THE MYTHS vs FACTS

The Indonesian Palm Oil Industry in Social, Economic, and Environment Global Issues

The Fourth Edition

The Myths Vs. Facts
The Indonesian Palm Oil Industry in Social, Economic and Environment Global Issues The Fourth Edition

Fourth Edition, 2023
First Print

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Citation:
PASPI. 2023 *The Myths vs. Facts : The Indonesian Palm Oil Industry in Social, Economic and Environment Global Issues. Fourth Edition*. Bogor (ID): Palm Oil Agribusiness Strategic Policy Institute.

Publisher:

Palm oil Agribusiness Strategic Policy Institute

Palm Oil Agribusiness Strategic Policy Institute (PASPI)
website : palmoilina.asia

Supported by:

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Oil Palm Plantations Fund Management Agency (BPDPKS)

Foreword
Oil Palm Plantations Fund Management Agency (BPDPKS)

Amidst the hardship due to Covid-19, palm oil industry is still growing positively and making the greatest contribution to the gross domestic product (GDP). The palm oil sector is declared one of the primary industries supporting Indonesia's economy.

The importance of palm oil to the national economy has stimulated the growth of people's economy. At all levels, from villages, cities/districts, and provinces, to the capital city, the economy boosted by oil palms has generated countless positive economic, social, and environmental impacts on the national sustainable development goals (SDGs).

Processing fresh fruit bunches or Tandan Buah Segar (TBS) produced by oil palm companies and farmers into crude palm oil (CPO) has provided raw materials for eco-friendly and renewable products. Thus, TBS, CPO, and their derivatives have conserved the environment and sustainability of the earth.

From upstream to downstream, the national palm oil industry is important for national development. The data from the Ministry of Trade of the Republic of Indonesia revealed four indicators of the industry's importance. First, it created jobs absorbing 4.2 million direct labor and 12 million indirect labors. Second, it promoted economic growth by 3.5% of the total gross domestic product (GDP). Third, it contributed to foreign exchange at an average of 13.5% from the non-oil and gas exports every year. Lastly, it promoted energy independence through biofuel or biodiesel, saving the foreign exchange of diesel fuel imports worth US$8 billion per annum.

Sustainable palm oil can create jobs, improve public welfare, and preserve social harmony and the environment aligned with the national development goal of preserving the harmony of people, profit, and planet (3P). It is in accordance with the principles and criteria set by palm oil stakeholders. The development of sustainable palm oils following ISPO is expected to be the ultimate weapon to dismiss the accusations against palm oil.

The book *The Myths vs. Facts: Indonesia's Palm Oil Industry in Social, Economic, and Environmental Global Issues: The Fourth Edition* is a part of advocacy to deny black campaigns against palm oils and create their positive image. The book can be a reference for palm oil stakeholders (farmers, plantation enterprises, palm oil downstream producers, ministries, ambassadors and trade attaches representing Indonesia in other countries, and local governments) and the general public (including students and university students). Therefore, they can better understand the national palm oil industry and the dynamics of domestic and global issues affecting it.

The fourth edition is the update of the three previous editions. It contains data updates, related empirical evidence, and current issues relevant to the state of national palm oil industry affected by the global market dynamics. This book discusses five key issues, i.e., economic, social, nutrition and health, environmental, and policy governance issues. Those issues are discussed comprehensively by debunking myths, opinions, accusations with facts at local/village, regional, national, and global levels. However, the issues surrounding nutrition, health, and policy governance are not addressed based on levels/scopes.

In the end, I invite palm oil stakeholders to make Indonesia's palm oil industry grow positively and remain resilient during and after the pandemic. Let us synergize and collaborate. We are committed to making palm oils an important part of Indonesia's economy.

Jakarta, January 2023

Eddy Abdurrachman
President Director of Oil Palm Plantations Fund Management Agency (BPDPKS)

Preface to the Fourth 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,* mainly to discuss issues surrounding palm oil industry. Indonesia's success in developing oil palm plantations has led to a revolution in the world's vegetable oil industry. For example, it has succeeded in turning palm oil into the world's primary vegetable oil and becoming the world's largest palm oil producer.

With broader availability and lower price, palm oil has turned the world's vegetable oil competition from price competition into non-price competition. However, social, health, economic, and environmental concerns are raised as the themes of negative/black campaigns. Those negative campaigns against palm oils have become more massive and intensive, discriminating against palm oils in importers' trade policy.

Negative or bad opinions, perceptions, views, and myths surrounding palm oils (or referred to as myths in this book) have been perpetuated in a structured, systematic, and massive manner. To discuss and address those issues, this book has been published in three editions (2015, 2016, and 2017). The three previous editions have been reprinted several times and distributed domestically and abroad. However, there has been more and more demand for this book, particularly from those expressing concern about the national palm oil industry.

The fourth edition contains data updates, empirical evidence, and the latest issues relevant to the state of the national palm oil industry and the global vegetable oil market dynamics. Furthermore, each chapter contains the results of the discussions/reviews of the third edition at universities and other forums on palm oil industry.

The fourth edition is divided into five chapters exploring the issues of palm oil industry comprehensively, i.e., economic, social, nutrition and health, environmental, and policy governance issues. Each chapter dialectically contains myths, opinions, and accusations dismissed by related facts at global, national, regional, and local levels.

We would like to offer our gratitude and appreciation to the Indonesia Oil Palm Plantations Fund Management Agency (BPDPKS) for financing the publication of the fourth edition. In addition, we would like to express our gratitude and appreciation to the academics who conducted analyses and provided valuable inputs in the preparation of the fourth edition. Prof. Dr. Ir. Supiandi Subiham, M.Agr (*Faculty of Agriculture, IPB University*), Prof. Dr. Ir. Yanto Santosa, DEA (*Faculty of Forestry and Environment, IPB University*), Prof. Dr. Almasdi Syahza, S.E, M.P (*Universitas Riau*), Prof. Dr. Amzul Rifin, S.P, M.A (*Faculty of Economics and Management, IPB University*), Dr. Puspo Edi Giriwono, S.TP, M.Agr (*Food Science and Technology Department, IPB University and SEAFAST IPB*), dan Dr. Ir. Hasril Siregar, M.Si (*Oil Palm Research Institute*).

We would like to convey our gratitude and appreciation to the palm oil stakeholders involved in the focus group discussion about this book: Ministry of Agriculture, Ministry of Trade, Ministry of Foreign Affairs, Ministry of Industry, Oil Palm Plantations Fund Management Agency of the Ministry of Finance, Food and Drug Monitoring Agency, and Oil Palm Research Institute. Moreover, we would like to express our gratitude and appreciation to Indonesian palm oil associations such as the Indonesian Oil Palm Society (MAKSI), Indonesian Palm Oil Association (GAPKI), Indonesian Vegetable Oil Association (GIMNI), Indonesian Biofuel Producer Association (APROBI), Indonesian Oleochemical Manufacturer Association (APOLIN), and Indonesian Palm Oil Smallholder's Association (APKASINDO).

Like the previous edition, the fourth edition is still being discussed in forums at universities and non-universities. The results of the discussions, data updates, and new empirical evidence will be used to improve the next edition.

Bogor, January 2023
Palm Oil Agribusiness Strategic Policy Institute

Dr. Ir. Tungkot Sipayung
Executive Director

Preface to the Third Edition

PASPI has prepared and published this book, *The Myths vs. Facts of Indonesia's Palm Oil Industry in Social, Economic, and Environmental Global Issues,* mainly to discuss important issues surrounding the Indonesian palm oil industry. Indonesia's success in developing oil palm plantations has led to a revolution in the world's vegetable oil industry. For example, it has succeeded in turning palm oil into the world's primary vegetable oil and becoming the world's largest palm oil producer. The revolution has resulted in unfair competition in the vegetable oil market. Social, health, economic, and environmental concerns are the themes raised in negative/black campaigns. This book addresses those issues with facts. The issues, opinions, views, accusations, and the like are classified as myths.

It was published in two editions (in 2015 and 2016). Both previous editions have been reprinted several times and distributed domestically and abroad. However, there has been more and more demand for this book, particularly from those expressing concern about the national palm oil industry. As in previous years, PASPI has regularly held discussions/book reviews in academic forums attended by lecturers and students at several universities in Indonesia. In 2015, the first edition of this book was discussed/reviewed at the Universitas Sumatera Utara, Universitas Riau, Universitas Sriwijaya, Universitas Palangka Raya, Mulawarman University, Universitas Hasanuddin, and Institut Teknologi Bandung. One year later, its second edition was discussed/reviewed at the Universitas Indonesia, Universitas Gadjah Mada, Universitas Syiah Kuala, Universitas Tanjungpura, Universitas Jambi, Universitas Bengkulu, and Universitas Lambung Mangkurat. Such events brought about innumerable inputs.

This third edition has been changed with more materials. In addition to improving and updating the presented data, the discussions/reviews results of the second edition at those universities are included. Data updates and substantial additions have been made in each chapter of this edition. New materials can be found in Chapters 7 and 9. The third edition also contains the Myths and Facts of the Nutrition and Healthiness of Palm Oil (Chapter 8) not covered yet in the previous edition.

We would like to express our gratitude and appreciation to academics and researchers who carried out analyses and provided significant inputs in the reviews of the first edition. Prof. Dr. Erwin M. Harahap, Prof. Dr. Abdul Rauf, Prof. Dr. S. B. Simanjuntak (Universitas Sumatera Utara), Prof. Dr. Usman Pato, Prof. Dr. Almasdi Syahza, Prof. Dr. Hasan Basri Jumin (Universitas Riau), Prof. Dr. Andy Mulyana, Prof. Dr. Imron Zahri, Dr. Umar Harun (Universitas Sriwijaya), Dr. Yusurum Jagau, Dr. Suharno, Dr. Masliani (Universitas Palangka Raya), Dr. Bernaulus Saragih, Dr. Zainuddin (Mulawarman University), Dr. Endah Sulistyawati (Institut Teknologi Bandung), Prof. Dr. Kaimuddin, Prof. Didi Rukmana (Universitas Hasanuddin).

We would also like to convey our gratitude and appreciation to academics and researchers who conducted analyses and provided valuable inputs to the third edition of this book: Prof. Dr. Emil Salim, Prof. Dr. Ari Kuncoro, Dr. Widyono Soetjipto, Ahmad Dermawan, SP, MSc (Universitas Indonesia), Prof. Dr. Slamet Hartono, Prof. Dr. Azwar Maas, Dr. Jamhari (Universitas Gadjah Mada), Prof. Dr. Zulkifli Alamsyah, Prof. Dr. Anis Tatik Maryati, Prof. Dr. Dompak Napitupulu (Universitas Jambi), Dr. Sofyan, Dr. Ashabul Anhar, Dr. Sugianto, Dr. Fazly Syam (Universitas Syiah Kuala), Prof. Dr. Alnopri, Prof. Dr. Priyono Prawito, Dr. Mustafa Ramadon (Universitas Bengkulu), Dr. Hamdani, Dr. Gusti Rusmayadi, Dr. Taufik Hidayat (Universitas Lambung Mangkurat), Dr. Iwan Sasli, Dr. Jajat Sudrajat, Dr. Adi Suyatno (Universitas Tanjungpura). Prof. Dr. Afrizal, MA, Dr. Ir. Ira Wahyuni Syarfi, MSi, Prof. Dr. Ir Reni Mayerni, MSi (Universitas Andalas). In addition, we would like to extend our gratitude and appreciation to university students, local governments, leaders of oil palm farmers, and members of non-governmental organizations attending the book reviews at those universities.

As mentioned in the previous edition, we hope the third edition can be a reference and help promote the Indonesian palm oil industry in the global and more intensive vegetable oil competition amid more social, economic, and environmental issues. The third edition is still being discussed in forums at universities and non-universities. The results of the discussions, data updates, and new empirical evidence will be used to improve the next edition.

Bogor, April 2017
Palm Oil Agribusiness Strategic Policy Institute

Dr. Ir. Tungkot Sipayung
Executive Director

Preface to the Second Edition

At least 10,000 copies of the first edition of the book *The Myths vs. Facts of Indonesia's Palm Oil Industry in Social, Economic, and Environmental Global Issues* (2015) have been reprinted and distributed domestically and abroad. However, there has been more and more demand for this book, particularly from those expressing concern about the national palm oil industry.

PASPI has held discussions/book reviews with academics, lecturers, and students at various universities such as the Universitas Sumatera Utara, Universitas Riau, Universitas Sriwijaya, Universitas Palangka Raya, Universitas Mulawarman, Universitas Hasanuddin, and Institut Teknologi Bandung. Valuable inputs were received from those discussions/book reviews at the universities.

Thus, there are some improvements to this second edition. In addition to the improvements and data updates, the results of the discussions/reviews of the first edition at those universities are included. Data updates and substantial additions have been made in each chapter of this second edition.

Several chapters in the second edition reflect the additions and enrichments of the issue. Chapter 4 discusses the relation between the urban and rural economy and oil palm plantations. It also discusses the relation between the expansion of oil palm plantations and the decrease in the national rice areas. Then, Chapter 5 highlights the relation between the economy of farmers, cattle raisers, fishermen, and workers of oil palm plantations. Chapter 6 explores the global deforestation driver. Lastly, Chapter 7 discusses the expansion of palm oils and the deforestation in Indonesia; the expansion of palm oils and the conservation of Indonesia's biodiversity; land and water conservation; and the potential of palm oils as a producer of second-generation biofuels.

We would like to express our gratitude and appreciation to academics and researchers who carried out analyses and provided significant inputs in the reviews of the book: Prof. Dr. Erwin M. Harahap, Prof. Dr. Abdul Rauf, Prof. Dr. S. B. Simanjuntak (Universitas Sumatera Utara), Prof. Dr. Usman

Pato, Prof. Dr. Almasdi Syahza, Prof. Dr. Hasan Basri Jumin (Universitas Riau), Prof. Dr. Andy Mulyana, Prof. Dr. Imron Zahri, Dr. Umar Harun (Universitas Sriwijaya), Dr. Yusurum Jagau, Dr. Suharno, Dr. Masliani (Universitas Palangka Raya), Dr. Bernaulus Saragih, Dr. Zainuddin (Mulawarman University), Dr. Endah Sulistyawati (Institut Teknologi Bandung), Prof. Dr. Kaimuddin, Prof. Didi Rukmana (Universitas Hasanuddin) and lecturers and students at the university.

As mentioned in the first edition, we hope the second edition can be a reference and help promote the Indonesian palm oil industry in the global and more intensive vegetable oil competition amid more social, economic, and environmental issues. The second edition of this book will still be discussed and updated with fresh empirical evidence and data.

Bogor, June 2016
Palm Oil Agribusiness Strategic Policy Institute

Dr. Ir. Tungkot Sipayung
Executive Director of PASPI

Preface to the First Edition

There have been negative campaigns against palm oil industry since the early 1980s when Indonesia started to develop oil palm plantations under the Nucleus Estate and Smallholder (PIR) scheme. The growing concern of soybean oil producers amid their inability to compete with palm oil has led to intensive campaigns against palm oil. At first, the negative campaign themes were nutrition/health issues to influence consumers. However, in the last 15 years, they have highlighted economic, social, and environmental aspects, particularly those related to global public concern. New scenarios have been produced to stop the growth of and destroy palm oil industry.

The campaign strategies are more structured, systematic, and massive, involving transnational and local anti-palm NGOs. In addition, they use mass and cyber media. The campaigns are designed to influence global public opinions and have used all channels, from consumers, producers, industry, and supporting institutions, to governments.

At the consumer level, in addition to negative and black campaigns, boycotts are called for by labeling multinational food chains "*palm oil free.*"On the other hand, at the producer level, in palm oil production centers, local people are incited to protest their production and require producers to sign the Indonesia Palm Oil Pledge. The supporting industry for palm oil production, such as banks, also comes under pressure not to provide loans. Government agencies are also under intense pressure to make policies to control palm oil industry.

The themes and material for those black campaigns are not based on truth. Instead, they tell lies. The paradigm of the campaign run by anti-oil palm NGOs is **"lies repeatedly said and published through the mass media broadly and intensively will be accepted by the public as truth**." Today, many global communities, government officials, students, academics, young people, children and adolescents have been trapped in the paradigm of the anti-oil palm NGOs. Through such campaigns, people can no longer differentiate between facts and myths when viewing palm oil industry.

This misperception of oil palm industry can threaten the future of the national palm oil industry as one of the strategic industries in Indonesia's economy. Palm oil industry has become an important source of income for millions of people, involving millions of family businesses, as well as small and medium enterprises in at least 190 regencies across the country. It is also the largest contributor to the country's non-oil and gas foreign exchange. However, they have been targeted by anti-oil palm NGOs conducting black campaigns.

This book is prepared to debunk the myths surrounding palm oil industry created by anti-oil palm NGOs. Each myth is dispelled with facts so people can differentiate between facts and myths. The issues, opinions, views, accusations, and the like are classified as myths.

To make it understandable, the book begins with the recent development of Indonesia's palm oil industry. Then, it describes the myths and facts of palm oil in the global vegetable oil competition; the myths and facts of 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; the myths and facts of oil palm plantations in environmental issues; and the myths and facts of Indonesia's oil palm plantation governance.

We would like to thank the PASPI research team for working hard to prepare this book. In addition, we would like to convey our gratitude and appreciation to those providing 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

Foreword

The palm oil industry is and will be the strategic industry in the Indonesian economy. It is called strategic industry due to its significant contribution to Indonesia's non-oil and gas exports, job creation, rural development, and poverty reduction. In addition, the industry will be an important part of Indonesia's energy sovereignty system. Not many sectors of the economy, especially commodities, have made more substantial, inclusive, and broader contributions than the palm oil industry.

In the last decade, anti-oil palm NGOs have used various social, economic, and environmental issues as the themes of their negative or black campaigns against Indonesia's palm oil industry. If the campaigns are ignored, they will mislead many people and harm Indonesia's palm oil industry. Therefore, we need public education to correct false perceptions of palm oil industry in the society.

In relation to this, we welcome the PASPI's initiative to prepare and publish the book **The Myths vs. Facts of Indonesia's Palm Oil Industry in Social, Economic, and Environmental Issues Global**. The book is expected to debunk the myths surrounding Indonesia's palm oil industry. Also, this book is expected to help inform and educate the public at home and abroad about Indonesia's palm oil industry.

On behalf of the Advisory and Supervisory Board of PASPI, I appreciate the PASPI team led by Dr. Tungkot Sipayung as the Executive Director of PASPI for completing this difficult task. We hope PASPI will continue innovating to safeguard Indonesia's palm oil industry as in PASPI's mission statement.

Bogor, November 2015

Prof. Dr. Ir. Bungaran Saragih, MEc.
Minister of Agriculture of RI 2000-2004 and the Chairman of
PASPI's Supervisory Board

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Chapter 1
The Latest Development in the Indonesian Palm Oil Industry

The history of Indonesian palm oil industry goes back to colonial era. It was said that four oil palm seeds were brought by Dr. DT Pryce in 1848 to be planted as part of Bogor Botanical Gardens's collection. Two of the seeds came from Bourbon and Mauritius, and the other two, of the Dura type, were brought from Amsterdam (Hunger, 1924; Rutgers *et al*., 1922). These seeds were then planted as ornamental plants and as experiments to find "suitable growth locations" in Java, Sulawesi, Kalimantan, Nusa Tenggara, Maluku, and Sumatra, particularly 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*. J. Kroll, the Manager of the *Deli Maatschappij*, reported that the results of the experiment were quite encouraging because the yield was better than in its native habitat in West Africa.

In 1911, the first commercial oil palm plantations were opened in 1911 by a Belgian company in Pulau Raja (Asahan) and Sungai Liput (Aceh). Thus, was the beginning of commercial oil palm plantation in Indonesia.

In the same year, a German company opened an oil palm plantation in Tanah Itam Ulu (North Sumatra). Then, Dutch and British investors followed along. The number of companies operating oil palm plantations rose from 19 in 1916 to 34 in 1920. Indonesia's first CPO mill was built in Sungai Liput (Aceh, 1918). The second one was constructed in Tanah Itam Ulu (North Sumatra, 1922).

From the colonial era until the Old Order, the development of oil palm plantations in Indonesia was influenced by the dynamics of politics in Indonesia. After the independence, private and Dutch-owned plantations were nationalized and absorbed to be part of Indonesia's state-owned plantation enterprises (SOEs).

To accelerate the growth of Indonesian oil palm plantations, the government formulated policies to strengthen the Large National Private Plantations (*Perkebunan Besar Swasta Nasional/PBSN*), such as, i.e., PBSN I (1977-1978), PBSN II (1981-1986), and PBSN III (1986-1990). In those policies, the Indonesian government provided low-interest loans for PBSN to rehabilitate existing plantations and open new oil palm plantations.

In 1977, the government collaborated with the World Bank, Asian Development Bank (ADB), Germany Government Donor Agency (KfW), and International Fund for Agricultural Development (IFAD) to start NES (Nucleus Estate and Smallholders) or PIR (*Perkebunan Inti Rakyat*) project. The NES/PIR became a model for future partnerships between oil palm smallholders and corporations. After the success of the NES/PIR (I-IV), more oil palm plantation models/patterns in Indonesia were developed (Badrun, 2010; Sipayung, 2011; Kasryno, 2015; PASPI, 2022).

First, Special NES and Local NES (*PIR-Spesial dan PIR-Lokal)* were introduced in 1980. Those programs continued the NES financed by the World Bank. The Special PIR and Local PIR are associated with local/regional economic development.

Second, Transmigration NES (*PIR-Trans*) has been developed since 1986 in relation to the transmigration program. NES-Trans developed the cooperation between state-owned and private plantation enterprises as the nucleus and transmigrants as the plasma.

Third, Primary Credit Cooperatives for Members NES (*PIR-KPPA*) was started in 1996. It is developed to integrate the development of oil palm plantations with cooperatives. The state-owned and private oil palm plantation enterprises become the nucleus, while oil palm smallholders as cooperative members become the plasma.

Fourth, Partnerships (*Kemitraan*) have been developed since 1999. Thus, the state-owned and private oil palm plantation enterprises must allocate at least 20 percent of their total plantation areas for developing community plantations. This model can either be a one-cycle plantation management by a plantation enterprise or BOT (Build, Operation and Transfer) to be converted to the smallholders.

Fifth, The Plantation Revitalization Partnership Policy (*PIR-Revitbun*) has been developed since 2006. In that policy, the government provides loan facilities (subsidized loan interest) related to the development of bioenergy and the revitalization of plantations.

Through those NES/PIR, smallholders can participate in the national oil palm plantations. Those NES/PIR policies and programs can develop smallholding plantations as NES/PIR participants (plasma smallholders). In addition, they can encourage and convince other smallholders (non-plasma) to participate and invest in oil palm plantations independently as independent smallholders.

The central and (decentralized) local governments supported through the implementation of NES/PIR models, partnerships, and licensing governance, accelerating the development of oil palm plantations in Indonesia (Figure 1.1).

