 tons of oil palm fruit bunches (TBS) per hectare with a yield of 26 percent or equivalent to about 9 tons of oil per hectare should be achieved.

MYTH 3-03

Indonesian palm oil industry only exports raw materials.

FACTS

Despite its long history since the colonial era, Indonesia's palm oil industry has only been accelerating since 2000, since the reform movement in 1998. In terms of time, the development of the palm oil industry in Indonesia has been different from that of the Malaysian palm oil industry, which developed earlier, or the European and United States vegetable oil industries, which have been developing for 100 years.

In the last 15 years the Indonesian palm oil industry has experienced a leap of development not only in area size but also in downstream industrialization. The industrialization of Indonesian palm oil is reflected in the changes of the composition of exported palm oil products (Table 3.3).

Table 3.3: Composition of Indonesia's palm oil exports (thousand tons)

Year	Crude Palm Oil (CPO)		Processed Palm Oil	
	Volume	Share (%)	Volume	Share (%)
2008	8,375	55.59	6,690	44.41
2009	10,173	59.55	6,912	40.45
2010	10,007	58.57	7,078	41.43
2011	9,768	55.51	7,828	44.49
2012	8,090	44.39	10,133	55.61
2013	6,577	31.00	14,640	69.00
2014	5,782	26.57	15,979	73.43
2015	7,872	29.82	18,529	70.18
2016	5,424	21.60	19,689	78.40

Source: BPS, database PASPI

Palm oil products that Indonesia exported until 2011 were still dominated by Crude Palm Oil (CPO). However, after 2011 it changed. Processed palm oil exceeded the export volume of crude palm oil. Thus, the Indonesian palm oil industry has shifted from exporting crude palm oil to processed palm oil. Of course, the opportunity to further develop the downstream palm oil industry is still wide open.

MYTH 3-04

Foreign exchange generated from the Indonesian palm oil industry is relatively small compared to what is generated by other Indonesian export commodities. So, the export of Indonesian palm oil is not too important for the national economy.

FACTS

Foreign exchange is a measurement of net exports, namely the value of exports minus the value of imports. If an industry exports commodities of great value, but also imports commodities

of great value, then it would generate limited foreign exchange, or even create a foreign exchange deficit.

In the Indonesian economy, the non-oil sector (including the palm oil industry) is the mainstay for generating foreign exchange. From 2008 to 2016 (Table 3.4) the value of net exports of non-oil and gas sector fluctuated, but it maintained a surplus.

Table 3.4: Export value of palm oil and net export value of non-oil and gas in Indonesia (USD billion)

Year	Net export value of palm oil	Net export value of non-oil and gas aside from palm oil	Net export value of non-oil and gas
2008	15.4	-0.3	15.1
2009	12.3	13.3	25.6
2010	16.3	11.1	27.4
2011	21.6	3.7	25.3
2012	21.3	-17.4	3.9
2013	19.2	-10.7	8.5
2014	21.1	-9.9	11.2
2015	18.6	-4.9	13.7
2016	18.1	-3.4	14.7

Source: BPS

If the export value of non-oil and gas is divided into the export of palm oil and non palm oil, it will be seen that the net value of palm oil exports is consistently in surplus with an increasing trend. In contrast, the net value of exports aside from palm oil tends to decrease from surplus to deficit. In total, the net non-oil and gas exports are still in a surplus as caused by palm oil exports.

The data clearly show that palm oil exports are an important component and the savior of Indonesia's non-oil and gas trade. Without the export of palm oil, Indonesia's trade balance would be in deficit (that is, there would be a negative foreign exchange).

MYTH 3-05

The palm oil industry does not contribute to government revenues.

FACTS

Aside from being a source of foreign exchange, the export of palm oil and its derivative products is also a source of government revenues, namely from palm oil export taxes (Figure 3.2). The accumulated government revenues from palm oil export taxes increased from Rp 4.2 trillion in 2007 to Rp 111.6 trillion in 2016.

The data clearly show that the Indonesian palm oil industry also contributes to government revenues. The value of government revenues in the form of palm oil export duty is still greater than the total value of subsidies received by food crop farmers and fishermen for the last five years.

Figure 3.2: Government revenues from palm oil export duty (Finance Ministry, 2016)

Of course, apart from the export duty, like other economic sectors the palm oil industry is also a source of considerable government revenues from both the property and land taxes,

value-added tax (VAT) and income tax. Unfortunately, detailed data cannot be displayed here.

MYTH 3-06

The Indonesian palm oil industry does not have a downstream policy so the added value created does not grow.

FACTS

Indonesia already has a policy to promote the downstream palm oil industry. Indeed, prior to 2008, the downstream industry proceeded in a revolutionary manner without support in the form of policy focusing on the downstream palm oil industry. Since 2008, downstream policy has become increasingly focused and intensive, especially to maintain the rapid growth of CPO production.

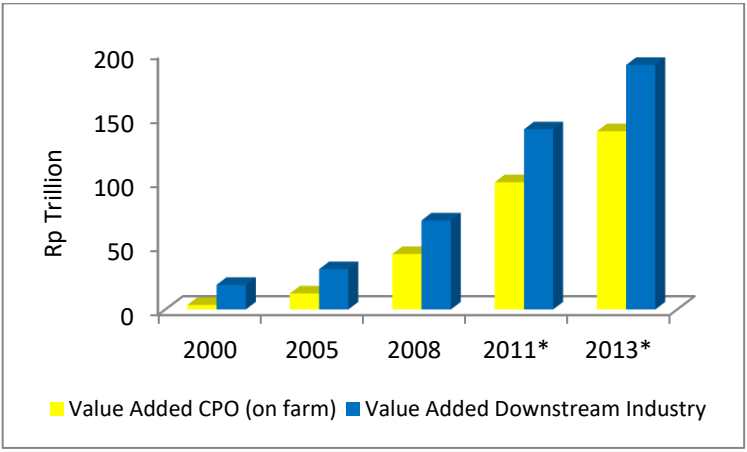


Figure 3.3: The development of added value in Indonesia's palm oil industry (Table I-O, BPS)

Generally, there are three strategy paths for boosting the downstream palm oil industry in the country, namely (1) the oleofood downstream line (cooking oil, margarine, specialty fats and other oleofood), (2) the oleochemical downstream line to

produce more downstream products such as surfactant, lubricant and others and (3) the biodiesel downstream line to produce fatty acid methyl ester as a substitute for fossil fuel. These various downstream lines are expected to generate more value-added downstream palm oil products.

According to the Indonesian input-output table data, the palm oil industry's added value has grown from year to year (Figure 3.3). Growth of added value occurs in oil palm plantations and in the downstream palm oil industries. It is estimated that the growth of added value will be more rapid and widespread because of the acceleration of downstream palm oil and the ongoing increasing productivity of oil palm plantations.

MYTH 3-07

The palm oil industry employs few workers.

FACTS

The palm oil industry, especially oil palm plantations, is a relatively labor-intensive industry and is not capital intensive. Therefore, any increase in palm oil production is only possible if labor utilization is increased.

In general, the number of workers employed in the palm oil industry has increased year by year from 2.1 million in 2000 to 8.2 million in 2016 (Figure 3.4). This shows that the palm oil industry is labor intensive and needs a lot of manpower.

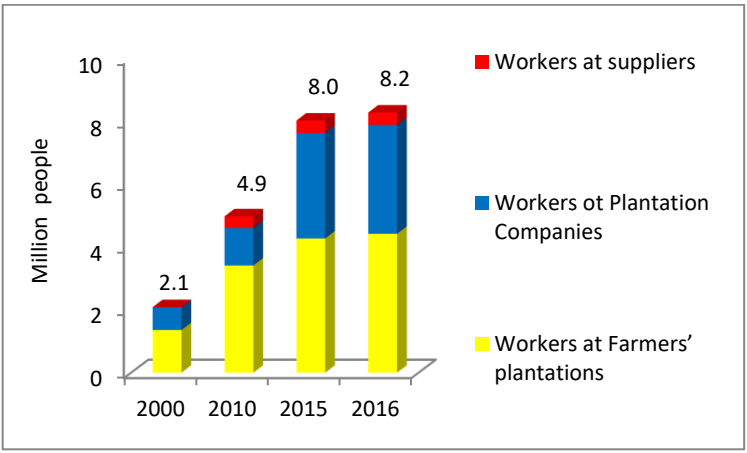


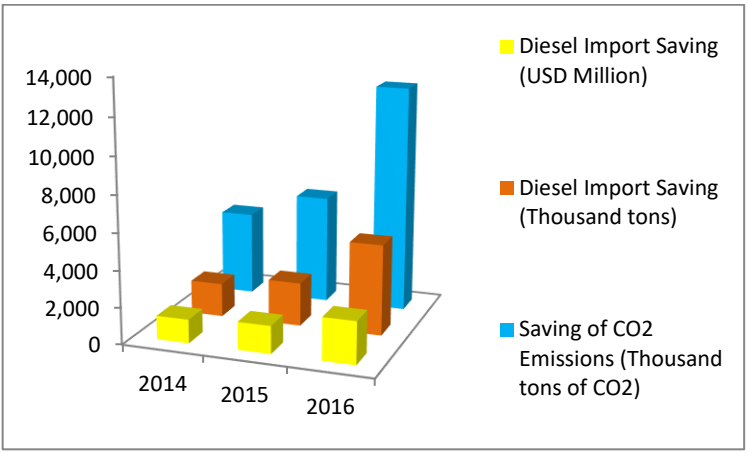
Figure 3.4: Workforce growth in oil palm plantations (Finance Ministry, PASPI database)

MYTH 3-08

The replacement of diesel fuel with palm biodiesel brings losses to Indonesia.

FACTS

Implementation of a policy concerning the mandatory use of biodiesel from 2014 to 2016 in Indonesia led to accumulated savings of diesel fuel, reduced CO2 emissions and more foreign exchange from diesel imports (Figure 3.5). Cumulatively, 5 million tons of diesel fuel imports and foreign exchange from diesel imports worth US$2.3 billion were saved. It also reduced CO2 emissions by 12.4 million tons.



Figurer 3.5: Accumulated saving of diesel imports, reductions of CO2 emissions and improved foreign exchange based on the implementation of mandatory biodiesel in Indonesia (Economic Ministry, PASPI data, 2017)

Thus, the policy for mandatory biodiesel provides double benefits for Indonesia, namely to build national energy sovereignty through the efficient use of imported diesel and to earn foreign exchange from imported diesel. In addition, the policy reduces national CO2 emissions.

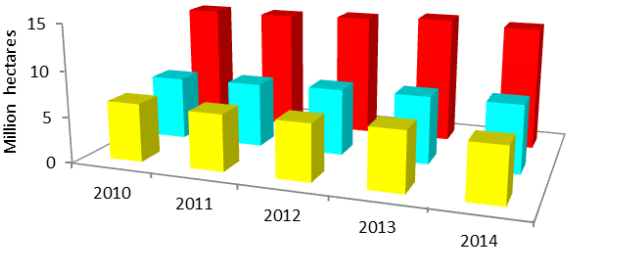
MYTH 3-09

Oil palm plantations reduce rice farming in Indonesia.

FACTS

The conversion of farmland, both from one commodity to another and from one sector to another, is a normal phenomenon that occurs as development progresses. Although Law No. 12/1992 on plant cultivation systems gives farmers the freedom to choose the crops to be grown, the conversion of major food lands, such as large paddy fields, could threaten the national rice production.

The extensive development of oil palm plantations in Indonesia, which is almost entirely outside of Java, has not reduced the area of rice fields. Based on 2015 data from the Agriculture Ministry, rice farming areas outside Java are likely to increase (Figure 3.6).



	2010	2011	2012	2013	2014
Java	6.36	6.17	6.19	6.47	6.00
Outside Java	6.90	7.04	7.26	7.37	7.39
Indonesia	13.25	13.20	13.45	13.84	13.39

Figure 3.6: The expansion of rice fields on Java and outside Java (Agriculture Ministry, 2015)

On the contrary, rice land on Java Island is declining because of conversion to non-agricultural sectors, such as industry, infrastructure and housing. However, the overall national rice area is still relatively stable at about 13 million hectares and it is increasing.

These data show that the expansion of oil palm plantations outside of Java as a whole did not reduce the area of rice crops. The area of rice farms outside Java is on the increase. In addition, rice land on Java Island is not part of the development area of oil palm plantations, but is declining because of conversion to the non-agricultural sector, which may be more productive.

Of course, at the regional and local level, rice farming areas are being converted into non-rice areas, including as oil palm plantations as farmers feel it is more profitable to develop non-

rice businesses. The right of farmers to choose commodities and businesses that are profitable for them is protected by Law No. 12/1992. However, the overall expansion of oil palm plantations entirely outside of Java Island is also followed by expansion of rice plantation areas.

Chapter 4
Myths Vs. Facts: Oil Palm Plantations within Social Issues and Rural Development

Rural development is one of the focuses of development policy in Indonesia, considering that (1) half or more of Indonesia's population, 58 percent in 2000 and 50 percent in 2012, lived in rural areas and their welfare needs to be improved, (2) the largest labor force is located and working in rural and agricultural areas, (3) poor people in Indonesia are largely in rural and agricultural areas. Therefore, rural development in Indonesia should focus on increasing rural incomes (pro-rural income development) and poverty reduction (pro-poor development).

The following myths are often cited concerning the connection between the development of oil palm plantations and rural development.

MYTH 4-01

Oil palm plantations exploit local resources and create backwardness in rural areas.

FACTS

Since the beginning, or at least since the 1980s, the development of oil palm plantations in Indonesia, both as part of agricultural development and regional development (through a transmigration program), has been aimed at opening and building

new economic growth centers in rural areas. Underdeveloped areas, periphery, remote, isolated and hinterland areas, are developed into new growth centers.

The development of oil palm plantations is a pioneering economic activity in the context of rural development. The government has introduced several cooperative programs of plantation development that involve main plantation companies called nucleus ("Inti") and individual farmers called plasma farmers. The largely empty, isolated and underdeveloped rural areas, designated by the government as oil palm plantation development areas, are developed by state-owned enterprises (BUMNs) and/or private companies as nucleus while the local communities are developed as the plasma.

Considering that the area is still isolated, the state and private companies must open the area with access roads and bridges. In this case, they have to construct farm roads, development nucleus and plasma plantations, build employee housing, educational and health facilities, social and public facilities and maintain the young oil palm plants (Figure 4.1).

The development of new nucleus-plasma plantations has attracted investments from local farmers who are not part of the nucleus-plasma scheme to jointly grow oil palms on their land and these plantations are categorized as people's plantations. The number of individual smallholder has estates grown rapidly in many places and, therefore, the areas of people's plantations are larger than that of the nucleus-plasma plantations (PIR).

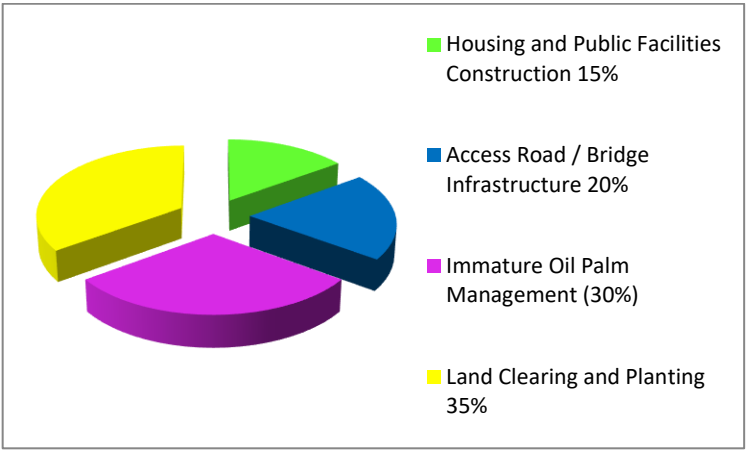
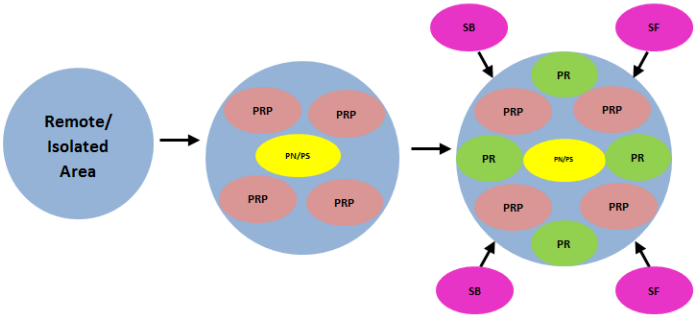


Figure 4.1: Component of early investment into oil palm plantations in rural areas (PASPI, 2014)

The growth of oil palm plantations, either under the nucleus-plasma scheme or by independent farmers, leads to the flourishing of small and medium cooperative (UKMK) businesses in the supply of goods and services, as well as traders of agricultural, fishery and livestock products to the oil palm plantation communities (Figure 4.2).

In the later stage of oil palm growth, especially after producing crude palm oil (CPO), there is the development of residential centers, offices, markets, etc. in such a way that as a whole it becomes a new agropolitan, a new agricultural town.

According to the Manpower and Transmigration Ministry (2014), by 2013 at least 50 rural and disadvantaged regions were developed into new growth areas whose basis is CPO production. They are Sungai Bahar (Jambi), Pematang Panggang and Peninjauan (South Sumatra), Arga Makmur (Bengkulu), Sungai Pasar and Lipat Kain (Riau), Paranggean (Central Kalimantan) and other areas. Most of the CPO production centers have developed into new districts or regencies in rural areas.



PS : Private Plantation
PN : State Plantation
PRP : Plasma Famers' Plantation
PR : Independent Plantation
SB : Supplier of Goods / Services
SF : Food Supplier

Figure 4.2: The process of oil palm plantation development from an isolated area into a new economic growth center (PASPI, 2014)

The following are new economic growth centers resulting from oil palm plantation development: (1) North Sumatra (Stabat, Belarang, Sei Rampah, Limapuluh, Perdagangan, Rantau Prapat, Aek Kanopan, Aek Nabara, Kota Pinang, Sosa, Sibuhuan, Panyabungan and others), (2) Riau (Pasir Pengaraian, Bangkinang, Siak Sri Indrapura, Rengat, Tembilahan, Bengkalis, Bagan Siapi-api, Teluk Kuantan, Dumai, Pekanbaru and others), (3) South Sumatra (cities like Sungai Lilin, Tugumulyo, Pematang Panggang, Bayung Lencir, Musi Rawas, Peninjauan and some cities bordering with South Sumatra, such as those from Muara Enim to Lahat), (4) Jambi (Sarolangun, Sungai Bahar, Sengeti, Kuala Tungkal and others), (5) Central Kalimantan (Sampit, Kuala Pembuang, Pangkalan Bun, Kasongan and others), (6) East Kalimantan (Sangatta, Tenggarong, Tana Pase, Tanjung Redeb, Nunukan, Sendawar and others), (7) South Kalimantan (Batulicin, Kotabaru, Pelaihari and others) and (8) Sulawesi (Mamuju, Donggala, Bungku, Luwu, Pasangkayu and others).

Thus, oil palm plantations in rural areas do not exploit rural resources but instead, through the development of the plantations, attract substantial new investment into isolated rural areas in such a way as to transform underdeveloped areas into new growth centers. This statement is also confirmed by the World Growth (2011) study, which says that oil palm plantations in Indonesia are an important part of rural development.

MYTH 4-02

The benefits generated by oil palm plantations are exclusively enjoyed by those directly involved in the oil palm plantations, i.e., plantation owners, employees and laborers.

FACTS

In economic development, the impact of investment on a particular sector depends on the relation between investment and economic activity in the region. It has been mentioned earlier that growth of palm oil production has a strong correlation to and multiplier effect on other sectors.

Amzul's 2011 study shows that increasing CPO production in CPO production centers in rural areas is also linked to and has a wide impact on rural sectors outside the oil palm plantations (non-farm economy). The 10 aforementioned sectors are as presented in Table 4.1.

If the CPO production increases (i.e. due to consumption, downstream investment and exports) the majority of the economic benefits it creates, about 60 percent, occurs in the areas of oil palm plantations and about 40 percent of those benefits occur in rural sectors outside of oil palm plantations such as with financial institutions, trades, restaurants, hotels, transportation, infrastructure and other sectors.

Table 4.1: Rural sectors that develop as a result of oil palm plantations

Rank	Sector
1	Financial services
2	Other services
3	Trade, restaurants and hotels
4	Basic chemicals and fertilizers
5	Oil, gas and mining
6	Transportation
7	Infrastructure
8	Food processing
9	Electricity
10	Other sectors

Source: Table I-O Indonesia; Maul (2011)

This means the economic benefits created by the growth of oil palm plantations are not only enjoyed by the people and working communities on oil palm plantations, but also (40 percent) by communities working outside the oil palm plantations in rural areas.

The people working in oil palm plantations are also consumers of food and non-food products produced by urban and rural communities. Based on public expenditure data (BPS, 2016), the value of transactions between the people on the oil palm plantations and the urban communities reached Rap 336 trillion per year. Meanwhile, the transactions with rural communities amounted to Rp 92 trillion per year (Figure 4.3). This means the total transactions between the people on the oil palm plantations and in the communities outside the oil palm estates nationally reach Rp 428 trillion per year.

In other words, the growth of oil palm plantations in rural areas increases the capacity of the rural economy to generate output, income and employment opportunities on oil palm plantations and in other rural non-farms sectors. The multiplier impact of oil palm plantation development is also enjoyed by the

urban sector, such as by financial institutions, restaurants and hotels, food processing and electric equipment and manufacturing sectors. Developing oil palm plantations does not only build rural areas but is also part of urban development.

Figure 4.3: The value of transactions between people on oil palm plantations and the rural and urban economies

It is very clear that the benefits of oil palm plantations are not only enjoyed by the communities directly involved in oil palm plantations but also communities that are not directly involved, both in rural and urban areas (inclusive growth).

MYTH 4-03

Oil palm plantations do not contribute to regional economic growth.

FACTS

A study by PASPI (2014) shows that the growth of crude palm oil production has a positive and significant impact on the growth of regional gross domestic product (RGDP) in palm oil production centers. Regional economic growth is even very responsive to an increase in palm oil production. The increase in the production of palm oil has led to the greater growth in the regional economy than the CPO production (Figure 4.4).

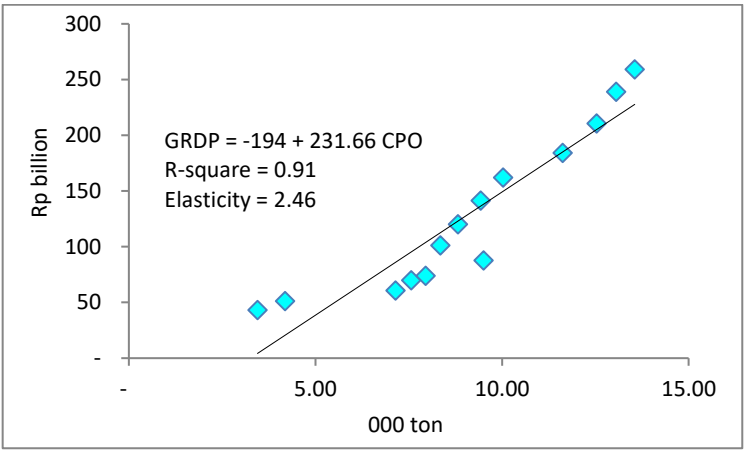


Figure 4.4: Impact of CPO production on regional gross domestic product (PASPI, 2014)

Regions with oil palm plantations book higher economic growth than regions without oil palm plantations. Consequently, there is a sharp difference in the growth of RGDP between the palm oil centers and the non-palm oil centers (Figure 4.5).

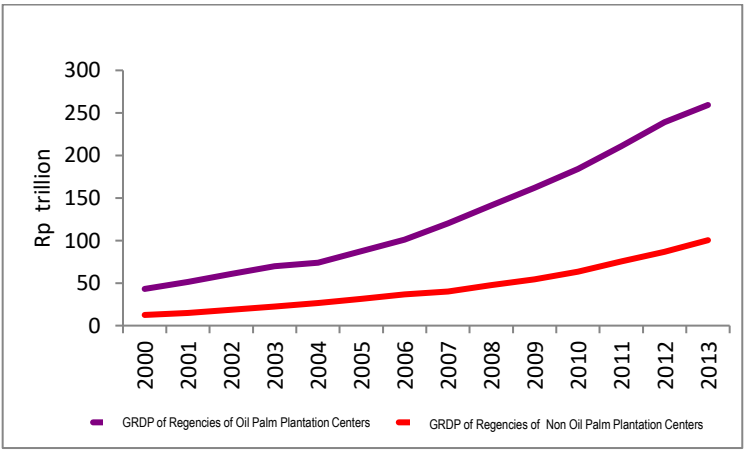


Figure 4.5: Comparison of non-oil and gas regional gross domestic product (RGDP) in oil palm centers and in non-oil palm centers (PASPI, 2014)

Thus, the notion that oil palm plantations do not contribute to regional economic growth contravenes the existing facts. In contrast, the growth of oil palm plantations has significantly increased the economic growth of the oil palm centers at a higher rate compared to non-oil palm centers.

MYTH 4-04

Oil palm plantations do not contribute to the revenues of oil palm plantation areas.

FACTS

Oil palm plantations developed in 190 regencies and 23 provinces in Indonesia economically drive the growth and development of those areas. The oil palm plantation centers enjoy the expansion of employment and business opportunities, increased production of goods and services and increased economic growth.

Oil palm plantations are taxpayers. They pay taxes including land and building tax, value added tax, individual or corporate income tax, international trade tax (export tax, export duties and import duties) and dividends for any activities related to oil palm plantations.

Those taxes are the revenues of the central government and local administrations (especially the land and building tax). Through the state budget or regional budget mechanism, the government revenues are distributed to finance the activities of the ministries or agencies of the central government and activities of the local administrations through fiscal decentralization instruments such as the general allocation fund (DAU) and the special allocation fund (DAK).

In other words, the contribution of oil palm plantations to the local revenues has occurred so far through the fiscal mechanism of the state budget as well as through the provincial

budgets, regency budgets and municipality budgets. The more developed and enhanced the production of palm oil in the aforementioned areas is, the greater the contribution to local revenues either through central taxes or local taxes.

The above description shows that people enjoy the fruits of oil palm plantations through the state budget and/or regional budget mechanisms. In addition, the community also receives plantation corporations' CSR funds through various productive activities such as education scholarships, capital assistance, training and local cultural development.

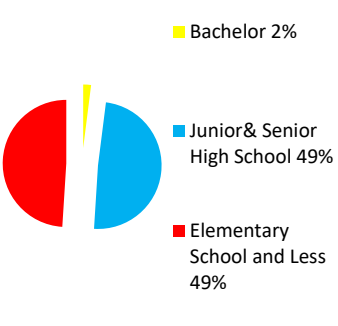
MYTH 4-05

The manpower required and employed at oil palm plantations does not fit with labor conditions in the regions' rural areas.

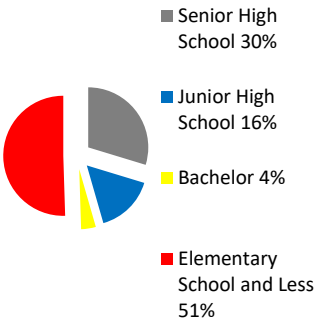
FACTS

In a bid to reduce unemployment in rural areas, it is necessary to develop economic sectors that would employ more labor, which is in line with the characteristics and backgrounds of rural labor. Oil palm plantations belong to an economic sector that is labor intensive. It is not only labor-intensive, but also accommodates the diverse skills of rural labors.

Generally, people in rural areas are mostly elementary school graduates or uneducated. About 49 percent of the productive age people in rural areas have primary school education and 49 percent are junior and senior high school graduates and only 2 percent have diplomas or Bachelor's degrees, as shown in Figure 4.6 (BPS, 2002).



A. Structure of Labor Education in Rural Areas



B. Educational Structure of Manpower at Oil Palm Plantations

Figure 4.6: Comparison between the education of manpower in rural areas and those employed on oil palm plantations in Indonesia

The average education composition of laborers employed on oil palm plantations according to PASPI (2014) is as follows: about 51 percent have elementary school education, 16 percent have junior high school education, 30 percent have high school education and the remaining 4 percent have diplomas and Bachelor's degrees. This is very similar to the composition of laborers available in the countryside.

In other words, the oil palm plantations are generally more accommodative to the background of laborers available in rural areas where the plantations are located. The view that the laborers employed by oil palm plantations do not match the quality of laborers in rural areas is not supported with facts.

MYTH 4-06

The development of oil palm plantations violates human rights and is related to human rights violation in the area.

FACTS

Public awareness of human rights has continued to increase and strengthen, especially since the reform era of 2000. Free flow of information and the growing mass media and information technology have opened up every corner of Indonesia so nothing can be covered up. If there are human rights violations, people can easily report them to a competent institution.

Corporations, as part of a law-abiding society, have also long adopted good corporate governance, including aspects related to human rights.

Data from the National Commission on Human Rights (2017) shows the five provinces that submitted most human rights reports to the National Commission on Human Rights (Komnas HAM) (Table 4.2) are Jakarta, North Sumatra, East Java, West Java and West Sumatra.

Table 4.2: Top five provinces originating human rights complaints to Komnas HAM, 2011-2016

Province	2011	2012	2013	2016
Jakarta*	1,234	1,569	608	1,759
North Sumatra	629	634	357	663
East Java *	609	576	311	588
West Java *	558	522	335	634
West Sumatra	474	361	149	391
Indonesia	6,358	6,284	5,919	6,946

Source: Komnas HAM, 2017 *not oil palm centers

What people reported to Komnas HAM included violations of the right to life, the right to form a family and to nurture children, the right to self-development, the right to justice, the right for personal freedom, the right to security, the right to welfare, the right to participate in government, the rights of women, the rights of the child and the right not to be discriminated against. Of

course, the human rights complaints are not necessarily legally proven as human rights violations.

The data above shows the correlation between the oil palm areas and human rights cases is very weak. Human rights complaints received by Komnas HAM come from both non-palm oil and palm oil areas. The areas with many complaints of human rights violations are largely not oil palm areas. Surely, if there are proven human rights violations, both in the oil palm plantation centers and outside them, they would be dealt with through existing procedures and regulations.

MYTH 4-07

Oil palm plantations create agrarian conflicts.

FACTS

The reform era that has taken place in Indonesia since 2000 has provided enough space for people in every region to convey their aspirations and fight for their rights in accordance to the prevailing laws and regulations in Indonesia. It is therefore normal for people to express their aspirations, including in terms of the agrarian rights that are believed to be part of their life.

In reality, agrarian conflicts occur in almost every region in Indonesia, not exclusively in the oil palm plantation areas. Of course, as a law-based country, the settlement of agrarian conflicts is and will be resolved through the prevailing laws and regulations.

Based on a 2015 report of the Agrarian Affairs and Spatial Planning Ministry and the National Land Agency, there were approximately 4,223 cases of agrarian conflicts occurring in almost every province (Table 4.3). Those conflicts are being settled in accordance with the applicable laws and regulations.

If we take a look at the distribution of those agrarian conflicts, we see almost all provinces have agrarian conflicts. The 10 largest provinces with agrarian conflicts are South Sulawesi, Bali, West Java, West, Sumatra, Central Java, East Java Lampung, NTB, Southeast Sulawesi and Maluku.

Table 4.3: Number of agrarian conflicts in Indonesia

Province	Number of agrarian conflicts	Province	Number of agrarian conflicts
South Sulawesi*	477	Banten*	86
Bali*	396	Riau	79
West Java *	364	West Sulawesi	63
West Sumatra	353	South Sumatra	49
Central Java *	329	North Maluku	45
East Java *	287	Bengkulu	42
Lampung*	180	West Papua*	40
NTB*	173	Central Sulawesi	37
Southeast Sulawesi*	161	Gorontalo*	32
Maluku*	157	West Kalimantan	26
NTT*	147	Jambi	24
North Sulawesi *	117	East Kalimantan	22
North Sumatra	110	South Kalimantan	17
Jakarta*	103	Riau Islands*	14
Yogyakarta*	100	Papua*	13
Aceh	91	Bangka Belitung*	2
Central Kalimantan	87	Total/Indonesia	4, 223

Source: Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, 2015 *non oil palm plantation centers

Bali, West Java, East Java, South Sulawesi and NTB are not centers of oil palm plantations. West Sumatra, Lampung and Southeast Sulawesi provinces do have palm oil plantations, although they are very small. Major palm oil areas such as North Sumatra, South Sumatra, Riau, Central Kalimantan, East Kalimantan see some agrarian conflicts, but fewer than provinces without oil palm plantations.

Based on these data, correlations between oil palm plantations and the number of agrarian conflicts are very weak they are not even systematically associated. Agrarian conflicts are happening in almost all provinces, both in oil-palm plantation centers and non oil-palm centers. The largest number of agrarian conflicts actually occur in provinces that do not have oil palm plantations.

MYTH 4-08

The transportation of fresh fruit bunch (FFB) and crude palm oil (CPO) causes severe damage to roads in oil palm plantations.

FACTS

Roads are public facilities, the provision of which can only be carried out by the government in accordance to the prevailing laws and regulations. Roads are needed both by residents and for the movement of all goods and services between regions. Therefore, the provision of road infrastructure, in quantity, quality and coverage, is needed in accordance to development.

Based on data from the Public Works and Public Housing Ministry in 2015, the number of damaged roads, with either severe or light damage, reaches 6 percent of the total length of the national roads. If we look at the distribution of damaged roads in each province (Table 4.4), the highest percentage of damaged roads is in North Sumatra, Papua, West Papua, Central Sulawesi and Central Kalimantan. Meanwhile, the lowest percentage

occurred in the provinces of North Maluku, Bangka Belitung, NTB and West Sulawesi.

Table 4.4: Percentage of damaged roads in each province

Province	Percentage of damaged roads	Province	Percentage of damaged roads
North Sumatra	18.98	West Sumatra	1.79
Papua*	10.29	Central Java*	1.74
West Papua*	6.52	Maluku*	1.73
Central Sulawesi*	6.30	Banten*	1.71
Central Kalimantan	6.15	Gorontalo*	1.37
East Kalimantan	5.58	East Nusa Tenggara*	1.30
Southeast Sulawesi*	5.28	West Java*	1.08
West Kalimantan	4.78	East Java*	0.97
Aceh*	4.15	South Kalimantan	0.81
South Sulawesi*	4.00	Jambi	0.67
North Sulawesi*	3.80	West Sulawesi *	0.18
Riau	3.42	West Nusa Tenggara*	0.09
Lampung*	2.89	Yogyakarta*	0.06
South Sumatera	2.38	Bangka Belitung*	0.05
Bengkulu*	1.82	North Maluku*	0.04
Jakarta*	0.03	National	6.05

Source: Public Works and Public Housing Ministry, 2015 *non oil palm centers

Based on the distribution of road damage, it can be seen that road damage is not related to the presence or absence of oil palm plantations. Provinces that do not have oil palm plantations such as Papua, West Papua, Central Sulawesi and Southeast Sulawesi also have a relatively large percentage of damaged roads. In contrast, the areas of oil palm plantations such as Jambi and South Kalimantan actually have a relatively small percentage of road damage.

MYTH 4-09

Oil palm plantations employ child workers.

FACTS

In recent years, the anti-palm oil NGO networks in Indonesia have often accused oil palm plantations of employing children (under 17 years old) and published photographs of children residing in oil palm plantations.

The allegations, along with the publication of the photos, are not only unreasonable but they also exploit children for the sake of justifying the purpose of the NGO itself. The allegations are really harassing children in Indonesia and, of course, also their parents.

The presence of children at a particular place does not necessarily mean the involvement of children in the activities in that place. If we see children at a shopping mall and we immediately allege the children to have involved in selling, of course, it is probably a mistake because most likely the children are with their parents shopping at the mall. Similarly, in oil palm plantations, the presence of children in oil palm plantations does not mean that the children are workers in oil palm plantations.

In rural areas, the bond between family members, including children, is strong. Those from a village can easily understand this. The participation of children in the rice fields or land together with their parents is part of the socialization of the children and a mechanism of parental protection. Even though the children hold the hoe, it is just a mechanism of a family's education to help the juveniles understand family responsibilities.

Similar things also happen to traders in small towns. Sometimes they bring their children to the market because they cannot be left alone at home, but again that does not mean children are hired as traders.

At oil palm plantations, especially plantation companies, employing children is a law violation and is also very unlikely. The type of work at the oil palm plantation is beyond the ability of the children. Fresh fruit bunch harvesters, for example, require special training and it is also almost impossible for children to move heavy fruit bunches. In addition, the company's corporate governance makes it impossible to use child labor because one of the requirements for the workforce in the company is for a worker to be an adult who has a resident identity card.

Then why are there photos of children at oil palm plantations? If the photos are not fake, it can be ascertained that those children joined their parents who happen to be employees on the oil palm plantation. Once again, it is part of parental protection, as well as for the education of the children on how their parents work. The parents take the children with them because nobody keeps them at home. If an NGO really finds a company deliberately employing children and proves this conclusively (e.g. the child is registered at the company and receives wages), the NGO should complain about it legally because it is unlawful. Based on the Child Protection Law, if the NGO knows and does not report it to law enforcement officers, it is a law violation.

Chapter 5
Myths Vs. Facts:
Oil Palm Plantations and Poverty Reduction

With regard to poverty reduction in rural areas, oil palm plantations have become a public concern. Various myths about the role of oil palm plantations in poverty reduction will be described below and discussed using actual facts.

MYTH 5-01

Oil palm plantations in Indonesia are owned only by large corporations

FACTS

The area of oil palm plantations in Indonesia has increased from about 300,000 hectares in 1980 to about 11.6 million hectares in 2016 (Agriculture Ministry, 2015). During this process, the private individual-run oil palm plantations have shown rapid, some would say revolutionary, growth.

The nucleus estate smallholder (PIR) program run by the government is the entry point for individual participation in the national oil palm plantation development (Badrun, 2010, Sipayung, 2012). The PIRs consist of assisted PIRs, local PIRs and special PIRs set up by the government from 1977-1986; then followed by transmigration PIRs within the period 1985-1995; credit cooperatives(PIR/KKPA) 1995-2005 and plantation revitalization PIRs since 2005. The PIR policy and program series,

is not only effective for smallholder plantations participating in PIRs, but it also stimulates and encourages other farmers (excluding participants) to run oil palm plantations independently (independent palm farmers).

The successful implementation of the PIR, has transformed the composition of national palm oil plantations (Figure 5.1).

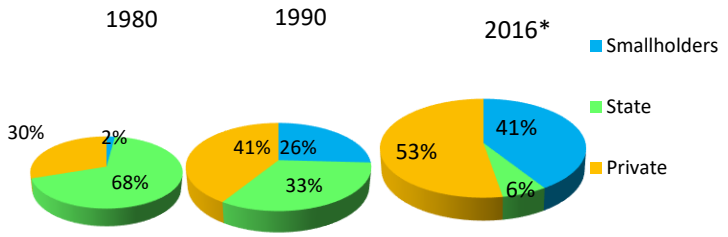


Figure 5.1: The changes in share of private individual-run oil palm plantations in the national oil palm plantation development (Agriculture Ministry, 2015) *estimate

In 1980, the share of private individual-run oil palm plantations was only 2 percent. But by 2016 this share had reached about 41 percent. Projected toward 2020, the share of people's oil palm plantations will reach 50 percent, beyond the share of corporate oil palm plantations, which is expected to be 45 percent.

So, oil palm plantations in Indonesia do not only belong to large corporations (private or state-owned). In contrast, the share of private individual-run oil palm plantations shows a revolutionary increase and will account for the largest share in the future.

MYTH 5-02

Oil palm plantations neglect small and medium enterprises (SMEs) in the regions.

FACTS

Oil palm plantations located in 190 regencies are an economic sector based on local resources. One of the important actors in oil palm plantations is the family-run oil palm business (part of SMEs). The progress of the family-run oil palm business increased rapidly from only 142,000 in 1990 to 2.2 million units in 2016 (Figure 5.2). The development of these oil palm SMEs is revolutionary and has been carried out without burdening the government budget.

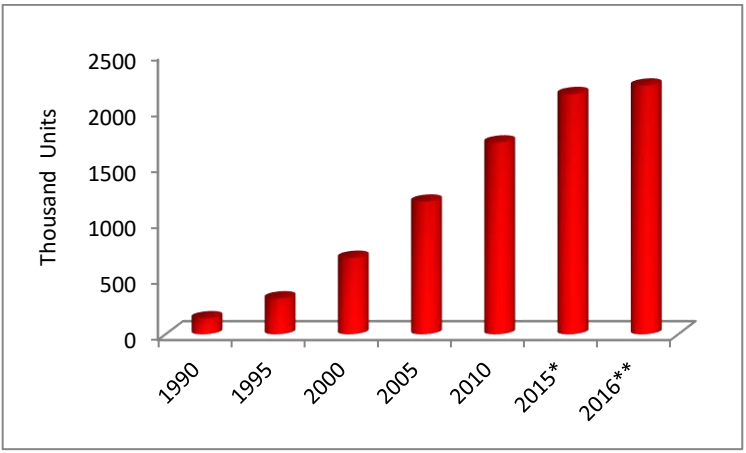


Figure 5.2: The growth of oil palm farmer units in Indonesia, (Agriculture Ministry, 2015)**temporary figure, **estimate*

Aside from oil palm farmers, many activities in the supply of goods and services related to oil palm plantations and their employees involve SMEs. Activities such as the procurement of fertilizers, pesticides, plantation tools and machinery, transportation of fresh fruit bunches (FFB) and CPO, the need for foodstuffs, especially food for employees and the need for

stationery and other supplies involve local SMEs. The more developed and mature oil palm plantations the more SMEs are involved in oil palm plantations.

Based on a PASPI study (2014), the average number of SMEs that supply goods and services for oil palm plantations has grown from 565 to 707 SMEs per 100,000 hectares of productive trees (TM), both results of the increase in the area size of TM and the age of TM (Figure 5.3).

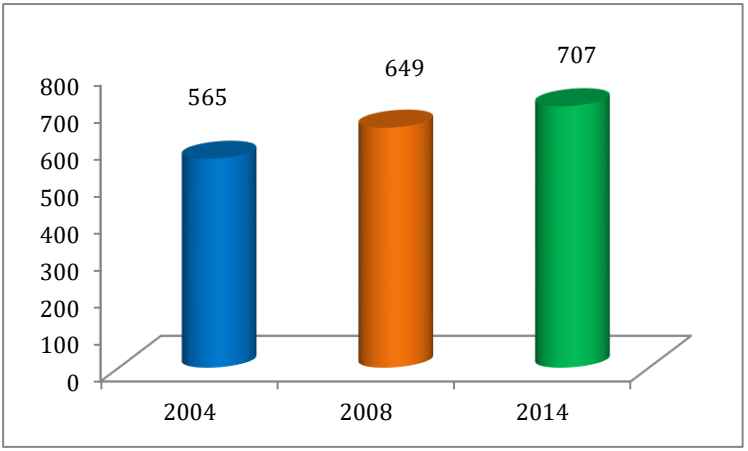


Figure 5.3: Progress of SMEs supplying goods and services to oil palm plantation (business unit/100,000 hectare of TM) (PASPI, 2014)

Progress of SMEs supplying goods and services to oil palm plantation (business unit/100,000 hectare of TM) (PASPI, 2014)

The participation of SMEs in the palm oil industry, either as oil palm plantation actors or as oil palm plantation suppliers, has created new SME communities in rural areas. These new SME communities are more qualified because they have developed on their own initiative, are self-financing and are based on local resources.

In other words, oil palm plantations encourage the development of local SMEs in all 190 regencies. In fact, oil palm plantations can only grow rapidly with the support of local SMEs.

MYTH 5-03

Oil palm plantation companies do not engage in partnerships.

FACTS

Regarding oil palm plantation development programs with local economies, there are several forms of partnership: (1) Nucleus-plasma partnerships, (2) Partnerships of independent palm farmers, (3) Partnerships with SME goods suppliers and (4) Partnerships with SME services suppliers. The four forms of partnership occur in oil palm plantation companies in line with the development phase of the company concerned. The distribution of the value of partnership transactions for the four types of partnership is presented in Figure 5.4.

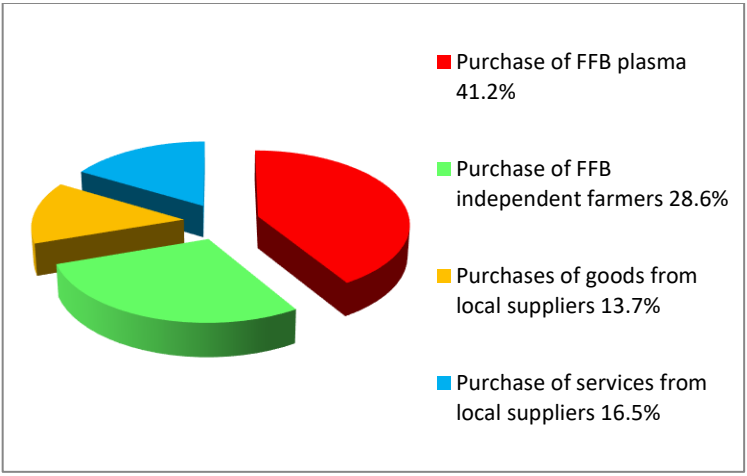


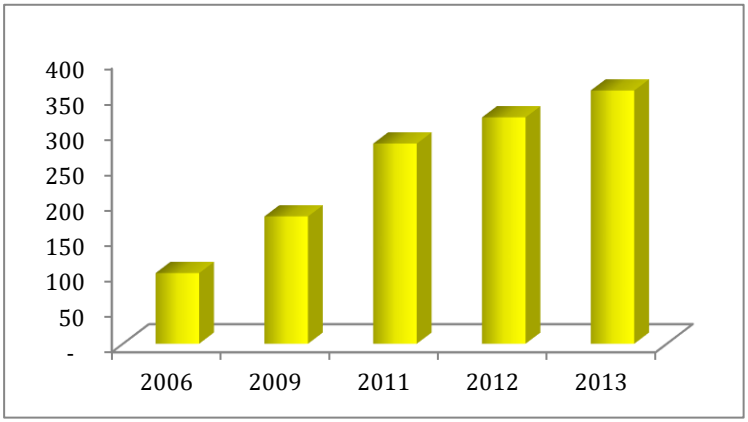
Figure 5.4: Value of partnership transactions with oil palm plantations (PASPI, 2014)

The nucleus-plasma partnership is an obligation as stipulated in the Plantation Law and its implementation stipulates

that corporate partnerships with private individual-run palm plantations should be a minimum of 20 percent. In general, the fact those private individual-run palm oil plantations reached 42 percent in 2014 shows that partnerships between corporate and private individual-run palm plantations have increased well above the minimum requirement of 20 percent.

The largest value of partnership transactions is in nucleus-plasma relations, namely the purchase of plasmas' FFB amounting to 41 percent of the total transaction value of the partnerships. This is followed by the transaction value of independent palm farmers, suppliers of goods and suppliers of services. The value of partnership transactions is generally increasing (Figure 5.5).

Figure 5.5: Index of average transaction value between plantation companies and local partners (PASPI, 2014)



Compared to the transaction value of 2006 (2006 = 100), the real partnership transactions has increased from year to year. In 2013, the value index of partnerships stood at 357, which means the value of partnership transactions in 2013 increased more than 3.5 times the value of 2006.

The data above show that oil palm plantations generally run partnerships, and these increase from year to year. The existing

partnerships are still fewer than demanded by many local communities and not all palm oil plantations have developed partnerships as expected. The number of partnerships with private individuals needs to be improved and expanded so that growth and an even distribution of development go hand in hand.

MYTH 5-04

Plantation companies do not channel corporate social responsibility (CSR) funds to surrounding communities.

FACTS

Plantation companies, in particular those that have been productive (FFB production), gradually also channel corporate CSR funds in various forms. In general, the channeling of CSR from oil palm plantation companies to the surrounding community is conducted in two forms: local SME development and the channeling of social, cultural and environmental assistance.

For the development of SMEs as carried out by the state-owned oil palm plantations, most assistance (Figure 5.6) is channeled to SMEs working in the trade sector (40 percent), followed by the service and agriculture sectors.

Regarding the channeling of CSR to the surrounding community (Figure 5.7), this is channeled for education and training (32 percent), public infrastructure (21 percent) and the rest for the construction of religious facilities, health services, nature conservation and disaster relief assistance.

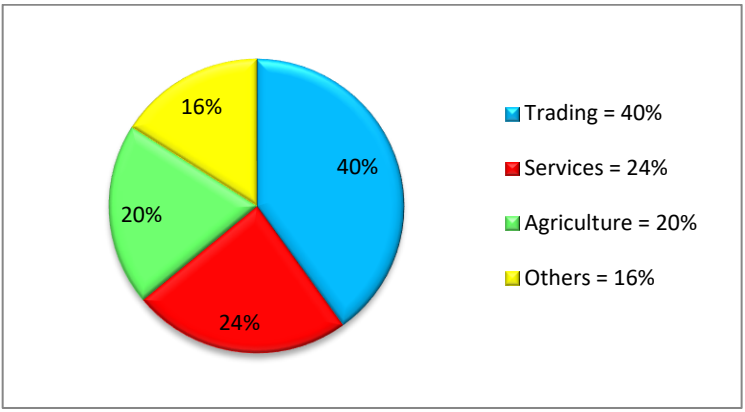


Figure 5.6: Distribution of SME development through CSR of oil palm plantation companies in Indonesia (PASPI, 2014)

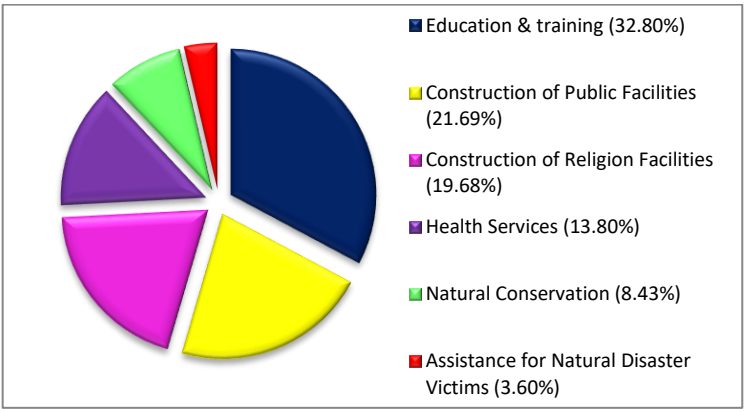


Figure 5.7: Distribution of CSR of oil palm plantation companies in Indonesia (PASPI, 2014)

In other words, some oil palm plantation companies have channeled CSR, although not all of them have done so. The size and scope of CSR by plantation companies, of course, varies depending on the scale of business and the stage of its development. Plantations that are still in the investment phase (immature crops) are still limited in channeling CSR.

MYTH 5-05

Oil palm plantations have no role in reducing unemployment in rural areas.

FACTS

The development of oil palm plantations, either by private companies, state-owned enterprises (SOEs) and SMEs (farmers, suppliers), creates new employment opportunities in rural areas. Based on data from the Agriculture Ministry (2015), the number of employees working in oil palm plantation companies increased from 717,916 people (2000) to 3.4 million people (2016).

Thus (Table 5.1), the number of workers absorbed directly was about 2 million people in 2000 and increased to about 7.8 million people in 2016.

Table 5.1: Growth in the number of workers at oil palm plantations

Description	2000	2010	2014	2015	2016
Oil palm farmers	1,360,000	3,420,000	4,104,100	4,281,548	4,432,362
Employees	717,916	1,199,552	3,202,200	3,352,422	3,454,532
Oil palm plantation workers	2,077,916	4,619,552	7,306,300	7,633,970	7,886,894

Source: Agriculture Ministry (2015), various data

It is estimated that the rural labor force absorbed in oil palm plantations will continue to increase with the intensification and growing size of oil palm areas. Employment opportunities are also created outside of oil palm plantations from indirect effects and induced consumption effects from the growth of oil palm plantations.

The sectors in rural areas (Table 5.2) whose employment growth is the result of increased palm oil production are agricultural services, trade, restaurants, hotels and others.

Table 5.2: Rural economic sectors whose labor absorption has increased because of CPO growth

Rank	Economic Sector
1	Agriculture Service
2	Trade, Restaurant, Hotel
3	Husbandry, Animal Health and Fishery
4	Food Farming
5	Transportation
6	Financial Service
7	Chemical Industry
8	Other sector

Source: Table I-O Indonesia

Based on the above data, it is clear that oil palm plantations have a very big role either directly or indirectly in lowering unemployment rates in rural area.

MYTH 5-06

The income of non-oil palm farmers is higher than that of oil palm farmers.

FACTS

If we compare the incomes of oil palm farming households and those of non-oil palm farmers (PASPI, 2014), generally the income of oil palm farmers is higher than that of non-oil palm farmers (Figure 5.8). On average, the income of oil palm farmers is not only higher than that of non-oil palm farmers but it also has increased more rapidly. The income of oil palm farmers increased from Rp 14 million/hectare/year (2009) to Rp 31 million/hectare/year (2013). Meanwhile, the income of non-oil palm farmers (rice farmers and rubber farmers) increased from

Rp 4.6 million/hectare/year to Rp 7.2 million/hectare/year in the same period.

Other studies also prove the same thing. Higher incomes of palm oil farmers than non-oil palm farmers were also found in Stern Review (World Growth, 2011) i.e. oil palm farmers ($960-3340/ha), rubber farmers ($720/ha), rice farmers ($280/ha), cassava growers ($190/ha) and timber farmers ($1099/ha).

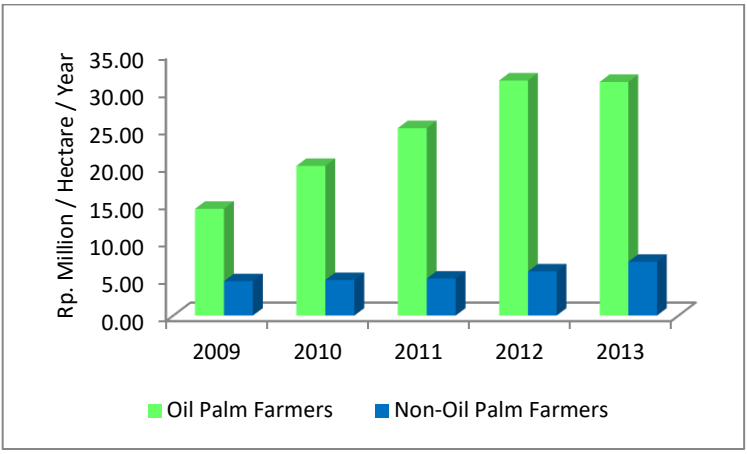


Figure 5.8: Comparison of the income of oil palm farmers and non-oil palm farmers (PASPI, 2014)

Thus, the development of palm oil plantations not only increases the income of oil palm farmers, but also provides middle-class incomes in rural areas.

MYTH 5-07

Oil palm plantations do not contribute to poverty reduction in rural areas.

FACTS

The number of poor people in Indonesia has declined rapidly at least in the last 10 years. In 2005 the number of poor people was still around 36.8 million people or 16.7 percent of the total

population. Of that number, about 23.5 million people or 64 percent were in rural areas, 13.3 million people were in urban areas. Through rural development, the number of poor people in 2016 had fallen to about 27.7 million people, 17.2 million people in rural areas and 10.5 million people in urban areas.

The decline in the poverty figures was mostly in rural areas. The number of poor people in rural areas in the period 2005-2016 declined by about 6 million people. Meanwhile, urban poverty in the same period fell by about 2.8 million people. This means rural development is more successful in reducing poverty than urban development.

According to the World Bank, the rapid growth of oil palm plantations in Indonesia has contributed to poverty reduction. Researchers at home also found the same thing. PASPI (2014), for example, found the increasing palm oil production at oil palm plantation centers was closely related to poverty reduction. Increased production of palm oil significantly reduces rural poverty.

The correlation between oil palm plantations and rural poverty reduction is easy to understand given all oil palm plantations in 190 regencies are located in rural areas. Oil palm plantations even serve as pioneers in remote areas whose economic activity has not yet developed. These areas, underdeveloped and isolated and not reached by government programs, have seen oil palm plantations flourish. For disadvantaged and remote areas that have not enjoyed road infrastructure, the current model of oil palm plantation development that combines infrastructure, education and healthcare with oil palm plantations appears to be effective in boosting the economy and assisting rural people out of poverty.

Rural poverty reduction with the help of oil palm plantations is made possible through a combination of direct and indirect impacts. Directly, the development of oil palm plantations creates employment opportunities that are appropriate to the working

capacity of the poor. In addition, the development of oil palm plantations also involves local residents both in the nucleus-plasma and self-help patterns, so that many local residents own oil palm plantations. This is confirmed by the composition of national palm oil plantations, where 41 percent are independently owned palm plantations.

Indirectly the income generated at oil palm plantations (both for employees and owners) creates demand for food and non-food items. It attracts business activities that produce and provide food and non-food requirements in rural areas. Thus the rural people, including the poor who are not directly involved in oil palm plantations, also enjoy a slice of the "economic cake" created in these rural areas.

The people working at oil palm plantations are the consumers or markets for food produced by fishing communities, crop growers and livestock farmers in rural areas. Based on population expenditure data (BPS, 2016), it is estimated that the transaction value between the people in oil palm plantations and fishermen amounts to Rp 13.7 trillion/year, crop farmers Rp 54.6 trillion/year and livestock farmers Rp 24.1 trillion/year (Figure 5.9).

In other words, there is a mutual symbiosis among the people in oil palm plantations and rural fishermen/crop farmers/livestock breeders. The symbiotic mechanism may be part of the sustainability of crop farming/animal husbandry/fisheries in rural areas, including reducing poverty.

Figure 5.9: Transaction values of palm plantations with fisheries, animal husbandry and crop farming (BPS 2016, various data)

Such a combination of mechanisms contributes to reducing rural poverty. The effort to reduce poverty through the development of oil palm plantations is also more efficient because it does not burden the state budget as in poverty-alleviation programs, such as direct cash assistance. Besides, it is also more sustainable because it is based on productive, long-term economic mechanisms and does not create dependence on the government.

Various studies show that the development of oil palm plantations in Indonesia has succeeded in reducing poverty in rural areas. A PASPI study (2014) shows that palm oil production has a reductive impact on poverty. Increased CPO production significantly reduces rural poverty (Figure 5.10).

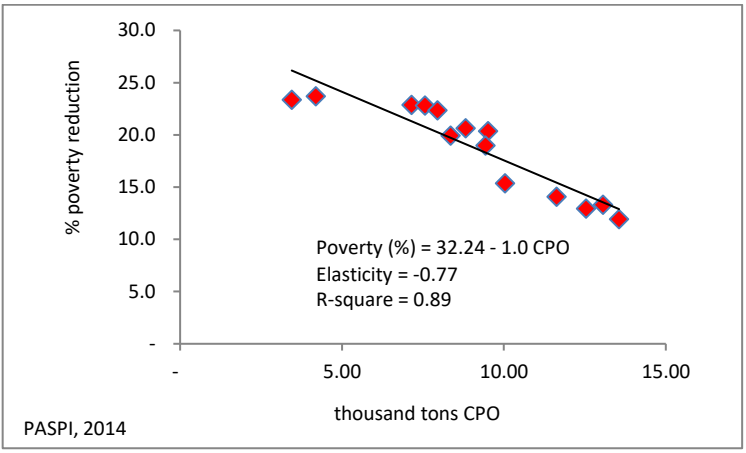


Figure 5.10: Impact of CPO production on rural poverty

Various studies have also found that oil palm plantations are an important part of poverty reduction in Indonesia. Susila and Munadi (2008) and Joni et al (2012) show that increasing national palm oil production reduces poverty. Goenadi (2008) argues that more than 6 million people involved in Indonesian oil palm plantations have been lifted out of poverty.

World Growth (2011) argues that oil palm plantations in Indonesia play an important and significant part in reducing poverty. Furthermore, in addition to increasing revenue, palm oil production also helps reduce income inequality (Syahza, 2007).

MYTH 5-08

The income of oil palm farmers is only slightly above the rural poverty line and is not sustainable.

FACTS

Oil palm farmers enjoy per capita incomes substantially above the rural poverty line (Table 5.3). In 2016, for example, the poverty line stood at Rp 4 million per capita/year. The income of

oil palm farmers (per 2 hectares with an average family of four) reached Rp 10.5 million per capita/year or Rp 42 million per family/2 hectares/year. The income of oil palm farmers is not only far above the poverty line in villages and towns, but it has also grown faster. The income of both plasma farmers and self-help farmers approximately doubled in the period 2009-2016.

Table 5.3: Comparison of the incomes of oil palm farmers and poverty line (million rupiah/capita/year)

Year	Poverty Line[1]		Average Income of Oil Palm Farmers[2]
	Urban	Rural	
2009	2.66	2.15	3.58
2010	2.79	2.2	5.01
2011	3.16	2.68	6.27
2012	3.32	2.88	7.86
2013	3.46	3.04	7.81
2016	4.37	4.12	10.58

Source: [1]BPS, [2]PASPI 2014

In addition, the income of the oil palm farmers is sustainable. The income of oil palm farmers is not from seasonal agricultural activities such as food crop farmers whose income can fluctuate every season. The income of oil palm farmers is relatively stable and even tends to increase along with the growing age of the oil palm plantation. Also, the plantation is guaranteed for up to 25 years. With such sources and income patterns, the oil palm farmers can guarantee the welfare of their family members, especially the education of their children.

Chapter 6
Myths Vs. Facts in Global Environmental Issues

Global warming has become a common problem and has gained the attention of the international community. Global warming and its impacts such as the global shift in the climate map, climate anomalies, floods, droughts, storms, the rise of sea levels and so on, have caused great losses and even threatened the sustainability of life on earth.