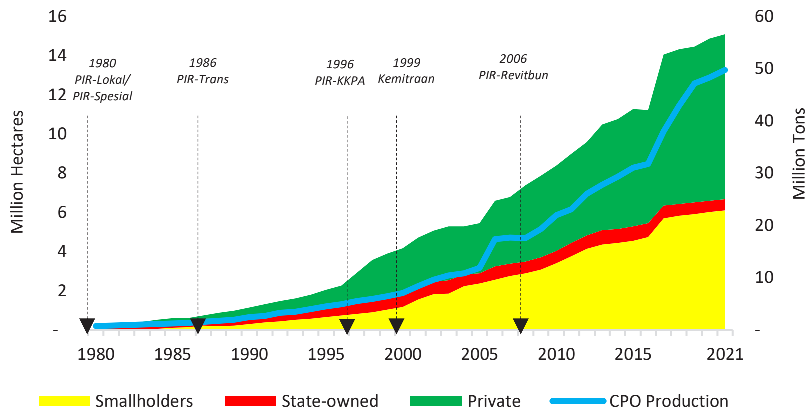


Figure 1.1. Total Areas of Oil Palm Plantations in Indonesia from 1980 to 2021 (Source: Ministry of Agriculture; data processed by PASPI, 2022)

The total area of oil palm plantations in Indonesia increased from about 294.5 thousand hectares in 1980 to around 15.1 million hectares in 2021. The crude palm oil (CPO) production volume rose from about 721.2 thousand tons in the same period to 49.7 million tons.

The area for smallholders' oil palm plantations grew exponentially and rapidly. From 1980 to 2021, their market share increased from around 2 percent to 40 percent (Figure 1.2). Likewise, the market share of private oil palm plantations rose from 30 percent to 56 percent. Although the areas of state-owned plantations increased, their market share fell from 68 percent to 4 percent.

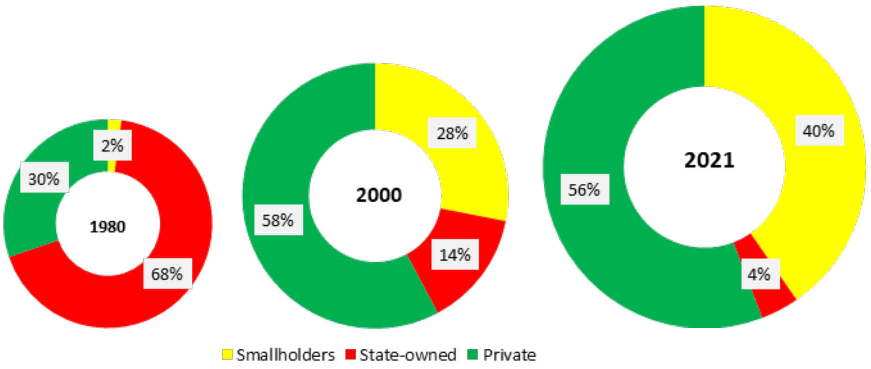


Figure 1.2. Market Share of the Indonesian Oil Palm Plantations Based on Their Exploitation Status in 1980-2021 (Source: Ministry of Agriculture; data processed by PASPI, 2022)

To increase the supply of palm oil, Indonesia shifted the land management strategy from land expansion (factor-driven) to capital utilization/embodied technology (capital-driven) and innovation utilization (innovation-driven) (Figure 1.3).

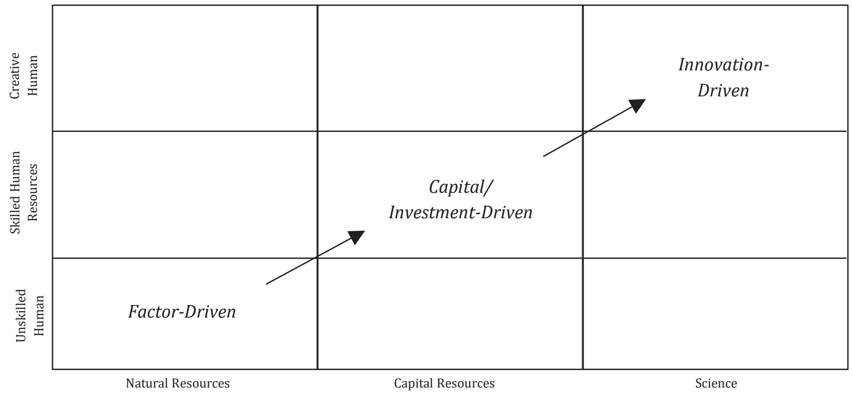


Figure 1.3. Strategy for Improving Oil Palm Productivity (Source: Sipayung, 2011, 2018)

In 1976, the Indonesian government focused on growing the domestic market to increase its palm oil consumption and add value to the palm oil industry. To achieve this, the Indonesian government developed the first downstream industry, called Pamina (now owned by PTPN IV) in Adolina, North Sumatra; and in 2011, various policies were implemented to accelerate Indonesia's downstreaming industry. Three outputs of the downstreaming process are as follows (Figure 1.4).

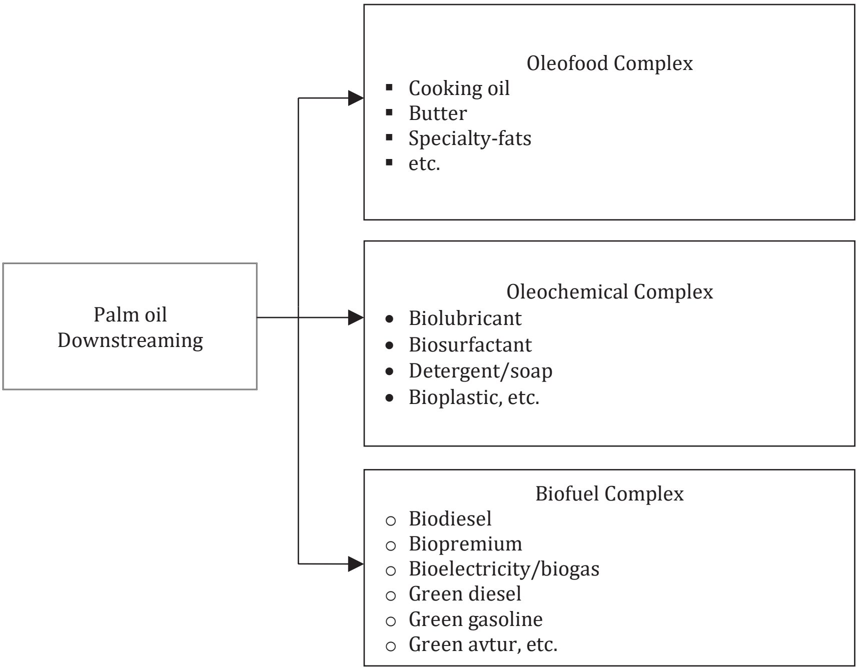


Figure 1.4. Three Ways to Palm Oil Downstream in Indonesia (Source: Sipayung, 2018)

First, the downstreaming of oleofood (oleofood complex), i.e., the industry to further processing palm oil such as crude palm oil and crude palm kernel oil (CPO and CPKO) into food, both intermediate products (refined palm oil) and palm oil-based final products (palm oil-based products). The oleofood products made in Indonesia are palm cooking oil, margarine, shortening, ice cream, creamer, cocoa butter, specialty-fats, and so forth.

Second, the downstreaming of oleochemicals (oleochemical complex), i.e., the industry to processing palm oil into basic oleochemical products (fatty acid, fatty alcohol, methyl ester, soap noodle, glycerine) and advanced oleochemical products, such as biosurfactant (detergent, soap, shampoo), toiletries and cosmetics, bio lubricant, and so forth.

Third, the downstreaming of biofuel/bioenergy (biofuel/bioenergy complex), i.e., the industry to processing/using palm oil (oil and biomass) into energy products, such as biodiesel (FAME), bio hydrocarbons/green fuel (green diesel, green gasoline, and green avtur), charcoal briquettes (biocoal), and so forth.

As seen in Figure 1.5, the growth of downstreaming industry in the country resulted in the higher domestic consumption of palm oil. In 2021, the domestic consumption of palm oil (CPO+CPKO) was dominated by the food industry at 8.9 million tons (49 percent), followed by the biodiesel industry at 7.3 million tons (40 percent) and the oleochemical industry at 2.1 million tons (11 percent). It indicates that Indonesia's palm oil downstream industry is still marketed for food products.

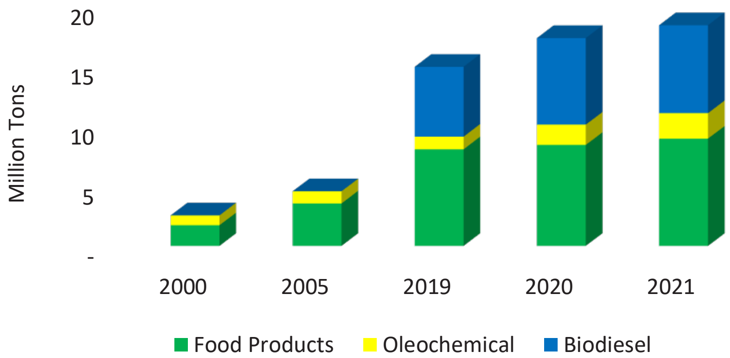


Figure 1.5. Consumption of Palm Oil (CPO+CPKO) Based on the Domestic Downstream Industry (Source: Data processed by PASPI, 2022)

The cooking oil industry in Indonesia consists of 104 cooking oil factories and 137 repacker factories (Ministry of Industry, 2022). The cooking oil production (RBD Palm Olein) in 2021 was 22.4 million kiloliters. Furthermore, 8.3 million kiloliters were used for domestic consumption and 14.1 million kiloliters for exports.

In 2021, the cooking oil is mostly sold in bulk or smaller packages in the retail market. The consumers for its bulk products are households (2.4 million kiloliters), industry (1.85 million kiloliters), and raw material for other industries (2.52 million). On the other hand, the consumption of packaged cooking oil was comprised of 231 thousand kiloliters of simple-packaged cooking oil for households and 1.27 million kiloliters of premium cooking oil for households.

Regarding the oleochemical complex, 21 companies produced basic oleochemicals in 2020 with a production capacity of 11.3 million tons (IOMA, 2021). The production of basic oleochemicals increased from 6.6 million tons to 12.9 million tons in 2014-2020 (Figure 1.6). Methyl ester production grew significantly from around 3 million tons to 8.59 million tons in that period.

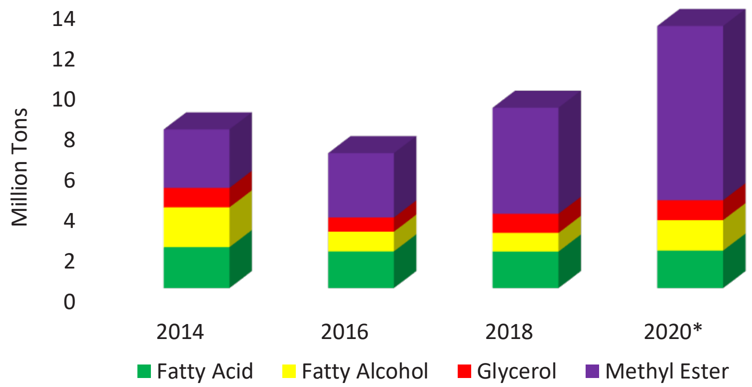


Figure 1.6. Production of Basic Oleochemicals in Indonesia, 2014-2020 (Source: Statistics Indonesia, data processed by PASPI, 2022)

For the biofuel/bioenergy complex industry, there were 32 companies producing biodiesel in Indonesia in 2021, with an installed capacity of 17.14 million kiloliters (APROBI, 2022). With such capacity, Indonesia is the largest producer of palm oil biodiesel (often called palm biodiesel) in the world.

The Indonesia's government's mandatory implementation of the biodiesel program has contributed significantly to the performance of the biodiesel industry, as seen from its increasing production and consumption in 2019-2021 (Figure 1.7). For instance, in 2011, biodiesel production was 1.8 million kiloliters. Out of the number, domestic consumption amounted to 0.36 million kiloliters, and export was 1.5 million. Ten years later, the production rose rapidly to 8.9 million kiloliters. The domestic consumption was 8.4 million kiloliters of the production.

The growth of the palm oil downstream industry cannot be separated from the palm oil downstreaming ecosystem built by the Indonesian government since 2011 (Sipayung, 2018; PASPI Monitor, 2021[e]). The three influential policies in this downstreaming efforts are export tax policies (export duty and export levy), biodiesel mandatory policies (B-7.5 to B-30), and downstreaming incentives.

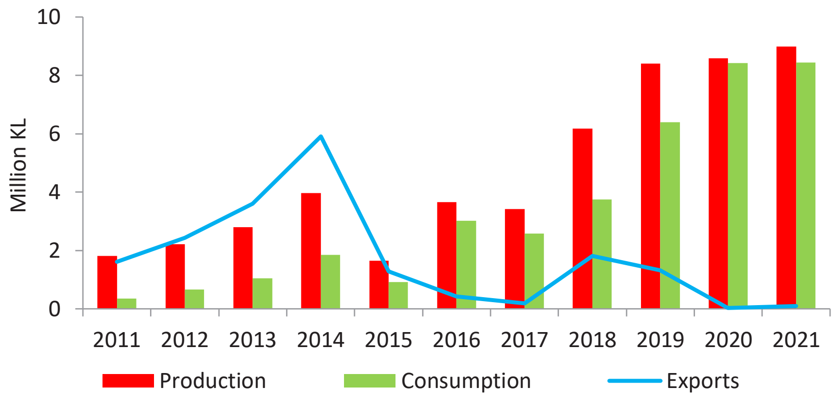


Figure 1.7. Production, Consumption, and Exports of Palm Oil Biodiesel in Indonesia from 2009 to 2021 (Source: APROBI, 2022)

Its downstreaming policy has also positively impacted export composition (Figure 1.8). The exports of Indonesian palm oil products in 2011 were dominated by crude palm oil (CPO+CPKO), intermediate products, and finished products with their respective market shares of 54 percent, 44 percent, and 2 percent.

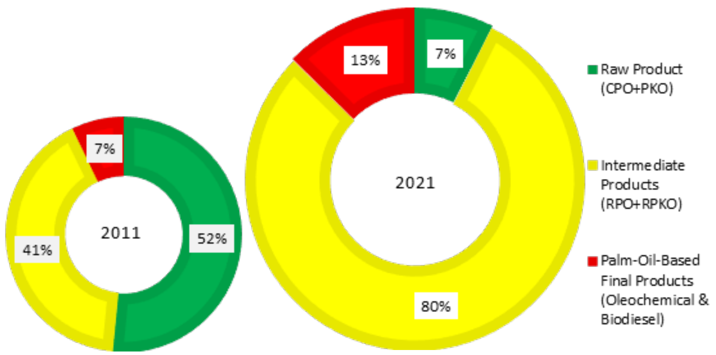


Figure 1.8. Changing Composition of Indonesia's Exported Palm Oil Products in 2011 and 2021 (Source: Statistics Indonesia; data processed by PASPI, 2022)

In 2021, the composition of exports changed quite significantly, dominated by domestic downstreaming products, i.e., intermediate products (80 percent) and finished products (13 percent). On the other hand, the exports of crude palm oil products (CPO+CPKO) fell dramatically to around 7 percent.

The push for downstreaming palm oil industry has led to better export performance of Indonesia's palm oil (Figure 1.9). The export value of Indonesia's palm oil and its derivatives increased from USD 21.6 billion to USD 36.2 billion in 2011-2021. The export volume doubled from 17.6 million tons to 34.4 million tons in the period.

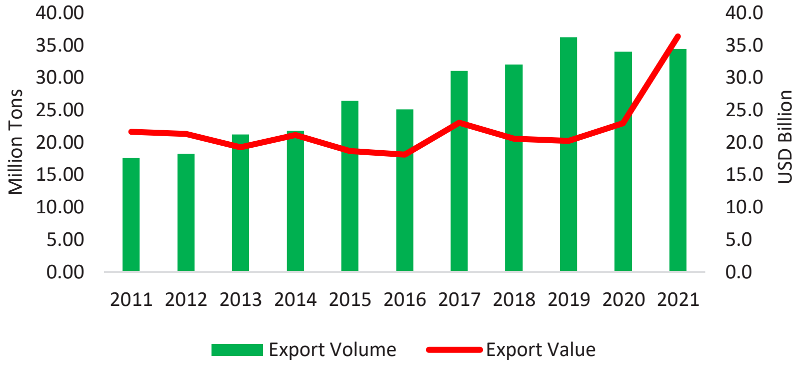


Figure 1.9. Export Performance of Indonesia's Palm Oil and Its Derivatives (Source: Statistics Indonesia, data processed by PASPI, 2022)

The rapid development of the national palm oil industry made Indonesia the world's largest producer of palm oil (Figure 1.10). In 1980, Malaysia dominated the world's market share of palm oil at 54 percent, while that of Indonesia was only 15 percent. After 2006, however, such a position changed as Indonesia's market share rose. In 2021, the market share of Indonesia reached 59 percent, while Malaysia's decreased to 25 percent. In other words, Indonesia plays a more significant role in the global palm oil market.

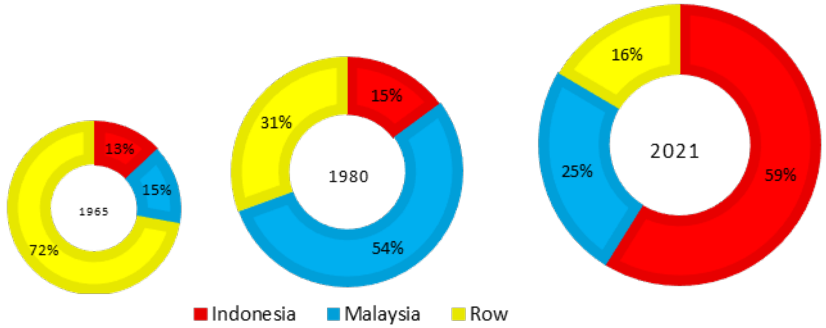


Figure 1.10. Increase of Indonesia's Market Share in Global Palm Oil Production (Source: USDA, data processed by PASPI, 2022)

Palm oil industry does not only produce vegetable oil. Like other agricultural sectors, the palm oil industry has several functions in the global ecosystem. Besides its multifunctional agriculture (Aldington, 1998; Dobbs and Petty, 2001; Moyer and Josling, 2002; Huylenbroeck *et al*., 2007), the industry serves its economic (white function/services), socio-cultural (yellow function/services), water conservation (blue function/services), and conservation (green function/services) functions. Therefore, the palm oil industry is essential to provide food and energy. It also plays a significant role in social life and environmental services (PASPI Monitor, 2021[i]).

Thus, the palm oil industry can benefit food security, energy security, economic security, and environmental security. Its development will contribute to improving food security, energy security, economic security, and environmental security at local, regional, national, and global levels.

Chapter 2
Myths versus Facts: Palm Oil in the Global Vegetable Oil Competition

The palm oil industry has grown rapidly, so much so it transforms the competition within the global vegetal oil industry. Soybean oil, sunflower oil, and rapeseed oil once dominated the vegetable oil market worldwide. However, palm oil is now the dominant commodity. As a result, there is a new dynamic in the global vegetable oil competition. Palm oil's competitive price as compared to the vegetable oils' has changed the market from price competition to non-price competition. In the latter format, the competition may be less equitable, with negative campaigns launched against the palm oil industry.

The campaigns to counter palm oil have started since the early 1980s and are increasingly more intensive. The combination of business competition in vegetable oil and protectionism that highlights social, economic, environmental, and health issues has influenced the global palm oil dynamics.

MYTH 2-01

Oil palm plantations are more expansive than those of other vegetable oils

FACTS

At the international level, 17 types of vegetable oil, which are used as the sources of fat and oil around the world, are traded globally with the food quality and safety standards set and approved by CODEX Alimentarius Commission (Hariyadi, 2010). Among the 17 types of vegetable oil, there are four main sources of vegetable oil in the world, i.e., palm oil (crude palm oil, crude palm kernel oil), soybean oil, rapeseed oil, and sunflower oil.

The rapid expansion of oil palm plantations is exaggerated. The data show that the expansion of oil palm plantations is less considerable than that of the plantations of other vegetable oil sources, such as soybean, rapeseed, and sunflower (Table 2.1).

Table 2.1. Changes in the Plantation Areas of the World's Major Vegetable Oil Sources in 1980-2021

Vegetable Oil Plant	Areas (Thousand Hectares)		
	1980	2000	2021
Soybean	48,488	75,472	129,998
Rapeseed	9,893	24,742	37,788
Sunflower	5,292	19,764	28,420
Oil Palm	1,027	10,093	25,058

Source: USDA, data processed by PASPI (2022)

In 2021, the total areas of soybean plantations in the world were 129.9 million hectares. On the other hand, the areas to plant rapeseed and sunflower were 37.8 million hectares and 28.4 million hectares, respectively. Meanwhile, the oil palm plantations in the world were only 25 million hectares.

Besides having the most extensive areas, in 1980-2021, soybean plantations grew most rapidly compared to the plantations of the other three vegetable oil sources. There were 81.5 million hectares of soybean plantations. Meanwhile, in the same period, the areas of oil palm plantations in the world only grew by 24 million hectares or 29 percent of the global growth of soybean plantations.

Thus, the largest vegetable oil plantations are that of soybeans, rapeseed, and sunflower. On the other hand, oil palm plantations are the least expansive compared to those of the other three vegetable oils.

Suppose the vegetable oil plantations were converted from forests, then, the land use conversion around the world including deforestation (Land Use, Land Use Change, and Forestry/LULUCF), is highest in the expansion of soybean plantations. Then, it is followed by rapeseed and sunflower plantations.

MYTH 2-02

Oil palm plantations are larger than those of other vegetable oils, making the global production of palm oil higher than the rest

FACTS

The composition of major global vegetable oil production changed from 1980-2021 (Figure 2.1). In 1980, the production of the world's major vegetable oil was dominated by soybean oil with a volume of 9.9 million tons (51 percent). It was followed by palm oil at 5.4 million tons (28 percent), rapeseed oil at 2.6 million tons (13 percent), and sunflower oil at 1.5 million tons (8 percent).

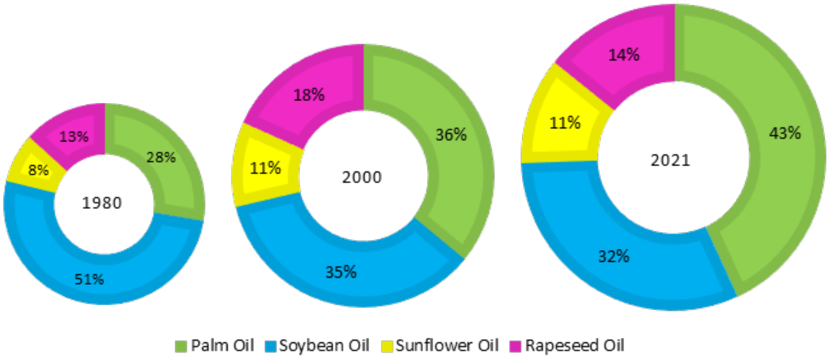


Figure 2.1. Changes in the Global Production Share of the Four Major Vegetable Oils in the World (Source: USDA; data processed by PASPI, 2022)

In 2021, the composition of the world's main vegetable oil production changed as palm oil became the most-produced global vegetable oil with a production volume of 84.2 million tons or a share of 43 percent of the total production of the four major vegetable oils in the world. It was followed by soybean oil at 61.3 million tons (32 percent), rapeseed oil at 27.9 million tons (14 percent), and sunflower oil at 22 million tons (11 percent).

Nonetheless, Table 1.1 and Figure 2.2 show that in terms of the total areas of the four major vegetable oil sources that amount to 221.1 million hectares, the greatest share was the total areas of soybean plantations at 59 percent. It was followed by rapeseed plantations at 17 percent, sunflower plantations at 13 percent, and oil palm plantations at 11 percent.

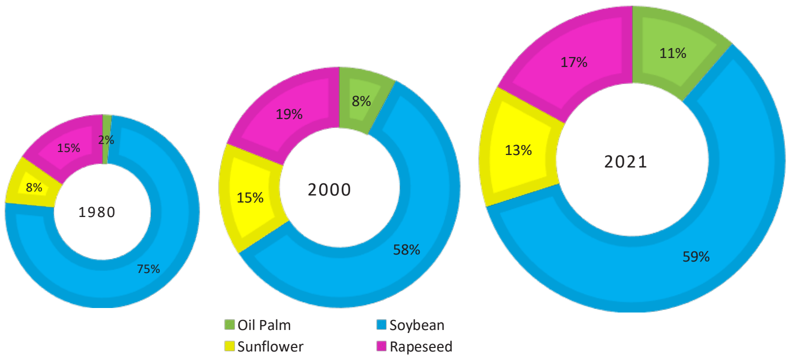


Figure 2.2. Changes in the Share of the Global Plantation Areas of the Four Major Vegetable Oil Sources (Source: USDA; data processed by PASPI, 2022)

Therefore, oil palm plantations have the smallest areas compared to other vegetable oil plantations. However, in terms of oil production, palm oil production is the highest. Regarding land use, oil palm plantations are more productive than other vegetable oil plantations.

MYTH 2-03

Palm oil is less productive than other vegetable oil sources, so making them the world's major vegetable oil is not economical

FACTS

With the lessening of agricultural land around the world, people need vegetable oil plantations that are more productive. So, even with limited land size, more vegetable oil can be produced.

In terms of the productivity of the world's main vegetable oil plants in 2021, Table 2.2 shows that oil palm productivity was 3.36 tons per hectare. In other words, a hectare of oil palm plantations could produce 3.36 tons of oil per year. Meanwhile, other vegetable oil plants are less productive than oil palm. The productivity of sunflower was 0.78 tons per hectare, rapeseed was 0.75 tons per hectare, and soybean was only 0.47 tons per hectare. It shows that the productivity of oil palms per hectare was 4-7 times as high as that of other main vegetable oil plants.

Table 2.2. Comparison of the Productivity of Major Vegetable Oil Plants in 2021

Plant	Oil Productivity (Tons/Ha/Year)
Oil Palm	3.36
Sunflower	0.78
Rapeseed	0.74
Soybean	0.47

Source: USDA, data processed by PASPI (2022)

In terms of oil productivity per hectare, oil palm were the most productive among the others. Furthermore, regarding land use, oil palm plantations are the most efficient vegetable oil plantations (IUCN, 2018).

In addition to the highest oil productivity, oil palm plants have several advantages of production, i.e.: (1) they are perennial plants with a production cycle (life span) of 25-30 years; (2) palm oil can be harvested every two weeks throughout the year. Thus, palm oil is the world's main vegetable oil with wide availability (relatively large volume and stable supply throughout the year) and high affordability (affordable price and the most competitive price) compared to other vegetable oils (PASPI Monitor, 2021[u]). Therefore, palm oil is eligible for the world's most efficient vegetable oil.

MYTH 2-04

Oil palm plantations are the largest monoculture plantations in the world

FACTS

The world's important agricultural commodities are generally cultivated in monoculture farms. For example: wheat, corn, beans, rice, and some other plants worldwide are monoculture crops. According to USDA (2022), globally, wheat was cultivated in 221 million hectares, corn in 202 million hectares, and rice in 167 million hectares (Figure 2.3). Likewise, other vegetable oil sources in the world, such as soybean, rapeseed, sunflower, and oil palm, are cultivated in monocultures. Thus, it's false to say that oil palm plantations are monoculture farms with the largest areas in the world. Wheat, corn, and rice plantations have much larger areas.

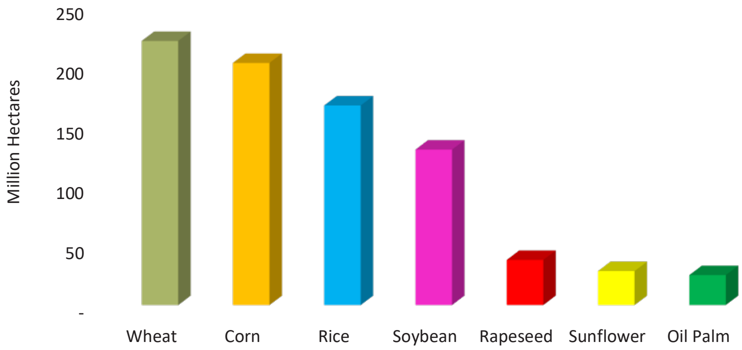


Figure 2.3. Total Areas Global Cultivation for Wheat, Corn, Rice, and Vegetable Oil Plants (Source: USDA, 2022)

Monoculture farming is considered rational as it can achieve economies of scale and be highly productive. However, plants are vulnerable to diseases, and monocultures negatively impact biodiversity.

Unlike other vegetable oil plantations, oil palm plantations are not purely monocultures. During the planting and maintenance of immature crops, cover crops, i.e., leguminous plants, are planted between oil palms (Prawirosukarto et al., 2005; Yasin et al., 2006; PASPI Monitor, 2021[x]). In addition, oil palm plantation businesses developed several types of integration such as the integration of oil palm and food crops during the immature period (Partohardjono, 2003; Singerland et al., 2019; Baihaqi et al., 2020; Kusumawati *et al.,* 2021) and the integration of oil palm and cattle during the mature period (Batubara, 2004; Sinurat et al., 2004; Ilham and Saliem, 2011; Utomo and Widjaja, 2012; Winarso and Basuno, 2013).

Naturally, throughout oil palm's lifespan, it produces more biodiversity. With a 25-30 years production cycle (life span) of oil palm plantations, as oil palm mature, there is a chance of higher biodiversity like in forests (PASPI Monitor, 2021[a]).

A study conducted by Santosa et al. (2017) reveals that the types of biodiversity in mature oil palm plantations are not necessarily less than those of lands before being converted into oil palm plantations (ecosystem benchmark) and of forest areas (High Conservation Value/HCV) as the biodiversity growth of oil palm plantations is directly proportional to their age. Thus, the studies conducted by Beyer et al. (2020) and PASPI Monitor (2021[a]) suggest that in the context of the global ecosystem, the Species

Richness Loss (SRL) per liter of vegetable oil from oil palm is lower than those of other vegetable oils plants such as soybean, rapeseed, sunflower, peanut, and olive.

Monoculture farming in oil palm plantations is only practiced during land clearing and planting. Afterward, oil palm plantations become polycultures through the integration of oil palm-food crops, oil palm-vegetables, oil palm-fruit, oil palm-cattle, other integration, and natural biodiversity. The integrated (polyculture) farming system of oil palm with agricultural commodities can preserve the biodiversity in oil palm plantations (Ghazali et al., 2016), prevent land degradation, and reduce greenhouse gas (GHG) emissions (Khasanah et al., 2020). Is this a running theme in other vegetable oil plantations?

MYTH 2-05

Palm oil is more expensive than other vegetable oils, so it is not suitable for the world's food and energy sources

FACTS

Food and energy are basic needs throughout the world. Thus, the availability dan affordability of the sources are essential.

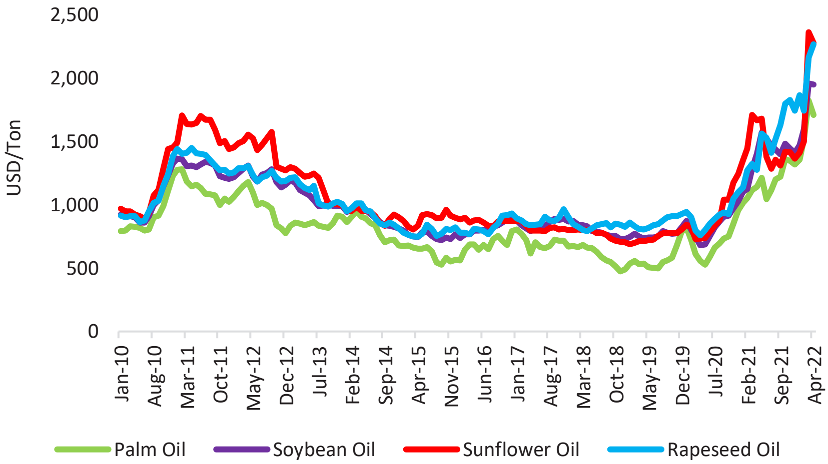


Figure 2.4. Price Comparison between the Palm Oil and Other Major Vegetable Oil (Source: Oil World, World Bank; data processed by PASPI, 2022)

The price of palm oil was more affordable/competitive than those of other vegetable oils (Figure 2.4). It cannot be separated from the fact that palm oil is more productive than other vegetable oils (Myth 2-03). The more affordable (competitive) price has positive impacts on people around the world. Palm oil is affordable, available throughout the year, and widely used. Hence, palm oil is a substitute for other vegetable oils in the global market (Kojima et al., 2016).

Palm oil can prevent food prices from skyrocketing by substituting other vegetable oils as a food source. As an energy source, palm oil, which substitutes for other vegetable oils, can also prevent the prices of energy feedstock (biofuel) from soaring.

MYTH 2-06

The share of palm oil consumption is lower than the shares of other vegetable oil consumption in the world

FACTS

Every country/region has different patterns in consuming vegetable oil which stems from its history, taste, and the availability of vegetable oil sources. At the international level, the availability of vegetable oil is part of global food security.

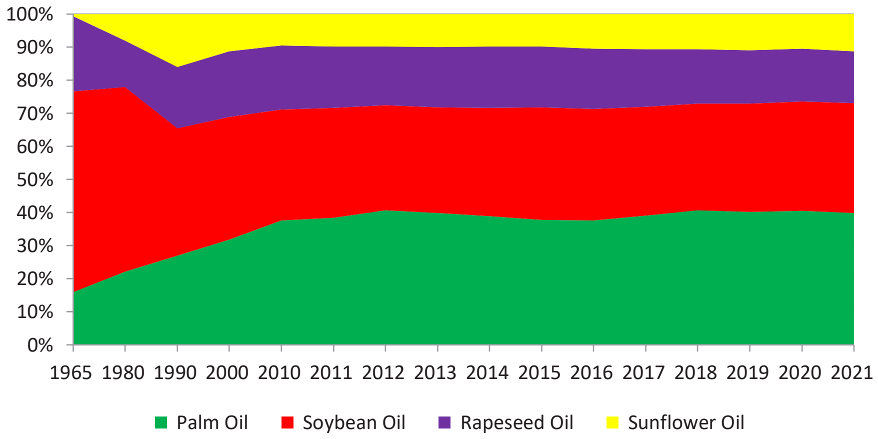


Figure 2.5. Changes in the Global Consumption Share of Palm Oil among Four Major Vegetable Oil Sources (Source: USDA; data processed by PASPI, 2022)

Throughout history, the global consumption of major vegetable oil has changed. In the global consumption of vegetable oil, the share of palm oil was increasingly dominant over the years (Figure 2.5). In 1965, the most consumed vegetable oils were soybean oil (61 percent), rapeseed oil (23 percent), palm oil (16 percent), and sunflower oil (1 percent). With the wider availability of palm oil at the international level, more affordable prices, and various applications, the share of palm oil consumption increased. Palm oil has surpassed soybean oil in the global consumption of major vegetable oils. In 2021, palm oil consumption ranked the highest at 40 percent. It was followed by soybean oil (33 percent), rapeseed oil (17 percent), and sunflower oil (11 percent).

Among the four main vegetable oils in the world, more palm oil was used in various major countries/regions, such as India, China, Africa, the European Union, and the United States. The European Union is the main producer of rapeseed oil and sunflower oil, the most consumed vegetable oils in the region. In 2000-2021, the share of palm oil consumption in the European Union rose from 24 percent to 29 percent (USDA, 2022).

The share also increased in the United States. The most consumed vegetable oil in the US is soybean oil. Despite the domination of soybean oil in that country, the proportion of palm oil consumption rose from 3 percent to 10 percent in 1980-2021 (USDA, 2022).

In 1965, the most consumed vegetable oils in China were rapeseed oil (68 percent), soybean oil (24 percent), and palm oil (9 percent). With China's population and economic growth, the share of palm oil consumption grew over the years to 19 percent in 2021 (USDA, 2022).

Unlike in the three countries above, in 1980, India's vegetable oil consumption pattern was relatively competitive with rapeseed oil (39 percent), soybean oil (37 percent), and palm oil (23 percent). With India's population growth and economic development, the share of palm oil consumption grew rapidly and dominated the consumption of vegetable oil in India. It rose from 37 percent in 1980 to 44 percent in 2021 (USDA, 2022).

It shows that palm oil has become more significant at an international level. With the changing global consumption of vegetable oil, palm oil is an informed choice as it is much more productive, and thus, more sustainable.

MYTH 2-07

Palm oil is not an ideal feedstock for biodiesel

FACTS

The international community is replacing fossil fuels with biofuel, including biodiesel, to reduce reliance on fossil fuels and global emissions. The development of biodiesel in every country uses the vegetable oil available in that country.

Palm oil is a versatile ingredient, making it widely used as foodstuff and non-foodstuff, including alternative energy. One of palm oil-based bioenergy/biofuel products is biodiesel used to substitute for diesel fossil fuel.

Palm oil is the main feedstock that is most extensively used by the global biodiesel industry (PASPI Monitor, 2019[e]). In 2015-2021, the use of palm oil as the feedstock for the global biodiesel industry rose from 6.2 million tons (22 percent) to 15.2 million tons (36 percent) (Figure 2.6).

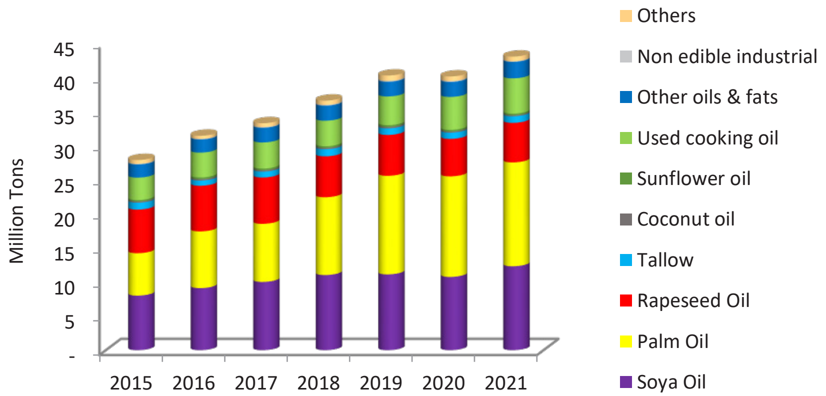


Figure 2.6. Development of the Vegetable/Animal Oil Use in the Global Biodiesel Industry (Source: USDA; data processed by PASPI, 2022)

Other kinds of vegetable oil and animal fat used as the feedstock for the global biodiesel industry in 2021 were soybean oil (29 percent), rapeseed oil (14 percent), used cooking oil/UCO (12 percent), tallow (2 percent), sunflower oil (1 percent), and others (6 percent). It shows that palm oil plays a more prominent role in the world's biodiesel industry.

Palm oil is used in the world's biodiesel industry due to its advantages. Relatively competitive price, huge volume, and stable supply of palm oil throughout the year meet the needs of the global biodiesel industry (Mekhlief et al., 2011; PASPI Monitor, 2021[w]).

Not only that, palm oil is an ideal feedstock for the world's biodiesel, but it also has more advantages compared to other kinds of vegetable oil. The increasing share of palm oil in feedstock for the world's biodiesel industry also confirms it.

MYTH 2-08

The use of palm oil as a feedstock for biodiesel in the European Union has decreased.

FACTS

The development of renewable energy in the European Union is a commitment to the Kyoto Protocol on the reduction of GHG emissions. The policy is imposed in Directive 2009/28/EC (RED I) adopted on 23 April 2009 (PASPI Monitor, 2019[c]; Suharto et al., 2019). The implementation of the policy led to the higher production and promotion of crop-based sustainable energy (biofuel) or so-called first-generation biofuels.

Despite a polemic on the use of palm oil as a feedstock for biodiesel in the European Union, their biodiesel industry still uses it. The use of palm oil in the industry increased from 980 thousand tons (10 percent) in 2011 to 2.6 million tons (18 percent) in 2021 (Figure 2.7).

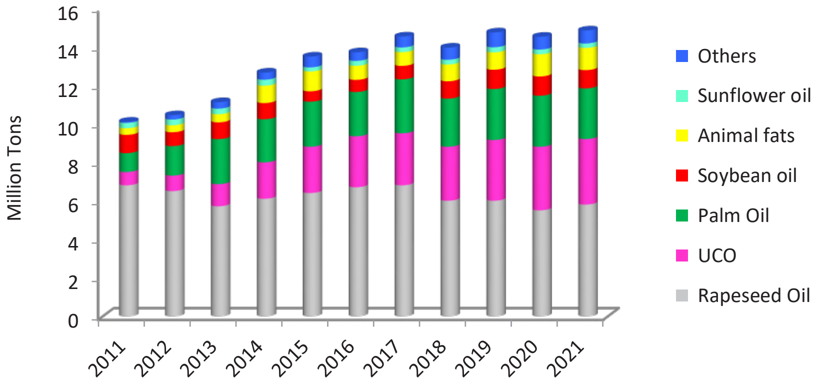


Figure 2.7. Use of Palm Oil in the Biodiesel Industry in the European Union (Source: USDA; data processed by PASPI, 2022)

Interestingly, using palm oil as a biodiesel feedstock in the European Union can reduce the burden on rapeseed oil. Rapeseed oil is the major vegetable oil produced in the European Union. It is mainly used as a foodstuffs e. If rapeseed oil is used to produce biodiesel, the European Union will face a food-fuel trade-off issue. Palm oil in the European Union market can be an alternative feedstock for biodiesel in the region, so less rapeseed oil is used to produce biodiesel. In 2011-2021, the amount of rapeseed oil used in the biodiesel industry in the European Union fell from 6.8 million tons (67 percent) to 5.8 million tons (39 percent).

The wider use of palm oil as a feedstock in the European Union's biodiesel industry is a matter of personal preference. Due to its price and supply (Myth 2-05 and Myth 2-07), the European Union's biodiesel industry still uses palm oil as a feedstock.

MYTH 2-09

The development of palm oil-based biofuel results in a food-fuel trade-off

FACTS

The use of agricultural products in biofuel, or the food-fuel trade-off, has long been debated at the international level. The issue is ethical and economic (Rajagopal et al., 2009; Thompson, 2012; Tomei and Helliwell, 2015; Judit et al., 2017).

The studies conducted by Zilberman et al. (2012), Abott (2014), and Zhang et al. (2013) have discussed the relation between the higher production of biofuel and the soaring prices of several food commodities such as corn, sugarcane, vegetable oil, and cereals. De Gorter et al. (2015) say that the biofuel sector is responsible for almost 80 percent of the increase in food product prices. Nonetheless, Durham et al. (2012) reveal that the production of biofuel did not significantly contribute to the rising prices of food. Those studies show that the food-fuel trade-off issue is still debated.

The issue stemmed from limited supplies. Therefore, we need more available and affordable vegetable oil globally to solve or minimize the trade-off. As the major supplier of vegetable oil across the world, palm oil plays an important role as both food source (Myth 3-01) and energy source (Myth 2-07).

It can be seen from the 2011-2021 data (Figure 2.8). The use of palm oil as a feedstock for the global biodiesel industry rose from 3.9 million tons to 15.4 million tons. Despite the wider use of palm oil in the global biodiesel industry, the global price of CPO did not increase. During that period, the price trend was decreasing.

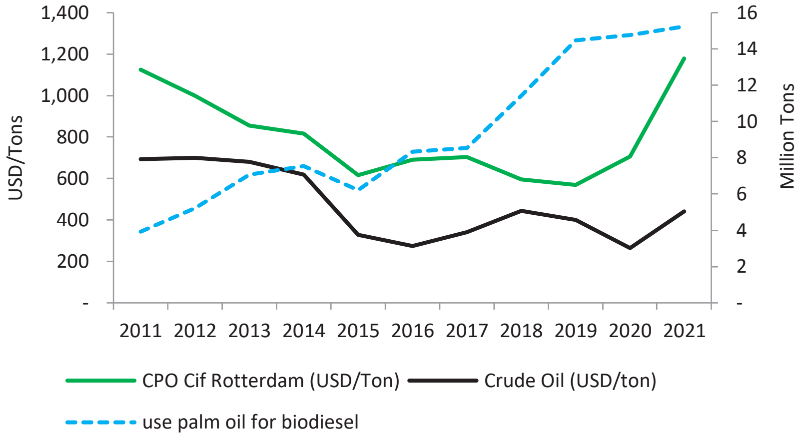


Figure 2.8. Relation between Palm Oil Volume in the Global Biodiesel Industry and the Global Prices of CPO and Crude Oil (Source: World Bank; USDA; data processed by PASPI, 2022)

It shows that palm oil does not cause or exacerbate the food-fuel trade-off. Instead, palm oil has several advantages to minimizing the potential of the food-fuel trade-off at the international level (PASPI Monitor, 2021[n]).

Chapter 3
Myths versus Facts: Palm Oil Industry in Economy Issues

It is widely believed that the palm oil industry exclusively benefits the business actors and not the economy inclusively. Indonesia has become the world's largest palm oil producer as well as the world's largest vegetable oil producer. However, the extent of the palm oil industry's contribution to the economy remains a question among the general public.