The global warming issue has clearly become a very serious problem and needs a fundamental and holistic solution. Since the problem constitutes deterioration in the earth's ecosystem quality, its solution has to be global. Each individual, each country needs to position itself as a part of the solution, to become a problem solver. For that, they need the same, equal and objective understanding about the causes of the global warming problem so that its solution can be found objectively as well.

On the other hand, a tradition of behaving and thinking in terms of a search for a scapegoat, building myths or shifting the problem to another party/nation, without any empirical facts that can be accounted for, is not part of the solution but part of the problem, being a problem maker, and creates new problems. Shifting the blame by building global public opinion on the principle that "lies which are repeated if they are reported intensively and widely then one day will be accepted as truth", will not help solve the global environmental problem.

MYTH 6-01

Global warming is caused by oil palm plantations.

FACTS

Global warming is not caused by the expansion of oil palm plantations but is due to increases in the intensity of GHG emissions affecting the earth's atmosphere. Naturally the earth's atmosphere is filled with GHGs especially water vapor (H2O), carbon dioxide (CO2), methane (CH4) and nitrogen (N2) in certain natural concentrations. Their function forms the mechanism of the natural greenhouse effect to protect and maintain the temperature of the earth's atmosphere to be compatible with life. Through the mechanism of the natural GHG effect, a part of the sun's energy is trapped in the earth's atmosphere with the other part being reflected into outer space (Figure 6.1). Without the natural greenhouse effect, all solar energy would be reflected into outer space so that the temperature of the earth's atmosphere would be very low and not compatible with life.

The intensity of the natural greenhouse effect increases when the GHG concentration in the earth's atmosphere increases above its natural concentration. This is caused by rising CHG emissions from human activities on the earth and the emergence of man-made gases such as chlorofluorocarbons (CFCs) and halogen creating a human-enhanced greenhouse effect.

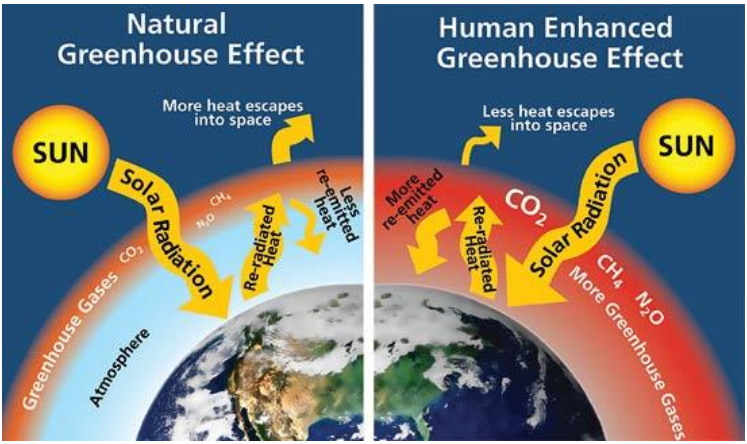


Figure 6.1: Mechanism of greenhouse gas effect (modified from http://i.livescience.com)

With the rising intensity of the greenhouse effect, the amount of radiation/solar energy that is trapped in the earth's atmosphere also rises (Soemarwoto, 1992) from its natural condition, thereby making the earth's temperature hotter. The increase in the temperature of the earth's atmosphere, which we know as global warming is caused by the rising intensity of the greenhouse effect on the earth's atmosphere.

According to the Intergovernmental Panel on Climate Change (IPCC, 1991) in the pre-industrial period up to the year 1990, CO2 in the earth's atmosphere increased from 280 to 353 partsper million volume (ppmv). Meanwhile CH4 increased from 0.8 to 1.72 ppmv; N2O rose from 288 to 310 parts per billion volume (ppbv). And the CFC concentration increased from zero to 280-484 parts per trillion volume (pptv). And according to data from the International Energy Agency (IEA), the CO2 concentration in the earth's atmosphere, which in 2005 reached 379 ppmv, increased to 396 ppmv in 2013 and to 399 ppmv in 2015 (IEA, 2016).

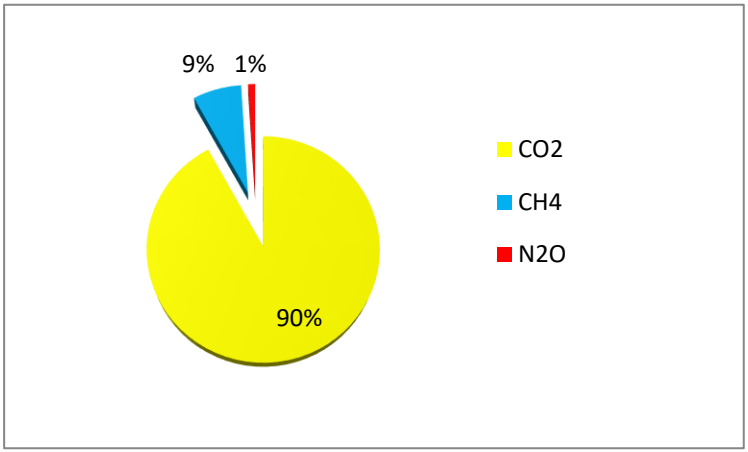


Figure 6.2: GHG emission source (IEA, 2016)

The increase in GHG concentrations in the earth's atmosphere has been related to the activities of the global community since the pre-industrial era up to the present. According to the IEA (2016), the global GHG emission source is based on the GHG gas types, the largest of which is (Figure 6.2) from CO2 emissions (90 percent), followed by CH4 (9 percent) and N2O (1 percent).

MYTH 6-02

Indonesia is the world's largest GHG emitter.

FACTS

Global GHG emissions until 2014 reached about 32.4 gigatons of CO2. Based on data from the IEA (2016) the largest GHG emitting countries (Figure 6.3) are China (28 percent), US (16 percent), India (6.2 percent) and Russia (5 percent).

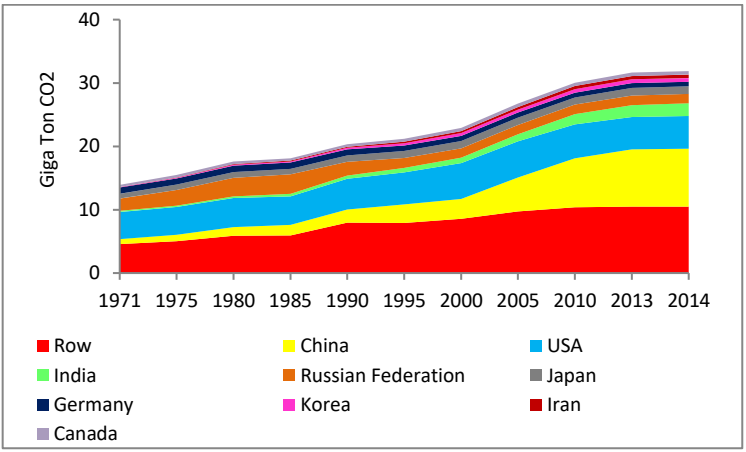


Figure 6.3: World's top 10 GHG emitters (IEA 2016)

GHG emissions from those 10 countries account for nearly half (58 percent) of global GHG emissions and are thus higher than the rest of the world (ROW). Indonesia, which contributes only 1.3 percent, is not even in the top 100 emitters. Therefore, the allegation that Indonesia is the largest global GHG emitter is incorrect and incompatible with existing data.

MYTH 6-03

Consumption of fossil fuels is not the biggest contributor of GHG emissions.

FACTS

Based on IEA data (2016), total global GHG emissions in 2014 reached 47.6 gigatons of CO2. About 68 percent (32.4 gigatons) of the source of global GHG was from the global energy sector, starting from production process until fossil fuel consumption (Figure 6.4).

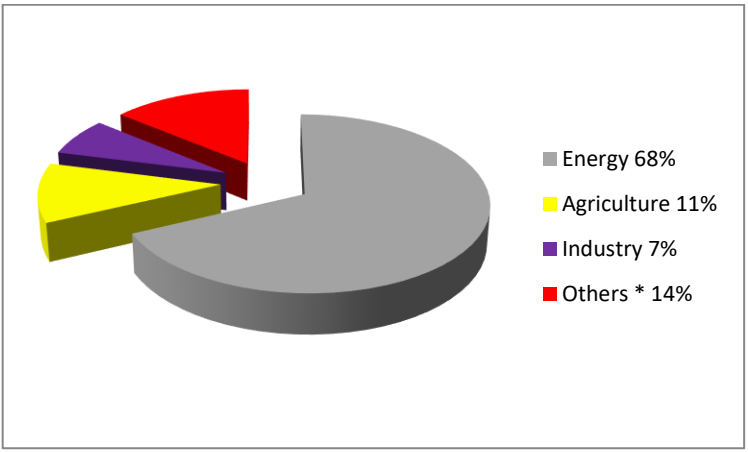


Figure 6.4: Global GHG contributors (IEA, 2016) * *covering fire emissions of biomass, peatland, other waste*

Meanwhile, global agriculture's contribution only amounted to 11 percent, and industry 7 percent. Other sectors accounted for 14 percent, which included the burning of forest/peatland, emissions from peatland and waste.

This data shows that the use of fossil fuels constitutes the biggest global GHG emission source. Therefore, in order to reduce emissions, the global community has to be willing to reduce fossil fuel consumption or replace them with low-emission energy sources.

MYTH 6-04

Indonesia is the world's largest fuel GHG emitter.

FACTS

Indonesia is not the biggest global GHG emitter in the energy sector. On the contrary, Indonesia is one of the lowest emitting countries in the global energy sector. According to IEA data (2016), out of the 32.38 billion tons of CO2GHG emissions from global energy use in 2014 (Table 6.1) about 28 percent was

produced by China, followed by the United States (16 percent) and the European Union (10 percent).

Indonesia's contribution to global energy emissions is relatively small, namely about 1.3 percent. Therefore, it is not true that Indonesia is the biggest contributor of GHG emissions in the world energy sector.

Table 6.1: Indonesia's position in global energy GHG-emitting countries

Countries	Emission Year 2014	
	Million Ton CO_2	%
China	9,134.9	28.21
US	5,176.2	15.99
EU	3,160.0	9.76
India	2,019.7	6.24
Russia	1,467.6	4.53
Japan	1,188.6	3.67
Korea	567.8	1.75
Canada	554,8	1,71
Iran	556,1	1,72
Saudi Arabia	506.6	1.56
Brazil	476.0	1.47
Indonesia	436.5	1.35
Rest of the World	7,136	22.04
World	32,381	100.00

Source: IEA, 2016

Since 68 percent of total global GHG emissions is from energy emission, in order to resolve the global warming and global climate change problems fossil fuel consumption in the largest emitting countries has to be reduced. Energy consumption and GHG emissions of the largest global sources such as China, the European Union, United States and India have to be reduced to save the earth.

MYTH 6-05

Indonesia's population is the world's largest GHG emitter.

FACTS

Based on IEA data (2016), (Figure 6.2) the Indonesian people are not the largest GHG-emission contributors as compared with people in other countries. The emissions of the Indonesian people are actually classified as among the lowest in the world.

The countries with the largest per capita emissions are Qatar, Kuwait, Luxemburg, Saudi Arabia and the United States whose per capita emission is over 16 ton of CO2. The per capita emission of the Indonesian people is classified as low, namely 1.7 tons of CO2, only about one 10th of the emissions of the people of the United States. The Indonesian per capita emission is even much lower than the average emission of the global population, below the average of European people and below the average of the people in OECD and Non-OECD countries.

Based on this data, in order to save the earth from further global warming and to prevent the global community from various forms of climate change impacts, the emissions of populations that are higher than Indonesia's, such as Qatar, Kuwait, Luxemburg, Saudi Arabia, the United States, European Union, China, Singapore and others, have to be lowered.

Reducing emissions means reducing luxuries/welfare. Will people from the highest emitting countries reduce their luxuries? If they are willing to they should do so and not search for a scapegoat or shift the global warming/global climate change blame to the people of other countries with lower emissions, like the Indonesian people.

Table 6.2. Indonesia and its comparison with other countries in CO2 emissions per capita

Countries	Ton CO_2/Per Capita	Countries	Ton CO_2/Per capita
Qatar	35.73	Saudi Arabia	16.40
Kuwait	22.94	United States	16.22
Luxemburg	16.57	Brunei Darussalam	16.06
Austria	7.11	Australia	15.81
Norway	6.87	Canada	15.61
China	6.66	Japan	9.35
United Kingdom	6.31	Germany	8.93
Iceland	6.25	Singapore	8.29
EU-28	6.22	Finland	8.28
Korea	11.26	Belgium	7.83
Denmark	6.12	Malaysia	7.37
Russia	10.20	Indonesia	1.72
Ireland	7.34	India	1.56
Italy	7.34	Asia	4.91
Iran	7.12	Non OECD	3.24
Netherland	8.80	OECD Total	9.36
Greece	6.03	OECD America	12.67
Spain	4.99	OECD Asia Oceania	10.41
Switzerland	4.61	OECD Europe	6.05
France	4.32	World	4.47

Source: IEA, 2016

MYTH 6-06

Deforestation is the largest source of GHG emissions in the world.

FACTS

Agriculture and global deforestation are not the world's largest GHG emission sources. The largest global GHG emission source based on sectors (Figure 6.5) is industry (29 percent), residential buildings (11 percent), commercial/public buildings (7 percent), transportation (15 percent), agriculture (7 percent), energy supply (13 percent), land use, land-use change, forest [LULUCF (15 percent)] and waste (3 percent).

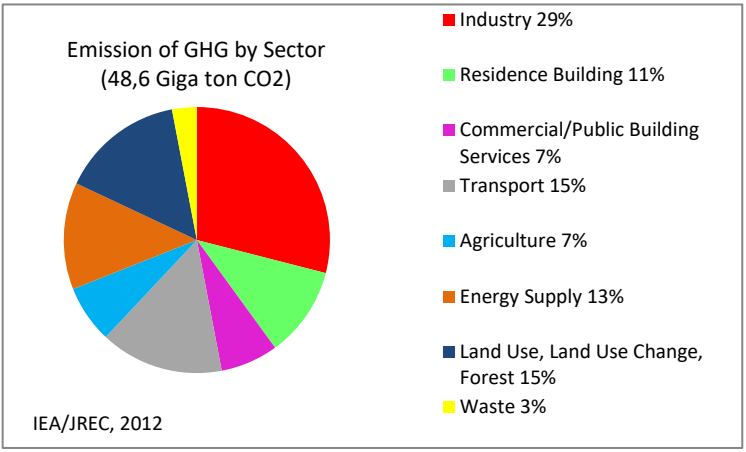


Figure 6.5: Global GHG emissions by sector

Therefore it is very clear that the largest GHG-emission contributor is from energy consumption (BBF) by industry, transportation, housing, offices and energy supply, which account for 75 percent of the global GHG emissions. The share of agriculture, land use, land use change and forest (LULUCF) is only about 22 percent. If the global community wants to resolve global warming, the most effective way is by reducing the BBF consumption globally and in a revolutionary way.

Lifestyles and luxuries that are reliant on consuming too much BBF need to be reduced revolutionarily. Reducing GHG emissions from agriculture, land use change, including deforestation, would not have a significant impact if it is not preceded by reductions in BBF consumption.

MYTH 6-07

Indonesia has the highest deforestation rate in the world.

FACTS

Deforestation is a normal process and part of the development practice in every country. All urban regions, residential and agricultural areas in every country originate from deforestation. Even though global deforestation is a normal process in each country, Indonesia is not the country with the largest deforestation in the world.

The results of Matthew's study (1983) showed that the start of development in temperate countries such as in Europe and North America resulted in the deforestation of 653 million hectares before the year 1980 (Table 6.3).

Table 6.3: Global deforestation

Description	Tropical forest (million ha)	Non-tropical forest (million ha)	World Forest (million ha)
1. Pre-agricultural forest	1,277	3,351	4,628
2. Forest in 1980	1,229	2,698	3,927
Deforestation (pre-agriculture to 1980)	48	653	701

Source: Matthew, 1983

The European mainland experienced deforestation before the 1500s, deforestation in the US took place in the 1620-1920 period (www.globalchange.umich.edu). Meanwhile, in the same period countries in the tropical regions carried out deforestation only on 48 million hectares because development and the size of their populations were relatively still low.

However, since the 1980s when tropical countries and others have begun carrying out development and face population growth, deforestation has increased.

In the 1990-2008 period (European Commission, 2013) global deforestation reached 239 million hectares. About 33 percent of this deforestation took place in the United States (Figure 6.6) and 31 percent in Africa, while, Southeast Asia, where Indonesia is located, accounted for 19 percent.

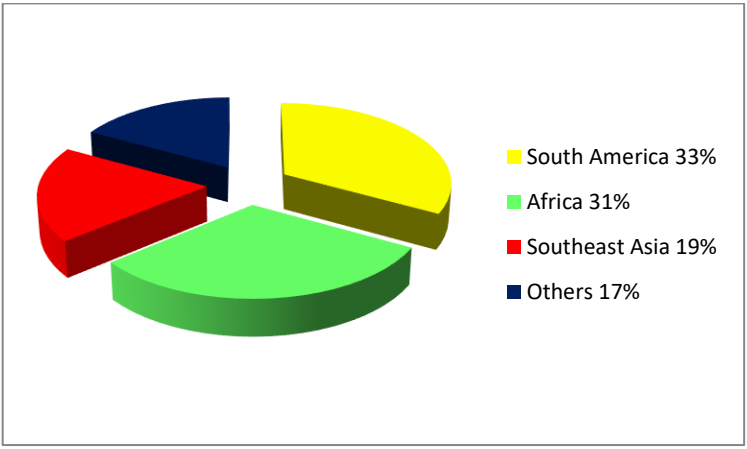


Figure 6.6: Global Deforestation 1990-2008 (*European Commission*, 2013)

With this global deforestation data, deforestation is seen as a part of normal development processes in each country. Despite it being a normal development process, deforestation in Indonesia is not the biggest source of global deforestation. Deforestation in North American and European regions (before 1980) and South American countries like Brazil and Argentina (1980-2008) was still much greater than the deforestation in Indonesia.

MYTH 6-08

Expansion of oil palm plantations biggest cause of global deforestation

FACTS

The scale of global deforestation in 1980 had already reached 701 million hectares (Matthew, 1983). Then in the 1990-2008 periods the total global deforestation was 239 million hectares (European Commission, 2013).

The cause of the 1990-2008 global deforestation (Table 6.4) was cattle ranch expansion (24.3 percent) especially in South America, fires (17.2 percent), soybean farm expansion (5.6 percent), the expansion of corn farms and sugarcane plantations (3.2 percent), while global oil palm expansion was only 2.3 percent.

Table 6.4: Cause of global deforestation 1990-2008

Driver	Deforestation Width	
	Million ha	Percent
Cattle ranches (South America)	58	24.3
Fires	41	17.2
Soybean farm expansion (South America)	13.4	5.6
Infrastructure development	9	3.8
Corn expansion (South America)	7.5	3.1
Oil palm expansion	5.5	2.3
Logging/ wood production	4.5	1.9
Rice field expansion	4.3	1.8
Sugarcane expansion	3.3	1.4
Other agricultural use	35.5	14.9
Others	58	24.3
Total	239	100.0

Source: European Commission, 2013

Based on this data, oil palm plantations are not the main cause of global deforestation. Development of grazing areas, sugarcane plantations, soybean, rapeseed and sunflower farms are the main cause of global deforestation (see also Myth 2-01).

MYTH 6-09

The development of oil palm plantations in Indonesia has reduced the amount of forests in the country to be less than its minimum ecological requirement, like in other countries.

FACTS

Based on international forestry data (FAO, 2013), the portion of Indonesian forest remains much better than that of other countries, or from the standpoint of the ecological requirement (Table 6.5).

Table 6.5: Share of forest and agricultural land compared to total land area in various countries

Region/Countries	Percentage of total forest		Percentage of land area	
	Protected forest	Primary forest	Agriculture	Total forest
World	3.8	35.7	37.6	31.1
Asia	2.3	18.6	53.0	19.1
Europe	4.7	26.2	21.4	45.5
West Europe	7.8	0.2	50.0	30.6
Africa	2.3	9.6	39.2	22.9
South America	6.3	59.4	30.7	40.5
North America	3.5	39.2	25.3	32.9
US	5.0	24.8	44.1	40.5
Indonesia	7.4	50.0	29.6	52.5

Source: FAO Statistical Yearbook: World Food and Agriculture

In general, the minimum ecological requirement of forest to total land area as adopted in Regulation No. 41/1999 on Forestry and Regulation No. 20/2007 on Spatial Planning is a proportion of 30 percent. The proportion of forest area in Indonesia in 2013 was about 52 percent of total land area. Of the Indonesian forest area, about 50 percent constituted primary virgin forest.

The Indonesian forest proportion is still better than the forest proportions in India, China and European countries. It is even better than the forests in the US, both in terms of forest proportion to the total land area and the quality of forest, namely the primary forest portion.

Based on this data, it is not true that the forest proportions in Indonesia are under the ecological threshold. On the contrary, forests in Indonesia remain better compared to forest conditions in big countries and advanced nations.

MYTH 6-10

Indonesia has the largest peat land areas in the world so they need to be maintained as global carbon reserves.

FACTS

Based on data of Wetland International (2008), global peat land areas total 381.4 million hectares, which are divided (Figure 6.7) among Europe and Russia (44.08 percent), the Americas (40.5 percent), Africa (3.41 percent), Indonesia (6.95 percent), others Asia (2.74 percent), Australia and Pacific (1.91 percent) and Antarctica (0.41 percent).

Meanwhile, Russia is the largest area of 137.5 million ha, Canada has 113.4 million ha, the US has 22.4 million ha and Indonesia has 18.5 million ha. Therefore, Indonesia is not the owner of the largest amount of peat land in the world, but the fourth largest.

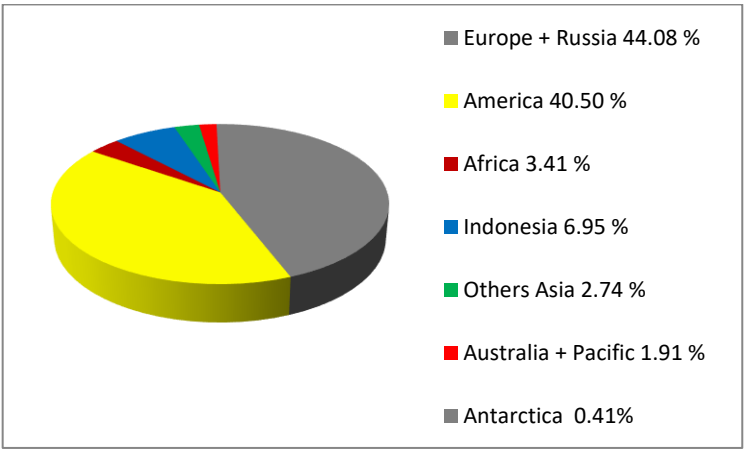


Figure 6.7: Distribution of global peat land 1990-2008 (Joosten, 2009: Wetland International)

Of course, peat land needs to be preserved through protection or cultivated with regard to sustainable principles.

MYTH 6-11

Indonesia is the largest country deforesting and converting its peat land into agricultural areas.

FACTS

From 1990 to 2008 3.83 million ha of global peat land was converted into agricultural land or for other uses (Joosten, 2009). Of that, (Figure 6.8) about 37 percent happened in Russian and 33 percent in European peatland areas. About 13 percent of Indonesia's peatland was also converted in that period.

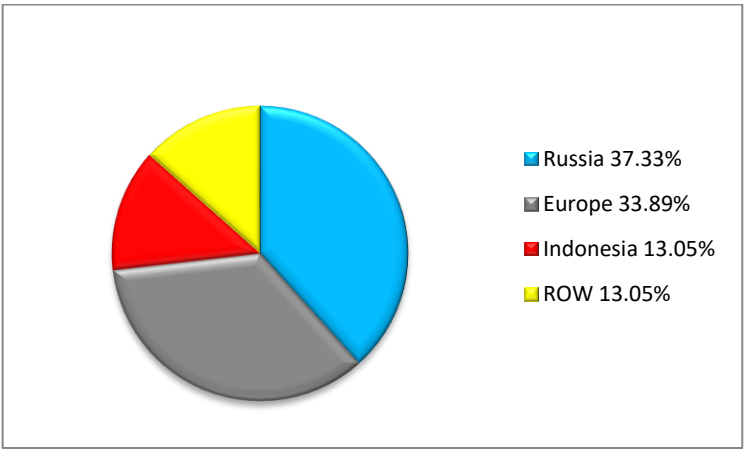


Figure 6.8. Global peat land conversion 1990-2008 (Joosten, 2009: Wetland International)

Therefore, the largest peat land deforestation from 1990 to 2008 was not in Indonesia, but in Russia and Europe.

MYTH 6-12

Most global peat land is in the form of peat land forest and only Indonesia uses peat land for agriculture.

FACTS

Based on the data of Wet International (2008), most global peat land (80 percent) is utilized for agricultural activities and only 20 percent is utilized for peat land forest (Figure 6.9). The use of peat land for agriculture in various regions is as follows: Africa (65 percent), the Americas (75 percent), Europe (67 percent) and Asia (89 percent).

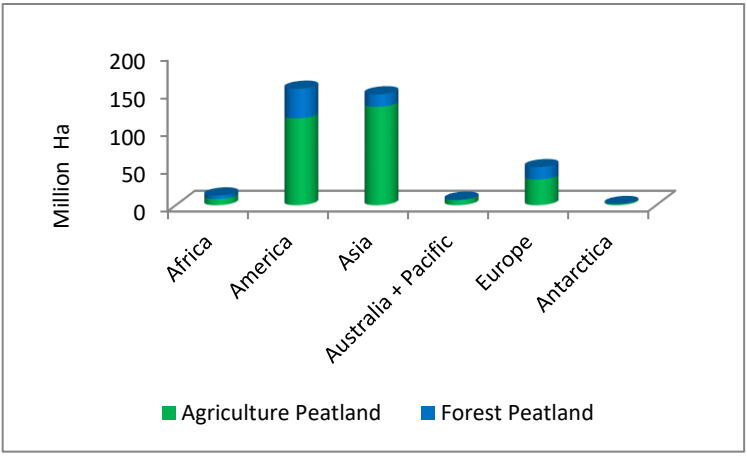


Figure 6.9: Global peat land use for agriculture and forest (Joosten, 2009: Wetland International)

Of the peat land used for agriculture (Figure 6.10), most of the 296.3 million ha is in the Asian region, followed by the American region. Russia, which has about 137 million hectares of

peatland, uses 130 million hectares, about 94 percent, for agriculture.

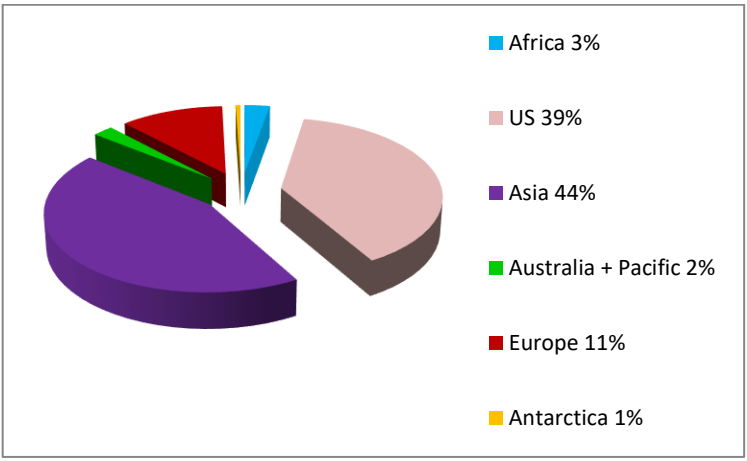


Figure 6.10: Global Agriculture peatland and Distribution (Joosten, 2009: Wetland International)

The US, which has about 22 million ha of peat land, uses approximately 12.4 million ha (55 percent) for agriculture. Meanwhile, Indonesia (Agricultural Research and Development Agency, 2008), which has about 18.3 million ha of peat land, uses about 6.05 million ha for agriculture.

Therefore, it is not true that most global peat land is used for peat land forest and it is also not true that Indonesia is the country to use the most peat land for agriculture.

MYTH 6-13

Indonesian agricultural sector is the biggest global agricultural GHG contributor.

FACTS

Data of global agricultural GHG emissions issued by FAO (2013) shows (Figure 6.11) that the main contributors of global agricultural GHG are the agriculture of China (14 percent), India (13 percent), Brazil (9 percent), the European Union (8 percent)

and the US (8 percent). The five countries contribute 52 percent of total agricultural GHG emissions.

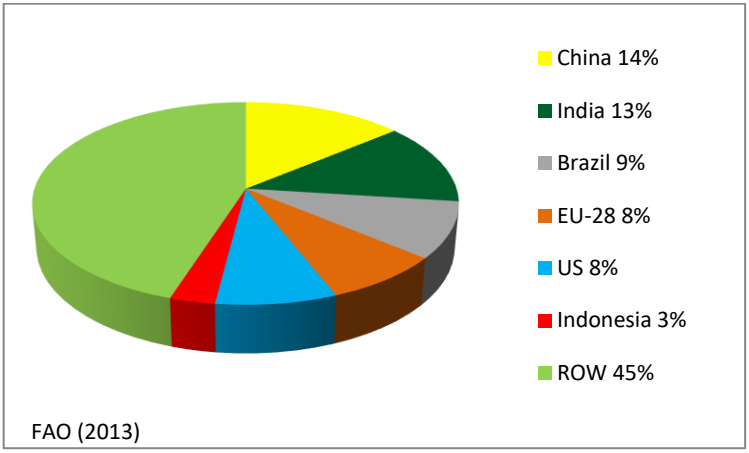


Figure 6.11: Indonesian agriculture's share of global agricultural greenhouse gas emissions

The GHG emissions contributed by the Indonesian agricultural sector is relatively small, only 3 percent. Therefore, an accusation that the Indonesian agricultural sector is the biggest global agricultural GHG contributor is not true and not supported by existing data.

MYTH 6-14

Utilization of peat land for agriculture constitutes the biggest GHG emission source from global agriculture.

FACTS

Data concerning global agricultural emissions issued by FAO (2013) shows (Figure 6.12) that the sources of global agricultural GHG emissions are enteric fermentation (43 percent), manure left on pasture (16 percent), the use of synthetic fertilizers (15 percent), rice cultivation (11 percent), manure management (7 percent), crop residues (3 percent), manure applied to soils (2

percent), cultivated organic soils (2 percent) and burning crop residues.

In other words, most (95 percent) of the emission sources of global agriculture is from activities of enteric fermentation, rice cultivation and use of factory fertilizer, while emissions from the peat land utilization is relatively small, namely only 2 percent.