In general, the palm oil industry contributes to the economic sector by improving food security, energy security, and community economic security at various levels, starting from the local/rural, regional, national, and even global level. The contribution of the palm oil industry to the creation of economic security is evident from the increased smallholders' income, rural economic development, regional economic growth (GRDP), national economic growth (GDP), and revenues of palm oil importing countries. For Indonesia, the palm oil industry contributes to foreign exchange earnings either through palm oil product exports or through foreign exchange savings by not importing fossil diesel and using palm oil-based biodiesel instead.

This chapter will dialectically cover myths, opinions, and accusations dismissed by related facts about the roles and contributions of the palm oil industry in the economic sector at global, national, regional, and local levels.

MYTH 3-01

Palm oil makes no significant contribution to global food

FACTS

Both Crude Palm Oil (CPO) and Crude Palm Kernel Oil (CPKO) are the most traded vegetable oils in the world (USDA, 2022; FAO, 2022). The global palm oil trade involves almost every country in the world as the producer or consumer (Figure 3.1), consist of 10 producers, 39 exporters, 220 importers/consumers. The global palm oil trade includes palm oil products both as intermediate products and finished products.

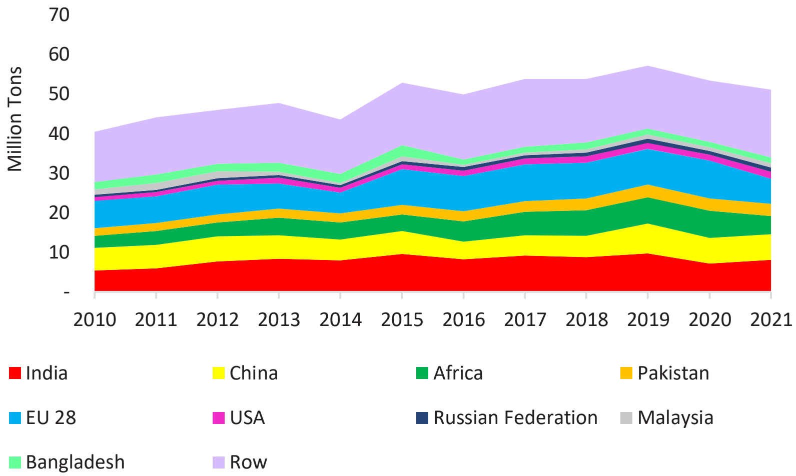


Figure 3.1. Palm Oil Feeding the World (Source: Trademap; data processed by PASPI, 2022)

Around 70–90 percent of palm oil traded in the global market is used for food (Sheil *et al.,* 2009; Shimizu and Descrochers, 2012; Gaskell, 2012; Kojima *et al.,* 2016; Parcell *et al.,* 2018; Hariyadi, 2020). Palm oil has been a food source for the African people since the 18th century. Today, many palm oil-based food products, such as cooking oil, margarine, shortening, ice cream, creamer, chocolate, biscuit, specialty fats, etc., are available and edible for people around the world.

Palm oil's role as a foodstuff can be seen at the country/region level. For example, in 2021, the use of palm oil for food in China accounts for 66 percent of its total use, in India 96 percent, in Pakistan 98 percent, and in European Union 36 percent.

There is a difference in how palm oil-based food products are consumed in Asia and Europe (Rifin, 2011; Kojima et al., 2016). In Asia, palm oil is mainly consumed as cooking oil for household and industrial uses. On the other hand, in Europe and America, palm oil is mainly used as a raw material in the food industry to manufacture food products such as bakeries, biscuits, chocolate, etc.

In addition to being used as food for humans (oleofood), oil palm also has a by-product called Palm Kernel Meal (HS 2306.60), which is used as a feedstuff for the world's animal feed industry. The Palm Kernel Meal (PKM) is used by the global animal feed industry (PASPI Monitor, 2021[n]) to meet the increasing demand for feed as the trends of livestock products and pet ownership are on the rise.

PKM export from palm oil-producing countries, especially Indonesia and Malaysia, increased from around 2.8 million tons in 2000 to around 7 million tons in 2021 (Figure 3.2). Likewise, Indonesia's market share of PKM export rose from 37 percent to 71 percent in the same period.

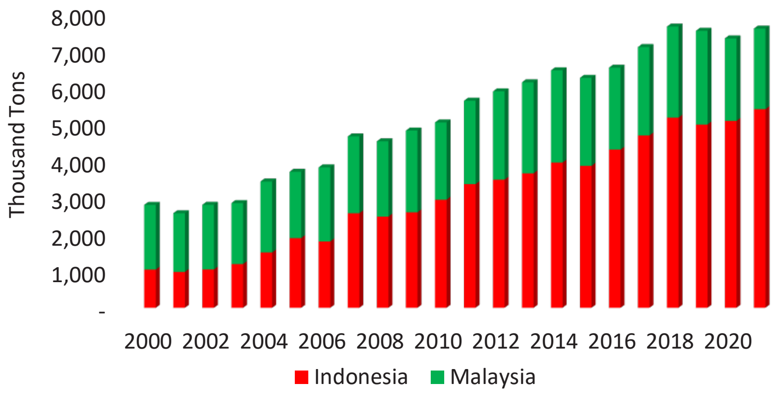


Figure 3.2. Volume of Palm Kernel Meal Export Globally (Source: USDA, 2022; data processed by PASPI)

In addition to PKM, other oil palm products that can be potentially used as feedstuff for the feed industry (PASPI Monitor, 2021[p]) are POME (Palm Oil Mill Effluent), PPF (Palm Press Fiber), and OPF (Oil Palm Frond). Palm oil by-products are feedstuff for poultry, ruminant (animals with four stomachs), and fish feed (Sinurat, 2003; Boateng *et al.,* 2008; Kum and Zahari, 2011, Abdeltawab *et al.,* 2018; Nikhlany *et al.,* 2022).

Therefore, it is clear that the world's palm oil industry is part of global food security, meaning it is feeding the world (PASPI Monitor, 2021[d]). Many palm oil-based food products are used as food ingredients consumed by households, food industry, and food service industry.

MYTH 3-02

Palm oil makes no significant contribution to global energy

FACTS

In addition to producing food worldwide, the palm oil industry also produces feedstock for renewable energy for global community. Renewable energy from the palm oil industry includes (Figure 3.3): (1) First Generation Renewable Energy, consist of the derivatives of palm oil (CPO+CPKO) such as biodiesel/FAME, green diesel, green gasoline, and green avtur; (2) Second Generation Renewable Energy, consist of the derivatives of oil palm biomass (empty fruit bunch, frond, shell, fiber) such as bioethanol, biopellet, charcoal briquette, biocoal, biogas, bioelectricity; and (3) Third Generation Renewable Energy, consist of the derivatives of Palm Oil Mill Effluent (POME) to produce biogas (with methane capture technology) and algae-based biodiesel (with algae pond technology).

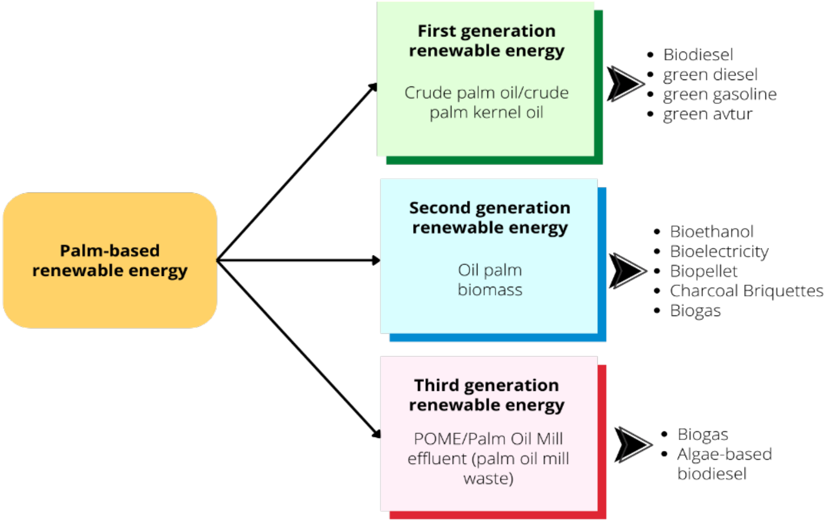


Figure 3.3. Oil Palm-based Renewable Energy

Oil palm-based renewable energy such as biodiesel/FAME and bio-coal have been widely used in many countries. Other first-generation renewable energy products such as palm oil-based green fuel (green diesel, green gasoline, and green avtur) are currently under development in Indonesia, whereas second and third generation renewable energy products (biogas) have generally been used locally.

Palm oil is important in the global biodiesel industry (Myth 2-07). The volume of palm oil used in the world's biodiesel industry rose from 3.9 million tons in 2011 to 15.2 million tons in 2021 (Figure 3.4).

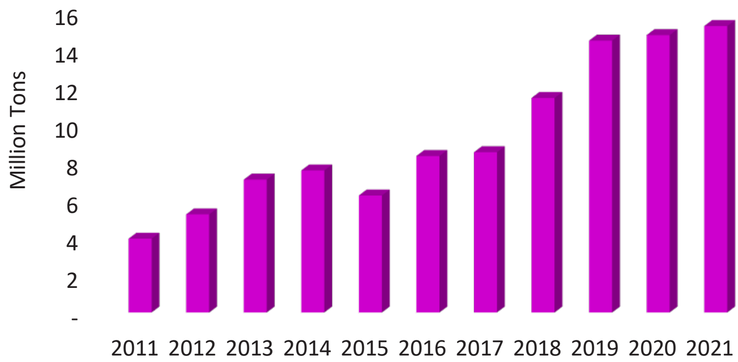


Figure 3.4. Volume of Palm Oil Used as Feedstock for Global Biodiesel Industry (Source: USDA, data processed by PASPI, 2022)

As the world's largest palm oil producer, Indonesia processes palm oil into biodiesel (Faty Acid Methyl Ester/FAME). On top of that, Indonesia is the world's largest palm oil-based biodiesel producer and second largest biodiesel producer, with 17 percent of total global production, below the United States with its soybean-based biodiesel.

From 2011 to 2021, Indonesia's biodiesel production rose from 243 thousand kiloliters to 8.9 million kiloliters (Figure 3.5). Palm oil-based biodiesel in Indonesia is developed mainly for domestic consumption, and the rest will be exported.

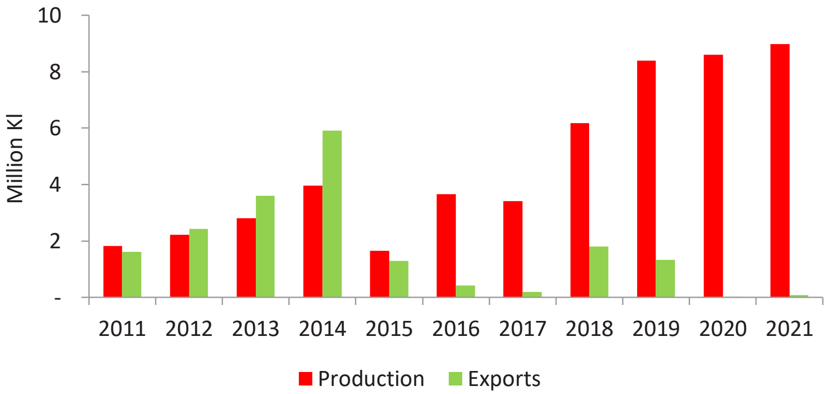


Figure 3.5. Production and Exports of Palm Oil Biodiesel in Indonesia in 2011–2021 (Source: Ministry of Energy and Mineral Resources, APROBI)

The description above shows that palm oil contributes to the global energy supply both as a feedstock and as a final product. The untapped potential of palm oil as a feedstock for renewable energy is still relatively big.

MYTH 3-03

Palm oil products are not consumed daily by the global community

FACTS

Palm oil is a versatile ingredients with wide applications for many products. Palm oil is used by the global manufacturing industry as a raw material to produce many kinds of products, such as food products, toiletries and cosmetics, as well as energy.

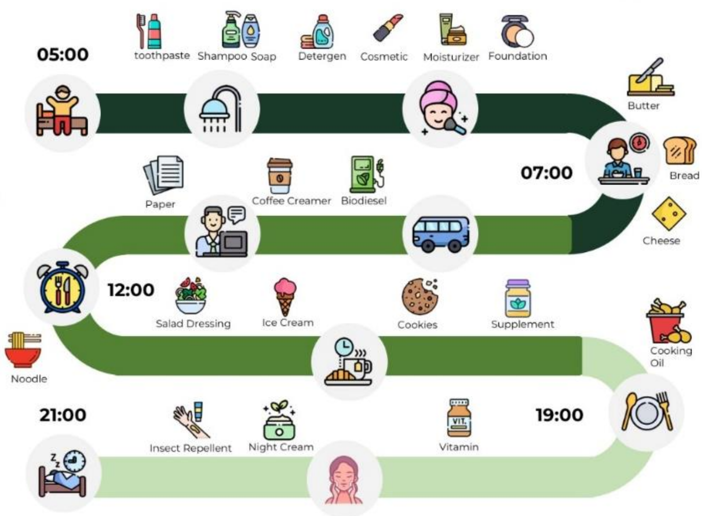


Figure 3.6. Palm Oil Products in Everyday Life

Palm oil-based products are used by people around the world 24 hours a day, from morning, noon, to nighttime (Figure 3.6). Consumers use palm oil in products such as toiletries (soap, shampoo, body lotion, toothpaste, facial soap, shaving foam), other cleaning products (detergent), skincare (moisturizer, sunscreen, serum), and makeup (lipstick, foundation, powder). Consumers also use food products containing palm oil, such as cooking oil, creamer, chocolate spread, bread, margarine, cereal, milk, biscuit, potato chip, mayonnaise, salad dressing, etc.

Palm oil products are also used by consumers in the transportation sector when they are traveling with vehicles fueled by palm oil-based biodiesel. Not only as an energy source for fuel, oil palms are also processed into other vehicle components such as car seats, car paint, tire, bio-lubricant, and helmet. Activities at school or office are also inseparable from palm oil products, which can be found in palm oil-based ink, fabric dye, and wall paint. Palm oil products can also be found in many furnitures, such as cupboards, chairs, and tables.

Therefore, it is clear that palm oil products are part of consumers' everyday life from when they wake up until going back to sleep. Palm oil's existence is essential to support everyone's life worldwide.

MYTH 3-04

Palm oil industry makes no contribution to global economy

FACTS

As discussed in Myth 2-01 concerning the global supply of vegetable oil, palm oil is the biggest contributor among other vegetable oils. The world's palm oil production rose from 55 million tons in 2010 to 84.2 million tons in 2021 (USDA, 2022). The increase in production is concurrent with the increase in palm oil global trade volume, from around 40.5 million tons to 42 million tons in the same period.

The largest palm oil importing countries/regions from 2010 to 2021 (Table 3.1) were India (18 percent), the European Union (15 percent), China (15 percent), Africa (13 percent), and the United States (4 percent).

Table 3.1. Top Five Global Importers of Palm Oil from 2010 to 2021

Country/Region	Import Volume (Thousand Tons)				
	2010	2015	2019	2020	2021
World	36,913	43,779	48,923	50,551	51,340
India	5,731	8,963	9,120	9,340	8,245
China	6,132	5,249	6,983	7,250	8,100
EU-27	5,498	7,426	7,350	7,050	6,900
USA	1,266	1,662	1,944	1,860	2,055
Africa	4,659	5,377	6,374	6,818	6,818
Rest of The World	13,627	15,102	17,152	18,233	19,059

Source: USDA; data processed by PASPI (2022)

The palm oil imported by these importers is further processed into various downstream products. Palm oil downstreaming activities in those countries have provided economic benefits. Intensifying and expanding palm oil downstreaming in importing countries have direct and indirect impacts on the economic sectors, which are ultimately enjoyed by the people (induced consumption impacts) by consuming palm oil products directly and indirectly.

The study conducted by European Economics (2016) reveals that at least 15 important sectors are also growing thanks to downstreaming in palm oil importing countries. These sectors include food; agriculture; hotel and restaurant; textile; construction, public administration and social security; trade; healthcare; wood processing; chemical substance and chemical product; personal service; education; and pulp and paper manufacturing.

A study conducted by Shigetomi *et al.* (2020) also confirms that many economic sectors in the world engage in the palm oil supply chain. These sectors include: (1) the food, beverage, and tobacco industry; (2) the chemical and chemical product industry; (3) the construction industry; (4) the textile, apparel, and leather product industry; (5) the petroleum industry; and (6) public health and social work services.

The study also reveals that the economic benefits of the palm oil industry are enjoyed by both the importing countries and the global community engaging in the supply chain of palm oil products and palm oil-based products. Households in many countries rely heavily on the consumption of internationally traded palm oil-based finished products, also known as hidden palm oil, such as food and non-food products (biofuels, cosmetics, and toiletries).

The combination of direct impacts, indirect impacts, and induced consumption impacts of import and downstream palm oil activities in importing countries contributes to an increase in global value-added and Gross Domestic Product (GDP). The study by European Economics (2016) reveals that the income generated by importing countries from palm oil downstreaming in 2013/2014 amounts to USD 32.8 billion.

The distribution of income generation from imports and downstreaming varies among palm oil importing countries (Figure 3.7). The European Union enjoys the largest share of income generation at 18.7 percent, followed by China (17 percent), India (16.7 percent), Africa (13.5

percent), Pakistan and Bangladesh (10.1 percent), the USA (7.3 percent), and the Rest of the World (17 percent).

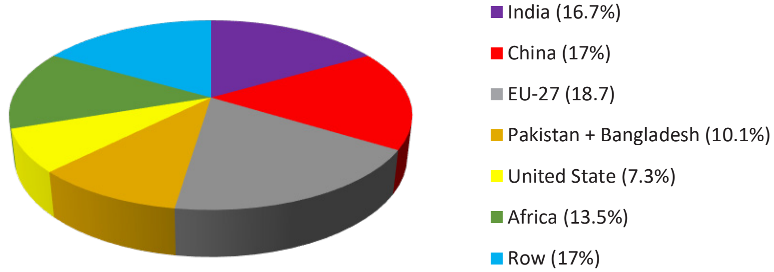


Figure 3.7. Distribution of Income Generation in Palm Oil Importers (Source: European Economics, 2016, processed by PASPI)

The description above shows the importance of palm oil in the global economy. Palm oil contributes to the economy of palm oil-producing countries. The imports and downstreaming activities in importing countries and the supply chain of palm oil products and palm oil-based finished products also generate income enjoyed by global community, whether they consume palm oil or not.

MYTH 3-05

Palm oil imports make no contribution to importing country's government revenues

FACTS

International trade generally imposes import/export tariffs (duty, levy, VAT, etc.), which are intended to, among others, increase government tax revenues. The world palm oil trade also imposes import tariffs which vary among countries. In addition to taxes on international trade, tax revenues in palm oil importing countries are collected from the various taxes levied on all parts of the supply chain, such as on import, processing, trade, and consumption.

The study by European Economics (2014) reveals that the tax revenues enjoyed by the European Union countries from palm oil imports and downstreaming reached € 2.6 billion (Figure 3.8). The distribution of government tax revenue generated from imports and oil palm downstreaming in each country is affected by the import volumes and the intensity of palm oil downstreaming in that country. The top 5 countries with the largest government tax revenues in the European Union are Italy (19 percent), Spain (8 percent), Germany (7 percent), the United Kingdom (7 percent), and France (6 percent).

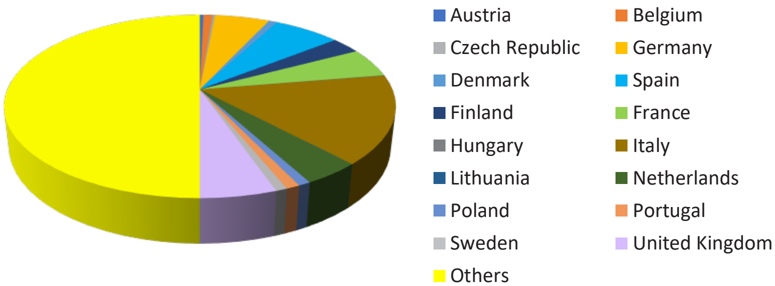


Figure 3.8. Distribution of Government Tax Revenue Enjoyed by Palm Oil Importers in Europe (Source: European Economics, 2014, processed by PASPI)

The description above shows that palm oil importing countries generate government revenues. If the import of palm oil and its downstreaming are greater, the government revenues generated by the importing country will be larger.

MYTH 3-06

Palm oil industry is exclusive, with economic benefits for the businesspeople

FACTS

The palm oil industry is frequently accused of and labeled as exclusivist. In fact, in the early days of its development in 1970–1980, many economists thought the industry would only benefit corporations. It took a lot of capital to open oil palm plantations, and at that time, smallholders could not afford the palm oil processing technology (CPO-Mill). These two factors prevented people to start the oil palm plantation business (Sipayung, 2018).

However, government policies and partnerships with state/private plantation companies (NES/PIR) opened opportunities for smallholders to start the oil palm plantation business. In 2021, smallholder oil palm plantations accounted for 40 percent of the areas of national oil palm plantations (Figure 1.2 in Chapter 1). This proves that the smallholder also benefits from the plantations.

Those directly involved in the business are not the only ones who benefit from oil palm plantations, as can be seen in the multiplier effect indicators, such as output, income, value-added, and labor (Table 3.2).

Table 3.2. Multiplier Index of Oil Palm Plantations

Multiplier Index	Oil Palm Plantation
Output	1.71
Income	1.79
Labor	2.64
Value-Added	1.59

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

Each multiplier index of output, income, labor, and value-added of oil palm plantations is greater than one. This reflects that the public also benefits from the plantations. Increased economic activities in oil palm plantations have both backward linkages and forward linkages (Syahza, 2005; PASPI, 2014). The plantations have backward linkages with input suppliers of plantation production and forward linkages with industries that use palm oil (Rifin, 2011; PASPI, 2014; Edwards, 2019).

Table 3.3. Top Ten Emerging Economic Sectors due to the Growing Output, Income, and Value-Added from Oil Palm Plantations

Rank	Output Effect	Income Effect	Value-Added Effect
1	Finance	Other services	Agricultural services
2	Other services	Finance	Trade, hotels, and restaurants
3	Trade, hotels, and restaurants	Trade, hotels, and restaurants	Animal husbandry, forestry and fishery
4	Agricultural chemicals, fertilizers, and pesticides industry	Agricultural chemicals, fertilizers, and pesticides industry	Other services
5	Oil, gas, and mining industry	Transportation	Food Farming
6	Transportation	Infrastructure	Transportation
7	Infrastructure	Oil, gas, and mining industry	Finance
8	Food industry	Agricultural infrastructure	Other Plantations
9	Machinery and electrical equipment	Agricultural services	Agricultural chemicals, fertilizers, and pesticides industry
10	Other sectors	Other sectors	Other sectors

Source: Statistics Indonesia

Increased palm oil consumption, investments, and exports will have greater positive effects (through direct effects, indirect effects, and induced consumption effects) in terms of output, income, value-added, and job opportunities to oil palm plantations and the entire economy (Table 3.3).

The description above shows that from an economic perspective, oil palm plantations are not an exclusive economic activity but rather an inclusive one. As oil palm plantations continue to grow, the economic benefits will be shared among other economic sectors in the country, whether they are directly connected to oil palm plantations.

MYTH 3-07

Palm oil industry makes no contribution to the growth of Indonesia's GDP

FACTS

One indicator of the contribution of a sector to the national economy is Gross Domestic Product (GDP). The palm oil industry's contribution to Indonesia's GDP continues to increase yearly (Rifin, 2010; PASPI, 2014; Kasryno, 2015).

How the palm oil industry contributes to GDP can be seen from the contribution of oil palm plantations and the oil and fat industry. The Input-Output data (Figure 3.9) shows that the output value of Indonesian oil palm plantations grew relatively fast, from IDR 5 trillion in 2000 to IDR 367 trillion in 2021. Likewise, the oil and fat industry also saw an increase in output, from IDR 48 trillion to IDR 752 trillion. In total, the output values of the palm oil industry increased relatively fast, from IDR 54 trillion to IDR 1.119 trillion, or more than 20 times bigger at the end of the period.

Likewise, the value-added of the palm oil industry in 2000 and 2021 increased (Figure 3.10). The value-added of oil palm plantations rose from IDR 4 trillion to IDR 270 trillion. The oil and fat industry also saw an increase in value-added, from IDR 19 trillion to IDR 240 trillion. Thus, the total value-added of the palm oil industry increased from IDR 23 trillion to IDR 510 trillion.

The palm oil industry's share in the total national output and value-added also increased in 2000 and 2021. The share of the palm oil industry in total national output increased from 2 percent to 3.1 percent. Likewise, the total national value-added share increased from 1.7 percent to 2.7 percent.

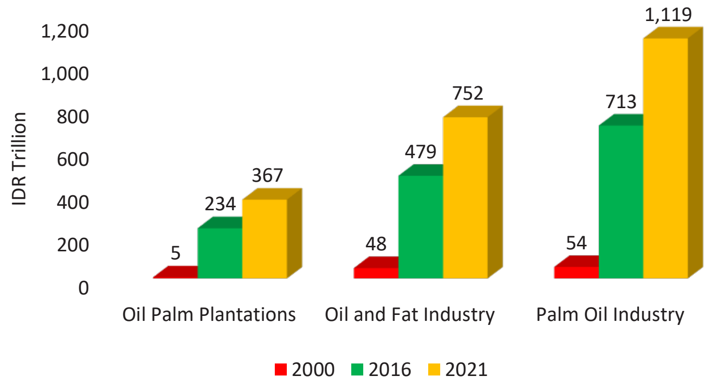


Figure 3.9. Growth of Outputs from Oil Palm Plantations, Oil and Fat Industry, and Palm Oil Industry in Indonesia's GDP in 2000 and 2021 (Source: Statistics Indonesia, processed by PASPI)

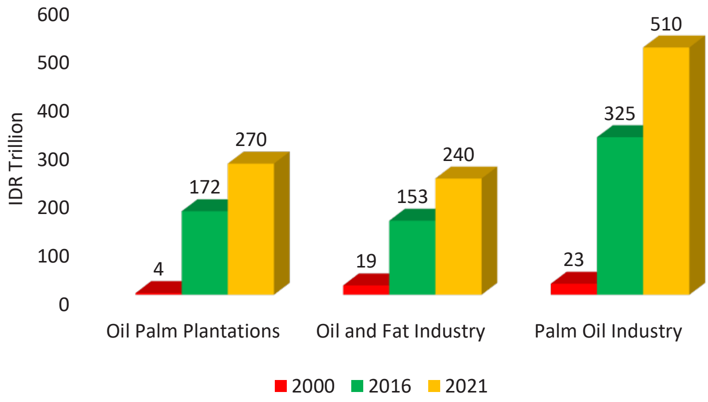


Figure 3.10. Growth of Value Added of Oil Palm Plantations, Oil and Fat Industry, and Palm Oil Industry in Indonesia's GDP in 2000 and 2021 (Source: Statistics Indonesia, processed by PASPI)

The description above shows that the palm oil industry greatly contributes to Indonesia's GDP growth. The palm oil industry's contribution to Indonesia's GDP will be even greater as the development of domestic oil palm downstreaming intensifies.

MYTH 3-08

Palm oil industry makes no contribution to the growth of the local economy

FACTS

Regional development, especially in remote, isolated, peripheral areas, is an important target of Indonesia's national development. Bringing new investments to these areas is the key to regional economic development. Oil palm plantation development attracts new investments to isolated rural areas, thus transforming these underdeveloped areas into new centers of economic growth.

The studies conducted by PASPI (2014) and Hariyanti *et. al.* (2022) shows that the increase in palm oil (CPO) production has positively and significantly affected the growth of the Gross Regional Domestic Product (GRDP) in oil palm hub areas (Figure 3.11).

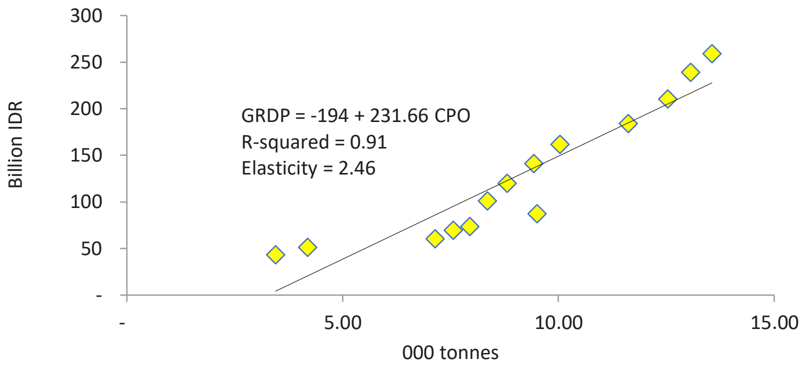


Figure 3.11. Effect of CPO Production on Gross Regional Domestic Product (Source: PASPI, 2014)

In fact, regional economic growth quickly reacts to the increase in palm oil production. As palm oil production increases, the regional economy will grow faster. A study conducted by PASPI (2022) reveals that the economic growth of oil palm center areas is faster and more considerable than that of their non-center counterparts. There is a considerable difference in the GRDP growth between oil palm center areas and their non-center counterparts (Figure 3.12).

A study by Kasryno (2015) reveals that the GRDP of oil palm center provinces in Indonesia, such as North Sumatra, Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, and East Kalimantan, has relatively higher GRDP growth rates than provinces with relatively small areas for oil-

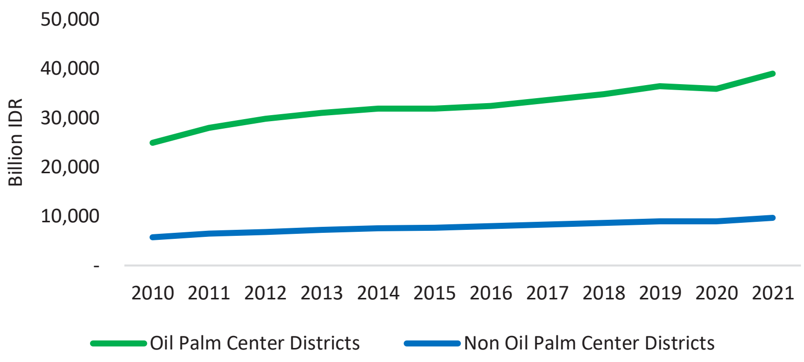


Figure 3.12. Comparison of GRDP between Oil Palm Hub Districts and Non-Oil Palm Hub Districts (Source: PASPI, 2022)

palm plantations, such as Aceh, West Sumatra, Bengkulu, Lampung, South Kalimantan, and provinces in Sulawesi. The expansion of oil palm plantations in many regions across Indonesia significantly affected economic performance, as indicated by the relatively high GRDP growth (Bunyamin, 2008; Budidarsono et al., 2013; Apresian et al., 2020).

Thus, the view that oil palm plantations do not contribute to regional economic growth does not match the facts. On the contrary, many facts have proven that the economic growth of oil palm center areas is faster and more considerable than that of their non-center counterparts.

MYTH 3-09

Oil palm plantations create backwardness in rural areas

FACTS

Oil palm plantations are generally developed in remote, peripheral, and underdeveloped areas, as well as degraded land (ghost towns). Thus, they are often considered pioneers in economic activities. By developing oil palm plantations, it is possible to restore degraded land and transform it into new centers of economic growth in many regions across Indonesia.

The restoration process can be divided into three phases (Figure 3.13). The Initial Phases (A and B) are marked with the development of nucleus and plasma oil palm plantations, followed by the development of independent oil palm plantations; Micro, Small, and Medium Enterprises (MSMEs); and private corporations.

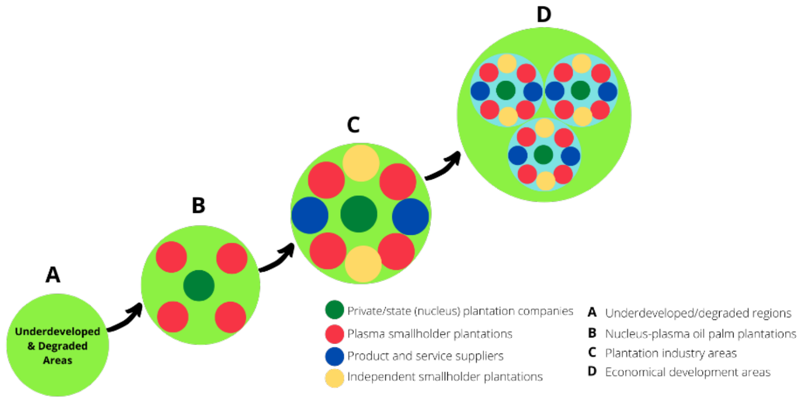


Figure 3.13. Process of Developing Oil Palm Plantations from Underdeveloped/Isolated Areas to New Centers of Economic Growth in Rural Areas

The availability of access roads, guaranteed markets for Fresh Fruit Bunches (FFB) in palm oil mills, and the success of previous smallholders have become a magnet for new business actors to invest in the areas surrounding the oil palm plantations. The growth of oil palm plantation activities helps propel other economic sectors, such as the service sector. Included in this sector are transportation services of FFB from plantations to mills, transportation services of CPO from mills to ports, financial/banking services, office goods supplier services, food trade services, eatery/restaurant services, intercity trade services, etc. Overall, it creates an urban agglomeration in rural areas.

Oil palm plantations can also provide economic benefits to those living in non-palm oil villages and even in cities. People who work in oil palm plantations (smallholders and plantation employees) are consumers of food and non-food products manufactured by urban and rural communities.

A study by PASPI based on population spending (Statistics Indonesia, 2021) reveals that the transaction value between oil palm plantation communities and urban communities reaches IDR 367 trillion per year (Figure 3.14). With rural communities, oil palm plantation communities' transaction value is IDR 146 trillion annually. The total transactions of oil palm plantation communities and non-oil palm plantation communities in the country are worth IDR 514 trillion annually. In other words, the growth of oil palm plantations in rural areas has improved the economic capacity of rural areas to generate output, income, and job opportunities in oil palm plantations and other sectors (rural non-farm) both in rural and urban areas.

Figure 3.14. Transaction Value between Oil Palm Plantation Communities and the Rural and Urban Economies

According to the Ministry of Transmigration and Manpower, in 2013, at least 50 underdeveloped/isolated rural areas transformed into new areas of economic growth centered around palm oil production. A study by PASPI (2017) reveals that new centers of economic growth centered around oil palm plantations have emerged from Aceh to Papua (Table 3.4).

Table 3.4. New Economic Growth Centers based on Palm Oil Industry

Province	**New Economic Growth Centers**
Aceh	Nagan Raya, Aceh Singkil, East Aceh, Subulussalam, Southwest Aceh, North Aceh Utara, etc.
North Sumatra	Stabat, Belarang, Sei Rampah, Limapuluh, Perdagangan, Rantau Prapat, Aek Kanopan, Aek Nabara, Kota Pinang, Sosa, Sibuhuan, Panyabungan, etc.
West Sumatra	West Pasaman, Dharmasraya, Agam, South Pesisir, Sijunjung, etc.
South Sumatra	Sungai Lilin, Tugumulyo, Pematang Panggang, Bayung Lencir, Musi Rawas, Peninjauan, Muara Enim, Lahat.
Riau	Pasir Pengaraian, Bangkinang, Siak Sri Indrapura, Rengat, Tembilahan, Bengkalis, Bagansiapiapi, Teluk Kuantan, Dumai, Pekanbaru, etc.
Jambi	Sarolangun, Sungai Bahar, Sengeti, Kuala Tungkal, etc.
Bengkulu	South Bengkulu, Mukomuko, Seluma, North Bengkulu, South Bengkulu, Central Bengkulu, etc.

Source: PASPI (2017)

Table 3.4. New Economic Growth Centers based on Palm Oil Industry (Continued)

Province	New Economic Growth Centers
West Kalimantan	Sanggau, Bengkayang, Ketapang, Sintang, Kubu Raya, etc.
Central Kalimantan	Sampit, Kuala Pembuang, Pangkalan Bun, Kasongan, etc.
East Kalimantan	Sangatta, Tenggarong, Tana Pase, Tanjung Redeb, Nunukan, Sendawar, etc.
South Kalimantan	Batulicin, Kotabaru, Pelaihari, etc.
Sulawesi	Mamuju, Donggala, Bungku, Luwu, Pasangkayu, etc.
Papua & West Papua	Keerom, Sorong, South Sorong, Manokwari, Teluk Bintuni, Fakfak, Merauke, etc.

Source: PASPI (2017)

How oil palm plantations successfully accelerate regional development can also be seen from the Village Development Index (IDM). PASPI's study (2022) indicates that the composite economic, social, and environmental growth rates (IDM) in Oil Palm Villages are higher than those of non-Oil Palm Villages. Therefore, the presence of oil palm plantations in rural areas can indeed accelerate village development. The study also confirms the study by World Growth (2011), stating that oil palm plantations in Indonesia are crucial aspects of rural development.

The description above shows that oil palm plantations do not cause rural areas to be underdeveloped. Instead, oil palm plantation development can transform underdeveloped areas into new centers of economic growth in rural areas.

MYTH 3-10

Oil Palm Villages are economically less resilient than Non-Oil Palm Villages

FACTS

The economy of a village whose residents engage with oil palm plantations (called Oil Palm Village) is said to be homogeneous, causing it to be relatively more vulnerable and riskier. This is not entirely true. Empirical evidence shows that various economic activities thrive not only in oil palm plantations, but also in Oil Palm Villages. Thus, the overall economic activities in Oil Palm Village are heterogeneous.

In addition, oil palm smallholders develop several types of business integration, such as the integration of oil palms and food crops during the immature period (Partohardjono, 2003; Singerland et al., 2019; Baihaqi et al., 2020; Kusumawati et al., 2021) and the integration of oil palms and cattle during the mature period (Batubara, 2004; Sinurat et al., 2004; Ilham and Saliem, 2011; Utomo and Widjaja, 2012; Winarso and Basuno, 2013). In addition to contributing to food supply increase, these types of integration also increase the diversity of economic sectors in Oil Palm Village.

Besides oil palm plantations, other businesses also emerge, such as transportation services, financial services, trade services, food and beverage stall/booth services, etc. (Rifin, 2011; Budidarsono et. al., 2012; PASPI, 2014). The study by PASPI (2022) reveals that the number and growth of MSME businesses selling food/beverage in Oil Palm Villages are significantly larger and faster than those in non-Oil Palm Villages. Likewise, studies conducted by Syahza (2005), Rifin (2011), PASPI (2014), and Syahza et al. (2019) reveal that food booths/eateries/restaurants are thriving in rural areas where oil palm plantations are present.

As economic activities driven by oil palm plantations thrive, the Oil Palm Village experiences economic growth. The study by PASPI (2022) reveals that the economic growth of Oil Palm Villages is faster and more considerable than that of non-Oil Palm Villages.

The growth of oil palm plantations in rural areas has improved the economic capacity of villages to generate output, income, and job opportunities in oil palm plantations and other sectors in rural areas (*rural non-farm*). Oil palm plantations act as a locomotive propelling the development of other economic sectors. Even though the leading economic sector in Oil Palm Villages is oil palm plantations, these plantations have fostered many other economic sectors, thus increasing economic diversity. Growing the leading sector rapidly and fostering the economic diversity of Oil Palm Villages are key to achieving the economic security of Oil Palm Villages. The study by PASPI (2022) reveals that the economic security of Oil Palm Villages is better and grows faster than that of non-Oil Palm Villages.

MYTH 3-11

Oil palm smallholders earn less than non-oil palm smallholders

FACTS

From the economic perspective, smallholders grow oil palm trees because this business is considered more profitable than growing other commodities, such as rubber and rice (Susila, 2004; Bunyamin, 2008; Feintrenie et al., 2010; Rist et al., 2010; Adebo et al., 2015; Euler et al., 2016; Kubitza; et al., 2018; Nuva et al., 2019). PASPI studies (2014, 2022) also reveal that oil palm smallholders' income is higher than that of non-oil palm smallholders. Their income grows faster as well (Figure 3.15).

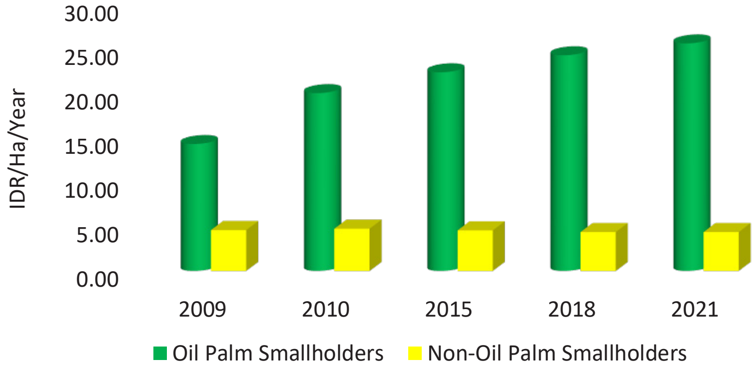


Figure 3.15. Comparison of Incomes Received by Oil Palm Smallholders and Non-Oil Palm Smallholders (Source: data processed by PASPI, 2022)

Several studies (Euler et al., 2016; Qaim et al., 2020; Apresian et al., 2020; Chrisendo et al., 2021) reveal that oil palm smallholders' income is higher than that of smallholder/farmer of other commodities. The Stern Review (World Growth, 2011) reveals that oil palm smallholders earn USD 960-3,340 per hectare, or higher than rubber farmers (USD 720 per hectare), rice farmers (USD 280 per hectare), cassava farmers (USD 190 per hectare), and timber farmers (USD 1,099 per hectare).

A study by Syahza et al. (2021) reveals that the average income of oil palm smallholders in Riau when the oil palm trees are in their most productive period is IDR 6.4 million per month from a land area of 2-4 hectares. This number translates to around IDR 2.1 million per hectare per month. The growth rate of income earned by smallholders from growing oil palm trees will keep rising as the trees age (Budidarsono et al., 2013). Oil palm smallholders enjoy a 200-300 percent income growth after five years of cultivating oil palm trees. Subsequently, their income growth is 400-1,300 percent after 5-10 years, then 2,200-25,000 percent after the oil palm trees are over ten years old. The data shows that their income is sustainable and rises as the oil palm trees age.

In addition to higher income, oil palm smallholders also earn a stable income because the income is received monthly from the sale of Fresh Fruit Bunches (Balde et al., 2019; Apreisan et al., 2020). Another proof of higher and more stable oil palm smallholders' income is their ability to repay their debts/loans (to finance production costs) before the maturity date (Susila, 2004; Feintrenie et al., 2009; Rist et al., 2010).

The description above shows that the income of oil palm smallholders rises higher, grows fast, and is relatively sustainable than that of smallholders/farmers of other commodities. This gave rise to the middle class in rural areas.

MYTH 3-12

The expansion of oil palm plantations threatens national food security

FACTS

Agricultural land converted for other commodities and other sectors is a normal phenomenon that marks progress in development. Law Number 12 of 1992 on the Plant Cultivation System allows the smallholders/farmers to decide which commodities they want to grow. However, large-scale conversion of rice fields, the main cropland, can threaten national rice supply.

As it turns out, the expansion of land used for oil palm plantations in Indonesia, almost entirely outside of Java, does not reduce Indonesia's total rice field areas. According to Statistics Indonesia data (2022), land areas for rice cultivation (rice fields and rice harvest areas) outside of Java continue to increase; thus, the total rice field areas also increase (Figure 3.16).

In contrast, rice field areas in Java decrease, but rice harvest areas still increase. Thus, the overall trend of rice harvest areas in Java is still rising. The data shows that the expansion of oil palm plantations outside of Java does not reduce the overall rice field areas.

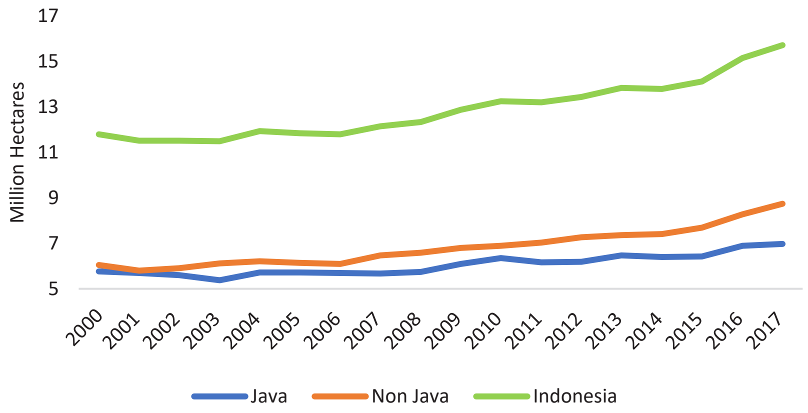


Figure 3.16. Progression of Rice Harvest Areas in Java and Non-Java (Source: Statistics Indonesia, 2022)

Obviously, at the local level, there have been land conversions of rice cultivation areas into non-rice ones, including smallholder oil palm plantations. Farmers consider growing non-rice commodities to be more profitable. Their freedom to choose commodities/businesses lucrative for them is guaranteed by Law no. 12 of 1992. Overall, however, the expansion of oil palm plantations taking place entirely outside of Java is also accompanied by the expansion of rice field areas.

Moreover, food crops, vegetables, fruits, and livestock are integrated into the oil palm plantations. Oil palm smallholders also develop several types of integration, such as the integration of oil palms and food crops during the immature period (Partohardjono, 2003; Singerland et al., 2019; Baihaqi et al., 2020; Kusumawati et al., 2021) and the integration of oil palms and cattle during the mature period (Batubara, 2004; Sinurat et al., 2004; Ilham and Saliem, 2011; Utomo and Widjaja, 2012; Winarso and Basuno, 2013). These types of integration also help strengthen the food supply, especially in oil palm center areas.