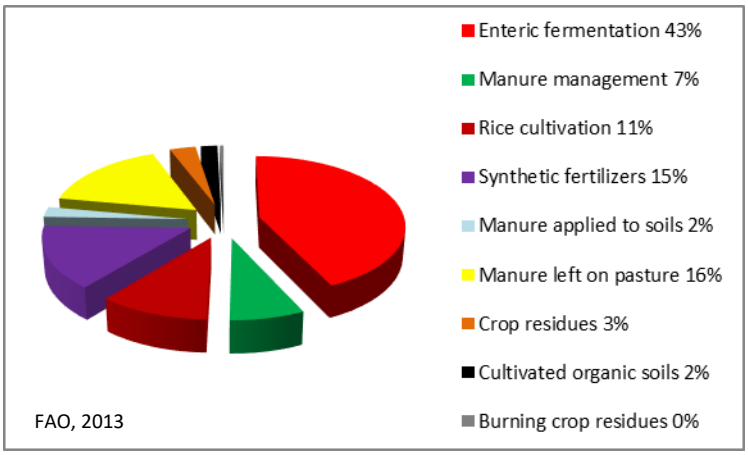


Figure 6.12: Sources of global agricultural greenhouse gas emissions

MYTH 6-15

Global climate change is caused by expansion of oil palm plantations.

FACTS

Global climate change is an effect of global warming (IPCC, 1991; Soemarwoto, 1992; IEA, 2014). The rising amount of solar energy trapped in the Earth's atmosphere leads to changes in global climate (Figure 6.13), like (1) rising evaporation, (2) warming/rising sea/ocean water temperature, (3) changes in the conditions of plants and animals and (4) melting snow and ice.

Combinations of the above-mentioned changes leads to various forms of global climate changes, such as the increasing rainfall, storms, droughts and fires, as well as climate anomalies.

Figure 6.13: Global warming impact mechanisms on global climate change (modified from http://www3.epa.gov)

Different forms of climate change occur and are felt in each country of the world. Therefore, global climate change is not caused by oil palm plantations in Indonesia.

MYTH 6-16

Forest and land fires in Indonesia are larger than in other countries.

FACTS

From 2010 to 2015, for example (Table 6.6), the average extent of forest and land fires in various countries remained high. In some countries they are even more extensive than in Indonesia. The area of forest and land fires in Russia reaches about 2.3 million ha each year; in the US it reaches 2.2 million hectares; about 236,000 ha burn in Australia, about 107,000 in Spain and about 84,000 hectares in Portugal. The area of forest and land fires in those countries is larger than in Indonesia, where it is about 64,000 hectares per annum.

The data shows that global forest and land fires are not country specific, not ecosystem specific and not industry/commodity specific either, but a global phenomenon that happens in nearly every country every year.

Table 6.6: Area of forest fires in Indonesia and other countries (hectares)

Countries	2011	2012	2013	2014	2015	Rata-Rata
USA*	326,947	3,688,656	1,722,870	1,435,024	4,050,060	2,244,711
Russia	1,636,232	1,900,000	1,416,659	3,738,207	2,875,350	2,313,290
Portugal	73,813	110,231	152,756	19,929	64,443	84,234
Spain	102,161	226,125	58,985	46,721	103,200	107,438
France	9,400	8,600	3,608	7,493	11,160	8,052
Italy	72,004	130,184	29,076	36,125	41,511	61,780
Greece	29,144	59,924	46,676	25,846	64,443	45,207
Poland	2,678	7,235	1,289	2,690	5,510	3,880
Sweden	945	483	1,508	14,666	594	3,639
Australia	7,500	-	174,000	518,186	245,980	236,417
Indonesia**	2,612	9,606	4,918	44,546	261,060	64,548

Source: European Commission, 2016 * USA-NOAA, National Centers for Environmental Information ** Environment and Forestry Ministry

Countries that have the best technology and equipment, have management, government and a large amount of funds and

a reliable community ethos, such as the US, Australia and European countries, are also unable to prevent forest and land fires. Forest and land fires are not related to whether there is peat land and whether there are oil palm plantations. Russia, the US, Australia, Portugal and Italy do not have oil palm plantations, but forest and land fires also take place, even more than in Indonesia.

The interesting thing to learn is the distribution of fires based sector and land use (Figure 6.14). About 70 percent of fires in Europe and North Africa hit forests, timber estates and natural land and about 29 percent of fires take place on agriculture land. This shows that forest areas are the most being gutted by fire in each country.

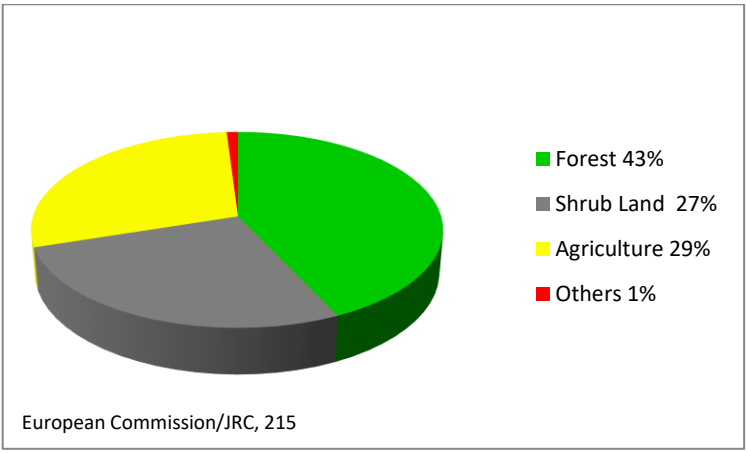


Figure 6.14, Forest fire distribution based on sectors in Europe and Africa 2014

A great many fires also hit agricultural land in nearly each country in Europe and North Africa. This raises interesting questions. Do farmers in advanced countries like Europe have habits like Indonesian farmers? Or is agriculture the victim of a spill-over of forest fires?

MYTH 6-17

Forest and land fires in Indonesia caused by oil palm plantations

FACTS

Forest and land fires that happen in various countries also happen in Indonesia. Based on data from the Forestry and Environment Ministry of the Republic of Indonesia (2016), forest and land fires happen in a majority of provinces throughout Indonesia (Table6.7).

Table 6.7. Vastness of Forest and Land Fires in Indonesia 2010-2016

Provinces	Vastness(Ha) 2010-2016	Provinces	Vastness(Ha) 2010-2016
Central Kalimantan	21,316	Papua*	710
South Sumatra	8,065	South Kalimantan	539
Lampung*	4,964	East Nusa Tenggara*	453
North Sulawesi*	4,627	Southeast Sulawesi*	445
East Kalimantan	4,181	South Sulawesi*	195
Jambi	3,334	Bali*	72
Gorontalo*	2,083	Bengkulu	62
Riau	2,073	West Sumatra	60
North Sumatra	1,847	Aceh	58
West Kalimantan	1,841	Central Sulawesi*	34
Maluku*	1,787	North Maluku*	26
East Java*	1,753	Yogyakarta*	10
Central Java*	1,671	North Kalimantan	3
West Java*	1,464	Banten*	2
West Nusa Tenggara*	1,363	West Papua*	1

Source: Forestry Ministry. 2016 *Not oil palm center

In several provinces with high concentrations of oil palm plantations such as Central Kalimantan, South Sumatra, East Kalimantan and Riau, forest and land fires have taken place in relatively large areas. However, forest and land fires covering relatively large areas also take place in provinces having no oil palm plantations, such as Lampung, North Sulawesi, Gorontalo,

Maluku, East Java, Central Java and West Java. Meanwhile, oil palm plantation-expansion provinces such as North Kalimantan and Bengkulu record relatively fewer forest fires compared with fires in Central Java and East Nusa Tenggara provinces, where there is no oil palm development.

Therefore, just as in other countries, forest and land fires in Indonesia are not systematically or specifically related to oil palm development. In fact forest and land fires can happen in provinces with or without oil palm development. Also, forest and land fires do not specifically hit peatland areas. East Java, West Nusa Tenggara and West Java, which do not have any peatland, also suffer from forest fires in relatively large areas.

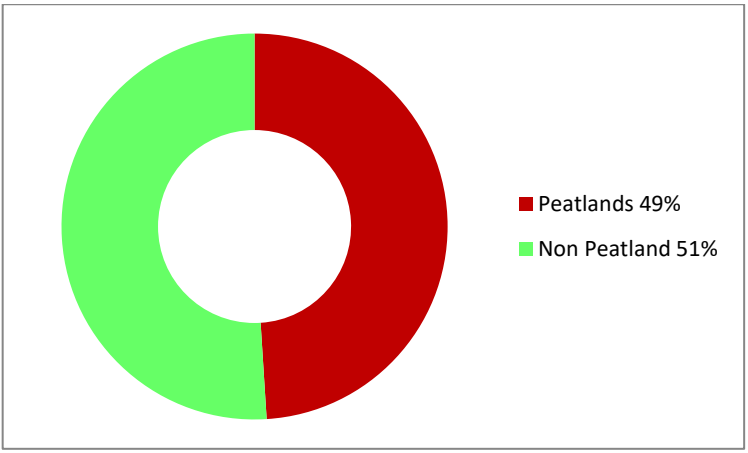


Figure 6.15: Distribution of hot spots on peatland and outside peatland in the July-November 2015 period in Indonesia

Forest and land fires not related to peatland are also confirmed by the spread of hotspots found in the July-November period 2015 (Figure 6.15). The spread of hotspots in peatland was even smaller than those outside peatland.

MYTH 6-18

Most forest fires occur in oil palm concessions.

FACTS

The spread of hotspots in November 2015 based on land use (Figure 6.16) shows a similar pattern of hotspots in other countries suffering from forest fires. About 56 percent of hotspots turned out to be outside oil palm concessions, namely primary forests managed by the government. This is followed by production forest (HTI) concessions, at33 percent, while the hotspots in oil palm plantation concessions accounted for only 7 percent.

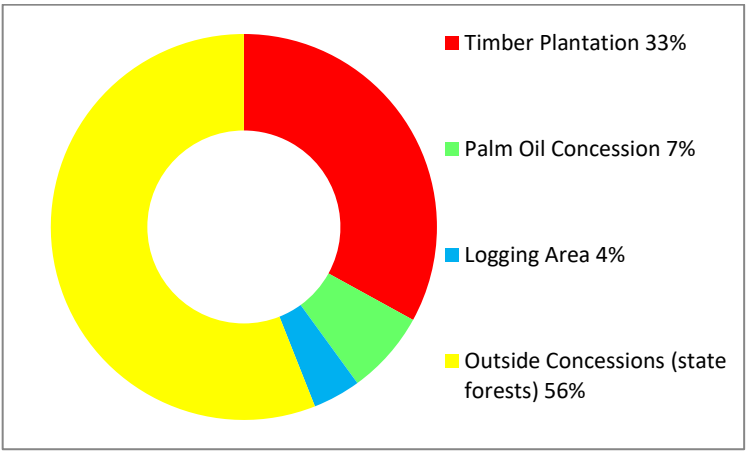


Figure 6.16: Spread of hotspots in November 2015 in Indonesia (WRI Washington, using NASA Active Fire)

In other words, the biggest forest and land fires in Indonesia during the El Nino period of 2015 occurred in primary forests managed byte government. Linking the forest and land fires to oil palm plantations is not supported by current facts.

MYTH 6-19

Forest and land fires in Indonesia in 2015 was caused by palm oil producers.

FACTS

If one looks at the threat of heavy punishments for those setting forest fires, common sense says it is unlikely corporations would do this. Indonesian laws and regulations impose heavy sanctions on companies found to have deliberately set forest and land fires. The sanctions include imprisonment and heavy fines.

Article 78 paragraph 3 and paragraph 4 of the 2009 Forestry Law stipulates sentences of from five to 15 years or a fine of Rp 5 billion at the maximum for perpetrators of forest fires; while article 187 of the Criminal Code threatens a sentence of 12 years. Article 48 paragraph 1 of the 2004 Plantations Law, Article 108 of the 2009 Environmental Protection and Management Law stipulates sentences of up to 10 years and fines of up to Rp 10 billion.

Then there is Government Regulation No. 1502000 on the control of land damage for biomass production with sanctions against perpetrators, and referring to the 1997 Environment Management Law, which stipulates that perpetrators of environmental crimes are subject to: (1) confiscation of benefits obtained from the criminal acts; and/or (2) closure of whole or part of the company; and/or (3) reparation due to the criminal acts; and/or (4) obligation to work on what has been neglected without any rights; and/or (5) nullifying what has been neglected without any right; and/or (6) putting the company under supervision for three years at a maximum.

An examination of the weight of the sanctions and punishments imposed on perpetrators of land fires in corporations, shows it is hard to believe that plantation owners would risk their investments worth trillions of rupiah by setting forest and land fires to clear land to save a few billion rupiah. It would seem that only irrational entrepreneurs would carry out land clearance by burning.

Besides the heavy punishments, losses resulting from forest and land fires also cause declines in productivity of oil palm plantations. Results of a study by the Oil Palm Research Center disclose that impacts of drought alone (Table 6.8) can reduce productivity by 28-41 percent and yields by 06-2.5. Meanwhile, haze affects the process of formation and growth of oil palm fruit, thereby reducing productivity by about 0.2-5.5 percent. This means the potential loss per hectare due to declining productivity caused by forest and land fires in the surrounding areas could reach up to Rp 12-15 million per hectare.

Table 6.8: Losses suffered by oil palm plantations due to drought and haze

Description	Impacts of Drought & Haze
A. Productivity Decline (%)	0.2-5.5*
Age 9-20 year	28-31**
Age> 20 year	29-41**
B. Yield Decline (%)	0.6-2.5**

Source: PPKS. * only haze ** only drought

With such potential losses in oil palm plantations caused by haze from fires, it is difficult to believe that oil palm plantations either individually or collectively carry out burning, which would cause losses to themselves. It is also difficult for common sense to accept that oil palm plantations deliberately left land fires in the surrounding areas unattended as that would cause losses in the form of productivity declines. Of course all have to share the responsibility for extinguishing fires, regardless of who initiates them.

MYTH 6-20

Oil palm plantations cause flooding.

FACTS

Flooding constitutes a part of global climate change. Therefore, flood disasters happen in nearly all countries throughout the world and there is no connection with oil palm plantations. Europe, North America, China, Australia and other regions that do not have oil palm plantations are also hit by flood disasters every year.

In Indonesia floods happen in various regions. According to data from the National Disaster Mitigation Agency (BNPB, 2017), the three provinces most frequently hit by major floods in the period between 2010 and 2016 were Central Java, East Java and West Java. Out of all national flood-disaster incidents in the 2010-2016 periods, 45 percent took place in these three provinces (average of 15 percent) as seen inTable 6.9. It is worth noting that these three provinces are not oil palm centers.

Five major oil palm provinces, namely Riau, North Sumatra, Central Kalimantan, South Sumatra,West Kalimantan and East Kalimantan were also hit by major floods like other provinces in Indonesia, but out of the major floods nationwide in the 2010-2016 period, only about 12 percent happened in the five major oil palm provinces (average of 2 percent).

Table 6.9: Accumulated number of major floods in Indonesia from 2010-2016

Provinces	Number of Cases	Provinces	Number of Cases
Central Java*	698	West Nusa Tenggara*	83
East Java*	692	Gorontalo*	79
West Java*	633	Central Kalimantan	61
Aceh	200	Riau	57
South Sulawesi*	187	West Kalimantan	51
North Sumatra	186	Yogyakarta*	43
South Sumatra	182	Bengkulu*	37
West Sumatra*	165	West Sulawesi*	34
East Kalimantan	158	Bali*	33
Jambi	118	North Sulawesi*	32
Southeast Sulawesi *	118	Maluku*	26
DKI Jakarta*	111	Papua*	26
Banten*	101	Bangka-Belitung*	23
Lampung*	100	Riau Islands*	21
South Kalimantan	94	North Maluku*	13
Central Sulawesi*	86	West Papua*	8
East Nusa Tenggara*	83	North Kalimantan*	5

Source : BNPB (2017) *not oil palm plantation center

Based on this data, it very clearly shows that flood disasters are a global phenomenon and they happen in many places. Flooding is not related to oil palm plantations and they actually most frequently take place in provinces with no oil palm plantations.

MYTH 6-21

Oil palm plantations cause drought.

FACTS

Drought is also a form of global climate change. The major droughts that occur in various countries also happen in regions throughout Indonesia.

Based on data from the National Disaster Mitigation Agency (BNPB, 2017), the provinces most vulnerable to drought in the 2010-2016 period were East Java (29 percent), Central Java (27 percent), West Java (20 percent), South Sulawesi (15 percent) and Aceh (9 percent) (Figure 6.17).

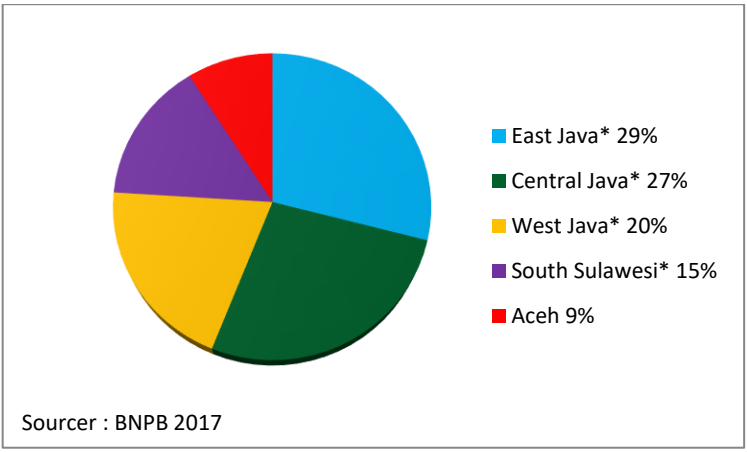


Figure 6.17: Five severest drought disasters in provinces in Indonesia 2010-2016. *Not oil palm plantation center

Those areas, especially Central Java, East Java and West Java, where 76 percent of the national drought disasters happened, are not oil palm plantation regions. Aceh was the only oil palm center province included in the five worst provinces for drought.

Based on drought data, it can be concluded that drought occurs in various provinces that have no connection to oil palm

plantations. Drought occurs in both oil palm-production provinces and non-oil palm production provinces. Indeed the provinces where the worst droughts happened, mostly on Java Island, are not oil palm plantation regions.

MYTH 6-22

Oil palm plantations are the biggest GHG emitters in the farming sector.

FACTS

Based on data on Indonesian agriculture emissions issued by the FAO (2013), we can see (Figure 6.18) that the Indonesian agricultural sources of emission are enteric fermentation amounting to 13 percent, manure left on pasture 7 percent, synthetic fertilizers 12 percent, rice cultivation 39 percent, manure management5 percent, crop residues 3 percent, manure applied to soils 2 percent, cultivated organic soils 9 percent and burning crop residues 0 percent.

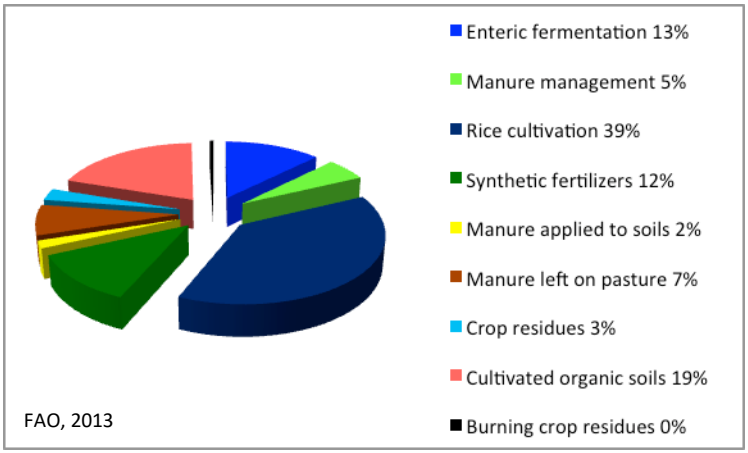


Figure 6.18: Indonesia's farming GHG emission sources

Based on this data, the biggest source of Indonesian farming GHG emissions is rice-cultivation activities (39 percent) and

activities related to animal husbandry (27 percent) so that the two commodities contribute 66 percent of the Indonesian farming GHG. Meanwhile, oil palm can be ascertained as not the main farming GHG contributor in Indonesia.

MYTH 6-23

Oil palm plantation development on peatland raises peatland GHG emissions.

FACTS

According to the report of Wetland International (Joosten, 2009), about 90 percent of Indonesian peatland constitutes degraded peatland. The utilization of peat land for oil palm plantations, according to various studies, turns out to have reduced peatland GHG emissions (Table 6.10).

Table 6.10: Oil palm plantations on peatland reduce peatland CO2 emissions (degraded peatland)

Land Use *Peat land*	Emission TonCO_2/ha/Year	Researchers
Primary Peatland Forest	78.5	Melling.*et al.*. (2007)
Secondary Peatland Forest	127.0	Hadi.*et al*.. (2001)
Peatland oil palm	57.6	Melling.*et al*..(2007)
Peatland oil palm	55.0	Melling.*et al*.. (2005)
Peatland oil palm	54.0	Hooijer. et al (2006)
Peatland oil palm	54.0	Murayama and Bakar (1996)
Peatland oil palm	38.0	Melling andHenson (2009)
Peatland oil palm	31.4	Germer and Sauaerborn (2008)

Secondary peatland GHG (degraded peat land) emissions amount to127 tons of CO_2/hectare/year. By planting oil palm on peatland, GHG emissions decline to 55-57 tons of CO2/hectare/year (Melling. et al., 2005. 2007), Murayama and Bakar (1996). Hooijer (2006) found a smaller emissions figure,

namely 54 tons of CO2/hectare/year. Even Germer and Sauaerborn (2008) found oil palm plantation GHG emissions on peatland to be far smaller, namely only 31.4 tons of CO2/hectare/year. The differences in the study results were possibly caused, among other factors, by differences in depth and quality of the peat and management of oil palm plantations on peatland.

The results of Sabiham's research (2013) show (Table 6.11) that carbon stocks in the upper level of peatland increases in line with the rise in the age of oil palm plants. Carbon stocks in older peatland oil palm plantations are even higher compared with carbon stocks in degraded peatland forest.

Table 6.11: Comparison of the carbon stock in upper levels of peatland and on peatland with oil palm plantations

PeatlandUse	Carbon Stocks (tonC/ha)
Primary Peatland Forest	81.8
Secondary Peatland Forest	57.3
Oil Palm:	
- Age under 6 years	5.8
- Age under 9-12 years	54.4
- Age 14-15 years	73.0

Source:Sabiham (2 013)

Based on the above empirical facts, oil palm plantations on peatland do not increase peatland GHG emissions; on the contrary they reduce peatland GHG emissions. Therefore, the utilization of secondary peatland for oil palm plantations managed in line with sustainability principles can reduce peatland GHG emissions compared with if they are left untended as secondary peatland areas.

MYTH 6-24

Development of palm oil industry is against GHG emission reduction program.

FACTS

President Susilo Bambang Yudhoyono promised in 2009 to the world to reduce Indonesian GHG emissions by 26 percent (by working alone) and 41 percent (with international assistance) by the year 2020. This was followed by a letter of intent between the Indonesian government and the Norwegian government in the Framework of REDD+ on May 26, 2010.And one year later on May 20, 2011 Presidential Instruction No. 10/2011, known as the forest and peatland moratorium, was issued. The presidential instruction was later extended in 2013 and again in 2015.

Regardless of the controversy, the Indonesian oil palm industry presents two solution combinations to reduce Indonesian GHG emissions. The first solution is through a mandatory policy of reducing the use of diesel fuel by replacing it with oil palm biodiesel. Replacement of diesel fuel with biodiesel reduces diesel engine emissions by 62 percent (European Commission. JRC, 2012). If this policy was fully realized, it could reduce emissions by 10.3 million tons of CO2 (2015) and 24.6 million tons of CO2 (2020). The second solution is through carbon dioxide absorption by oil palm plantations. Oil palm plantations absorb 64.5 tons of CO2 per hectare net so that the existing plantations can absorb about 691 million tons of carbon dioxide.

Experience of biodiesel implementation in Indonesia in the 2014-2016 period (Figure 6.19) shows that there is a saving in the use of fossil diesel fuel accumulatively of 4.9 million tons, thereby reducing CO2 emissions by 12 million tons of CO2.

Therefore, the Indonesian palm oil industry is part of the solution of its GHG emissions-reduction program. The bigger the volume of diesel oil replaced by palm oil biodiesel, the greater the reduction of GHG emissions. Likewise, the more oil palm

plantations, the higher amount of carbon dioxide will be able to be absorbed.

The Indonesian experience needs to be introduced to other countries. The government should bring its Global Emission Reduction proposal with the Mandatory Oil Palm Biofuel to international forums, including in the United States and the European Union. Indonesia should stop begging for environmental funding.

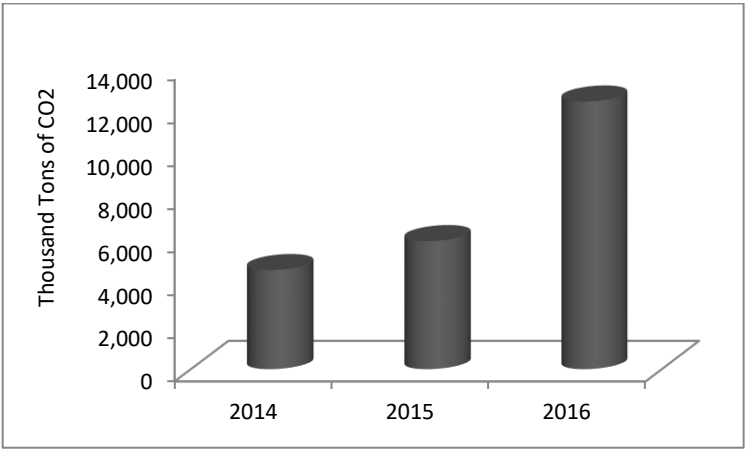


Figure 6.19: Reduction of Indonesia's CO2 emissions due to mandatory biodiesel 2014-2016.

Advanced countries, currently the largest GHG producers, have to be brave enough to change their consumption of fossil fuel to biofuel from, among other sources, palm oil. They have so far made no significant contribution to the efforts toward global emissions reduction, but rather they have shifted the blame by looking for weaknesses in palm oil producers using upside down logic.

Chapter 7
Myths Vs. Facts
Oil Palm Plantations and Environmental Issues

Environmental issues constitute a negative campaign theme mostly launched by anti-oil palm NGOs to attack Indonesian oil palm plantations. They use both global and local environmental issues to discredit oil palm plantations. Therefore, this chapter presents the dialectics between myths and existing facts around environmental issues.

MYTH 7-01

Oil palm plantations are the main trigger for conversion of forests to non-forests in Indonesia.

FACTS

Conversion of forests into non-forest areas (deforestation) is a normal phenomenon development that happens in every country all over the world (see Myth 6-07, 6-08). In the European region, deforestation took place before the 17th century while in the United States it lasted from 1620 until 1950.

No country in the world, including Indonesia, prohibits deforestation and each country sets its own rules and procedures for deforestation. Conversion of forest into non-forest is one of the ways to meet demand for space for development. Demand for space continues to rise in line with the growth of population and expansion of development in all sectors to improve the welfare of

the people. Is there any land on Earth that has never been covered by forests?

In Indonesia conversion of forest into non-forest has taken place for a long time in line with the need for space for development. Deforestation in Indonesia cannot be separated from the logging era, which resulted in neglected and degraded land that was later used by the government for the development of transmigration areas or for extending agriculture and plantations. Expansion of oil palm plantations came later by utilizing logged areas, which had been converted by the government into cultivation areas.

Discussing the history of deforestation, Koh and Wilcove (2008) mentioned that 67 percent of oil palm plantations are on areas converted from forest. However, a study by Gunarso et al (2012) made a different conclusion from the accusation made by Koh and Wilcove. They concluded the land for oil palm development in Indonesia was mostly originally farmland and degraded land and some was converted from secondary forest (Casson 2000; McMorrow & Talip 2001; Gunarso et al, 2012). The massive logging era before 1990 left neglected areas and ghost towns. The development of oil palm plantations only started later, especially after 2000.

An analysis of the history of the conversion of forest into non-forest areas shows that the expansion of oil palm plantations is not the main driver (Figure 7.1).

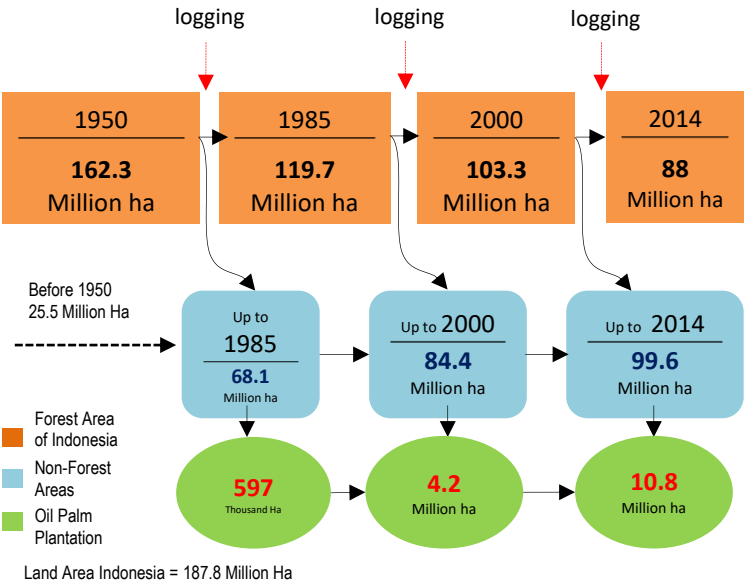


Figure 7.1: Oil palm plantations in land use change in Indonesia (Hanibal, 1950; Gunarso, et al, 2012; Forestry Ministry, processed data)

In 1950 there was162.3 million ha of forested land in Indonesia. From 1950 to 1985 the conversion of forest into non-forest areas reached 68.1 million ha, while expansion of oil palm plantation in the same period was only about 0.6 million ha, 0.9 percent. Then, total conversion of forest into non-forest areas until 2000 reached 84.4 million hectares, so that the forest areas declined to 103.3 million ha. Meanwhile, oil palm plantation areas expanded to only 4.2 million ha.

In other words, from 1950 to 2014, conversion of forest into non-forest areas in Indonesia accumulatively totaled 99.6 million hectares, compared to 10.8 million ha of oil palm plantation areas developed during the period. This data shows that out of 99.6 million ha of forests converted into non-forest areas, oil palm plantation areas in Indonesia were relatively small, growing by

10.8 percent only. Therefore, oil palm cultivation is not the main driver of deforestation in Indonesia.

MYTH 7-02

Indonesian oil palm plantations equal deforestation.

FACTS

Looking into the origin of oil palm plantation areas in Indonesia, it can be concluded that expansion of oil palm plantations is not the main trigger of deforestation in Indonesia. Data from Citra Land Set (Gunarso, et al, 2012) and other research show the origin of oil palm plantations from both the results of deforestation and reforestation (Table 7.1).