The description above shows that the rising trend of oil palm plantations in Indonesia does not threaten the overall availability of food sources for the people. On the contrary, the presence of oil palm plantations strengthens food security in oil palm center areas by increasing the production of agricultural and livestock products, which can be achieved by applying several types of integration in oil palm plantations.

MYTH 3-13

Oil palm smallholders and villages face food shortages

FACTS

The food shortage issues include the availability and affordability of food. Food affordability is closely related to smallholders' income. With higher and relatively stable income all year round (Myth 3-11), oil palm smallholders can increase their and their family's food purchasing power. Higher income means the smallholder's households have increasing access to food (Apreisan et al., 2020).

Several empirical studies (Rist et al., 2010; Budidarsono et al., 2012; Euler et al., 2017; Qaim et al., 2020; Chrisendo et al., 2019) reveal that the increase in oil palm smallholders' income helps them meet their household's nutrient/calorie needs. Meeting nutrient needs can reduce malnutrition, improve dietary quality, and ensure food security in the households of oil palm smallholders.

Likewise, villagers working in other economic sectors also thrive thanks to oil palm plantations, even though they are not directly involved in the plantations (Myth 3-09). The villagers' income and purchasing power also increase, allowing them to meet their dietary needs. From the demand side, higher income increases food affordability for people.

From the supply side, the people in Oil Palm Villages also increase their accessibility to and availability of food in rural areas through three mechanisms. First, the integrated farming system of oil palms with food crops and livestock (Myth 3-12) helps improve food availability in rural.

Second, the people in Oil Palm Villages also obtain food products supplied by the people of other villages (Non-oil Palm Villages) that focus on agriculture, animal husbandry, and fisheries (Figure 3.14). And third, the growth of food booth/eatery MSMEs in Oil Palm Villages (Myth 3-10). It should be noted that while oil palm smallholders are the very producers of feedstock for palm cooking oil, they also consume the palm cooking oil in their house or outside at local food booth/eatery MSMEs.

The increased affordability (because of income growth) and availability of food have contributed to improving the accessibility of food for oil palm smallholders and the people in Oil Palm Villages. With such conditions, it is understandable that oil palm smallholders and the people in Oil Palm Villages do not experience problems regarding food crisis.

MYTH 3-14

Indonesia's palm oil industry only exports raw material

FACTS

The long history of palm oil industry in Indonesia has existed since the colonial era. Before 1978, the Indonesian palm oil industry was export-oriented before shifting to domestic-market-orientated, then once again it became export-orientated after 2000 (Tomic and Mawardi 1995; Sato, 1997; Sipayung, 2011; PASPI Monitor, 2021[e]).

The significant development of palm oil downstreaming in the country took place only after 2011. In general, this ongoing development focuses on three downstream sectors (Figure 1.4 in Chapter 1): oleofood complex, oleochemical complex, and biofuel/bioenergy complex. Indonesia's palm oil downstreaming is a success, as reflected in the changing composition of Indonesia's exported palm oil products (Figure 3.17).

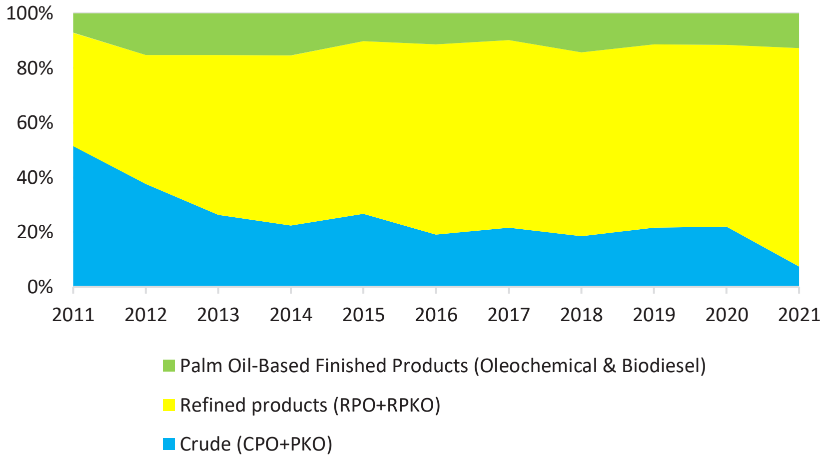


Figure 3.17. Changing Composition of Indonesia's Exported Palm Oil Products (Source: Statistics Indonesia, data processed by PASPI, 2022)

The composition of Indonesia's exported palm oil products in 2011 was dominated by crude palm oil (CPO+CPKO) with 54 percent market share, while the market shares of the derivatives were only 44 percent and palm oil-based finished products merely 2 percent. In 2021, the composition significantly changed. The exports of crude palm oil fell dramatically to around 7 percent of the total market share. The remaining exported products were the derivatives and finished products.

The data above shows that Indonesia is no longer exporting crude palm oil. Indonesia is still intensifying and expanding palm oil downstreaming in all ways: the oleofood complex, oleochemical complex, and biofuel/bioenergy complex. Thus, the country will increase the portion of palm oil-based finished products for both domestic and export markets.

MYTH 3-15

The development of palm oil biodiesel does not reduce reliance on fossil diesel fuel

FACTS

Since 2004, Indonesia has changed from a net exporter of petroleum to a net importer of petroleum, including a net importer of fossil diesel fuel. Indonesia's imports of fossil diesel fuel increase every year. To make matters worse, the demand for diesel fuel in the country keeps rising because of population growth and economic growth. If imported diesel fuel is not substituted with domestic diesel fuel, Indonesia's dependence on diesel fuel will be even higher.

One objective of developing renewable energy, including biodiesel, as stated in Presidential Regulation Number 5 of 2006 on National Energy Policy and Presidential Decree Number 20 of 2006, is to reduce dependence on (imported) fossil fuel consumption.

To reduce dependence on imported fossil diesel fuel, Indonesia has developed a policy to substitute imported fuel with palm oil biodiesel, known as the mandatory biodiesel policy. The policy was implemented in 2009 with a blending rate of 1 percent palm oil biodiesel and 99 percent fossil diesel fuel (B1), which increased to B10 in 2013–2014 and B15 in 2015 (Sipayung, 2018).

The mandatory biodiesel policy in Indonesia made significant progress when the B20 biodiesel became mandatory in 2016. Subsequently, in 2019, the B20 expanded for the PSO (Public Service Obligation) sector and the non-PSO sector. In 2020, the Government of Indonesia strengthened its commitment to substituting imported fossil diesel fuel with palm oil biodiesel by implementing a mandatory B30 biodiesel policy in the PSO sector and the non-PSO sector (PASPI Monitor, 2021[j]).

The more intensive mandatory biodiesel policy has conserved imported diesel fuel usage (Ministry of Energy and Mineral Resources, 2021; PASPI Monitor, 2021[j]; APROBI, 2022). From 2011 to 2020 (Figure 3.18), domestic biodiesel consumption increased from 359 thousand kiloliters to 8.4 million kiloliters. The increased consumption of palm oil biodiesel has reduced the fossil diesel fuel consumption in the country, from 33.5 million kiloliters to 27.6 million kiloliters. The declining consumption of fossil diesel fuel in the country has also led to a significantly declining dependence on imported diesel fuel, from 41 percent to 12 percent in the same period.

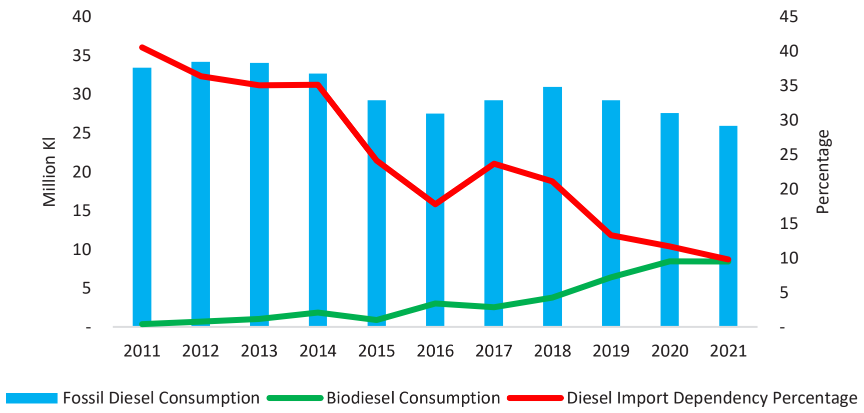


Figure 3.18. Reduction of Dependence on Diesel Imports as a Result of the Mandatory Biodiesel Policy (Source: Ministry of Energy and Mineral Resources, data processed by PASPI, 2022)

The development of palm oil biodiesel in Indonesia proves capable of reducing dependence on the consumption of imported fossil diesel fuel. Reducing dependence on fossil diesel fuel will remain on the government's agenda, which can be achieved by increasing the blending rate of palm oil biodiesel (beyond B30) or by developing a new substitute, that is, palm oil-based green diesel considered to be of higher quality.

MYTH 3-16

The development of palm oil biodiesel does not have an impact on saving foreign exchange for imported diesel and Indonesia's oil and gas trade balance

FACTS

The mandatory biodiesel policy is one of the government's efforts to improve the constant oil and gas trade deficit by substituting imported diesel fuel with domestic palm oil biodiesel. It is expected that the success of the mandatory biodiesel program to reduce dependence on imported diesel fuel (Myth 3.15) will increase the foreign exchange savings on diesel fuel imports (Figure 3.19).

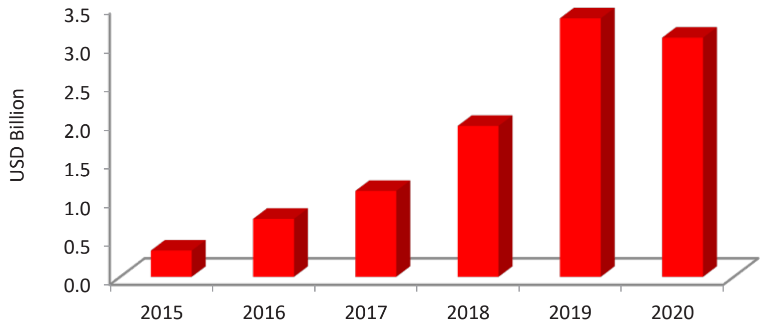


Figure 3.19. Saving on Foreign Exchange for Diesel Imports as a Result of the Mandatory Biodiesel Policy in 2015–2020 (Source: Sipayung, 2018; Ministry of Energy and Mineral Resources, 2021; Tjakrawan, 2021, PASPI Monitor, 2021[i])

The foreign exchange savings on diesel fuel imports increased from USD 0.34 billion in 2015 to USD 3.3 billion in 2019 and USD 3.09 billion in 2020. The amount of foreign exchange savings on diesel fuel imports for each liter of biodiesel due to the substitution with biodiesel ranged from USD 0.366–0.372 per liter in the same period.

The foreign exchange savings on diesel fuel imports as a result of substituting imported diesel fuel with domestic palm oil biodiesel (called "Import Substitution Foreign Exchange") has helped improve the oil and gas trade balance (Sipayung, 2020; Tjakrawan, 2021; PASPI Monitor, 2021[j], 2022[f]). The effect of diesel fuel import substitution foreign exchange on the "Oil and Gas Balance" is shown in the difference between the "Oil and Gas Balance with Biodiesel" and the "Oil and Gas Balance without Biodiesel" (Table 3.5).

Every year, the "Oil and Gas Balance without Biodiesel" was in deficit, with a sizable value. Thanks to the mandatory palm oil biodiesel, Indonesia's oil and gas trade balance ("Oil and Gas Balance with Biodiesel") had a lower deficit than "Oil and Gas Balance without Biodiesel". The mandatory B30 program in 2021 resulted in a deficit of USD 13.25 billion in the "Oil and Gas Balance with Biodiesel". This amount is lower than the "Oil and Gas Balance Without Biodiesel" deficit at USD 18.23 billion.

Table 3.5. Mandatory Impact of Biodiesel on Indonesia's Oil and Gas Balance of Trade from 2011 to 2021

Year	Imported Fossil Diesel Fuel Foreign Exchange	Oil and Gas Balance	
		Oil and Gas Balance without Biodiesel	Oil and Gas Balance with Biodiesel
2014	1.58	-15.02	-13.44
2015	0.46	-6.40	-5.94
2016	1.15	-6.78	-5.63
2017	1.27	-9.85	-8.57
2018	2.35	-15.05	-12.70
2019	3.74	-13.84	-10.10
2020	3.15	-9.10	-5.95
2021	4.98	-18.23	-13.25

Source: Statistics Indonesia, APROBI, data processed by PASPI (2022)

The implementation of the mandatory palm oil biodiesel policy proves capable of contributing to foreign exchange savings on diesel fuel imports while simultaneously reducing the deficit in Indonesia's oil and gas trade balance. Obviously, the effect of diesel fuel import substitution foreign exchange on foreign exchange savings and the oil and gas trade balance depends on the global price of fossil oil and the actual implementation of the blending rate. If the global price of fossil oil is higher, mandatory biodiesel will have a greater effect on improving the oil and gas trade balance.

MYTH 3-17

Export levies are only imposed by biodiesel companies

FACTS

Under Presidential Regulation Number 61 of 2015 in conjunction with Presidential Regulation Number 66 of 2018, Oil Palm Plantations Fund Management Agency (*Badan Pengelola Dana Perkebunan Kelapa Sawit-BPDPKS*) is tasked with collecting palm oil funds from levies imposed on businesses that export palm oil products. This agency also manages and distribute palm oil funds to finance Indonesia's palm oil industry development programs (Oil Palm Plantations Fund Management Agency, 2022). These programs include: (1) human resource development; (2) research and development; (3) promotion; (4) replanting; (5) facilities and infrastructure; (6) fulfillment of food needs; (7) palm oil downstreaming industry; and (8) provision and utilization of biofuel.

As mentioned above, one of the programs using palm oil funds is the incentive for developing biofuel, especially palm oil biodiesel. The palm oil funds distributed to this program in 2015–2021 reached IDR 110 trillion or 79 percent of the total palm oil funds collected from export levies in the same period (Oil Palm Plantations Fund Management Agency, 2022). Due to the large portion of palm oil funds distributed, the biodiesel incentive program has been under public scrutiny.

Oil Palm Plantations Fund Management Agency disburses the biodiesel incentives to cover the difference between the Market Index Price of diesel fuel (set by the Director General of Oil and Gas) and the Market Index Price of biodiesel (set by the Director General of New Renewable Energy and Energy Conservation). The incentives are given by Oil Palm Plantations Fund Management Agency to the Biofuel Enterprises as biodiesel (FAME) producers to support the Government of Indonesia's commitment to developing biodiesel.

Palm oil, as the feedstock for biodiesel, is obtained from FFB produced in both corporate plantations and smallholder plantations. As part of the mandatory biodiesel policy, biodiesel is also developed with the purpose of expanding the domestic palm oil market, which, in turn, will stabilize the FFB price at a relatively profitable level for smallholders

In addition to the development of palm oil-based biofuels (biodiesel), the palm oil funds are also intended for programs that benefit the business actors in Indonesia's palm oil industry. Oil Palm Plantations Fund Management Agency's data (2022) reveals the actual funds used to finance programs until 2021 as follows: IDR 6.59 trillion for the Smallholders' Oil

Palm Plantation Replanting (*Peremajaan Sawit Rakyat*/PSR) program; IDR 21.1 billion for the smallholder oil palm plantation facilities and infrastructure program; IDR 199 billion for the human resource development program (training of oil palm smallholders and scholarships for children of oil palm smallholders); and IDR 389.3 billion for the research and development program.

Therefore, the palm oil funds collected from export levies from July 2015 to 2021 was mostly utilized for the success of the biodiesel mandatory policy. However, the mandatory biodiesel policy indirectly benefits the people in many ways, such as reducing dependence on diesel fuel imports (Myth 3-15) which can improve the oil and gas trade balance (Myth 3-16), reducing emissions (Myth 6-41), and stabilizing domestic CPO/FFB prices.

MYTH 3-18

The development of palm oil biodiesel is harms Indonesia's economy

FACTS

Some think implementing the B30 biodiesel mandatory use policy leads to an economic loss. The reasoning behind this view is that the B30 biodiesel mandatory use has not been proven to improve the country's negative balance of trade. However, Indonesia has been experiencing declining foreign exchange from palm oil export due to its use in the in-country production of B30 biodiesel.

The goals of supporting palm oil biodiesel production with the policy on the mandatory use thereof are to reduce dependency on fossil fuels (import reduction), minimize Greenhouse Gas (GHG) emissions (climate change mitigation), promote the development of rural areas and regions that produce the biodiesel feedstock, and improve the global palm oil market management. The implementation of the policy to realize import substitution has decreased the use/consumption of fossil diesel fuel, especially the imported fossil diesel fuel (Myth 3-15), which resulted in less foreign exchange spending on imported fossil diesel fuel as well as improved country's negative oil and gas balance (Myth 3-16) and reduced GHG emissions (Myth 6-41).

Economically, biodiesel production strengthens the regional economy. The biodiesel industry is among the pathways for downstreaming palm oil. Palm oil is produced by regional oil palm plantations, including smallholders.

This means the biodiesel industry development will affect the people involved in the oil palm plantation (i.e., smallholders and workers of palm oil companies).

The data from the Ministry of Energy and Mineral Resources (2021) shows that the implementation of the policy on the mandatory use of biodiesel boosted the labor absorption rate in the oil palm plantation subsector, i.e., from 2,426 people in 2017 (a result of B20 biodiesel mandatory use policy) to 8,678 people in 2021 (a result of B30 biodiesel mandatory use policy). The increased labor absorption rate is also seen in the downstream subsector, i.e., from 321,446 people to 1.15 million people for the same period. The biodiesel industry's higher labor absorption rate will inevitably lead to economic growth and better regional development.

Higher added-value is another indicator that reveals the role of biodiesel production in driving the country's economic growth. Such added-value was created from the policy on mandatory biodiesel use in 2017, amounting to IDR 3.45 trillion. The added-value then rose to IDR 11.26 trillion in 2021. This improvement in added-value is in line with the findings of various studies that show the impacts of palm oil biodiesel production on the country's economic growth (Susila and Munadi, 2008; Joni, 2012; Obidzinki *et al*., 2012; Singagerda *et al*., 2018; Nuva *et al*., 2019).

Findings from other empirical studies also indicate that biodiesel contributes to economic growth in many countries. The study conducted by Jaafar *et al*. (2010) revealed that biodiesel production in Malaysia created a 2.8 output multiplier, or higher than that from petrodiesel (1.61). This means every consumption of biodiesel worth IDR 10 trillion creates an output multiplier worth IDR 20.8 trillion. This figure was higher than the output multiplier from petrodiesel (fossil diesel fuel), which was IDR 16 trillion.

In 2018, the United States biodiesel sector (LMC International, 2019) also yielded a profit amounting to USD 17 billion and created 65.6 thousand job opportunities whose labor income (wage) was USD 2.5 billion. A similar reality was seen in Canada in 2020 (Grensing *et al*., 2021), its biodiesel industry created 3,750 job opportunities whose labor income (wage and benefits) amounted to USD 200 million. Furthermore, Canada's biodiesel industry contributed to the creation of added-value worth more than USD 400 million and an output multiplier worth USD 1.5 billion.

In addition to strengthening economic growth, Indonesia's biodiesel mandatory use policy also constitutes an effort to improve the global palm oil market management considering its position as one of the world's largest palm oil producers. Implementing mandatory biodiesel use will promote the domestic absorption of palm oil, reducing the volume of exported palm oil. This declining export volume will help control the palm oil stock in the global market (oversupply prevention) so that the global palm oil price remains relatively stable and profitable.

Mistry (2020) stated that Indonesia's (B30) biodiesel mandatory use program is a game changer as it improved global palm oil prices in 2020. The profitable global CPO price will certainly boost the smallholders' price for FFB (PASPI Monitor, 2020[l]). In conclusion, we must assess the impacts of the biodiesel mandatory use policy in Indonesia comprehensively through the economic, social, and ecological perspectives, not just the financial perspective (financial loss and gain).

MYTH 3-19

Foreign exchange generated from Indonesia's palm oil industry is relatively small compared to that generated by other sectors

FACTS

Many empirical studies have shown the role of the palm oil industry in Indonesia's exports (World Growth, 2011; Rifin, 2011; PASPI, 2014; Sipayung, 2018; Edwards, 2019). Since 2000, export has always been the focus of trade policies for palm oil industry. These export-oriented policies have been proven to generate higher foreign exchange.

As the palm oil production and domestic downstreaming improves, the export volume and composition also improve. The oil palm products exported by Indonesia include crude palm oil (CPO+CPKO), palm oil intermediate products (Refined Palm Oil/RPO + Refined Palm Kernel Oil/RPKO), and palm oil-based finished products such as palm cooking oil, biodiesel, and oleochemical.

The data from Statistics Indonesia (Figure 3.20) shows that export-based foreign exchange growth fluctuates following growing trends. In 2000, the foreign exchange gained from palm oil products export was only USD 1.08 billion. In 2021, the number skyrocketed to USD 36.2 billion.

The export value constitutes net export value (foreign exchange) since Indonesia does not import palm oil or its derivatives. In 2021, Indonesia registered a trade surplus worth USD 35.34 billion (Statistics Indonesia, 2022) and a net value of palm oil products export of USD 36.2 billion.

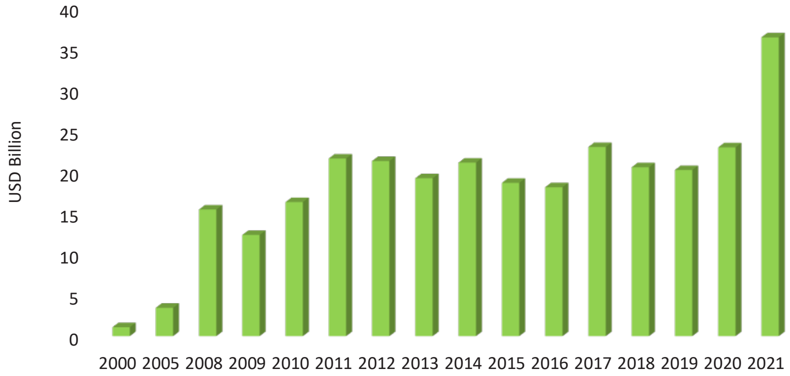


Figure 3.20. Foreign Exchange Generated from Export of Palm Oil Products in 2000–2021 (Source: Statistics Indonesia, data processed by PASPI, 2022)

This shows that foreign exchange from palm oil products exports is bigger than that from other export sectors/export commodities. Indonesia's balance of trade will certainly show a deficit without the foreign exchange from palm oil products export.

MYTH 3-20

Palm oil industry makes no significant contribution to Indonesia's balance of trade

FACTS

Normally, the oil and gas trade account is separated from the non-oil and gas account on the goods trade account. Oil and gas transactions (export-import) are indicated on the oil and gas trade account. Meanwhile, transactions of products other than oil and gas, such as palm oil and its refined products, are indicated on the non-oil and gas trade account. The contribution of the palm oil industry to the country's balance of trade is seen in the "Non-Oil and Gas Trade Account", "Oil and Gas Trade Account", and "Indonesian Trade Balance" (Table 3.6).

In “Non-Oil and Gas Trade Account”, the palm oil industry contribution is made clear by comparing the “Non-Oil and Gas Trade Account with Palm Oil” with the “Non-Oil and Gas Trade Account without Palm Oil”. From 2011–2020, the “Non-Oil and Gas Trade Account without Palm Oil” only showed a surplus in three years: 2011, 2020, and 2021. Apart from these, the “Non-Oil and Gas Trade Account without Palm Oil” was always negative. When the export of palm oil products was included, the “Non-Oil and Gas Trade Account with Palm Oil” has always been positive every year. This shows that the palm oil industry can minimize the deficit and yield a surplus for Indonesia’s “Non-Oil and Gas Trade Account”.

Table 3.6. Contribution of the Palm Oil Industry to Indonesian Trade Balance in 2011-2021 (USD Billion)

	2014	2015	2016	2017	2018	2019	2020	2021
Palm Oil Products Export	21.1	18.64	18.1	23	20.54	20.2	22.96	36.34
Saving on Fossil Diesel Fuel Import	1.58	0.46	1.15	1.27	2.35	3.74	3.15	4.98
Oil and Gas Trade Account								
Without Biodiesel	-15.02	-6.4	-6.78	-9.85	-15.05	-13.84	-9.1	-18.23
With Biodiesel	-13.44	-5.94	-5.63	-8.57	-12.7	-10.1	-5.95	-13.25
Non-Oil and Gas Trade Account								
Without Palm Oil	-9.86	-5	-3.63	-2.59	-16.54	-13.15	4.73	12.26
With Palm Oil	11.24	13.64	14.47	20.41	4	7.05	27.69	48.6
Indonesian Trade Balance								
Without Palm Oil dan Biodiesel	-24.88	-11.4	-10.41	-12.43	-31.59	-26.99	-4.37	-5.97
With Palm Oil dan Biodiesel	-2.2	7.7	8.84	11.84	-8.7	-3.04	21.74	35.34

Source: Statistics Indonesia, APROBI (Data processed by PASPI, 2022)

Meanwhile, in “Oil and Gas Trade Account”, the contribution of the palm oil industry is made clear by comparing the “Oil and Gas Trade Account with Biodiesel” with the “Oil and Gas Trade Account without Biodiesel”. Economically, the biodiesel mandatory use policy constitutes a way to realize import substitution, reducing the foreign exchange spent on fossil diesel fuel. Such reduction certainly improves the “Oil and Gas Trade Account”, which in this case is seen in “Oil and Gas Trade Account with Biodiesel”.

"Oil and Gas Balance without Biodiesel" has always been negative, with significant deficit value. Meanwhile, the "Oil and Gas Trade Account with Biodiesel" shows only a small deficit value compared to the "Oil and Gas Trade Account without Biodiesel". The reduction in deficit on the "Oil and Gas Trade Account with Biodiesel" indicates the contribution of the palm oil industry. Such contribution can only be made possible through the biodiesel mandatory use policy.

The total contribution of the palm oil industry to the country's trade balance is revealed by comparing the "Indonesian Trade Balance with Palm Oil and Biodiesel" with the "Indonesian Trade Balance without Palm Oil and Biodiesel". The "Indonesian Trade Balance without Palm Oil and Biodiesel" was always negative from 2014–2021. By including the palm oil industry contribution (i.e., through exporting palm oil products or substituting fossil diesel fuel import with palm oil-based biodiesel use), the deficit can be minimized, and a surplus can be made on the "Indonesian Trade Balance with Palm Oil and Biodiesel".

The palm oil industry managed to improve Indonesia's negative trade balance in 2014 (from USD -24.8 billion to USD -2.2 billion) and in 2018 (from USD -26.9 billion to USD -3.04 billion). The palm oil industry could even create a trade surplus during the COVID-19 pandemic and global economic recession in 2020 (amounting to USD 21.7 billion) and 2021 (amounting to USD 35.3 billion).

Such surplus could compensate the service account, which always experiences a deficit. The current account will also show a surplus, thanks to the significant surplus value in 2020 and 2021. This will boost economic volume, creating more job opportunities and income (Palley, 2012; Kang, 2015; Murugesan, 2019).

The foreign exchange generated by the palm oil industry can promote a favorable trade balance and even enjoy a foreign exchange surplus. Conversely, the absence of palm oil industry will likely cause an extended foreign exchange deficit, which will push Indonesian trade balance further down the negative scale.

MYTH 3-21

Palm oil industry makes no contribution to government revenues

FACTS

Apart from generating foreign exchange for the state, the export of palm oil and its derivatives also serves as the source for the state's export taxes-based revenue. For the international trade of palm oil and its derivatives, the Government of Indonesia imposes export duties and levies.

In total, the state revenue from export duty rose from IDR 4.2 trillion in 2007 to IDR 100.3 trillion in 2016 (Figure 3.21.). Meanwhile, the state revenue from export levy (imposed from 2015) also rose from IDR 6.9 trillion to IDR 139.2 trillion in 2021 (Figure 3.22.).

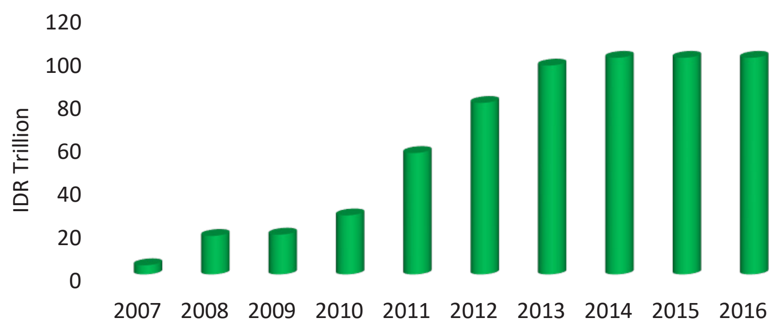


Figure 3.21. Cumulative Government Revenue from Palm Oil Export Duties (Source: Ministry of Finance, 2016 in Sipayung, 2018)

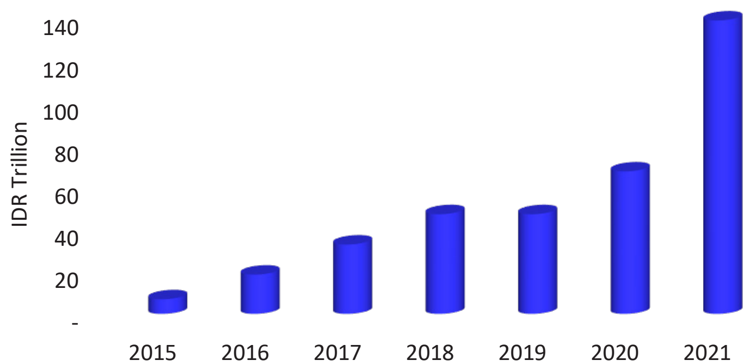


Figure 3.22. Cumulative Palm Oil Export Levies in July 2015–2021 (Source: Oil Palm Plantations Fund Management Agency, 2022)

Apart from export duty and levy, the state also receives revenue from taxes imposed on the palm oil industry. Similar to other economic sectors, the palm oil industry is also subject to tax instruments such as Land and Property Tax, Value-added Tax, and Individual or Corporate Income Tax. Unfortunately, detailed data on the tax revenue from palm oil industry cannot be displayed. Another source of state revenue from the palm oil industry is the dividend from the state-owned oil palm plantation holding company.

The palm oil industry contributes largely to state revenue through various tax instruments. As prices and trends of palm oil products export improve and the country's palm oil industry develops, the country's revenue will be higher. Such revenue can finance the country's development.

Chapter 4
Myths Versus Facts: Palm Oil Industry in Social Issues

One of the purposes (Aldington, 1998; Dobbs and Petty, 2001; Moyer and Josling, 2002; Harwood, 2003; Jongeneel and Slangen, 2004; Huylenbroeck, et al., 2007) of agriculture, including oil palm plantation, is the social purposes (yellow services). The social purposes of oil palm plantations can be seen in their contribution to rural development, employment rate, and poverty reduction. In addition to the rural level, such social purposes can also be enjoyed at the regional, national, and global levels.

This chapter will dialectically discuss myths, opinions, and accusations dismissed by social facts surrounding oil palm plantations. The accusations concerning social issues are concerned with human rights violations, labor exploitation, child labor, gender issues, agrarian conflicts, restrictions on freedom of association, and others.

MYTH 4-01

Palm oil industry makes no contribution to reducing global unemployment

FACTS

The palm oil industry contributes to the global economy (Myth 3-04) through import and downstreaming activities in importing countries. Both activities drive the growth of economic sectors, directly and indirectly, that further process palm oil (European Economics, 2016; Shigetomi et al., 2020).

The growth of these economic sectors creates jobs in those palm oil importing countries. A study by European Economics (2016) reveals that in 2014, there were 2.9 million workers employed in the downstreaming activities of palm oil imported globally, or around 54 workers per ton of imported palm oil. The jobs are created as direct, indirect, and induced impacts of palm oil imports, downstreaming, and consumption in importing countries.

The distribution of job creation from palm oil imports and downstreaming (Figure 4.1) varies in each importing country. India and China enjoy the largest shares of job creation, with 40 percent and 33 percent, respectively. In addition to the large volume of palm oil imports, the large-scale job creation in both countries is also the result of their labor-intensive palm oil downstreaming technologies. They choose the technology befitting their conditions as the two most populous countries in the world with the abundant and cheap workforce.

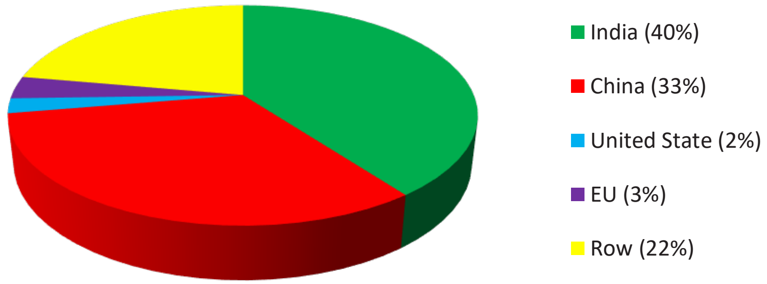


Figure 4.1. Distribution of Job Creation in Palm Oil Importing Countries (Source: Europe Economics, 2016, processed by PASPI, 2022)

Job creation in the European Union (EU) and the United States (US) have lower shares, with 3 percent and 2 percent, respectively. Palm oil in the EU and the US is intended for industries such as the complex food industry, cosmetics and toiletries, biodiesel, and animal feed. These industries are relatively capital-intensive and labor-saving. The amount of capital (for technologies/investments) are relatively cheaper in the EU and the US.

Therefore, palm oil-producing countries like Indonesia share economic benefits through job creation with palm oil-importing countries. This also shows that the palm oil industry is globally inclusive. It extensively involves the people in the supply chain and shares its economic benefits through job creation with palm oil importing/consuming countries, which, in turn, contributes to reducing the global unemployment rate.

MYTH 4-02

Palm oil harms poor countries

FACTS

The world's population lives in poverty across 107 countries. Around 67 percent live in middle countries, mostly in Sub-Saharan Africa and South Asia (UNDP, 2021).

From an economic perspective, poverty concerns the affordability of food with nominal income and the prices of the products purchased. As an edible oil, vegetable oil is one of the foods recommended by FAO to be consumed by the global community as a source of both nutrients and oil/fat.

Four vegetable oils are consumed globally, i.e., palm oil, soybean oil, rapeseed oil, and sunflower oil. Among the oils, the palm oil price is lower (competitive) than that of the other three (Myth 2.05). As palm oil-based food products are available at relatively low prices, it can increase the purchasing power and affordability of those living in poverty. With relatively stable nominal incomes, people living in poverty can consume a larger volume of palm oil (or palm oil-based food products) than other, more expensive vegetable oils.

This situation benefits low-income countries importing palm oil, such as India, Pakistan, Bangladesh, and Africa. Mehta (2020) and Janmohammed (2020) reveal that the lower-middle-income population in India, Pakistan, and Bangladesh use palm oil instead of other vegetable oils to cook.

The result of a study by Kojima et al. (2016) on countries with per capita income under USD 1,000 reveals that the own-price elasticity of demand for palm oil is more inelastic compared to that of other vegetable oils. In other words, a change in palm oil prices does not significantly affect palm oil consumption by people living in poverty. The income elasticity of demand for palm oil is highly elastic. If the people living in poverty have a rise in income, it will increase palm oil consumption by a greater proportion to the rise in income (Yulismi and Siregar, 2007). This indicates that palm oil is relatively pro-poor compared to other vegetable oils.

The price difference between palm oil and the other three vegetable oils on the global market is approximately USD 100-200 per tonne, where the palm oil price is lower. Such low price benefits the global community, especially those living in poverty and those with low incomes (PASPI Monitor, 2021t). With the competitive (cheaper) price, palm oil also plays another role in preventing excessive increases in the prices of other vegetable oils. This is linked to the substitution between palm oil and other vegetable oils. Kojima et al. (2016) study reveals that if the price of soybean oil, rapeseed oil, or sunflower oil increases, people will switch to palm oil. With this scheme, the price of other vegetable oils will not increase drastically.

The description above shows that palm oil benefits its consumers, especially those living in poverty or with low incomes. With all-year-round availability and relatively low price, palm oil will increase the availability and affordability of palm oil and palm oil-based products, for those living in poverty.

MYTH 4-03

Palm oil industry employ only a few national workers

FACTS

The ability of a sector to employ workers depends on the characteristics of technology and raw material used. The palm oil industry uses technology that is relatively labor-intensive. Moreover, the industry is domestic resources based. Thus, the rate of domestic workers employed will increase as the industry grows.

The palm oil industry is a strategic sector in Indonesia that helps increase the number of employed workers. The oil palm plantation sectors can create jobs and employ workers directly from rural or urban areas (Rifin, 2011; PASPI, 2014; Syahza et al., 2019; Syahza and Asmit, 2019). The labor multiplier of oil palm plantations is 2.6 (PASPI, 2014). In other words, oil palm plantations can multiply job creation in the national economy by 2.6 times for each worker employed in the palm oil industry.

Rural communities are directly involved in the plantation sector as oil palm smallholders or plantation company employees. Moreover, rural workers are also employed in other economic sectors directly and indirectly connected with oil palm plantations, such as trade, transportation, food and beverage, and other sectors.

Overall, the number of workers employed in the palm oil industry increased from 12.5 million in 2015 to 16.5 million in 2021 (Figure 4.2).

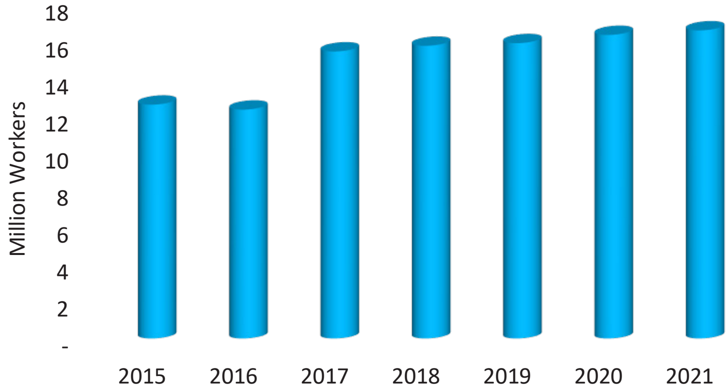


Figure 4.2. Growth of the Number of Workers in Oil Palm Plantations (Source: Ministry of Agriculture, data processed by PASPI, 2022)

In 2021, of the 16.5 million workers employed in oil palm plantations in Indonesia, 9.7 million were direct workers. The breakdown is as follows: 5.2 million workers in smallholder oil palm plantations and 4.5 million employees of state-owned and private oil palm plantation companies. The remaining 6.8 million were indirect workers who engaged in other activities related to oil palm plantations, such as transporting FFB/CPO, supplying fertilizers and plantation equipment, supplying office goods, etc.

This employment does not consider the workers employed in the upstream, downstream, and related service sectors in the palm oil agribusiness and its systems (PASPI Monitor, 2017[a]). Palm oil downstream industries (such as oleofood, oleochemical, or biofuel/bioenergy) and trading activities from the distribution to retail trading, clearly employ numerous workers.

The description above shows that large-scale employment occurs at the village, sub-district, district/city, provincial, and national levels and throughout the supply chain of the palm oil industry. The palm oil industry can create plentiful, diverse, and large-scale jobs as a domestic resources-based industry with labor-intensive technologies.

MYTH 4-04

Palm oil industry makes no contribution to poverty reduction in Indonesia

FACTS

Alleviating poverty is one of the focuses and objectives of Indonesia's development. Poverty reduction and its various configurations are the targets of sectoral, industrial, regional, and national developments.

The Government of Indonesia attempts to achieve its goal of poverty alleviation by, among others, empowering the people through the development of the agricultural sector. In the agricultural sector, developing oil palm plantations is on the government's agenda to improve rural development and achieve rural poverty alleviation.

Rural communities living in poverty mostly reside in remote, interior, isolated, and peripheral areas. In general, oil palm plantations pioneer economic activities in these areas. It is expected that the growth of plantations producing palm oil, a main export commodity and industrial raw material, will push regional development and reduce poverty in that region.

Many researchers have provided empirical evidence to prove the contribution of oil palm plantations to reducing poverty. At the national level, studies by Susila and Munadi (2008), Joni et al., (2012), and PASPI (2014) reveal that the increased production of Indonesia's palm oil can reduce poverty. World Growth (2011) also states that oil palm plantations in Indonesia are crucial to and significant for poverty alleviation.

Goenadi (2008) reveals that over 6 million people involved in oil palm plantations in Indonesia have been lifted out of poverty. In line with the findings of this study, Edwards (2019) also estimates that around 2.6 million Indonesian people have been lifted off from poverty. Besides the two studies above, the National Team for the Acceleration of Poverty Reduction (2019) reveals that since 2000, around 1.3 million of the rural population and around 10 million of Indonesia's population have successfully been lifted off from poverty thanks to the growth of the palm oil industry.

Oil palm plantations also play a significant role in reducing poverty in other palm oil-producing countries (World Bank, 2011), such as Malaysia (Norwana et al., 2011), Papua New Guinea (ITS Global, 2012), Nigeria (Adebo et al., 2015), Ghana (Ayodele, 2010), and Colombia (Castiblanco et al., 2015; Qaim et al., 2020; Porter, 2020). This indicates that oil palm plantations have become a driver in reducing poverty in palm oil-producing countries (PASPI Monitor, 2021[aa]).

At the regional level, the increased palm oil production in oil palm plantation center areas closely correlates with the significant poverty reduction (PASPI, 2014; Syahza et al., 2019). A study by Alamsyah et al., (2020) reveals that the growth of oil palm plantations in ten oil palm center provinces in Indonesia has significantly reduced the population living in poverty in rural and urban areas. The study also reveals that reducing the population living in poverty in rural and urban areas by 1 percent takes 1.05 million hectares of oil palm plantation expansion. On the other hand, reducing the population living in poverty in rural areas by 1 percent takes 959.7 thousand hectares of oil palm plantation expansion.

The growth of palm oil production improves the economic capacity of rural areas to generate output, income, and employment in oil palm plantations and other sectors. The multiplier effect of developing oil palm plantations is also enjoyed by other modern sectors in the region, such as financial institutions, restaurants and hotels, food processing, the electrical equipment sector, and manufacturing. This indicates that oil palm plantations promote new centers of economic growth to emerge and reduce the poverty rate in those areas.

Studies by PASPI (2014), Kasryno (2015), and Edwards (2019) reveal that poverty reduction rates in districts with the largest oil palm plantations (oil palm centers) are faster than districts without oil palm plantations (Figure 4.3).

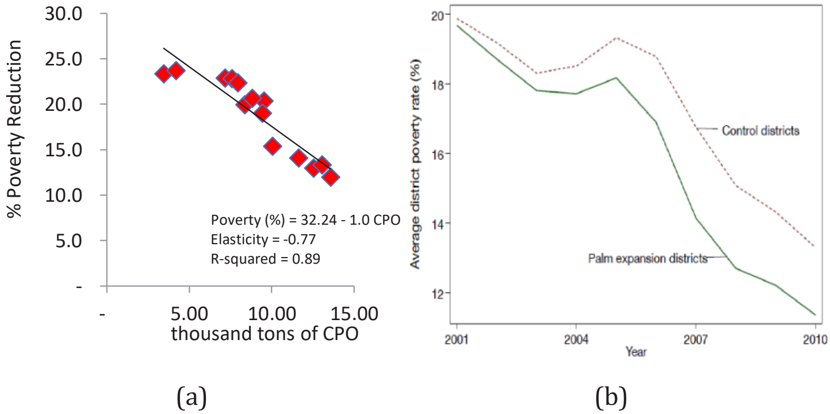


Figure 4.3. Effect of CPO Production on Poverty Reduction (Source: (a) PASPI, 2014; (b) Edwards, 2019)

At the rural level, the contribution of oil palm plantations to poverty alleviation has been revealed by many. A study by Alwarritzi et al. (2015) reveals that an increase in income generated from oil palm plantations has lifted the oil palm smallholders' household out of poverty. A study by Santika et al. (2019) reveals that oil palm plantations contribute greatly to improving rural socio-economic welfare and reducing poverty in these areas. Similarly, the study by Syahza et al. (2020) reveals that oil palm plantations create a multiplier effect on rural areas' economies and increase rural communities' welfare index.

The description above shows that oil palm plantations play a major role in and contribute to poverty reduction at the rural, regional, and national levels. Oil palm plantation development across remote, isolated, and peripheral areas has promoted new economic growth centers, thus reducing poverty in those areas.

MYTH 4-05

Palm oil industry widens economic inequality

FACTS

Almost every country experience economic inequality in its development process. Economic disparities between industrial and agricultural sectors, urban and rural areas, and modern and traditional sectors are some of the varieties of economic inequality. Whether or not such disparities reflect the worsening economic inequality is still debatable among development experts.

As mentioned earlier, oil palm plantations are developed in the remote, isolated, and peripheral areas. The economy and welfare of these areas lag far behind their surrounding areas.

The growth of oil palm plantations drives economic activities faster and more extensively and creates greater and more varied economic benefits. It will gradually improve the economy and welfare of their communities, thus, allowing these areas to catch up with the other already developed areas. In these areas, oil palm plantations are the economic pioneer that has successfully driven other economic sectors and, in turn, created new centers of economic growth in rural areas. Oil palm center areas which were once degraded economically were transformed into more developed and prosperous areas.