Table 7.1: Origin of Oil Palm Plantation Areas in Indonesia (hectares)

Year	Oil palm areas from deforestation[2, 4]	Oil palm areas from reforestation [2, 5]	Net reforestation
Up to 2000	1,055,581	1,858,965	803,384
2001-2005	402,484	1,354,844	952,360
2006-2010	1,097,868	3,009,048	1,911,180
2011-2013 [1, 3]	-	1,686,230	1,686,230
Total	2,555,933	7,909,087	5,353,154

[1]*Statistics of Indonesian Oil Palm Plantations.*
[2]*Gunarso, et al (2012) Analysis of Land Covers and its Conversion into Oil Palm Plantations in Indonesia.*
[3] *Since the issuance of the moratorium based on Presidential Instruction (Inpres) No. 10/2011, Inpres No. 6/2013, Inpres No. 8/2015), forest is no longer being converted into new oil palm plantations.*
[4] *Deforestation (conversion of exploited production forest into oil palm plantations).*
[5] *Reforestation (conversion of farm land/neglected land into oil palm plantations).*

The above table shows that oil palm plantation areas from deforestation (conversion of the exploited production forest) only amounts to about 2.5 million ha, while from reforestation

(conversion of farm land/neglected land) reach 7.9 million hectares. Therefore, the net expansion (reforestation/deforestation) of oil palm plantations in Indonesia comes from reforestation (increasing the areas for carbon stocks) covering 5.3 million ha.

Consequently, besides not being the main trigger of deforestation, Indonesian oil palm plantations are developed from reforestation. Accusations that expansion of oil palm plantations is the main trigger of deforestation is not backed up by data. Oil palm plantations even rehabilitate damaged ecology and regional economies caused by previous logging.

MYTH 7-03

Oil palm plantations are the main trigger of conversion of forest into non-forest areas on Sumatra Island.

FACTS

Sumatra Island is where the early development of oil palm plantations took place. It is also where major development of Indonesian oil palm plantations has continued to take place. According to 2015 data from the Agriculture Ministry, about 63 percent of the national oil palm plantation areas are on Sumatra. Are oil palm plantations the chief trigger of conversion of forest into non-forest areas on Sumatra Island?

In 1950 there were 37.4 million ha of forest areas on Sumatra. From 1950 to 1985 the conversion of forest into non-forest areas reached 23.8 million ha (Figure 7.2). Meanwhile, the expansion of oil palm plantations in the same period took up only 0.5 million ha, 2.3 percent. Total conversion of forests into non-forest areas increased to 31.6 million hectares by the year 2000. However, the oil palm plantation areas increased only to 2.7 million hectares, 8.6 percent.

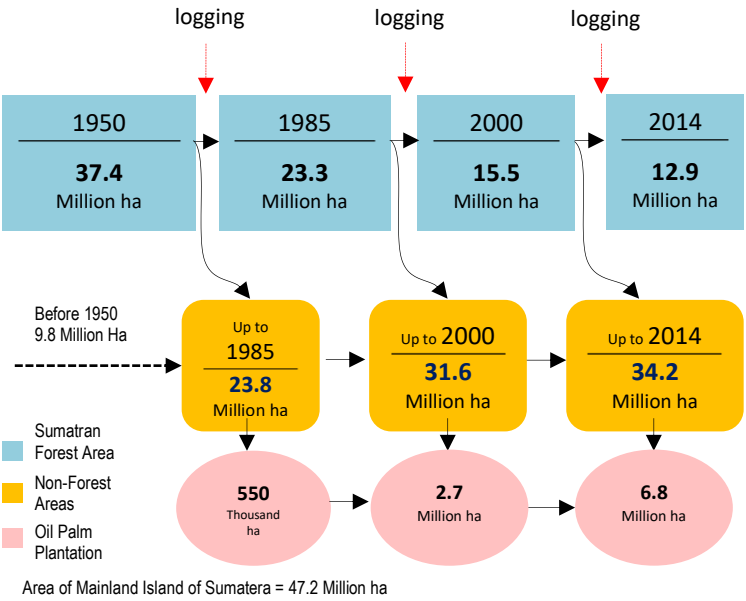


Figure 7.2: Oil palm plantations in the conversion of land use on Sumatra Island (Forestry Statistics, Plantation Statistics, processed data)

In other words, from 1950 to 2014 the conversion of forest into non-forest areas on Sumatra Island reached 34.2 million ha, while those earmarked for oil palm plantation development on Sumatra Island in the corresponding period were 6.8 million ha, only 19.9 percent of the total conversion area.

Therefore, oil palm plantations are not the main trigger of the conversion of forest into non-forest areas on Sumatra Island. About 80 percent of forest conversion areas are used for purposes other than oil palm plantations.

MYTH 7-04

Oil palm plantations are the main trigger of conversion of forest into non-forest areas in Kalimantan Island

FACTS

Kalimantan province on Borneo Island has become a center of the world's attention on issues of forest conservation. The world's attention on Borneo Island has been rising since the island constitutes an area of Indonesian oil palm development. Therefore, perception has been built up that the expansion of oil palm plantations has become the main trigger of the reduction of forest areas in Kalimantan.

Data of the history of conversion shows that in 1950 there were 51.4 million ha of forest areas in Kalimantan. From 1950 to 1985, the conversion of forests into non-forests areas reached 13.1 million hectares (Figure 7.3). Meanwhile, in the same period, oil palm plantations reached only 0.04 million hectares, 0.1 percent of the total forest conversion on the island.

Conversion of forests into non-forests increased to 20.2 million hectares by the year 2000, while oil palm plantation development reached only 0.8 million ha, 3 percent of the total forest conversion areas.

In other words, from 1950 to 2014, total conversion of forests into non-forest areas in Kalimantan reached 27.4 million hectares, while the oil palm plantation areas in Kalimantan covered only 3.4 million ha, 13 percent of the total forest conversion areas.

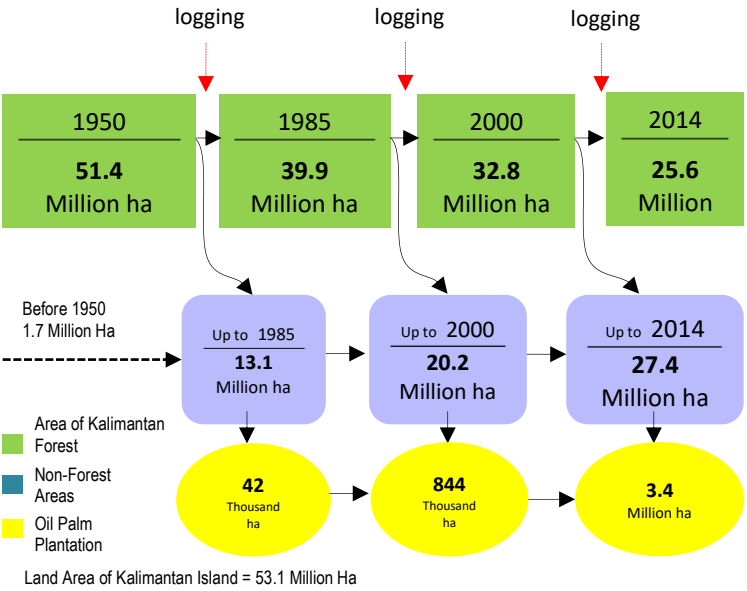


Figure 7.3: Oil palm plantations in land use change in Kalimantan province on Borneo Island (Forestry Statistics, Oil Palm Statistics, processed data)

Therefore, the perception that oil palm plantations have become the main trigger of the conversion of forests into non-forests is not supported by data.

MYTH 7-05

Oil palm plantation is the main trigger of forest conversion into non-forest areas on Sulawesi Island.

FACTS

Sulawesi Island is actually not a major oil palm plantation center in Indonesia. The oil palm plantations on the island only covered 0.37 million hectares in 2015, only about 3 percent of the national oil palm plantation areas. The development of oil palm

plantations on Sulawesi took place only after the era of logging on the island.

In 1950 there were 17.0 million ha of forest areas on Sulawesi. From 1950 to 1985, conversion of forests into non-forest areas reached 7.2 million ha (Figure 7.4), while oil palm plantations only covered 5,000 ha, 0.07 percent of the forest conversion areas.

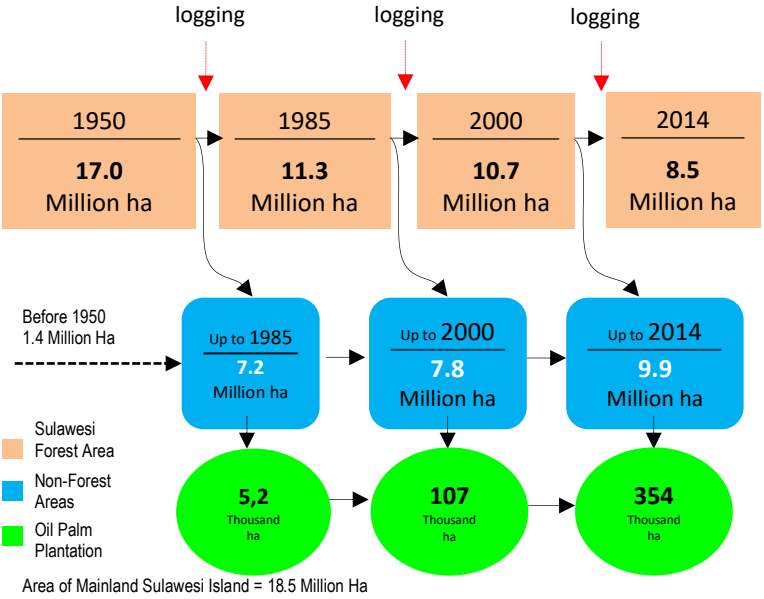


Figure 7.4: Oil palm plantations in land use change on Sulawesi Island (Forestry Statistics, Oil Palm Plantation Statistics, processed data)

Total conversion of forests into non-forest areas reached 7.8 million hectares by the year 2000, while the oil palm plantation areas increased only by 100,000 ha, 1.4 percent of the total conversion areas.

In other words, from 1950 to 2014, the accumulated area of forest converted into non-forests on Sulawesi reached 9.9 million ha, while the oil palm plantation areas on Sulawesi in the same period were only 400,000 ha, 3.5 percent of the total conversion accumulation. So the oil palm plantations are not the main trigger of the conversion of forests into non-forests on Sulawesi Island.

MYTH 7-06

Oil palm plantations are not environmentally friendly as they do not conserve soil or water.

FACTS

Oil palm plantations have three mechanisms to protect soil and water. The three mechanisms are canopy land cover, oil palm plantation area management and oil palm root systems.

First, the layered leaf structure of mature oil palm trees is able to cover land by nearly 100 percent. Besides functioning as the photosynthesis mechanism of oil palm trees, such a leaf structure also functions to protect land from the direct blow of rainfall. During rainfall, the blows of raindrops do not directly hit the soil because it has been protected by the layered leaf structure.

Second, land management in oil palm cultivation conserves soil and water. The technical standards of oil palm plantations, starting from planting to crop tending, uses soil and water conservation principles. Starting from zero/minimum tillage, crop cover during young crop tending (aged zero to 4 years), the making of terracing systems on sloping areas, the making of horseshoes, the placement of oil leaves (pruning) as contour terraces made of organic materials in spaces among trees, the return of empty bunches and liquid waste to the land and others are parts of the mechanism of soil and water conservation in oil palm plantations.

Third, the massive, wide and deep root system of mature oil palm trees can reach a radius of 4 meters around the base and a depth of up to 5 meters beneath the soil surface that forms micro and macro soil pores (Harahap, 1999, 2007), which can be called natural bio-pores. The natural bio-pores of the oil palm are mostly located near or around the base of the palm trees (Figure 7.5). The soil micro and macro pores become more numerous and larger as the palm trees mature.

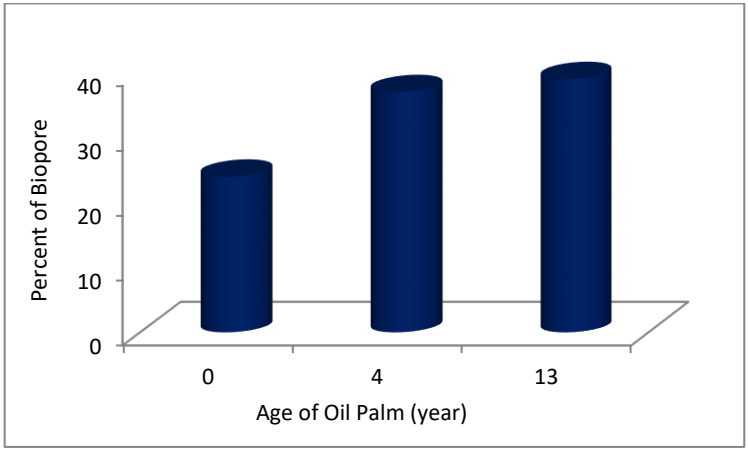


Figure 7.5: Bio-pore percentage of oil palm plant root system (Harahap, 1999, 2007; Harianja, 2009)

Natural bio-pores increase the water holding capacity of oil palm plantation areas through the enhancement of rainfall infiltration into the soil, thereby reducing run-off by storing the water reserves in the soil. The larger the amount of oil palm natural bio-pores (namely near the base of the trunk), the higher the rate of infiltration of soil surface water to fill the bio-pores. The rate of infiltration will increase in line with the age of the plants (Figure 7.6) so that erosion and water run-off could be controlled.

The three oil and water conservation mechanisms are built-in systems in the oil palm trees and plantations, so that managing

oil palm plantations for economic objectives will at the same time manage soil and water conservation in three ways. Moreover, the three soil and water conservation mechanisms of oil palm plantations are long term, equal to the economic age of the oil palm plantation (average 25 years).

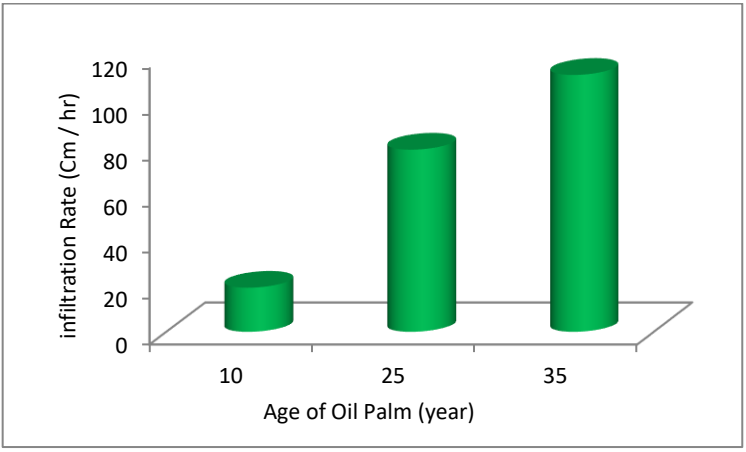


Figure 7.6: Rate of water infiltration into oil palm plantations rises in line with the age of oil palm trees (Harahap, 1999, 2007; Harianja, 2009)

Therefore, oil palm plantations have their own soil and water conservation systems. Oil palm plants even meet the requirements of being soil and water conservation plants. (Harahap,1999, 2007).

MYTH 7-07

Oil palm water consumption is larger than that of other forest plants.

FACTS

Experts have long studied the water consumption of various plants. One of them is Coster (1938) who examined the water needs of several plants long before oil palm plantations were

developed. Using plant evapotranspiration indicators, Coster found that bamboo and *lamtoro* crops are quite wasteful of water with a need of about 3,000 millimeters of water per year (Figure 7.7). That is followed by the acacia plant with a need for 2,400 mm of water per year, the *sengon tree* that uses 2,300 mm per year and pine and rubber trees that need about 1,300 mm per year. Meanwhile, an oil palm only needs 1,104 mm of water per year.

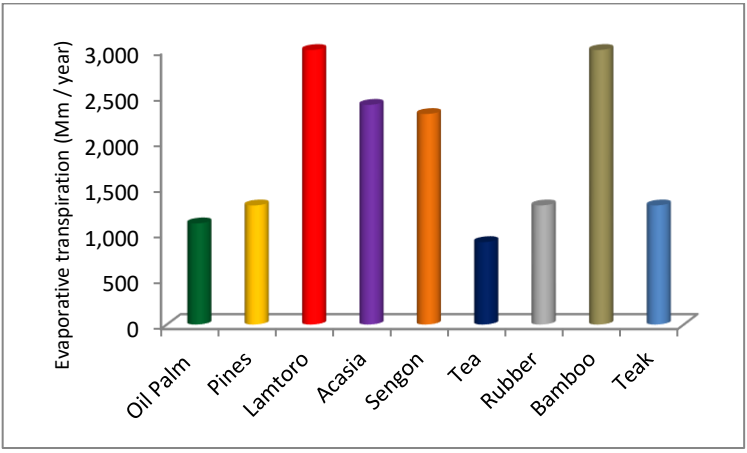


Figure 7.7: Comparison of water needs of oil palm and forest plants (Coster, 1938)

Looking into the portion of rainfall utilized by oil palms, Pasaribu et al (2012) found that the percentage of rainfall used by oil palms is about 40 percent of the annual rainfall. The percentage is smaller than mahogany's, 58 percent, and pine's, 65 percent (Figure 7.8).

Pine, acacia and *sengon* plants are popularly used as forest plants both in the reforestation program and timber estate development. These forestry plants are relatively wasteful of water.

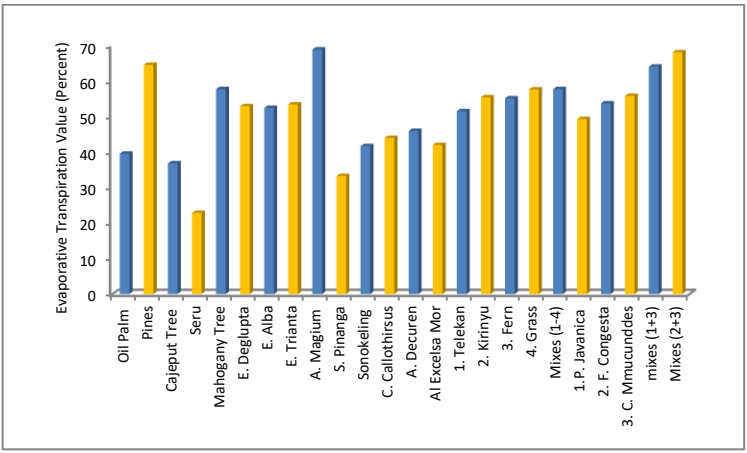


Figure 7.8: Percentage of annual rainfall used by oil palm and forest plants (Pasaribu et al, 2012)

Meanwhile, oil palms, which have been alleged to be wasteful of water, turn out to be much more efficient in the consumption of water than the regular forestry plants. Oil palms are even more efficient in water consumption than the rubber plant.

Results of research by experts disclose that oil palm can be classified as the group of plants that are relatively efficient in water consumption compared with the forestry plants or the rubber plant. Not only are they efficient in water consumption, oil palm plants store more water in their massive fiber root systems that form natural bio-pores that function to store water and organic substances.

MYTH 7-08

Oil palms are a vegetable oil plant more wasteful of water than other plants.

FACTS

Oil palm's productivity of biomass and oil is very high. The high productivity equally needs a high level of intake. However,

whether a plant is wasteful in its water consumption has to be measured using the same output unit. Gerbens-Leenes et al (2009), in their research entitled *The Water Footprint of Energy from Biomass: A Quantitative Assessment and Consequences of an Increasing Share of Bioenergy Supply,* found an interesting result about which plant is most efficient in its water consumption to produce bioenergy. The results of the research published in the *Journal of Ecological Economics 68:4* found that oil palms belong to the most efficient group (after sugarcane) in water consumption for producing each gigajoule (GJ) of bioenergy.The bioenergy-producing plants most wasteful in their water consumption are rapeseed, followed by coconut, cassava, corn, soybean and sunflower. To produce each GJ of bioenergy (oil), rapeseed plants (European vegetable oil plants) need 184 m^3 of water, while coconut, which is abundant in Indonesia, the Philippines and India, requires an average of 126 m^3 of water. Cassava (a producer of ethanol) needs an average of 118 m^3 of water (Table 7.2).

Table 7.2: Water requirement to produce one gigajoule of bioenergy in various plants

Types of plants	Average water consumption (m^3/gigajoule of energy produced)
Cassava	118
Coconut	126
Corn	105
Oil palm	75
Soybean	100
Sugarcane	28
Sunflower	87
Rapeseed	184

Source: Gerbens – Leenes et al, (2009)

Meanwhile, soybean as the main vegetable oil plant in the US needs an average of 100 m^3 of water. Sugarcane and oil palm turn out to be the most efficient in consuming water for producing bioenergy. To produce each GJ of bioenergy (palm oil), oil palms only use 75 m^3 of water.

With this fact, it is clear that oil palms turn out to be relatively efficient in their water consumption for producing bioenergy. Existing views saying that oil palm is wasteful in water consumption are disproved by the research results.

MYTH 7-09

Oil palm plantations change land into desert.

FACT

Common sense alone would make it easy to comprehend that any plant on Planet Earth functions to preserve to environment. There is no theory that says plants damage the environment. Plants were created by God. On the contrary, we are asked to cultivate plants to help improve the environment. The "1 million plant movement" has long been carried out by officials, including by environmental activists. The Arabian countries, which have many deserts, are trying to green their deserts by planting vegetation, including palm species – namely dates.

As early as 1911 (104 years ago) Indonesia developed oil palm plantations on Raja Island (Asahan, North Sumatra), Tanah Itam Ulu (Batubara regency, North Sumatra) and Sei Liput (Aceh), which thus far still exist and have not changed into deserts. On the contrary, the productivity of the existing oil palm plantations even continues to increase.

Many studies also prove that biomass (one of the important components for soil fertility) on oil palm plantations increases in line with the advancing age of the oil palm plants. Chan (2002) discloses that the older the oil palm, the larger the volume of

biomass produced (Table 7.3). Four-yea- old oil palm plants produce about 40 tons of biomass per ha per year, which increases to about 93 tons by the age of 15. By the age of 24 (the age for rejuvenation), the production of biomass reaches its peak, namely about 113 tons per ha per year. When the plantations are rejuvenated, the biomass is left in the soil.

Then, a part of the biomass that is harvested in the form of fresh fruit bunches is returned to the plantation areas. Out of oil palm production of 24 tons per ha per year, only about 5 tons are processed into palm oil and the remaining 19 tons remain in the form of biomass, namely empty fruit bunches, shells and sludge, which are all returned to the plantation areas to maintain fertility.

Besides by adding back biomass, soil fertility is also maintained by providing fertilizer in accordance to the age and productivity of the plants.

Table 7.3: Biomass volume and carbon stocks on oil palm plantations

Age (year)	Biomass stocks (tons/ha)	Carbon stocks (tons/ha)
1-3	14.5	5.80
4-8	40.3	16.12
9-13	70.8	28.32
14-18	93.4	37.36
19-24	113.2	45.28
>25	104.5	41.00

Source: Chan, K.W (2002).

Oil palm Carbon Sequestration and Carbon Accounting: Our Global Strength. MPOABiomass content is not only increased above ground, but also underground in the oil palm rooting zone,

the rhizosphere, specifically in the oil palm root bio-pores (Figure 7.9).

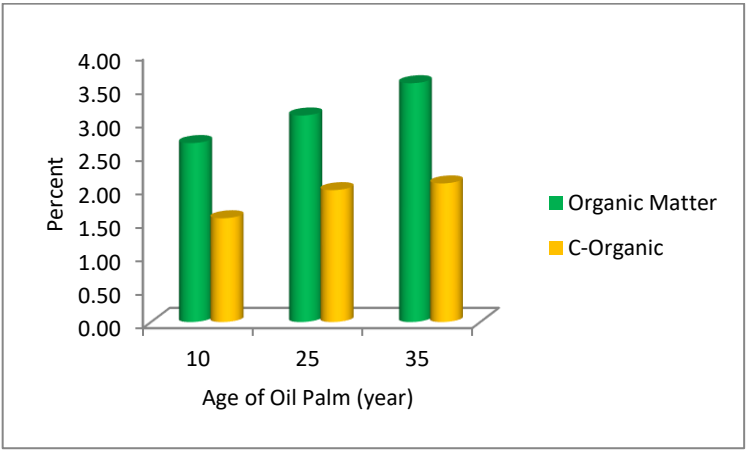


Figure 7.9: The content of organic and c-organic ingredients in the oil palm rooting zone increases with age of growing oil palm (Harianja. 2009)

The older the oil palm, the more organic ingredients are stored in the ground bio-pores. Therefore, if the organic ingredients are returned to the ground, the fertility of the oil palm plantation areas will not decline. Moreover, the oil palm plantation management system provides fertilizer based on the principle of at least replacing the nutrients contained in the fresh fruit bunches being harvested so as to render impossible a decline in soil fertility that would create a desert.

The experience of soybean farming in the US can provide an analogy. The US' soybean farms now cover 34 million ha and are more than 100 years old. The soybean farms produce less than about 20 percent of the biomass produced on oil palm plantations. Have the soybean farms in the US changed into infertile desert? Of course not. If the soybean farms where only a small quantity of biomass is returned to the farm areas (compared to oil palm

plantations) do not change into desert, then oil palm plantations will not change into deserts either.

MYTH 7-10

Oil palm plantations do not absorb carbon dioxide.

FACTS

Each second the Earth's atmosphere is crammed with wasted carbon dioxide from human activities on the planet. Humans, animals, motorized vehicles and factories around the whole world emit excessive carbon dioxide (a greenhouse gas) into the Earth's atmosphere, which has triggered global warming and changes in the environment. In order to reduce the concentrations of this greenhouse gas in the Earth's atmosphere, besides by reducing greenhouse gas emissions, re-absorption of the greenhouse gas is also needed.

Each plant, both forestry plants and oil palm plants, has the ability to absorb carbon dioxide from the atmosphere. Through plant photosynthesis, the existing carbon dioxide in the Earth's atmosphere will be absorbed.

Through a plant's metabolism, carbon dioxide is divided into carbon and oxygen. The carbon is processed and changed into parts of the plants (roots, stems and leaves).

Meanwhile, the oxygen is discharged into the atmosphere for animal life to breathe. Because plants have the ability to absorb carbon dioxide from the atmosphere and produce oxygen for the atmosphere in return, green plants, including oil palms, are called as the "lungs" of the ecosystem (Figure 7.10).

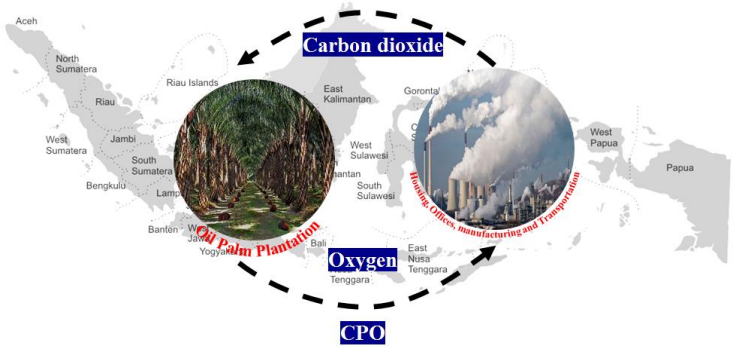


Figure 7.10: Oil palm plantations as the "lungs" of the ecosystem (PASPI, 2016)

If oil palm plantations and forests are compared (Table 7.4), each ha of oil palm plantation absorbs a net 64 tons of carbon dioxide each year and produces about 18 tons of oxygen.

Table 7.4: Carbon dioxide absorption and oxygen production of oil palm plantations and tropical forests

Indicators	Tropical Forest	Oil Palm Plantation
Gross assimilation (tons CO_2/ha/year)	163.5	161.0
Total respiration (ton CO_2/ha/year)	121.1	96.5
Net assimilation (tons CO_2/ha/year)	42.4	64.5
Oxygen production (O_2) (tons O_2/ha/year)	7.09	18.70

Source: Henson (1999). PPKS (2004. 2005)

Meanwhile, a forest's net absorption amounts to about 42 tons of carbon dioxide each year and it produces about 7 tons of oxygen. Therefore, oil palm plantations are even superior to forests when it comes to absorbing carbon dioxide from the atmosphere and producing oxygen for the Earth.

MYTH 7-11

Forest energy production is better than that of oil palm plantations.

FACTS

The main source of energy for human life on Earth is the sun. Plants, both in forests and on oil palm plantations, constitute "harvesters" of solar energy for life on Earth .Comparing the abilities of forests and oil palm plantations to harvest solar energy shows (Table 7.5) that oil palm plantations are superior in terms of the efficiency of photosynthesis, the conversion of solar radiation and the production of dry substances and incremental biomass. Meanwhile, the index of leaf areas and total biomass stocks indicates the relative superiority of forests. Therefore, to harvest solar energy, oil palm plantations are superior to forests. However, for storing energy as biomass, forests are superior.

Table 7.5: Comparison of solar energy harvesting effectiveness between oil palm plantations and tropical forests

Indicators	Tropical forest	Oil palm plantation
Leaf area index	7.3	5.6
Photosynthesis efficiency (%)	1.73	3.18
Radiation conversion efficiency (g/mj)	0.86	1.68
Total biomass in the area (tons/ha)	431	100
Incremental biomass (tons/ha/year)	5.8	8.3
Dry substance productivity (tons/ha/year)	25.7	36.5

Source: Henson (1999), PPKS (2004, 2005)

If what is needed is a way to produce energy more efficiently, to absorb more carbon dioxide and to produce a larger amount of oxygen, oil palm plantations are better than forests. However, if what is needed is a way to store a large amount of biomass and carbon stocks and to preserve biodiversity, forests are better than oil palm plantations.

MYTH 7-12

Water systems of oil palm plantations are poorer than those of forests.

FACTS

One of the functions of plants in an ecosystem is to preserve water. Through the evapotranspiration mechanism, the plants evaporate water into the atmosphere, which will in turn descend to the Earth as rainfall. Moreover, the plant also preserves soil and water through various mechanisms such as holding a water supply in the topsoil layer, protecting soil from direct rainfall and maintain air humidity in a micro climate.

If oil palm plantations are compared to forests (Table 7.6), the two generally have the same function in conservation and hydrology. This is reflected by the evapotranspiration, ground water reserves, deflection of rainfall, infiltration rates and air humidity.

Table 7.6: Comparison of water management functions between oil palm plantations and tropical forest

Indicator	Tropical forest	Oil palm plantations
Evapotranspiration (mm/year)	1,560-1,620	1,610-1,750
Groundwater reserves up to depth of 200 cm (mm)	59-727	75-739
Deflecting rainfall from soil surface (%)	85	87
Rate of *solum* layer infiltration 0-40 cm (ml/cm^3/minute)	30-90	10-30
Air humidity (%)	90-93	85-90

Source: Henson (1999), PPKS (2004, 2005)

Since oil palm plantations have a long production cycle of up to 25 years (from planting to replanting), that means they perform conservation and hydrology functions for up to 25 years.

MYTH 7-13

To replace fossil fuels, oil palm plantations only produce the first generation of biofuel (biodiesel), which is unsustainable because it competes for land with food production.

FACTS

In order to reduce global greenhouse gas emissions, a global movement to replace fossil fuel with biofuel is needed. The use of the first generation of biofuel, namely from agricultural and plantation production, is considered unsustainable because it requires a trade-off between fuel and food. Therefore, policies of the European Union Renewable Energy Directives (RED) and the US Renewable Fuel Standard (RFS) recommend the use of the second generation of biofuel, such as biomass, as being more sustainable (Naik, et al, 2010).Indonesian oil palm plantation fulfill that role and contribute to the future global energy policy. Besides producing the first generation of biofuel (biodiesel, FAME), Indonesian oil palms also produce the second generation of biofuel (biomass) in a very large quantity, even bigger than the combined biomass volume produced by soybeans, rapeseed and sunflowers.

Oil palm plantations produce oil palm biomass in the form of empty fruit bunches, shells and fiber, oil palm trunks and oil palm fronds. Research results by Foo-Yuen Ng et al. (2011) show that each ha of oil palm plantation produces biomass in the form of about 16 tons of dry substance per year. The oil palm biomass production is three times bigger that the production of crude palm oil (CPO), which is the main product of oil palm.

With about 11 million ha of oil palm plantations in Indonesia in 2015, biomass production reached 167 million tons each year (Figure 7.11).

Oil palm biomass can be processed into bioethanol to replace premium fuel such as gasoline. According to the experience of the KL Energy Corporation in 2007, each ton of dry biomass substance can produce 150 liters of ethanol. This means oil palm biomass production of up to 167 million tons per year can produce 25 million kiloliters of ethanol every year, nearly 60 percent of the premium needs of Indonesia. With such a big volume of ethanol from oil palm biomass, don't Indonesian oil palm plantations have the great potential to become ethanol or biopremium “mines”?

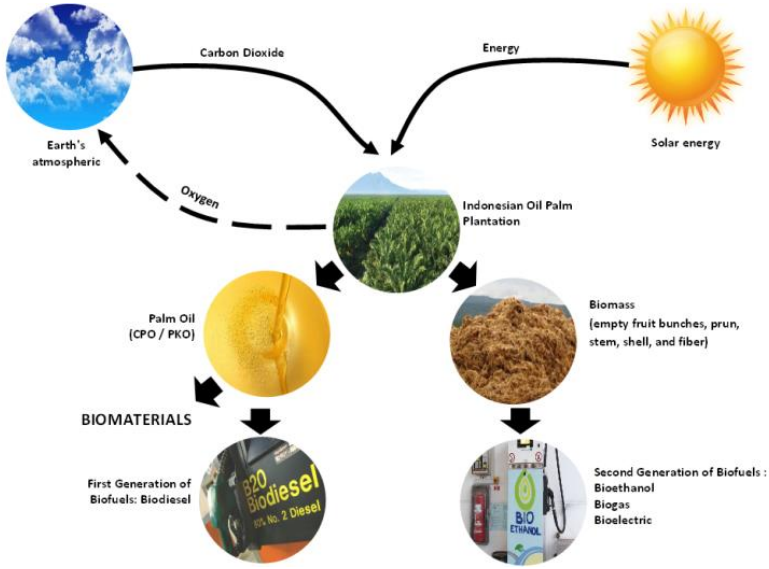


Figure 7.11: Sustainable oil palm plantation generation of first and second generation renewable energy (PASPI. 2016)

Besides using biomass from oil palm plantations, there is also the potential to utilize palm oil mill effluent (POME) through methane capture to produce biogas and biomethane (Figure 7.12). The production 113 tons of POME per year can produce

3,179 million cubic meters of biogas each year. This biogas can reduce the consumption of natural gas or be used to generate electricity (bioelectricity).

Figure 7.12: Installation of liquid palm oil waste processing plant with biogas technology to produce bioelectricity in East Kalimantan province

In other words, oil palm plantations produce sustainable renewable energy, namely biodiesel, bioethanol and biogas/bioelectricity. These three renewable sources of energy can replace fossil energy. Biodiesel would replace diesel oil, bioethanol would replace premium and biogas would replace natural gas. The uniqueness of the oil palm plantations is that they can jointly produce them with no trade-off. As long as the sun still shines, the production of palm oil and biomass will be sustainable so that biofuel production will also be sustainable.

Chapter 8
Myths Vs. Facts:
Palm Oil, Health and Nutrition

Among the issues in the negative smear campaigns often used by palm oil's competitors is the causal relationship between palm oil and health and nutrition problems. The false accusation of the harmful effects of palm oil on health has been thrown around by palm oil's competitors since the 1970s.Extensive research on health and nutrition related to palm oil consumption has also been conducted by experts in different fields in Indonesia, Malaysia and other countries. The research not only offers empirical evidence to counter the negative accusations about palm oil, it also provides more extensive information to the public about the nutritional benefits of palm oil that the consumers can take advantage of.

In this chapter, the perceptions, opinions and even myths related to the health and nutrition aspects of palm oil will be discussed through the presentation of empirical evidence from much research conducted in various countries. The dialectic between myth and the empirical evidence of the health and nutrition aspects of palm oil gains importance with the growing attention from consumers, especially in developed countries, about the health and nutrition attributes of palm oil.

MYTH 8-01

Global society still prefers soybean oil, rapeseed oil and sunflower oil over palm oil.

FACTS

Palm oil is an edible oil that has been consumed by public for thousands of years (Cottrell 1991). It is used either as cooking oil, margarine, shortening, or as vegetable oil in the food industry. Palm oil is one of 17 vegetable oils recommended as food ingredients by FAO and WHO (Codex Alimentarius Commission, 1983).

The revealed preferences of international society can be seen from the composition of global vegetable oil consumption. From 1965 to 2016 there were changes in the pattern of global vegetable oil consumption.

The consumption share of palm oil among the world's main four vegetable oils swiftly increased to 39 percent in 2016 from 22 percent in 1980. In contrast, the share of soybean oil decreased to 33 percent from 55 percent during the same period. (Figure 8.1)

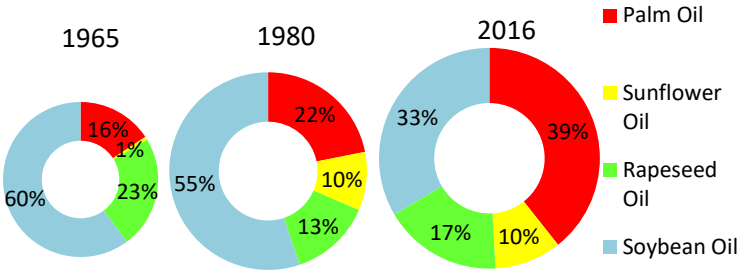


Figure 8.1: Change of preferences among global consumers of four main vegetable oils (USDA, 2017)

The change in preferences of world vegetable oil consumption shows that the consumption of palm oil has shifted from soybean oil to palm oil. In other words, society prefers palm oil to other kinds of vegetable oils.

MYTH 8-02

The palm oil products being offered in the market are palm kernel extractions that are of the same quality as coconut oil.

FACTS

In the world trade of vegetable oil, palm oil (PO) is often mistaken for palm kernel oil (PKO). In fact, there are distinctive differences in the physical forms and chemical constructions of the two. Palm oil is extracted from the meat of palm fruit, the mesocarp, while palm kernel oil is extracted from the seeds. The palm cooking oil and fat spreads being offered in the market are expressed from palm oil and not from palm kernel oil.

Unlike palm kernel oil (Choo and Nesaretnam, 2014), which is dominated by saturated fatty acid, palm oil is dominated by unsaturated fatty acid. In other words, palm oil products such as cooking oil and butter spread are not the same as coconut oil products and or other vegetable oil extracted from the seeds.

MYTH 8-03

Palm oil contains unstable fats that are not good for health.

FACTS

According to nutritionists, palm oil contains a stable proportion of saturated fatty acid and unsaturated fatty acid (Table 8.1). The fatty acid composition of palm oil is saturated fatty acid that consists of 44 percent palmitic fatty acid, 5 percent stearic fatty acid and monounsaturated fatty acid (MUFA) that consists of 10 percent linoleic fatty acid and 0.4 percent alpha linolenic fatty acid. In fact, as a whole palm oil has the behavioral characteristics of monounsaturated oils (United States Department of Agriculture, 1979; Cottrell, 1991; Small, 1991; Choudhury et al., 1995; Kritchevsky et al., 2000; Ong and Goh, 2002; FAO, 2010; Hariyadi, 2010; GiriwonodanAndarwulan, 2016).

Table 8.1: The composition of fatty acid in palm oil

Fatty acid	% Total fatty acid	
	Range	Average
Lauric acid (C12:0)	0.1-1.0	0.2
Myristic acid (C14:0)	0.9 0 1.5	1.1
Palmitic acid (C16:0)	41.8-45.8	44.0
Palmitoleic acid (C16:1)	0.1-0.3	0.1
Stearic acid (C18:0)	4.2-5.1	4.5
Oleic acid (C18:1)	37.3-40.8	39.2
Linoleic acid (C18:2)	9.1-11.0	10.1
Linolenic acid (C18:3)	0.0-0.6	0.4
Arakidonic acid (C20:0)	0.2-0.7	0.4

Source: Hariyadi (2010)

The illustration above shows that palm oil has a stable composition of saturated fatty acid and unsaturated fatty acid. Palm oil is not categorized as vegetable oil with the behavioral characteristics of saturated fatty acid. Instead, as a whole, it has the behavior of monounsaturated oils.

MYTH 8-04

The vitamin A content in palm oil is much lower than in other food sources.

FACTS

Palm oil is a food source of energy and fatty acid. Besides being an energy source, palm oil also has relatively high vitamin A content compared to other food sources (Table 8.2). Palm oil is rich with beta-carotene, an antioxidant and precursor of vitamin A (Krinsky, 1993). The vitamin A content of red palm oil is much higher than of other foods recognized as vitamin A sources, such as oranges, carrots, bananas, etc.

Table 8.2: The comparison of vitamin A (retinol level) of palm oil and other food

Food sources	μg Retinol Level/100 g (edible)
Oranges	21
Bananas	50
Tomatoes	130
Carrots	400
Red palm oil (refined)	5,000
Crude palm oil (CPO)	6,700

Source: Hariyadi (2010)

The benefits of vitamin A content in palm oil for human health have been proven through much health and medical research. They include the prevention of vitamin A deficiency, the prevention and treatment of blindness and the reestablishment of the body's immune system. It also helps to prevent cancer and tumors, fights free radicals, hampers liver enlargement and boosts immunity, lowers cholesterol, improves cognitive function, prevents coronary artery and heart diseases, among others (Oey et al., 1967; Karyadi dkk., 1968; Muhilal dkk., 1991; Carlier et al., 1993; Richard, 1993; Choo, 1994; Ooi et al., 1994; Nagendran et al., 2000; Van Stuijvenberg and Benade, 2000; Canfield et al., 2001; Oguntibeju et al., 2009; Rice and Burns, 2010; Sandjaja et al., 2014).

Palm oil with vitamin A content can also be used to treat many diseases associated with vitamin A deficiency such as blindness, xerophthalmia and hemeralopia. Research conducted by the Indonesian Health Ministry from 1963 to 1965 found that the consumption of red palm oil (RPO) helps to improve vitamin A status, which can be seen from the increase of the amount of vitamin A in serum from children (Oey, KL et al., 1967). Other research conducted by the Center for Nutrition Research and

Development in Bogor (Muhilal dkk., 1991) found that treatment using palm oil can cure xerophthalmia patients suffering from hemeralopia.

From the description above it is clear that palm oil is not merely a source of energy and vitamin A, but also the cure for various diseases.

MYTH 8-05

The vitamin E content in palm oil is much lower than in other vegetable oils.

FACTS

Vitamin E is a nutrient essential for health. It has benefits as an antioxidant, an anti-aging agent, for skin health and fertility, is able to prevent atherosclerosis, is anti-cancer and can boost immune functions (Walton et al., 1980; Hirai et al., 1982; Sylvester et al., 1986; Cross, 1987; Sundram et al., 1989; Komiyama et al., 1989; Goh et al., 1985, 1994; Guthrie et al., 1993, 1995, 1997; Elson and Qureshi, 1995; Nasaretnam, 2008; Ng et al., 2009; Sen et al., 2010; Anggarwal et al., 2010; Nasaretnam and Meganathan, 2010; Gopalan et al., 2014). Vitamin E cannot be produced by the human body and therefore can only be obtained from food sources. Palm oil is richest in vitamin E compared to other vegetable oils (Table 8.3).

Table 8.3: The comparison of vitamin E content (*Tocopherols* and *Tocotrienols*) in palm oil to other vegetable oils

Type of vegetable oil	Vitamin E content (ppm)
Palm	1,172
Soybean	958
Corn	782
Cottonseed	776
Sunflower	546
Groundnut	367
Olive	51
Coconut	36

Source: Slover, (1971); Gunstone (1986); Palm Oil Human Nutrition (1989)

Vitamin E content in palm oil reaches the amount of 1,172 ppm, higher than the vitamin E content in soybean oil (958 ppm), sunflower seed oil (546 ppm), corn oil (782 ppm) and the rest. As well, vitamin E in palm oil contains 20 percent tocopherols and 80 percent tocotrienols (Man danHaryati, 1997), both of which function as antioxidants.The pharmaceutical industry also uses palm oil as a vitamin E source. The effort to harvest vitamin E from palm oil has long been developed by the pharmaceutical industry through an extraction process and later produced as vitamin E capsules. Hence, oil palm plantations can be dubbed "biological factories" of vitamin E. Oil palm plantations are not only the most efficient producers of vegetable oil in the world, they are also the most efficient sources of vitamin E. In the future, besides being the world's largest producer of palm oil, Indonesia has the potential to become the largest exporter of vitamin E.

The description above clearly states that vitamin E in palm oil is much higher compared to other vegetable oils.

MYTH 8-06

Palm oil contains cholesterol.

FACTS

There has been a perception that has developed into a myth that palm oil contains cholesterol. The myth has grown stronger and it created a phobia in society against the consumption of oil-containing food, such as fritters, in fear of the high level of cholesterol.

Such a perception was formed because of the smear campaign thrown around by the American Soybean Association (ASA) in the early 1980s. In order to corner the market in tropical vegetable oils, especially palm oil, which at the time had become a threat to the world soybean oil market, the ASA sent out propaganda claiming that palm oil contained cholesterol and even suggested that the US government ban palm oil in the country. However, the accusation was not substantiated by health and nutrition research in various countries.

By far, no nutrition experts in the world have ever stated that cooking oil made of vegetable oil such as palm oil contains cholesterol. Cholesterol can only be produced by animals and humans, while plants doesn't have the ability to produce cholesterol (Calloway and Kurtz, 1956; USDA, 1979; Life Science Research Office, 1985; Cottrell, 1991; Muhchtadi, 1998; Muhilal,1998; Hariyadi, 2010; Giriwono and Andarwulan 2016). The cooking oil produced from oil palm does not contain cholesterol.

MYTH 8-07

Palm oil does not contain essential fatty acids for the human body.

FACTS

According to the science of nutrition, the three essential fatty acids in the human body are oleic (C18 : 1), linoleic (C18 : 2) and linolenic (C18 : 3). The fatty acid in palm oil (Table 8.4) contains a sufficient and balanced amount of essential fatty acid. If breast milk is used as the benchmark for the standard biological value, the composition of essential fatty acid in palm oil is close to that of breast milk.

Table 8.4: The comparison of palm oil fatty acid composition and breast milk (percentage)

Type of fatty acid	Palm oil	Breast milk
<C14 : 0	1.2	13.5
C16 : 0	49.3	32.2
C18 : 0	4.1	6.9
C18 : 1	36.3	36.5
C18 : 2	8.3	9.5
C18 : 3	0.5	1.4
C20 : 0	0.3	-

Source: Muhilal (1998)

Palm oil contains 36.3 percent essential oleic fatty acid, while breast milk contains 36.5 percent. The essential linoleic fatty acid in palm oil amounted to 8.3 percent, a tad lower than the linoleic fatty acid content in breast milk of 9.5 percent. The small difference is also found for linolenic fatty acid in palm oil, which amounted to 0.5 percent, while it is 1.4 percent in breast milk. Research conducted by Marangoni et al. (2000) revealed that breast milk contains 25 percent palmitic fatty acid, which is essential for baby growth.

The data above show that palm oil contains essential fatty acid in a balanced amount and is even similar to the composition of essential fatty acid in breast milk.

MYTH 8-08

Palm oil consumption increases blood cholesterol levels and triggers heart diseases: cardiovascular and arteriosclerosis.

FACTS

Cholesterol is a type of fat that is essential for health. If the level of cholesterol is too high and unstable, however, it may cause harm to health.

There are three lipid fractions that determine the quality of cholesterol in the human body. They are "bad" cholesterol or LDL (low-density lipoproteins), "good" cholesterol or HDL (high-density lipoproteins) and fatty acid or triglycerides. In general, high levels of LDL and triglycerides may harm health. In contrast, an increase of HDL levels is favorable and beneficial for health. In other words, everything that may cause the levels of LDL and triglycerides to increase increases the level of "bad" cholesterol. Meanwhile, if it increases HDL levels, that means it increases "good" cholesterol.

Many experts on health and nutrition have confirmed the correlation of consuming palm cooking oil to cholesterol levels. There have been dozens of research projects conducted at home and abroad, the results of which have been published in international journals (American Journal of Clinical Nutrition and Journal of Nutrition and Biochemistry, among others), on the examination of palm cooking oil and its impact on increasing cholesterol levels in the human body.

The consumption of palm oil can decrease LDL by 21 percent and triglycerides by 14 percent, while increasing HDL by 24 percent (Mien dkk, 1989). This means that the consumption of palm oil actually decreases the level of "bad" cholesterol and at the same time increases the level of "good" cholesterol, which is favorable for human health.

More research conducted by other experts (Lindsey et al., 1990; Hayes et al., 1991; Ng et al., 1992; Goodnight et al., 1992;Truswellet al., 1992; Wood et al., 1993; Hayes et al., 1995; Aro, 1995; Choudhury et al., 1995; Sundram et al., 1994, 1995, 1997; Choudhury et al., 1995; Ghafoorunissa et al., 1995; Zhang et al., 1997b; Hornstra, 1998; French et al., 2002; Voon et al., 2011; Gouk et al., 2013; Gouk et al., 2014) corroborated the conclusion that the consumption of palm cooking oil is not harmful to human health. On the contrary, the consumption of palm oil actually improves body cholesterol by increasing the level of "good" cholesterol (HDL) and decreasing the level of "bad" cholesterol (LDL) and triglycerides while lowering body fat deposition. Therefore, the consumption of palm oil actually helps lower the risk or prevents various diseases associated with the level and quality of blood cholesterol, such as cardiovascular and arteriosclerosis.

The improvement of blood cholesterol levels is attributed to the nutrient composition of palm oil, which contains a stable composition of fatty acid, essential fatty acid content, active compounds and antioxidants, and to the absence of hydrogenation in the production of palm cooking oil.

MYTH 8-09

Palm oil contains trans-fatty acids.

FACTS

Trans-fatty acid is detrimental to human health (FAO, 2010). Therefore, many Western countries prohibit the use of trans-fatty acid in food.

Trans-fatty acid is derived from hydrogenation (in particular the partial hydrogenation process) to increase the density of oil in the production of edible oils such as soybean oil. Palm cooking oil, which naturally has a stable composition of saturated fatty acid and unsaturated fatty acid, is already semi-solid with a melting

range of between 33oC and 39oC and therefore hydrogenation is unnecessary in the process so trans-fatty acid will not appear (Hariyadi, 2010).

In conclusion, palm cooking oil does not contain free trans-fatty acid. The properties of palm oil, especially stearin, can replace vegetable oils containing trans-fatty acid (Hariyadi, 2010; Giriwono and Andarwulan, 2016).

MYTH 8-10

Palm oil is carcinogenic.

FACTS

Cancer is among the most feared diseases because of the high number of fatalities in a year. Cancer is the uncontrolled growth of particular cells that mutate and attack normal body cells. There are various Factors that may cause cancer, such as radiation, viruses, chemical substances and others. The most updated theory on the cause of cell mutation is the presence of free radicals in the human body.

To treat and to hamper the growth of cancerous cells, free radicals have to be eradicated. Various research projects conducted at home and abroad (Sylvester et al., 1986; Chong, 1987; Sundram et al., 1989; Komiyama et al., 1989; Muhilaldkk, 1991; Iwasaki and Murokoshi, 1992; Goh et al., 1994; Guthrie et al., 1993, 1995) have substantiated that the consumption of palm oil is beneficial for suppressing the growth of cancerous cells, lowering and controling the growth (weight and volume) of tumors and preventing many other degenerative diseases.

Such effectiveness is attributed to the antioxidant properties, such as carotene (vitamin A), tocopherol and tocotrietol (vitamin E), contained in palm oil. As a footnote, palm oil is more effective compared to soybean oil in the prevention of degenerative diseases because the antioxidant content of palm oil, especially

tocotrienol, is twice the amount found in soybean oil (Cho, et al., 2009).

MYTH 8-11

Palm oil consumption may lead to diabetes.

FACTS

In the past few years there has been a debate over whether the consumption of vegetable oils causes obesity and therefore has the potential to cause diabetes. Research by experts on health and nutrition on the relation of palm oil consumption to diabetes is still limited because of uncommon incidents.

Cases of diabetes are related to insulin secretion, which is essential for blood sugar metabolism. Some existing research shows that the consumption of palm oil has no impact on insulin secretion and therefore is not a cause of diabetes and it even tends to reduce diabetes cases. Sundram, et al., (2007), Peairs, et al., (2011) and Filippou, et al., (2014) found that the consumption of palm oil does not affect the secretion function of insulin, nor the level of blood glucose. On top of that, Bovet, et al., (2009) revealed that lowering the intake of palm oil will actually increase cases of diabetes.

An interesting finding is that the consumption of both fully hydrogenated soybean oil and partially hydrogenated soybean oil hampers the production of insulin glands, increases the level of blood glucose and lowers HDL cholesterol (Sundram, et al., 2007).

It is clear that the consumption of palm oil as a food product has no effect on insulin secretion and diabetes. On the contrary, the consumption of hydrogenated soybean oil actually hampers the production of insulin and therefore has the potential to increase the cases of diabetes.

MYTH 8-12

Palm oil use is limited to cooking oil.

FACTS

Palm oil is a vegetable oil, the derivatives of which can be applied to many purposes that include food ingredients (edible oil), pharmaceutical and health purposes, toiletries and cosmetics (health products) and fuel and lubricants (non-edible). Besides cooking oil, other palm oil-based products include margarine, trans-free margarine, palm oil-based pourable margarine, reduced-fat spreads, shortening, Vanaspati, palm oil-based yoghurt, ice cream and many others (Table 8.5).

Besides food products, palm oil is also a source or ingredient for pharmaceutical products (vitamin E, pro-vitamin A, microencapsulated products, antioxidant, et cetera), cosmetic products (washing detergent, soap, transparent soap, body scrub, body deodorant, color cosmetic, shampoo and hair conditioner).

Table 8.5: The use of palm oil for food products, pharmaceuticals, health, toiletries and cosmetics

FOOD PRODUCTS	
Cooking Oils	Expanded and Extruded Snacks
Margarine	Nuts (Dried)
Trans-free Margarine	Doughnuts
Palm Based Pourable Margarine	Oriental Noodles
Reduced Fat Spreads	Confentionary Fat and Coating
Shortening	Sugar Confectionary
Vanaspati	Ice Cream
Bakery Fats	Filled Milk
Biscuit Fats	Coffee Whiteners
Peanut Butter	Palm Based Santan Powder
Flour Confectionery	Palm Based Processed Cheese
Pastry	Microencapsulated Palm Based Product
Drycake and Pastry Mixed	Palm Based Youghurt
Palm Based Spray Oil	Palm Olein Salad Dressing
Frying Oils and Fats	Soup Mixes
Potato Chips	Emulsifiers
PHARMACEUTICAL, HEALTH, TOILETRIES, COSMETIC PRODUCTS	
Vitamin E	Body Scrub
Pro-vitamin A (Carotene)	Body Deodorant
Micro Encapsulated	Color Cosmetic
Washing Detergent	Shampoo
Soap	Conditioner
Transparent Soap	Hand Wash
Moisturizing Cream	Oral Care
Anti-Wrinkle Cream	Detergent
Skin Whitening Cream	Lotion
Sunscreen Cream	Lipstick
Facial Cleansing Cream	Antioxidant
Shower Bath Soap	
FUEL AND LUBRICANT PRODUCTS	
Biodiesel Fuel	Transformer Oil
Hydraulic Fluid	Metal Working Fluid
Gear Oil	Drilling Mud
Chainsaw Oil	Grease
Compressor Oil	Car Shampoo
Turbin Oil	Ethanol/Biopremium
Bioelectricity	Biogas

Source: MPOB (2013)

Other than the above uses, palm oil can also be used for fuel and lubricant products (biodiesel fuel, hydraulic fluid, gear oil, chainsaw oil, biogas and others). In conclusion, palm oil is not used only for cooking oil. The application of palm oil is widely varied and includes the food, health, cosmetics, energy and biomaterial industries. Hundreds of products based on palm oil and its derivatives can be produced these days. In the future, the number of products produced by or using palm oil will keep increasing in line with the intensifying research on product development.

Chapter 9
Myths Vs.Facts
National Policy and Governance of Oil Palm Plantations

One of the accusations leveled against the Indonesian palm oil industry concerns plantation development, which has been perceived as unsustainable. It is alleged that Indonesia neither hasa sustainable national policy nor implements good management atits oil palm plantations.

Indonesia has adopted a sustainable development paradigm under which economic development (profit), social development (people) and environmental protection (planet) are balanced, inclusive and harmonious. In comparison, a development paradigm that focuses only on environmental protection (environtalism) is not sustainable. Sustainable development can only be realizedif it covers economic sustainability, social sustainability and environmental sustainability.

The following is the dialectic between the myths and the facts related to sustainable development policy and management, as well as the implementation of sustainable management at oil palm plantations in Indonesia.

MYTH 9-01

Indonesia does not have a national policy on sustainable development.

FACTS

Indonesia is still in the early stages of its development pathway towards the future. Nevertheless, the government has, since the outset, established foundationsfor cross-sectoral and cross-jurisdictional policy on national development management.This national policy is a set of regulations beginningwith laws and to ministerial regulations in lieu of law.

The laws related to national development management (Table 9.1) include laws and government regulationson spatial planning, land use, technology, management, human resources, environment, products and other types.

As a whole, the prevailing laws convergeon the sustainable development paradigm. Indonesia adopted a sustainable development paradigm in which economic development (profit), social development (people) and environmental protection (planet) work together in a balanced, inclusive and harmonious manner.

Economic development per se (developmentalism) while overlooking environmental protection (environmentalism) is not sustainable development. On the other hand, development that focuses solely on environmentalism is also not sustainable. Sustainable development can only be realized when it covers economic sustainability, social sustainability and environmental sustainability.

Table 9.1: National Policy and Sustainable Development Management in Indonesia

Regulation/Policy	Issue
1945 Constitution and Preambule	
UU No. 12 Year 1992	Agricultural System
UU No. 5 Year 1960	Agrarian Principles
UU No. 13 Year 2003	Manpower
UU No. 39 Year 2014	Plantations
UU No. 32 Year 2009	Environmental Management
UU No. 26 Year 2007	Spatial Planning
UU No. 5 Year 1990	Conservation of Natural Resource Biodiversity and Ecosystems
UU No 41 Year 1999	Forestry
UU No. 17 Year 2004	Ratificationof Kyoto Protocol to the United Nations Framework Convention on Climate Change
UU No. 29 Year 2000	Protection of Plant Varieties
UU No 18 Year 2012	Food
UU No. 8 Year 1999	Consumer Protection
UU No. 36 Year 2009	Health
UU No. 1 Year 1970	Workplace Safety
UU No. 40 Year 2007	Limited Liability Company
UU No. 20 Year 2014	Standardization and Compliance Assessment
UU no. 3 Year 2014	Industry
UU No. 7 Year 2014	Trade
UU No. 21 Year 2014	Ratification of Cartagena Protocol on Bio Safety to the Convention on Biological Diversity
UU No. 5 Year 1994	Ratification of United Nations Convention on Biological Diversity
UU No. 23 Year 2002	Child Protection
UU No. 25 Year 2007	Investment
UU No 18 Year 2013	Prevention and Eradication of Forest Degradation
UU No.19 Year 2013	FarmersProtection and Empowerment
UU No. 25 Year 1992	Cooperatives

Sustainable development has a holistic, indivisible approach. The sustainable development of a region will not succeed if only one sector or one industry is sustainable. Sustainable development must be seen as a whole that is cross-sectoral, cross-jurisdictional/regional and cross-generational.

MYTH 9-02

Development policy in Indonesia has no concerns about biodiversity conservation.

FACTS

World economies should learn a lesson from Indonesia on life spatial planning. As stipulated in Law No. 41/1999 on Forestry and Law No. 26/2007 on Spatial Planning, Indonesia has set a minimum of 30 percent land use as forests. Land use in each region is split intoconservation zones and non-forest/cultivation zones. Indonesia adopted a policy that allows the harmonious coexistence of non-forest areas (town centers and residential areas, industry, agriculture and farming areas, etc.) and conservation areas (protected and conserved forests) (Figure 9.1).

Forestsare maintained for natural biodiversity (animal, plants and endemic microorganisms), as natural barriers and as nature preserves. Meanwhile, the majority of the remaining 70 percent is designated for all development sectors such as agriculture, plantations, husbandry, urban areas, residential areas and other purposes.

According to 2015 data(Forestry Statistics, 2015), for example, out of 187 million hectares of land in Indonesia, satellite imaging shows 88 million hectares of forests, or 47 percent of total land, which is above the minimum requirement as stipulated by law. More than half of the existing forests are primary forests and the natural habitats of elephants, tigers, orangutans,

rhinoceroses, lions, bears, various birdspecies and other faunaacross the archipelago.

Farming and village areas cover 55 million hectares, or 29 percent of total land. Meanwhile, an urban area, which includes residential area, business districts, etc., is 43 million hectare, or 23 percent oftotal land. Included in the farming and village areasare palm oil plantations, which accountfor 10.7 million hectares, or 5 percent of the total land of Indonesia.

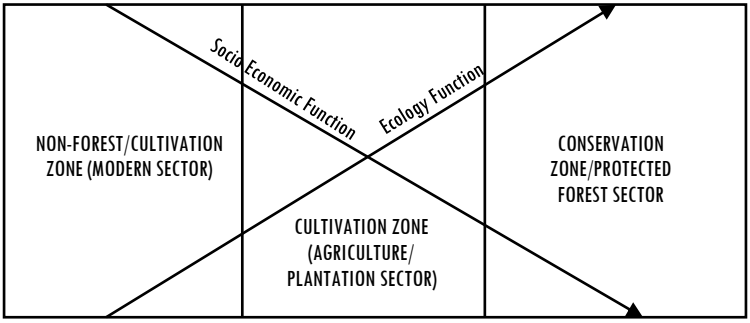


Figure 9.1: "The Co-existence of Modern Sectors, Agriculture/Plantation Sectors and Conservation Zones/Protected Forest Sectors in Indonesia"

Urban areas, agriculture/plantation zones and forestscoexist and grow on Indonesia land. Forests, as the natural habitat for diverse biological life, must be maintained, because their existence hasa unique function that cannot be replaced by the function assumed by agriculture/plantation and urban areas. On the other hand, urban areas, as the center of society's life activities, also have its own space and functionsthat cannot be replaced by forests or agriculture/plantation zones.

The same argument applies to agriculture/plantation zones as the producer of food, energy and biomaterials, which also has its own space and function that cannot be replaced by urban area or forests. Residential/urban areas, agriculture/plantation zones and forests each havetheir own indispensable function within an

ecosystem, and they must therefore exist in harmony withintheir designated spaces.

In other words, “Malls, Oil Palms, and Orangutans” coexist in harmony within their own spaces. Thisslogan describes the spatial planning policy for a sustainable ecosystem in Indonesia.

MYTH 9-03

Indonesia does not have a conservation system for natural biodiversity.

FACTS

The natural biodiversity of flora and fauna is the essence of the ecosystem, linked by the complex food web. For that reason, the conservation of natural biodiversity should not use a sectoral approach, but instead an ecosystem approach. Natural biodiversity is priceless wealth in the ecosystem, which should be conservedthrough the generations.

Unlike the North American and European countries that cleared virgin forests at the onset of industrial development, Indonesia, with its national philosophy “Unity in Diversity”, has from the start followed the land-use paradigm in utilizing natural forests,i.e.,"flora and fauna live side by side in harmony in their own habitats".

The paradigm’s implementation is stipulated in several different regulations, such as Law No. 41/1999 on Forestry, Law No. 26/2007 on Spatial Planning and Law No. 5/1990 on Conservation of Natural Biodiversity and Ecosystems.

According to the prevailing laws, land in Indonesia is divided into two primary zones, Conservation Zone and Cultivation Zone (Tabel 9.2). The main function of the Conservation Zone is to “house” the conservation of flora and fauna either in situ (within their natural habitats) or ex situ (outside their natural habitats), the latter of which is a combination of natural and human efforts.

Meanwhile, the Cultivation Zone is also another means for conserving biodiversity through forestry farming methods.

Table 9.2: Biodiversity Conservation System in Indonesia

	In Thousand Hectares	%
Ex Situ and In Situ Biodiversity Conservation in Conservation/Protected Zones		
Nature Preserves, Wildlife Sanctuaries, National Parks, Nature Parks, Community Forests, Game Hunting Reserves, etc.	41,575	22.1
Biodiversity Conservation by Forestry in Cultivation Zones		
Limited Production Forests, Production Forests, Conversion Production Forests, Industrial Forest Plantations	46,562	24.8
Total Forest Area	88,137	46.9
Plantations (Oil Palm, Rubber, Coconut, Cacao, Coffee, Tea, Sugarcane, etc.)	22,700	12.1
Total Land Cover	110,837	59.0
Food Crops, Vegetable Horticulture Farms, Fruit Farms, Tropical Plants/ Biopharmaceuticals/Medicinal Plants, Animal Husbandry Farms, Freshwater Fisheries	32,901	17.5
Other sectors	44,036	23.5
Total Land Area	187,774	100.0

Source: Environment and Forestry Ministry, Agriculture Ministry, Central Statistics Agency

In situ biodiversity conservation is conducted by keeping the flora and fauna in their natural habitats in protected forests and conservation forests (virgin forests). As each region has a unique ecosystem and natural biodiversity, protected/conservation forests exist in all regions in Indonesia. Protected/conservation forests are not to be converted for other functions. The second method of biodiversity conservation is by maintaining flora and fauna in man-made habitats, similar to but outside their natural habitats. Ex situ facilities take the forms of forest parks, botanical parks or zoos, which exist in many regions. Besides their function

to conserve flora and fauna, ex situ facilities are also designed as public recreationareas.

The main function of Cultivation Zones is to facilitate social activities through farms, plantations, production forests, urban areas, residential areas and other designed spaces. The expansion of oil palm plantations takes place within the Cultivation Zone. Unlike the Conservation Zone, land use in the Cultivation Zone is convertible. An area initially allotted for farming can be converted into a non-farming area, production forests can be converted to non-production forests, and oil palm plantations can be converted into non-oil palm plantations, and vice-versa. The Cultivation Zone has not only social and economic functions, but as a whole, also has a third function of biodiversity conservation through cross-generational plant cultivation, animal husbandry farms and fisheries.

Farming plants and animalsare among an effective means to conserve biodiversity while at the same time,catering tohuman needs as has been recorded in the history of civilizations. Agricultural farms, plantations, industrial forestplantations, animal husbandry farms and fisheries, as a whole,are a means to conserve natural biodiversity in human history.

MYTH 9-04

The expansion of oil palm plantations depletes the natural habitat of animals and biodiversity.

FACTS

Indonesia is not Europe or North America, which, at the beginning of their industrial development era, cleared all primary forests, and thus no longer have natural forests to house wildlife or natural biodiversity.

Hence, the countries in Europe and North America are currently reestablishing protected/conserved forests called High Conservation Value (HCV) and High Carbon Stock (HCS).

Indonesia, on the contrary, embarked on its development by preserving 30 percent of its total lands as natural forests, including protected forests and conservation forests. Virgin forests are protected from deforestation by Law No. 41/1999 on Forestry, Law No. 5/1990 on Conservation of Natural Resources and Ecosystems and Law No. 26/2007 on Spatial Planning as the home for wildlife such as orangutan, Sumatran tigers, elephants, rhinoceroses, Komodo dragons, and other diverse species.

Within the protected/conserved forests in Indonesia (Table 9.3) are 4 million hectares of Strict Nature Reserve and 5 million hectares of Wildlife Sanctuary. Other than theseis13 million hectares of Nature Conservation Area that consists of National Parks, Nature Recreational Parks, Grand Forest Park and Game Hunting Parks.

Table 9.3: Functions of High Conservation Value (HCV) Protected and Conservation Forests in Indonesia

Description	Land		Maritime	
	Unit	Ha	Unit	Ha
1. Nature Conservation				
a. Strict Nature Reserve	222	3,957,691	5	152,610
b. Wildlife Sanctuary	71	5,024,138	4	5,588
2. Natural Resource Conservation				
a. National Park	43	12,328,523	7	4,043,541
b. Nature Recreational Park	101	257,323	14	491,248
c. Grand Forest Park	23	351,680	-	-
d. Game Hunting Park	13	220,951	-	-

Source: Forestry Ministry Statistics, 2013

Protected and conservation forests are those forests with High Conservation Value (HCV) for biodiversity and the natural habitats and they are also High Carbon Stock (HCS).

The development of oil palm plantations takes place in Cultivation Zones, outside protected and conserved forest areas. The development of oil palm plantations has actually regreened, both ecologically and economically, uninhabited areas and critical lands after massive logging activities during 1970-1990.

MYTH 9-05

Biodiversity is being destroyed on Sumatra Island

FACTS

Sumatra Island is the pioneer and the center of oil palm plantations in Indonesia. The origin of the establishment of oil palm plantations on Sumatra is elaborated in Myth 7-03.Sixty-three percent of all **oil** palm plantations in Indonesia are located in Sumatra. The total land area of Sumatra is 47.2 million hectares, of which 22.9 million hectares, or 48.6 percent, are forest areas (forest cover and vegetation cover). Non-forest areas cover 24.4 million hectares, or 51.4 percent of the total land area of Sumatra (Table 9.4).

The area of oil palm plantations in Sumatra is 6.8 million hectares, or a mere 14.4 percent of the island's total land area. According to these figures, the largest allocation of land use in Sumatra Island is for forest areas, and not oil palm plantations.

In line with national policies, the "home" for natural biodiversity, protected forests and conserved forests, takes up 10.7 million hectares of the island. Both in situ and ex situ biodiversity conservation are distributed throughout all Sumatran provinces.

Table 9.4: Land use in Sumatra Island

Land use	Thousand Hectares	Percentage
Conservation Zones		
Conservation Forests (KSA-KPA)	5,082.30	10.77
Protected Forests	5,593.50	11.85
Cultivation Zones		
Limited Production Forests	2,886.70	6.12
Production Forests	7,372.60	15.62
Conversion Production Forests	2,001.00	4.24
Subtotal Forest Area	22,936.10	48.6
Oil Palm Plantations	6,803.55	14.42
Other Sectors	17,450.55	36.98
Total Land Area	47,190.20	100.00

Source: Forestry Statistics (2015); Oil Palm Plantation Statistics (2015)

North Sumatra, for example, as the starting point of oil palm plantation development, still maintains a biodiversity "home" in the region (Table 9.5), consisting of: (a) National Parks in three locations with a total area of 1,263,492 hectares; (b) Strict Nature Preserves in five locations with a total area of 16,531 hectares; (c) Wildlife Sanctuaries in four locations with total area of 83,638 hectares.

Table 9.5: In Situ Biodiversity Conservation in North Sumatra Province

Name	Area (ha)	Biodiversity
National Park		
Gunning Leaser	1,094,692	**Flora:** Silo(*Johannesteijsmanniaaltifrons*), Rafflesia(*Rafflesiaatjehensisand R. micropylora*), *Rhizantheszippelnii*,etc.. **Fauna**: Sumatran orangutan *(Pongo abelii),* Sumatran elephant (*Elephasmaximussumatranus*), Sumatran tiger (*Pantheratigrissumatrae*), Sumatran two-horn rhinoceros *(Dicerorhinussumatrensis),*RusaSambar*(Rusa unicolor),*Sun Bear (*Helarctosmalayanus*),Sarudung*(Hylobateslar)* ,Siamang(*Shimphalangussindactilus*), Long-tailed Macaque *(Macacafascicularis)*, Macaque *(Macacanemestrina),* Sumatran serow*(Capricornissumatraensis),*Leopard *(Pantherapardus)*, Rhinoceros Hornbill *(Buceros rhinoceros),* etc.
BatangGadis	108,000	**Flora**: Rafflesia (*Rafflesiaatjehensisand R. micropylora)*, Ixora flower *(Ixorapaludosa kurz.)* etc. **Fauna**:Sumatran Tiger (*Pantheratigrissumatrae*), Sumatran Serow*(Capricornissumatraensis),*Tapir(*Tapirus indicus)*, Sun Bear (*Helarctosmalayanus*), Deer (*Cervidae)*,Kijang*(Muntiacini),* Macaque *(Macacanemestrina)*, Black-handed gibbon (*Hylobatesagilis),*Long-tailed Macaque *(Macacafascicularis)*,Siamang(*Shimphalangussindactilus*), Caracal cat *(Caracal aurata),* Clouded leopard (*Neofelisnebulosi*) etc.
Grand Forest Park Bukit Barisan	51,600	**Flora**: Sumatran pine (*Pinusmerkusii*),Needlewood(*Schimawallichii*), Rasamala(*Altingiaexelsa*),Meang(*Alseodaphnes p.),PodocarpusSp*, Iron redwood (*Toonasurei*) etc. **Fauna**: Wau-Wau(*Hylobateslar*),Brahminy Kite *(Haliasturindus),* Hornbill *(Bucerossp.)*, Green junglefowl*(Gallus varius)* etc.

Table 9.5: In Situ Biodiversity Conservation in North Sumatra Province (continuation 1)

Name	Area (ha)	Biodiversity
Strict Nature Preserve		
Batugajah	0.89	**Flora**: Sumatran Pine (*PinusMerkusii*),Dita tree (*Alstoniascolaris*), Sugar palm *(Arengapinnata)*etc. **Fauna**: Palm civet (*Paradoxurushermaphroditus*),Treeshrew*(Scandentia),* Wild boar (*Susscrofa*), Apes *(Hominoidea)*, Spotted Dove *(Spilopeliachinensis),* Imperial pigeon *(Ducula),*Sooty-headed bulbul*(Pycnonotusaurigaster)* etc.
BatuGinurit	0.48	**Flora**: Rattan (*Calamusciliaris, C.exilis*) etc. **Fauna**: Rusa(*Cervustimorensis*), Macaque (*MacacaNemestrin)*, Wild boar (*Susscrofa*), Squirrel *(Sciuridae),* Imperial pigeon *(Ducula)*, Bats *(Chiroptera)*, etc.
DolokSautSurungan	39	**Flora**: Iron redwood (*Toonasurenimerr)*etc. **Fauna**: Wild boar (*Susscrofa*),Rusa(*Cervustimorencis*),Siamang(*Shimphalangussindactilus*), Sumatran serow*(Capricornissumatraensis)*, Hornbill (*Bucerotidae)*, Imperial pigeon *(Ducula)* etc.
DolokSibualbuali	5,000	**Flora**: *RafflesiaSp* etc. **Fauna**: Orangutan (*Pongo*), Mouse-deer (*Tragulus*),Barking deer (*Muntiacusmuntjak*), Malayan pangolin (*Manis javanica*), Sun Bear (*Helarctosmalayanus*),Siamang(*Shimphalangussindactilus*), Marbled Cat *(Pardofelismarmorata),*Wreathed Hornbill*(Rhyticerosundulates),*Scops Owl (*Otus*) etc.
DolokSipirok	6,970	**Flora**: *Rafflesiasp.*etc. **Fauna**: Orangutan (*Pongo*), Mouse-deer (*Tragulus*), Barking deer (*Muntiacusmuntjak*), Malayan Pangolin (*Manis javanica*), Sun Bear (*Helarctosmalayanus*),Siamang(*Shimphalangussindactilus*), Marbled Cat *(Pardofelismarmorata),* Wreathed

		Hornbill*(Rhyticerosundulates)*,Scops Owl (*Otus*) etc.

Table 9.5: In Situ Biodiversity Conservation in North Sumatra Province (continuation 2)

Name	Area (ha)	Biodiversity
DolokTinggiRaja	167	**Flora**: Red Meranti(*Shoreaacuminata*), Walnuts (*Canariumsp*.), Rattan (*Calamusciliaris, C.exilis*), Orchids (*Orchidaceae*), Tropical pitcher plants (*Nepenthes*) etc. **Fauna**: Sumatran tiger (*Pantheratigrissumatrae*), Mouse-deer (*Tragulusjavanicus*), Barking deer (*Muntiacusmuntjak*),Rusa(*Cervustimorensis*), Sumatran serow(*Capricornis*),Siamang(*Shimphalangussindactilus*), Bear (*Ursidae*) etc.
LiangBalik	0.31	**Flora**: Banyan tree (*Ficusbengamin)*, Dark red Meranti*(Shoreaplatyclados)*,Mayang(*Payenaacuminita)*,Haundolok*(Eugeniasp.)*,Darah-Darah*(Horsfieldiasp.),* DamoliBunga*(Sloetiaelongata)*,Medang*(Litseasp.)*,Durian*(Duriosp.)*,Kempas*(Coompaissp.),* etc. **Fauna**: Siamang*(Symphalangussyndactilus),*Black-handed gibbon *(Hylobatesagilis),*Leopard cat (*Felisbengalensis),*Marbled cat *(Felismamorata),*Macaque (*Macacafescicularis),*Spotted giant flying squirrel *(Petauristaelegans),*Three-striped ground squirrel *(Lariscusinsignis),*Tree Squirrel *(Sundasciurussp.),*Green snake *(Tremorosurussp.),*Giant turtle *(Orlitiabornensis),*Wild Boar *(susvitatus),*Hawk *(Accipitridasp.),* Great Hornbill *(Bucerosbicornis),* Black-naped oriole *(OriolusChinensis),* Woodpecker *(Dinopiumsp.),* White-rumpedshama (*Copsychusmalabaricus)*, Sheath-tailed Bats *(Emallonurasp.),*Water monitor

		*(Varanussalvator),*Masked palm civet *(Pagumalarvata)* etc.

Table 9.5: In Situ Biodiversity Conservation in North Sumatra Province (continuation 3)

Name	Area (ha)	Biodiversity
LubukRaya	3,050	**Flora**: RaflesiaSp, Sumatran pine (Pinusmerkusii) etc. **Fauna**: Mouse-deer (Tragulus), Pangolin (Manis javanica), Sun Bear (Helarctosmalayanus),Siamang(Symphalangussyndactilus), Wrinkled hornbill (Rhyticeroscorrogatus)etc.
MarteluPurba	195	**Flora**: Meranti (*Shoreasp.)* etc. **Fauna**: Tiger *(Pantheratigris),*Sumatran serow*(Capricornis)*,Wild Boar *(Susvitatus)*, Bear (*Ursidae)* etc.
SeiLedong	1,100	Flora, Fauna and Natural Bastion
Sibolangit	9.15	**Flora**: Rosewood (*Pterocarpusindicus*),Laurelwood (*Calophylluminophyllum*),Meranti (*Shorea*sp.), etc. **Fauna**:Wild Boar (*Susvitatus*), Mouse-deer (*Tragulusjavanicus*), Pangolin (*Manis javanica*),Bear cuscus (*Ailuropssp.)*, Hornbill (*Bucerotidae*) etc.
Wildlife Sanctuary		
Barumun	40,062	**Flora**: *Dipterocarpaceae* family such as Yellow Meranti (*Shoreamultiflora),* Red Meranti(*Shoreaacuminata*), Ironwood (*Casuarina sumatrana*), Sumatran pine (*Pinusmerkusii*), Malayan Yellow-wood (*Podocarpusimbricatus*), Mountain Ru (*Dacrydiumjunghuhnii*) etc. **Fauna**: Sumatran tiger (*Pantheratigrissumatrae*), Sumatran elephant (*Elephasmaximussumatranus*), Hornbill (*Bucerotidae*),Siamang*(Symphalangussyndactilus)*,Tapir(*Tapirus indicus)*etc.

Table 9.5: In Situ Biodiversity Conservation in North Sumatra Province (continuation 4)

Name	Area (ha)	Biodiversity
KarangGading	13,670	**Flora:** Tall-stilt mangrove (*Rizophoraapiculata*),SmallflowerBruguiera(*Bruguieraparviflora*),Buta-Buta(*Excocariasp.)*, Mangrove Cannonball (*Xylocarpusgranatum*), Nipah(*Nipa frutican*), etc. **Fauna**: Macaque (*Macacafascilcularis*), Langur (*Presbytiscristata*), Kingfisher (*Alcedoathis*), etc.
DolokSurungan	21,540	**Flora**: Ironwood (*Casuarina sp.)*, Mayang(*Palaguiumsp.)*,Haundolok(*Eugenia sp.)*,Chempaka(*Manglietiasp.)*, etc. **Fauna**: Rusa(*Cervustimorensis*), Wild Boar *(Susvitatus)*, Sumatran tiger (*Pantheratigrissumatrae*), etc.
Siranggas	8.366	**Flora**: Oak (*Quercussp.)*,Meang(*Palagiumsp.)*, Fern pine (*Podocarpussp.)*,Damar(*Agathissp.)*, Durian (*Duriozibethinus*), Horse mango (*Mangiferasp.)*, Forest Mangosteen(*Garcinia sp.)*, etc. **Fauna**: Sumatran tiger (*Pantheratigrissumatrae*),Rusa(*Cervustimorensis*), Mouse-deer (*Tragulusjavanicus*), Bear (*Ursidae*), Pangolin (*Manis javanica*), etc.

Source: Environment and Forestry Ministry

Riau, the province with the largest areal of oil palm plantation, also maintains its biodiversity "home" (Table 9.6) which consists of: (a) National Park in 2 locations with total area of 243,143 hectare; (b) Strict Nature Preserve in 3 locations with

total area of 20,700 hectare; (c) Wildlife Sanctuary in 5 locations with total area of 341,292 hektar.

Table 9.6: Biodiversity Conservation In Situ in Riau Province

Name	Area (ha)	Biodiversity
National Park		
BukitTigaPuluh	143,143	**Flora**: CendawanMukaRimau (*Rafflesiahasseltii*), Salo (*Johannestejsmaniaaltifrons*), Mapau (*Pinangamultiflorai*), Jernang (*Daemonoropsdraco*), Rattan (*Calamusciliaris, C.exilis*), PinangBancung (*Nengagajah*), AkarMendera (*Phanerakochiana*), Meranti (*Shoreapeltata*), KedudukRimba (*Baccaurearacemosa*), PasakBumi (*Eurycomalongifolia*), KayuGaharu (*Aquilariamalacensis*), Jelutung (*Dyeracostulata*), GetahMerah (*Palaquiumsp.)* , Pulai (*Alstoniascolaris*), Kempas (*Koompassiaexcelsa*), Rumbai (*Shorea spp.*), Medang (*Litsea sp., Dehaasiasp.)*, KulitSapat (*Parashoreasp.)*, Bayur (*Pterospermumjavanicum*), KayuKelat (*Eugenia sp.)*, Kasai (*Pometiapinnata*), etc. **Fauna**: White-handed gibbon (*Hylobateslar*), Black-handed gibbon (*Hylobatesagilis*), Siamang (*Symphalangussyndactylus*), Macaque (*Macacanemestrina*), Long-tailed Macaque (*Macacafascicularis*), Lutung (*Presbytiscristata*), Simpai (*Presbytismalalophos*), Kukang (*Nycticebuscoucang*), Sumatran tiger Sumatera (*Pantheratigrissumatrensis*), Clouded leopard (*Neofelisnebulosa*), Leopard cat (*Felisbengalensis*), Marbled cat (*Felismarmorata*), Palm civet (*Paradoxurushermaphroditus*), Malayan civet (*Viverratangalunga*), Banded palm civet (*Hemigalusderbyanus*), etc.

Table 9.6; Biodiversity Conservation In Situ in Riau Province (continuation 1)

Name	Area (ha)	Biodiversity
TessoNilo	100,000	**Flora**: Kayu Bata (*Irvingiamalayana*),Kempas(*Koompasiamalaccensis*), Jelutung (*Dyeracostulata*), Kayu Kulim (*Scorodocorpusborneensis*), Tembesu (*Fagraeafragrans*), Gaharu (*Aquilariamalaccensis*),Ramin(*Gonystylusbancanus*),Keranji(*Dialiumsp.)*,Meranti(*Shoreasp.)*, Keruing(*Dipterocarpussp.)*, etc. **Fauna**: Sumatran elephant (*Elephasmaximussumatranus*), Sumatran tiger (*Pantheratigrissumatrae*), Pangolin (*Manis javanicu*),Rusa(*Cervustimorencis*), Macaque (*Macaccafascicilarus*), etc.
Wildlife Sanctuary		
PulauBerkey	500	**Flora**: Mangrove (*Rhizophora*),Api-Api (*Avicenia Alba*),Pidada(*Sonneratiasp.)*, Rattan (*Calamuscirearus*), Riang-Riang (*Ploiariumaltermifollium*), etc. **Fauna**: White-bellied sea eagle (*Haliaeetusleucogaster*), Crow pheasant (*Centropuscinensis*), Collared kingfisher (*Halcyon chloris*), Scarlet-headed flowerpecker(*Dicaeumtrochileum*), Wild Boar (*Susscrofa*), Long-tailed macaque (*Macacafascicularis*), Lutung (*Trachypithecusauratus*), Banded krait (*Bungarusfasciatus*), Mangrove snake (*Boigadendrophila*), etc.
BukitBungkuk	20,000	**Flora**: Meranti (*Shoreasp.)*, Bintangur (*Calophyllum spp.*), Kempas (*KoompassiaMalaccensismaing*), Keruing (*Dipterocarpussp.)*, Balam (*Palaquiumgulta*), Durian Hutan (*Duriosp.)*, Kulim (*Scorodocarpusboonensis*), Suntai (*Palagiumwalsunrifolium*), Rengas (*Glutarenghas*), etc. **Fauna**: Sun Bear (HelarctosMalayanus), Sumatran tiger (*Pantheratigrissumatrensis*), Rusa (*Cervustimorensis*), Mouse-deer (*Tragulusjavanicus*), Long-tailed macaque (Macacafascicularis), Red junglefowl(*Gallus gallus*), Forest lizard (*Calotesspp.*), Siamang (*Shimphalangussindactilus*), etc.

Table 9.6: Biodiversity Conservation In Situ in Riau Province (continuation 2)

Name	Area (ha)	Biodiversity
PulauBurung	200	**Flora**: Mangrove *(Rhizophora),*Singapuar*(Babyrousa)*, etc. **Fauna**: Blue-crowned hanging parrot*(Loriculusgalgulus),*Natuna leaf monkey (*Presbytisnatunae*), Humphead wrasse*(Cheilinusundulates)*, etc.
Wildlife Sanctuary		
BalaiRaja	18,000	**Flora**: Meranti(*Shoreasp.)*,Bintangur(*Calophyllumspp.*),Balam(*Palaquiumgulta*),Kempas (*Koompassiamalaccensismaing*), Giam*(Cotylelobiumflavumdipterocarpaceae),*K antongSemar*(Nepenthes)*, etc. **Fauna**: Sumatran elephant (*Elephasmaximussumatranus*), Sumatran tiger (*Pantheratigrissumatrae*),Sun Bear (*Helarctosmalayanus*), etc.
BukitBatu	21,500	**Flora**: Ramin (*GonystylusBancanus*), Gaharu (*Aquilariamalaccensis*), MerantiBunga (*Shorealeprosula*), etc. **Fauna**: Sumatran elephant (*Elephasmaximussumatranus*), Sumatran tiger (*Pantheratigrissumatrae*), Wrinkled hornbill (*Aceroscorrugatus*), etc.
TasikBelat	2,529	**Flora**: Ramin (*Gonystylusbancanus*),Meranti(*Shoreasp.)*,Pun ak (*TetrameristaGlabra)*,Kempas(*Koompassiamal accensismaing*),Bintangur (*Calophyllumspp.*), etc. **Fauna**: Sun Bear (*Helarctosmalayanus*), Sumatran tiger (*Pantheratigrissumatrae*), etc.
DanauPulauBes ar–Bawah	28,238	**Flora**: Ramin (*Gonystylusbancanus*),Meranti (*Shoreasp.)*,Kempas(*KoompassiaMalaccensism aing*),Punak (*Tetrameristaglabra)*,Terentang*(Campnosper maauriculatum),*Bintangur (*Calophyllumspp.*), Pulai*(Alstoniascholaris),*Rengas*(Glutarenghas)*, etc. **Fauna**: Hair-crested adjutant stork *(Leptoptilosjavanicus),*Wallace's hawk-eagle *(Nisaetusnanus),*Sumatran elephant (*Elephasmaximussumatranus*), Sumatran tiger

		(*Pantheratigrissumatrae*),Tapir(*Tapirus indicus)*, etc.

Table 9.6: Biodiversity Conservation In Situ in Riau Province (continuation 3)

Name	Area (ha)	Biodiversity
TasikBesar–Metas	3,200	**Flora**: Ramin (*Gonystylusbancanus*), Meranti (*Shoreasp.)*, BalamSuntai*(PalaquiumWalsurifolium)*, Punak (*Tetrameristaglabra)*, etc. **Fauna**: Sun Bear (*Helarctosmalayanus*), Sumatran tiger (*Pantheratigrissumatrae*), Long-tailed macaque*(Macacafascicularis),*Macaque (*Macacanemestrina),*Whistling duck (*Dendrocygninae),* etc.
Kerumutan	120,000	**Flora**: Meranti(*Shoreasp.)*,Punak (*Tetrameristaglabra)*,Nipah*(Nypafruticans),* Rengas*(Glutarenghas)*, etc. **Fauna**: Sumatran tiger (*Pantheratigrissumatrae*), Clouded leopard *(Neofelisnebulosi),* Sun bear (*Helarctosmalayanus*),OwaJawa*(Hylobatesmoloch)*, etc.
TasikTanjungPadang	4,925	**Flora**: Meranti(*Shoreasp.)*,Gerunggang*(Cratoxylonarborescens),*BalamSuntai*(Palaquiumwalsurifoliu m)*,Punak (*Tetrameristaglabra)*, etc. **Fauna**: Pangolin *(Manis javanica),* Palm civet *(Paradoxurushermaphroditus),*Rhinoceros Hornbill *(Bucerosrhinoceros),*Punai*(Treron),*Lutung (*Trachypithecus),* Estuarine crocodile (*Crocodylusporosus),* Hair-crested adjutant stork *(Leptoptilosjavanicus)*, etc.
BukitRimbang-Baling	136,000	**Fauna**: Sumatran tiger (*Pantheratigrissumatrae*), Clouded leopard (*Neofelisnebulosi*),Tapir(*Tapirus indicus*),Rusa (*Cervidae*),Siamang(*Shimphalangussindactilus*), PelandukNapu(*Tragulusnapu*), Sun bear (*Helarctosmalayanus*), etc.
TasikSerkap-SarangBurung	6,900	**Flora**: Ramin (*Gonystylusbancanus*), BalamSuntai(*Palaquiumwalsurifolium*), Kempas (*Koompassiamalaccensismaing*), etc. **Fauna**: Sun bear (*Helarctosmalayanus*), Pangolin (*Manis javanica*), Long-tailed macaque (*Macacafascicularis*), Hornbill

		(*Bucerotidae*), Whistling duck (*Dendrocygninae*), etc.

Source: Environment and Forestry Ministry

Biodiversity conservation in other provinces in Sumatra is also being carried out,either in situ or ex situ. The policy for oil palm plantation development in Sumatra Island provides room for biodiversity conservation.

MYTH 9-06

Biodiversity is being eliminated in Kalimantan Island

FACTS

The Indonesian territory of Kalimantan, on the island of Borneo, is one of the regions where oil palm plantation development taking place. The origin of the establishment of oil palm plantations is elaborated in Myth 7-04. Total land area in Kalimantan is 53.1 million hectares, of which 36.5 million ha, or 68.8 percent, is designated as forest areas (forest cover and vegetation cover), while the remaining 16.5 million ha, or 31.1 percent (Table 9.7), and is non-forest areas.

The area used for oil palm plantations is a mere 3.4 million ha, or 6.5 percent of the total land. In other words, the largest land use allocation is for forest areas, not oil palm plantations.

In compliance with the national policy, 11.9 million ha has been retained as protected forests and conserved forests as the "home" of natural biodiversity. Current natural biodiversity conservation is either in situ or ex situ in all Kalimantan provinces: North Kalimantan, West Kalimantan, South Kalimantan, East Kalimantan and Central Kalimantan.

Table 9.7: Land Use in Kalimantan

Land Use	In Thousand Hectare	Percentage
Conservation Zones		
Conserved Forests (KSA-KPA)	4,956.30	9.34
Protected Forests	7,031.60	13.25
Cultivation Zones		
Limited Production Forests	10,622.40	20.02
Production Forests	10,848.70	20.45
Conversion Production Forests	3,072.60	5.79
Subtotal Forest Area	36,531.60	68.85
Oil Palm Plantations	3,451.95	6.51
Other sectors	13,074.15	24.64
Total Land Area	53,057.70	100.00

Source: Forestry Statistics; Oil Palm Plantation Statistics

East Kalimantan, for example, host of the largest area of oil palm plantations in Kalimantan, still maintain a biodiversity "home" in the region (Table 9.8) consisting of: (a) National Park in two locations with a total area of 1,505,129 ha; (b) Strict Nature Preserves in two locations with a total area of 178,478 ha; (c) Wildlife Sanctuary in one location with a total area of 103.05 ha.

The biodiversity conservation design in other Kalimantan provinces is also in situ or ex situ. The policy for oil palm plantation development in Kalimantan provides room for biodiversity conservation.

Table 9.8: In Situ Biodiversity Conservation in East Kalimantan Province

Name	Area(ha)	Biodiversity
National Park		
KayanMentarang	1,306,500	**Flora**: Orchids (*Orchidaceae)*, Rattan (*Calamuscirearus*), etc. **Fauna**: Hornbill (*Bucerotidae)*, Kuau Raja*(Argusianusargus),*Sempidan Kalimantan*(Lophurabulweri),* Banteng*(Bosjavanicus),*Sun bear (*Helarctosmalayanus*), etc.
Kutai	198,629	**Flora**: Ulin*(Eusideroxylonzwageri),*PasakBumi*(Euryc omalongifolia),* Mangrove*(Rhizophora),*Anggrek (*Orchidaceae)*, KantongSemar*(Nepenthes)*, etc. **Fauna**: Orangutan (*Pongo*), Beruk (*Macacanemestrina*), RusaSambar (*Rusaunicolor)*, Kancil (*Tragulusjavanicus*), etc.
Strict Nature Reserve		
TelukAdang	59,761	**Flora**: Rattan (*Calamuscirearus*), Aren*(Arengapinnata)*, etc. **Fauna**: LutungKelabu*(Trachypithecuscristatus),* RusaSambar (*Rusaunicolor)*, etc.
BukitSapat Hawung	1,385	**Flora**: Balau(*Shorealaevis*), Keruing(*Dipterocarpus*), Mahang(*Macaranga*), Ulin(*Eusideroxylonzwageri)*, etc. **Fauna**: Hornbill (*Bucerotidae*), Orangutan (*Pongo*), Owa-Owa(*Hylobatesmuelleri*), BurungMuraiBatu(*Copsychusmalabaricus*), BurungMerak (*Pavo*), etc.
MuaraKaman Sedulang	65,497	**Flora**: Meranti (*Shoreasp.*), Ulin(*Eusideroxylonzwageri*), Rattan (*CalamusCirearus*), etc. **Fauna**: Wild boar (*Susscrofa*), Bekantan(*Nasalislarvatus*), Lutung(*Trachypithecus*), Long-tailed macaque (*Macacafascicularis*), Otter (*Lutrinae*), etc.

Table 9.8: In Situ Biodiversity Conservation in East Kalimantan Province (continued)

Name	Area (ha)	Biodiversity
PadangLuwai	4,787	**Flora**: Anggrek Hitam *(Coelogynepandurate),* KapulagaSeberang*(Elettariacardamomum),*PasakBumi*(Eurycomalongifolia)*, etc. **Fauna**: Wild boar *(Susscrofa)*, Rusa*(Cervidae),*Kijang*(Muntiacini),*Biawak*(Varanus)*, Hornbill *(Bucerotidae),*Green pigeon *(Treron),* Carolina Parakeet*(Conuropsiscarolinensis)*, Crow*(Corvus)*, etc.
TelukApar	47,048	**Flora**: Api-Api (*Avecennia Marina*), Mangrove apple (*Sonneratiaalba*), etc. **Fauna**: Long-tailed macaque (*Macacafascicularis)*, Lutung*(Tra*chypithecus), Kingfisher (*Alcedines*), CucakRowo (*Pycnonotuszeylanicus*), etc.
Wildlife Sanctuary		
PulauSemama	103.05	**Flora**: Mangrove *(Rhizophora),* Mangrove apple (*Sonneratiaalba*), etc. **Fauna**: Sea cucumber (*Holothuroidea),*Kima*(Tridacna),* Coconut crab *(Birguslatro),* etc.

Source: Environment and Forestry Ministry

MYTH 9-07

Oil palm plantations endanger wildlife.

FACTS

The reports published by anti-oil palm plantation NGOs, either Indonesian groups or transnational groups, often make headlines with their claims on how wildlife, especially endangered species, face the threat of extinction because of the development of oil palm plantations. Endangered species such as orangutans, Sumatran tigers, Sumatran elephants and other indigenous wildlife are often reported to be near extinction as their habitats are destroyed. In general, such NGOs' reports

attribute the establishment of oil palm plantations with the destruction of wildlife habitats. This accusation is made purposefully to gain sympathy from the global community and with to achieve the global rejection of palm oil products.

Such NGOs make tendentious claims that oil palm plantations push endangered species such as orangutans, tigers and elephants toward near extinction. Butcan their claim be substantiated?

Indonesia is unlike the Western countries that cleared all primary forests, including their wildlife, at the onset of development. From the start (see Myth 9-01 to Myth 9-06), Indonesia realized the vital importance of conserving wildlife and vegetation. The prevailing laws (such as the Forestry Law, Environment Law and Spatial Planning Law) stipulate that a minimum of 30 percent of total lands must be designated as Conservation Zones (protected forest and conserved forest) to serve as a "home" for natural biodiversity.

According to the Ministry of Forestry Statistics 2015, the total area of protected forests and conserved forests in Indonesia stands at 41.5 million ha. Conservation areas include Natural Preserves, Wildlife Sanctuaries, National Parks, Natural Recreational Parks, Grand Forest Parks, Game Hunting Parks and other facilities to house natural biodiversity. Protected/conserved forests are the natural habitat (in situ) of orangutans, tigers, elephants, bears, rhinoceroses and other indigenous wildlife. The designated locations for protected/conserved forests are not selected randomly, but are based on the natural habitat for these species.

In compliance with the law, wildlife habitats exist within protected/conservation areas, the function of which is not convertible for other purposes. Areas that may be converted are those within the cultivation Zone, which includes production forests. The expansion of residential areas and farms/plantations, including oil palm plantations, must take place within the

Cultivation Zone. Wildlife and oil palm plantations, as well as residential areas and farms, are in different spaces that do not overlap. That said, why is wildlife found outside their habitats, entering residential areas as well as oil palm plantations in the Cultivation Zone?

Wildlife tends to remain within their customary territories, as per their natural behavior. Communities of wildlife will remain in their traditional habitat for generations. If they leave the habitat, it means that their "home" is no longer comfortable or is under threat. How can this be?

There are three main reasons that wildlife feels threatened and forced into entering a Cultivation Zone. The first reason is the massive illegal logging in the protected/conserved forests that encompass the wildlife habitat. From the 1970s until the present day, the protected/conserved forests have been the target destination for both legal and illegal logging. Millions of cubic meters of natural wood have been extracted every year from the home territory of wildlife. The Forestry Statistics reports that hundreds of illegal logging cases are uncovered annually. The figure is the tip of an iceberg, with estimates indicating many more cases yet to be revealed. The people who live around the forests are familiar with the massive illegal logging activities.

Second, besides illegal logging, the threat upon wildlife also comes from illegal hunting, which is increasing. Every year, the Forestry Ministry reports the arrests of hundreds of poachers. Again, the number of those who have not been caught is much higher. The discoveries of elephant carcasses with the tusks cut off or the carcasses of skinned tigers in protected forests, as well as the high number of endangered animals being smuggled out of the country from various regions indicate a dire problem.

The third reason is the fires that break out yearly in Conservation Zones. The Forestry Ministry records that 3-5 million ha of protected/conserved forests, Nature Preserves, Wildlife Sanctuaries, National Parks, and Natural Recreational

Parks are burned down every year. All three factors –uncontrolled legal and illegal logging, poaching and forest fires– that threaten the lives of indigenous wildlife indicate the poor management of protected/conserved forests that is home to Indonesia's flora and fauna.

The government's next task is to improve the management system. It must take a firm stance in stopping any activities in Conservation Zones that house the natural habitat of wildlife. The "homes" of wildlife that have been destroyed by fire and logging must immediately be restored. Placing the blame on oil palm plantations in Cultivation Zones as a factor that threatens wildlife habitats is not only unsubstantiated, it also diverts from the real problem, which is the poor management of wildlife habitats in Conservation Zones.

MYTH 9-08

Indonesia needs to adopt the HCV and HCS concepts, in order to promote natural resource and environmental management

FACTS

Indonesia is obviously not a European or North American country, which, at the onset of industrialization, cleared all forests, including their wildlife inhabitants. Today, sub-tropical primary forests and wildlife no longer exist. European and North American reports on the existence of vast forests, as seen in FAO statistical data, are secondary forests that were initially idle farmland (Soemarwoto, 1992). The current generation in Europe and North America are undertaking reforestation, including the reestablishment of conservation zones (High Conservation Value, HCV) and high carbon stock zone (High Carbon Stock, HCS). Although it's the right measures to take, it will not retrieve what has been perished in the past.

Under these concepts, which are now being campaigned by Indonesian NGOs at home, the HCV comprises the values of HCV 1

(Species Diversity), HCV 2 (Landscape-level Ecosystems and Mosaics), HCV 3 (Ecosystems and Habitats), HCV 4 (Critical Ecosystem Services), HCV 5 (Community Needs) and HCV 6 (Cultural Values). Meanwhile, the HCS concept consists of HK 3 (High Density Forest), HK 2 (Medium Density Forest), HK 1 (Low Density Forest), BM (Young Scrub), BT (Old Scrub) and LT (Cleared/Open Land).

Indonesia, on the other hand, has long classified "deforestation" areas and "non-deforestation" areas as its own version of HCV and HCS. Forests classified under the HCS and HCV concepts are akin to the protected forest and conserved forestays stipulated in Law No. 41/1999 on Forestry, while Law No. 26/2007 on National Spatial Planning stipulates that these forests be located within in Conservation Zones. In Indonesia, the conservation of HCV/HCS forests and natural biodiversity is already promoted by the protected forest and conserved forest designations.

As mentioned earlier, both protected and conserved forests are mainly primary forests, a natural asset that is protected and is not to be converted for any other use. The protected/conserved forests in Conservation Zones are "home" to Indonesia's natural biodiversity that includes wildlife, plants and microorganisms, have a hydrologic role and the function to conserve the ecosystem as a whole.

The type of forest that is convertible for development purposes is a production forest, specifically the conversion production forest, the conversion of which must go through a set of procedures as required by the Forestry Law. Production forests are dubbed a "land bank", a reserve within the Cultivation Zone to meet development and public needs for urban areas, residential areas, industrial zones, farms and plantations, as stipulated in the Spatial Planning Law.

The government's conversion of production forests in Cultivation Zones is made solely upon development/public needs.

The Forestry Law mandates that conversions should not be based on the carbon stock value of the forest as demanded by NGOs. A verified production forest can be converted into a different Cultivation Zone function, regardless of its carbon stock value. On the other hand, the conversion of protected/conserved forests into a Cultivation Zone is prohibited, regardless of how insignificant its carbon stock value.

MYTH 9-09

Indonesia does not have a sustainable oil palm plantation management policy.

FACTS

The Indonesian government has laid the foundation for development by setting a national policy on development management, which includes the oil palm sector.

This national policy takes the form of Government Regulations in Lieu of Law (PP) that pertain to spatial planning, land use, technology, management, human resources, the environment, products, and other aspects (Table 9.9).

The mechanism for obtaining land for plantations is stipulated in the Agrarian Principles Law, the Plant Cultivation System Law, the Spatial Planning Law, the Forestry Law and the Plantation Law, as well as the Environmental Management Law.

The guidelines for plantation managements are also enforced through Government Regulations (PP) such as those on pesticides, seedlings, agricultural equipment and machinery.

Table 9.9: Governance and Policy for Sustainable Development of Oil Palm Plantations in Indonesia

Regulations/ decrees / policies	Issue
PP 47/2012	Social and Environmental Responsibilities of Limited Liability Company
PP 28/2004	FoodSafety, Quality and Nutrition
PP 69/1999	Food Labels and Advertisement
PP 57/2016	Peatland Ecosystem Management and Protection
PP 27/2012	Environmental Permits
PP 28/2011	Management of Nature Reserves and Natural Conservation Areas
PP 11/2010	Leveling and Utilization of Idle Land
PP 10/2010	Procedures for Conversion of Allocations and Functions of Forest Areas
PP 41/1999	Air Pollution Control
PP 8/1999	Wild Flora and Fauna Exploitation
PP 7/1999	Preserving Flora and Fauna Species
PP 40/1996	Right to Cultivate, Right to Build and Right to Use Land
PP 44/1995	Crop Seeding
PP 14/1993	Establishment of Workers Social Security
PP 31/2009	Protection for Geographical Areasof Product Plantations of Specific Locations
PP 51/2007	Geographical Indication
PP 8/2001	FertilizersforCrop Cultivation
PP 85/1999	Management of Hazardous and Toxic Wastes
PP 6/1995	Crop Protection
PP 7/1973	Supervision of Pesticide Circulation, Storage and Use
No. 33/Permentan/OT.140/7/2006	Plantation Revitalization Programs
No. 98/Permentan/OT.140/9/2013	Guidelines for Plantation Permits
No. 58/Permentan/OT.140/8/2007	Implementation of National Standardization System in the Agriculture Sector
No. 07/Permentan/OT.140/2/2009	Guidelines for Plantation Business Estimates
No. 14/Permentan/OT.110/2/2009	Guidelines onUtilizingPeatlands for Oil Palm Cultivation
No. 11/Permentan/OT.140/3/2015	Certification System for Indonesian Sustainable Palm Oil (ISPO)
No. 87/M-IND/PER/12/2013	Implementation of Mandatory Indonesian National Standards for Palm Cooking Oil
No. 382/MENKES/PER/VI/1989	Food Registration
No. 1496.1/Kpts/OT.100/10/2003	Classification of Plantation Companies
No. 633/Kpts/OT.140/10/2004	Guidelines for Criteria and Standardized Classification of the Industrial Area of the PlantationSociety(Kimbun)
No. 75/M-IND/PER/7/2010	Guidelines for Processed Food Production (Good Manufacturing Practices)

With particular regard to the principles, standards and indicators of sustainable oil palm plantations in Indonesia, the Agriculture Ministry issued Ministerial Decree No. 11/Permentan/OT.140/3/2015 on Mandatory Certification System for Indonesian Sustainable Palm Oil (ISPO). It also has a voluntary certification system called the Roundtable Sustainable Palm Oil (RSPO).

In other words, Indonesia's oil palm plantations are already equipped with a set of policies and regulations on sustainable management. It is worth noting that oil palm is the only one out of the thousands of commodities/products in Indonesia that has detailed policies on sustainable management; it is perhaps even the only one out of millions of global commodities/products to possess such a distinct policy.

MYTH 9-10

Oil palm plantations encroaches on forests

FACTS

Indonesia follows the rule of law in managing development, including the expansion of oil palm plantations. The guidelines and procedures for acquiring additional land for plantations are also regulated by law (Figure 9.2).

With reference to Law No. 41/1999 on Forestry, it is stipulated that only production forests can be converted into non-forest areas carrying new functions, including their use as plantations. Converting protected forests and conserved forests, however, is prohibited.

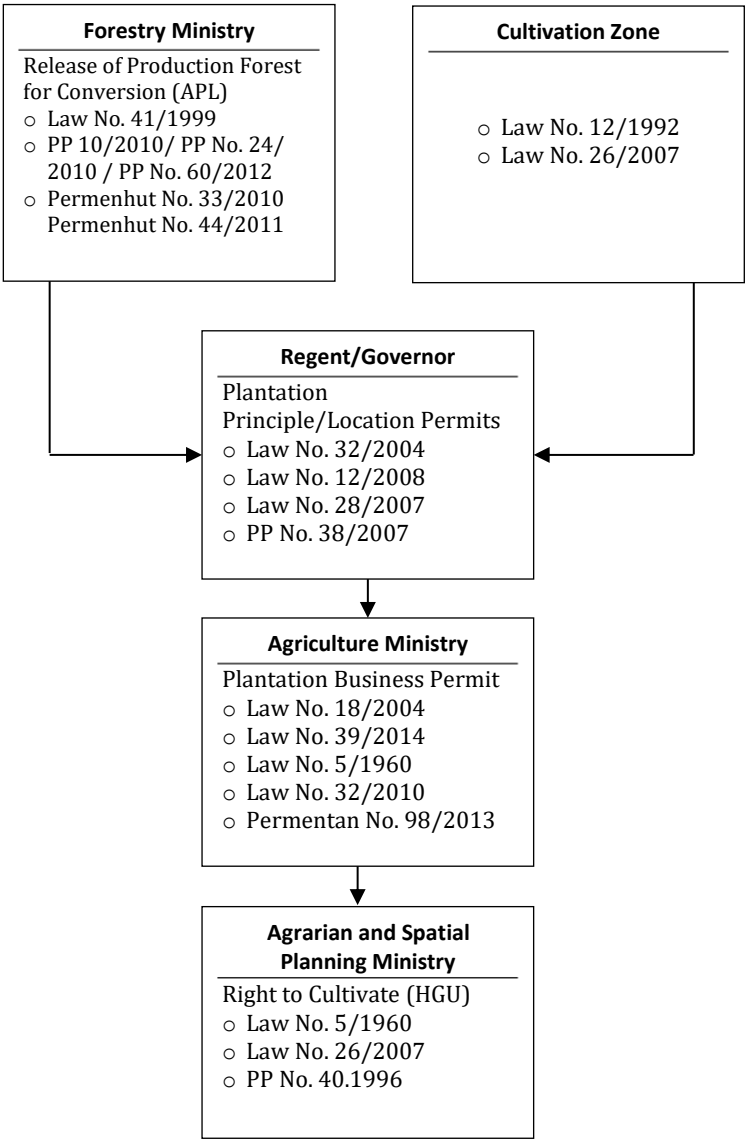


Figure 9.2: Procedure and Mechanism to Acquire Land for Use as an Oil Palm Plantation in Indonesia (Source: PASPI, 2015)

The only institution authorized to consent to and decide on releasing a production forest to be converted into a non-forest area is the government, through the Ministry of Forestry and Environment. After a ministerial decree on the releasing the area for conversion (SK Pelepasan Kawasan) is obtained, the institution authorized to issue the subsequent plantation location permit (Izin Lokasi Perkebunan) is the head of the regional administration –a regent or a governor – in accordance with the Plantation Law and the Regional Administration Law.

The next step in the process is to apply for a plantation business permit (Izin Usaha Perkebunan), which can only be issued by the Agriculture Minister. Only after obtaining this business permit can an application for the right of cultivation (HakGuna Usaha, HGU) be submitted to the Agrarian and Spatial Planning Minister to use the land as an oil palm plantation.

Such a procedure and mechanism to acquire land for plantation use, in which the government has the final say, does not accord oil palm plantation businesses the chance or the capacity to indiscriminately seize or take over forest areas. In fact, the tiered mechanism to acquire land for plantation use has been designed so as to prevent uncontrolled land use. If a breach in the procedure is committed, the perpetrators must then be brought before the law.

MYTH 9-11

No governance on oil palm plantations on peatlands.

FACTS

The utilization of peatlands for farming activities, including oil palm plantations, has long been practiced in Indonesia. In fact, several oil palm plantations on peatlands were among the first plantations established in Indonesia 100 years ago during the colonial era, located along the eastern coast of North Sumatra and Aceh. This shows that Indonesia is familiar with, and has long

applied, techniques for managing and cultivating oil palm plantations on peatlands.

To facilitate the development of oil palm plantations on peatlands, Indonesia has established a national policy under Law No. 39/2014 on Plantations and Law No. 32/2009 on Environmental Management and Conservation. The national policy is interpreted in Government Regulation (PP) No. 57/2016 (revision to PP No. 71/2014 on Protection and Management of the Peatland Ecosystem. A regulation specific to oil palm plantations is contained in Agriculture Ministerial Decree (Permentan) No. 14/2009 on Guidelines on Utilizing Peatlands for Oil Palm Cultivation. Aside from these laws and regulations, the businesses that cultivate oil palms on peatlands all have internal guidelines on cultural methods and management techniques for oil palm plantation on peatlands.

Therefore, the accusation that Indonesia does not govern the management of oil palm plantations on peat lands is unsubstantiated. However, it can be conceded that continual improvement is still needed at the implementation level.

MYTH 9-12

Palm oil refinery industry has no waste management system.

FACTS

Biomass waste by-products generated from palm oil mills (PKS), such as empty fruit bunches (EFBs), palm kernel shells(PKS) and palm oil mill effluent (POME),are no longer considered waste products, but instead joint products because of their added value. The established practice is to return the EFBs to the plantation to be used as organic fertilizer. The shells and palm pressed fibers (PPF) are repurposed as fuel for the boiler sat palm oil mills to generate power. Meanwhile, the POME is reused as fertilizer and distributed to oil palm plantations.

The reutilization of by-products generated by palm oil mills is regulated by Environment Ministerial Decree No. 28/2003 on Technical Guidelines for POME Utilization on Oil Palm Plantation Lands, as well as by Environment Ministerial Decree No. 29/2003 on Guidelines, Requirements and Licensing Procedure for POME Utilization on Oil Palm Plantation Lands.

POME has also been utilized to generate bioelectricity to meet the energy needs of villages in the vicinity of plantations. The biomass by-products from palm oil mills are processed in biogas tanks to produce methane for generating electricity (Figure 9.3).Many oil palm plantations in the regional centers of the national palm oil industry, such as North Sumatra, Riau, South Sumatra, Jambi and Kalimantan, presently produce bioelectricity from the by-products of palm oil mills. The development of POME-generated bioelectricity still continues today and into the foreseeable future.

Figure 9.3: Biogas-generated Power Plant/Methane Capture (Bioelectricity) at the Palm Oil Mill Waste Management Facility in Riau Province.

The production of bioelectricity at POME-biogas power plants has two-pronged benefits. Using the by-products from palm oil mills to generate bioelectricity cleans the environment, reduces the carbon emissions of oil palm plantations and preserves microorganisms in the biogas tank. The second benefit is that generating bioelectricity has fostered the energy security of rural areas as well as the local economy, while using locally produced renewable energy sources reduces the use of fossil energy as well as the carbon emitter generates. Distributing bioelectricity has also helped the government by contributing to the rural electrification rate.

It goes without saying that not all palm oil mills have been equipped with biogas power plants because of the high investment required. There are also palm oil mills that have yet to install a proper effluent management facility. It is expected that the newly issued government policy (Energy and Mineral Resources Ministerial Decree No. 12/2017), with the government objective to purchase bioelectricity, will serve as an incentive for businesses to utilize POME to generate bioelectricity.

MYTH 9-13

No governance of oil palm plantations in Indonesia.

FACTS

Oil palm plantations in Indonesia are administered with reference to management principles/cultural techniques that are tailored to local conditions and the policy on basic plantation management. Each and every link in the production supply chain has standards for processing and output (Table 9.10).

The production line for fresh fruit bunches (FFBs) – from planting to cultivating and to harvesting – refers to Good Agriculture Practices and the ISO.

Table 9.10: Implementation of Oil Palm Plantation Management Systems at Corporate Level

Company Level
Good Agriculture Practices
Good Manufacturing Practices
ISO 9001 (Quality Management System)
ISO 14000 (Environmental Management Standard)
ISO 26000 (Corporate Social Responsibility)
SMK 3 (Workplace Safety Management System)
ISPO/ RSPO (Sustainable Oil Palm Plantation Certification)
Good Corporate Governance
Oil Palm Plantation Classification
Indonesian National Standards (SNI): Agroinput, TBS, CPO, Palm Oil, etc.

The production line for crude palm oil at palm oil mills and even in the downstream industry also refers to Good Manufacturing Practices and the ISO, while product quality standards refer to the Indonesian National Standard (SNI).

The administration of sustainable oil palm plantations in Indonesia begins at the policy level, while the implementation of industry/plantation-level management is integrated and merged under a single system called the Indonesian Sustainable Palm Oil (ISPO). The ISPO comprises seven principles (Figure 9.4) from which hundreds of criteria/indicators are derived.

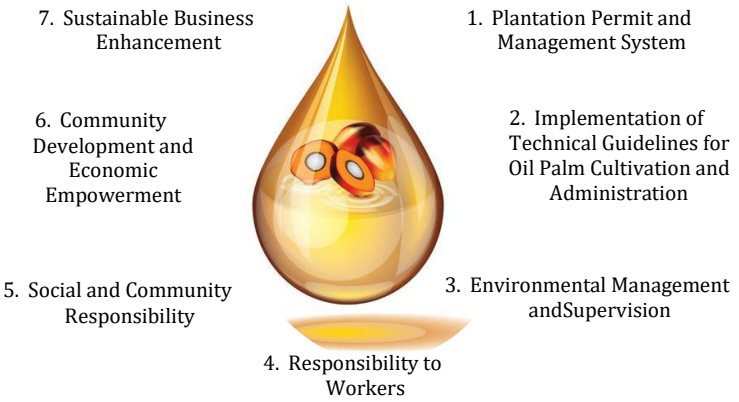


Figure 9.4: The ISPO Administration System

Evaluating the entity-level implementation of plantation administration is carried out periodically through the SMK 3, Oil Palm Plantation Classification, SNI, ISO certification, Good Corporate Governance and ISPO/RSPO certification.

Therefore, the accusation that oil palm plantations in Indonesia lacks sustainable entity-level administration is unsubstantiated. On the contrary, entity-level administration is on the right track, as it follows international standards. It is acknowledged that it is not yet ideal, as it needs much future improvement, especially in the system's implementation at the levels of smallholdings and small- and middle-scale businesses. The question is whether other vegetable oil or agricultural commodity industries are equipped with a sustainable administration and certification system as palm oil is.

MYTH 9-14

Sustainable palm oil certification lower compared to other vegetable oils

FACTS

Palm oil is the first global vegetable oil that has its own sustainable governance system and sustainable vegetable oil certification. The first two countries to receive vegetable oil certification for their palm oil are Indonesia and Malaysia. Other global vegetable oils, including soybean oil, rapeseed oil, sunflower oil and olive oil, do not have a sustainable vegetable oil governance system and are yet to receive sustainable vegetable oil certification.

Since its enforcement from2008 through 2015, about 5 percent of all internationally distributed palm oil is certified sustainable palm oil (Table 9.11). No other vegetable oils have been certified.

Table 9.11: Sustainable Palm Oil Certification (CSPO + CSPK) in Global Vegetable Oils Year 2015

Type of Vegetable Oil	Volume (in million tons)		
	Uncertified Sustainability	Certified Sustainability	Subtotal
Palm Oil	52.1	12.9	65
Soybean Oil	53.8	0	53.8
Rapeseed Oil	26.6	0	26.6
Sunflower Oil	16.7	0	16,7
Palm Kernel Oil	3.8	3	6.8
Groundnut Oil	5.6	0	5.6
Cottonseed Oil	4.5	0	4.5
Coconut Oil	3.4	0	3.4
Olive Oil	2.8	0	2.8
Total	169.3	15.9	185.2

Source: RSPO (2016)

In conclusion, palm oil is the only global vegetable oil that has undergone and received sustainable certification.

MYTH 9-15

Sustainable palm oil certification slow

FACTS

The production growth of CSPO and CSPK-certified sustainable palm oil has been relatively rapid (Figure 9.5). In 2008, the production volume of certified palm oil hovered around 0.7 million ton, but by 2015, it had increased to 15.8 million tons, growth of twentyfold within seven years.

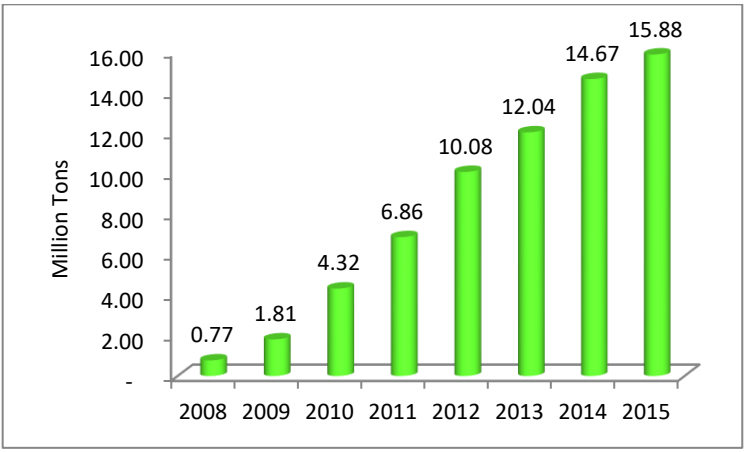


Figure 9.5: Production Growth of Certified Sustainable Palm Oil (Roundtable on Sustainable Palm Oil/RSPO, 2016)

The data only reflects the volume of palm oil produced by oil palm plantations with sustainable certification. The majority of the palm oil being produced is still being assessed for certification.

In conclusion, it is not true that the implementation of sustainable oil palm governance has been slow. The accusation that the production of certified sustainable palm oil has not seen growth is also unsubstantiated. On the contrary, the production growth of certified sustainable palm oil has been rapid.

MYTH 9-16

Indonesia, as the world's largest palm oil producer, has the lowest sustainable palm oil certification

FACTS

Based on the RSPO's 2016 data, Indonesia's production of certified sustainable palm oil is actually much higher when compared to other palm oil-producing countries (Figure 9.6). Almost 60 percent of certified sustainable palm oil (CSPO) and certified sustainable palm kernel oil (CSPK) distributed globally comes from Indonesia. Malaysia is the second highest producer of CSPO/CSPK, followed by Papua New Guinea and Brazil.

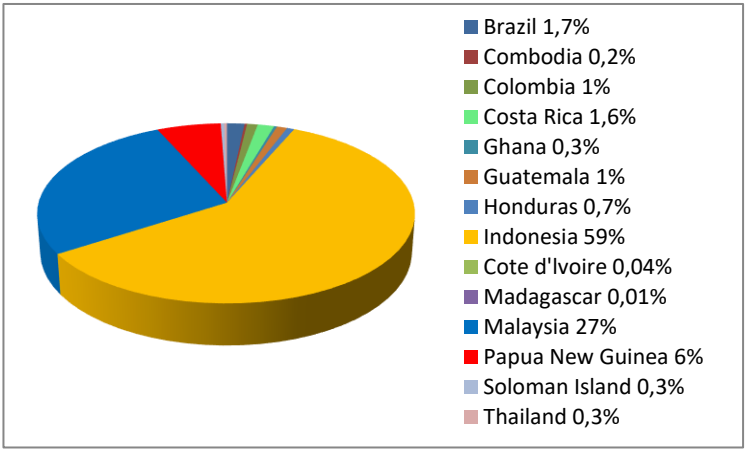


Figure 9.6: CSPO-Producing Countries by Production Volume* (RSPO, 2016)**per 30 June 2016*

Bearing in mind that the data for Indonesia's CSPO and CSPK in Figure 9.6 reflects only the data gathered by the RSPO and has yet to be merged with the data from ISPO, it also does not take into account the production volume of oil palm plantation companies undergoing the ISPO or RSPO certification process. If all data were included (because in reality, palm oil products have met sustainability standards), then the actual production volume of CSPO from Indonesia would be much higher.

The Agriculture Ministry is currently accelerating the implementation of ISPO, including for oil palm smallholdings. It is targeting 80 percent of existing oil palm plantations in Indonesia to become ISPO-certified by 2020.

The data shows that Indonesia is not only the world's largest palm oil producer, but also the world's largest producer of certified sustainable palm oil. Do producers of global soybean oil, rapeseed oil, and sunflower oil implement sustainable plantation management as Indonesian's palm oil producers do? What about the producers of other agricultural products, as well as oil, gas, mineral mining and industrial products – Have they also applied a sustainable management system and received certification? It is important to ask such questions, because a sustainable ecosystem can only be realized when all other sectors, industries, regional administrations, products and commodities – not only oil palm businesses and palm oil – are also sustainable.

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