Inequality in oil palm center areas is one of the most discussed issues. Exclusivism in oil palm plantations, believed to generate income only for those directly involved, is the reason behind high-income inequality.

There are two types of inequality associated with oil palm plantations. First, economic inequality occurs at the province and district levels between oil palm center areas and non-oil palm center areas. Second, income inequality occurs at the village level between oil palm plantation communities and non-oil palm communities.

As the drive of development in isolated, peripheral areas and degraded land, oil palm plantations have instead become a solution to increase economic growth while simultaneously reducing inequality. Oil palm plantations create a great and inclusive multiplier effect. In addition to those directly involved in oil palm plantations as smallholders or company employees, the growth of the plantations has also increased the income of non-plantation communities working in other sectors (Gatto et al., 2017).

In general, oil palm plantations development has no significant impact on income inequality between smallholders and non-smallholders in rural areas (Dib et al., 2018; Kubitza et al., 2018). The study by Alamsyah et al. (2020) also reveals that the growth of oil palm plantations significantly impacts income distribution, especially in oil palm center provinces.

In addition, the plantations can generate income in non-oil palm center areas through indirect effects (consumer goods suppliers) and induced consumption effects (Myth 3-06). As a result, oil palm and non-oil palm center areas experience economic growth. Likewise, studies by Syahza et al. (2019; 2021) reveal that oil palm plantations development can reduce income inequality among structures of society and reduce economic inequality among districts/cities.

The description above shows that oil palm plantations can improve the communities' economy and welfare as their poor areas transform into new centers of rural economic growth, narrowing the economic gap between rural and urban sectors. The emergence of the middle class in rural areas, thanks to the income generated from oil palm plantations, has narrowed the economic gap between smallholders and workers of modern sectors.

MYTH 4-06

Oil palm plantations leads to more poor villages

FACTS

It has been empirically proven that oil palm plantations contribute to poverty alleviation at the global level (Ayodele, 2010; Adebo et al., 2015; Castiblanco et al., 2015; Potter, 2020), national level (Susila and Munadi, 2008; Goenadi, 2008; Joni et al., 2012; World Growth, 2011; PASPI, 2014), and regional level (PASPI, 2014; Kasryno, 2015; Edwards, 2019; Alamsyah et al., 2020). The oil palm plantations' role in reducing poverty at those levels originated from poverty reduction in rural areas.

Poverty reduction in rural areas is closely linked with the role that oil palm plantations play in rural areas. Several empirical studies (Susila, 2004; Syahza, 2005; Rist et al., 2010; Syahza, 2013; Cahyadi and Waibel, 2013; Naylor et al., 2019; Qaim et al., 2020) find that the increase in villager's income generated from oil palm plantations proves to contribute to poverty reduction in rural areas.

Under the Regulation of Ministry of Villages, Development of Disadvantaged Regions, and Transmigration Number 2 of 2016, the Ministry categorizes villages by their development into Highly Underdeveloped, Underdeveloped, Developing, Developed, and Independent Villages. The study by PASPI (2022) reveals that oil palm plantations helped Oil Palm Villages to advance to Developed Village and Independent Village categories faster than non-Oil Palm Villages. In addition, as an indicator to measure village development, the Developing Village Index was applied from 2016 to 2021 for Oil Palm Villages in Indonesia to indicate growth in economic security, social resilience, and environmental security.

Oil palm plantations contribute to reducing poverty through direct and indirect mechanisms. The direct mechanism of oil palm plantation development creates jobs befitting the skills of people living in poverty. Oil palm plantations are also developed by involving local communities in the nucleus, plasma, and independent schemes. Thus, many locals own oil palm plantation assets. This is confirmed by the composition of oil palm plantation businesses nationwide (Figure 1.2 in Chapter 1), where smallholder oil palm plantations amount to 40 percent of the total areas of national oil palm plantations.

It is not hard to correlate oil palm plantations with poverty reduction in rural areas since all oil palm plantations are located in rural areas. In fact, oil palm plantations have become a pioneer in remote areas where economic activities have not yet flourished. While the government cannot reach or has not reached remote, underdeveloped, and isolated areas with their programs, oil palm plantations instead are present and growing in these areas. With the existence of oil palm plantations, infrastructure such as roads, bridges, educational facilities, healthcare facilities, and other public/social facilities are built to complete the availability of infrastructure and facilities in those rural areas.

As to the indirect mechanism, income generated from oil palm plantations (by working as company employees or smallholders) can create demand for food and non-food products. The demand, in turn, can attract food and non-food supplying business run by people living in rural areas. Thus, rural communities, including those living in poverty and not directly involved in oil palm plantations, can also enjoy the economic benefits created in rural areas.

A study by Euler et al. (2017) reveals that higher income and lower poverty rates are seen in villages where the land is primarily used for oil palm plantations (Oil Palm Villages), compared to villages where the land is used for rubber and rice farming (non-Oil Palm Villages). Qaim et al. (2020) reveals that Oil Palm Villages have an average poverty rate of 8 percent. In contrast, non-Oil Palm Villages that primarily engage in rubber plantations have a higher poverty rate of 20 percent. Likewise, Dib et al. (2018) reveals that the poverty rate of Oil Palm Villages is only 4 percent or lower than that of non-Oil Palm Villages with rubber plantations (14 percent) and crops (20 percent) as their core businesses.

In addition to a lower poverty rate, oil palm center areas are also relatively faster in reducing their poverty rate. A study by Edwards (2019) reveals that oil palm plantation expansion can reduce poverty in rural areas by 5 percent, higher than in other villages in the same region.

The description above shows that the poverty rate of Oil Palm Villages is lower than that non-Oil Palm Villages. With the presence of oil palm plantations and all the related activities, the once poor and underdeveloped rural areas have transformed into more developed ones.

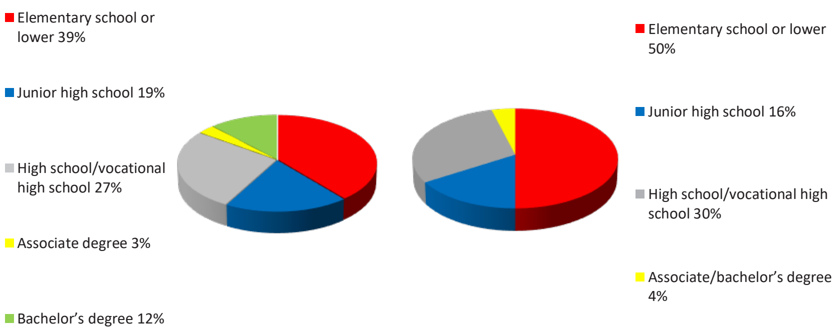
MYTH 4-07

Employment opportunities in oil palm plantations do not match the condition of workers in rural areas

FACTS

To reduce the rural unemployment rate, it is important to develop economic sectors that can employ more workers and accommodate the different backgrounds and characteristics of rural workers.

According to data from Statistics Indonesia, in 2020, 39 percent of workers in rural areas had an academic background of elementary school or lower (Figure 4.4 section A). Workers with an academic background of high school/vocational high school or lower amount to 46 percent, and the remaining 15 percent had associate and bachelor's degrees. On the other hand, most workers absorbed in oil palm plantations had an academic background of elementary school or lower, with a percentage of 50 (Figure 4.4 section B), followed by high school/vocational high school or lower (46 percent) and associate degree and bachelor's degree (4 percent).



A. Academic Backgrounds of Rural Workers

B. Academic Backgrounds Workers Absorbed in Oil Palm Plantations

Figure 4.4. Comparison of Academic Backgrounds between Rural Workers and Oil Palm Smallholders in 2020 (Source: PASPI, 2014; Statistics Indonesia, 2020; processed by PASPI, 2022)

The data shows that from academic backgrounds, the composition of rural workers absorbed in oil palm plantations can accommodate the composition of workers available in rural areas. The view that the workers absorbed in oil palm plantations do not suit the characteristics of rural workers is not supported by facts.

MYTH 4-08

Oil palm plantations make no contribution to providing infrastructure in rural areas

FACTS

Providing infrastructure for development, such as roads and bridges, is the authority and responsibility of the state/government. Law Number 38 of 2004 on Road states that the government (central, provincial, city/district, village) has the authority over public road administration, including road construction and maintenance. The availability of public roads, such as national roads, provincial roads, city/district roads, and village roads, marks the government's presence in people's daily lives.

The availability of road infrastructure in rural areas is the key to growing the rural economy. In addition to facilitating the people to mobilize, road infrastructure in rural areas is necessary to support the mobility of production facilities leaving for the village or of yields leaving for the market center/urban areas.

Oil palm plantations were initially developed in underdeveloped, peripheral, remote, isolated, and land-degraded areas. The development of oil palm plantations in the context of rural development is a pioneering economic activity. Considering that the areas are still isolated at the initial stage of oil palm plantation development, access roads and farm roads must be constructed as part of the investments in plantations (Figure 4.5).

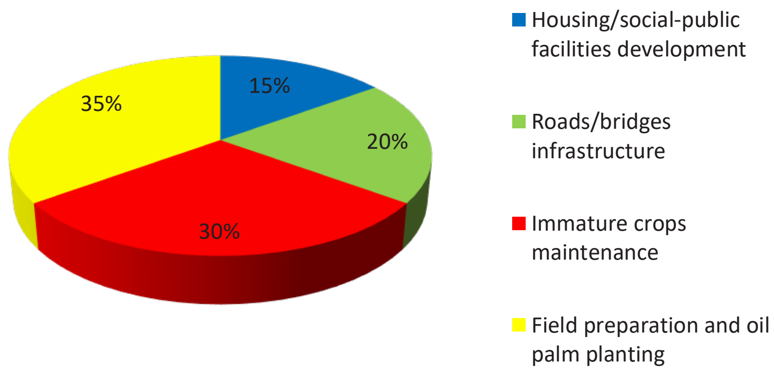


Figure 4.5. Investment Allocation in Oil Palm Plantations in Early Stages in Rural Areas (Source: PASPI, 2014)

One of the largest investment allocations in oil palm plantations is road and bridge construction (Rist et al., 2010; Obidzinksi et al., 2012; Budidarsono et al., 2013; Syahza et al., 2013, 2020; PASPI, 2014; Gatto et al., 2017; Edwards, 2019;). Roads and bridges in rural areas are also built and maintained through CSR programs of the oil palm plantation companies (Suwandi et al., 2013; Marwan et al., 2016; Pambudi et al., 2017; Satria, 2017; Pasaribu, 2019; Fajrin and Anshari, 2019; Syahrida et al., 2019; Baihaqi et al., 2020). PASPI (2022) study reveals the significant intensification of road construction in Oil Palm Villages. The constructed roads also improve in quality, as indicated by the increased proportion of asphalt/concrete roads in Oil Palm Villages, which is higher than that in non-Oil Palm Villages.

The description above shows that oil palm plantations also play a role in building road and bridge infrastructure in the once isolated and underdeveloped rural areas. Building such infrastructure also means improving the accessibility and connectivity of economic, educational, healthcare, and social activities between villages/regions and among the people, which will improve the welfare of rural communities.

MYTH 4-09

Oil palm plantations damage public roads

FACTS

Oil palm plantations are frequently accused of causing damage to public roads. The trucks transporting FFB/CPO exceeding their load capacity are particularly said to cause such damage.

Regarding damaged roads, data from the Ministry of Public Works and Public Housing (2021) shows that 8,306 km of roads in the country are classified as damaged (severe and mild), or around 26 percent of the total length of roads nationwide. As to the distribution of damaged roads in each province (Table 4.1), the length of damaged roads in oil palm center areas is 3,823 km or around 46 percent of the total roads nationwide. The remaining 54 percent is in non-oil palm center provinces and provinces without oil palm plantations, such as Java. The data suggest that damaged roads can be found in oil and non-oil palm center provinces. There is no convincing evidence that roads are only damaged in oil palm center provinces.

The Village Potential data (BPS, 2016, 2021) and the Village Development Index (Ministry of Villages, Development of Disadvantaged Regions, and Transmigration, 2016, 2021) reveal that the proportion of non-Asphalt roads (the type of road between dirt and paved roads) in Oil Palm Villages is greater than in non-Oil Palm Villages (PASPI, 2022). This is understandable, considering that Oil Palm Villages begin to develop only after oil palm plantations are established. Damaged roads are probably associated with oil palm plantations due to the plentiful non-asphalt roads in oil palm center areas. However, based on the government's definition of damaged roads, the quality of public roads can be classified as good, moderate, damaged, and heavily damaged. This classification has nothing to do with whether the road surface is asphalt.

Table 4.1. Comparison of Damaged Roads in Oil Palm Center and Non-Oil Palm Center Provinces in 2020

Province	Damaged Road (Km)	Province	Damaged Road (Km)
Papua*	1,094	Central Kalimantan	269
Riau	1,093	Riau Islands*	251
East Nusa Tenggara*	916	Jambi	244
South Sulawesi*	776	Gorontalo*	230
North Maluku*	667	Southeast Sulawesi*	216
Central Sulawesi*	648	North Kalimantan	206
North Sumatra	543	Yogyakarta*	202
West Kalimantan	506	West Java	191
West Papua*	485	North Sulawesi*	190
Lampung*	433	South Kalimantan	182
Aceh	412	Bali*	129
West Sumatra*	412	Central Java*	119
Bengkulu*	405	West Sulawesi*	109
South Sumatra	379	East Java*	99
Maluku*	373	Babel Islands*	72
East Kalimantan	367	Banten*	41
West Nusa Tenggara*	292	Indonesia	8,306

Source: Ministry of Public Works and Public Housing (2021)
Note: *) Non-oil palm center provinces

Nevertheless, damaged roads in oil palm center and non-oil palm center areas require a comprehensive solution as the roads concern mobility expenses of people and goods/services. Thus, every stakeholder must become part of the solution to improve road quality in the future. Government-built public roads facilitate development. Thus, their capacity and durability should accommodate the volume of vehicle traffic in each area.

MYTH 4-10

Oil palm plantations make no contribution to improving access to education in rural areas

FACTS

It has been empirically proven that oil palm plantations contribute to education. The contribution is realized in two mechanisms: providing educational facilities in oil palm plantation areas and improving the community's access to education.

Oil palm plantations are the pioneering economic activity in land-degraded, isolated, peripheral, and remote areas. Due to the isolated location of the plantations, oil palm plantation companies need to build public facilities to accommodate their employees' needs, such as educational facilities of early childhood education/kindergarten, elementary school, and junior high school.

Initially, the educational facilities were intended for the company employees' children. Later, however, the local community can also use the educational facilities built by the oil palm plantation companies. This phenomenon is also revealed in a study by Edward (2019) regarding the large number of schools built in oil palm center districts and the fact that most of these educational facilities were not public schools (built by the government).

Many empirical studies (Rist et al., 2010; PASPI, 2014; Budidarsono et al., 2012; Syahza et al., 2020) reveal that oil palm plantations contribute to the establishment of educational facilities. This finding is also confirmed by the study conducted by Santika et al. (2019), revealing that school infrastructure construction intensified in Oil Palm Villages more than in non-Oil Palm Villages.

Oil palm plantation companies not only build educational facilities inside their plantations but also help provide such facilities to the local community. Several empirical studies (Suwandi et al., 2013; Pambudi et al., 2017; Satria, 2017; Pasaribu, 2019; Fajrin and Anshari, 2019; Syahrida et al., 2019; Baihaqi et al., 2020) reveal the assistance that oil palm plantation companies provide, such as constructing/renovating of school infrastructure; donating teaching aids and properties, books, computers; giving scholarships, giving allowances to teachers, establishing smart houses/learning houses, and providing school buses.

The second mechanism of oil palm plantations' contribution to education is seen in how oil palm smallholders improve their access to various educational stages. With an increase in income, oil palm smallholders can raise their household spending to meet their education needs (Rist et al., 2010; Alwarritzi et al., 2016; Kubitza et al., 2018; Edwards, 2019). With an increase in income, oil palm smallholders also improve their capacity to afford better education at higher stages, including the associate/bachelor's/master's degrees (Syahza et al., 2021; Chrisendo et al., 2022).

Palm oil funds obtained from palm oil export levies managed by Oil Palm Plantations Fund Management Agency are also used for scholarship programs for oil palm smallholders' children pursuing an undergraduate education. From 2015- 2021, scholarship programs provided IDR 186 billion for smallholders' children from palm oil funds, distributed to 3,265 students pursuing associate degrees (D1 and D3) and a Bachelor of Applied Science degree (D4) (Oil Palm Plantations Fund Management Agency, 2022).

The description above shows that the palm oil industry improves the community's access to education with two mechanisms at work. The first is by building facilities for various educational stages (availability), and the second is by improving their ability to afford higher educational stages (affordability).

MYTH 4-11

Oil palm plantations make no contribution to improving access to health facilities in rural areas

FACTS

Health is an aspect that defines the quality and capacity of human resources. Therefore, oil palm plantation companies make access to health facilities an important part of their human resource development.

It has been empirically proven that the palm oil industry contributes to the health sector. Plantation companies improve the community's access to health facilities through two mechanisms: providing health facilities in the plantation areas (availability) and improving the community's access to health facilities (affordability).

Since oil palm plantations are situated in remote and isolated areas, far away from urban areas, it is difficult for the local community to access health facilities. As a result, oil palm plantation companies build health facilities, such as plantation clinics, the Plantation Community Health Centers (*Puskebun*), and hospitals that are easily and readily accessible to company employees and their families.

Oil palm plantation companies also provide the local community with health services and education, such as free medical checkups and treatments at the company clinics or mobile at the villages, ambulance assistance, supplemental nutrition assistance at the Integrated Healthcare Centers (*Posyandu*) and elderly Posyandu (*Poswindu*), and provision of clean water and sanitation facilities (Suwandi et al., 2013; Pambudi et al., 2017; Pasaribu, 2019; Satria, 2017; Syahrida et al., 2019; Baihaqi et al., 2020; Syahza et al., 2020).

With an increase in income generated from growing oil palm trees, oil palm smallholders also raise their household spending to access health services/facilities (Rist et al., 2010; Krishna et al., 2017; Edwards, 2019; Chrisendo et al., 2022). The household spending for health services/facilities consists of costs for health care and medical treatment (such as fees for going to doctors/clinics and costs for medicines/vitamins) as well as insurance (Syahza et al., 2021). The high medical expenses spent by oil palm smallholders indicate improved welfare and quality of life.

MYTH 4-12

Oil palm plantations make no contribution to improving access to clean water in rural areas

FACTS

Water is humans' basic need for drinking, bathing, and cleaning. Therefore, clean water facilities are fundamental wherever a community lives, including the community of oil palm plantations that need such facilities for production in the plantations.

The study by PASPI (2022) shows that the communities of both Oil Palm Villages and non-Oil Palm Villages have similar access to water sources. Sources of clean water for the communities of both Oil Palm Villages and Non-Oil Palm Villages are drinking water companies (*PAM*), wells, bottled water, springs, and other sources (rainwater, rivers, etc.).

This study has two interesting things to note regarding the clean water sources in Oil Palm Villages. First, the communities of both Oil Palm Villages and non-Oil Palm Villages have equal access to clean water. This also dismisses the rumor that the community of Oil Palm Villages is experiencing a clean water crisis. Second, the quality of clean water sources used by the community of Oil Palm Villages has shifted. Initially consuming river water and rainwater (lower quality), the community now consumes water from higher quality clean water sources, i.e., wells and drinking water companies (*PAM)*. This indicates that the community of Oil Palm Villages improves their affordability of clean water with better quality.

The data above also shows that oil palm plantations do not reduce the community's access to clean water. On the contrary, it shows that the community of Oil Palm Villages improves their availability and affordability of clean water with better quality.

MYTH 4-13

Oil palm plantations are exclusive and have no Corporate Social Responsibility (CSR) programs

FACTS

The people's view on the exclusivity of oil palm plantations is a colonial legacy. After Indonesia's independence, especially during the reform era in 2000, the wall of exclusivity fell. Plantations and their community have become integral to the local community and area. Economically, the inclusivity of oil palm plantations has been shown, among others, in Myth 3-06.

Plantation companies, particularly those producing FFB, gradually implement the Partnerships & Community Development Program/PCDP (*Program Kemitraan Bina Lingkungan/ PKBL*) and CSR programs. Numerous empirical studies reveal that oil palm plantation companies and their PCDP/CSR programs contribute to the development of villages and the local communities economically, socially, and environmentally.

In the economic aspect, partnership programs (nucleus-plasma) are implemented as the primary CSR programs carried out by plantation companies to help the rural community around the plantations (PASPI, 2014). A study by Suwandi et al. (2013) reveals that the partnership between companies and the local community under the Village Cooperatives (*Koperasi Unit Desa/KUD*) takes a more proactive role. In addition to facilitating FFB trades, it also serves as a community business for various purposes, such as savings and loans, convenience stores, procurement of agricultural production facilities, and transportation.

Oil palm plantation companies carry out CSR programs to develop the local economy, as demonstrated by how the companies develop local SMEs run by the local community near the plantations. The study by PASPI (2014) reveals the distribution of SME sectors most commonly developed by the state-owned oil palm plantation enterprise (PTPN) as shown in (Figure 4.6): the development of SMEs in the trade sector (40 percent), followed by the service sector (24 percent), and agriculture (20 percent).

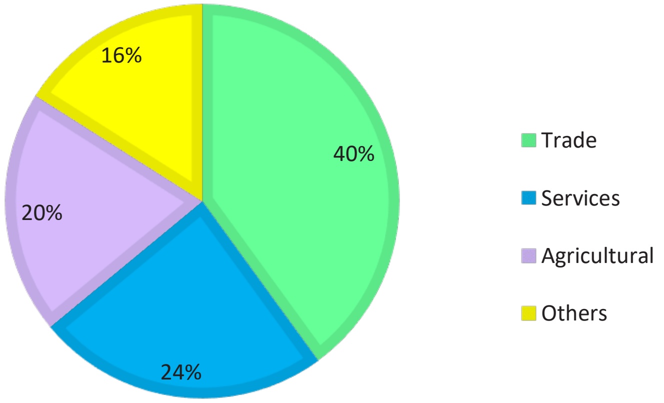


Figure 4.6. Distribution of SMEs Development through CSR Programs of Oil Palm Plantation Companies in Indonesia (Source: PASPI, 2014)

Other CSR programs carried out by oil palm plantation companies are, the development of MSMEs engaged in the trade sector are stalls and low-cost markets (Suwandi et al., 2013; Satria, 2017; Syahrida et al., 2019; Syahza et al., 2020), the development of MSMEs engaged in transportation services (Pambudi et al., 2017), the cultivation of non-oil palm agricultural commodities such as rice farming and horticulture (Suwandi et al., 2013; Baihaqi et al., 2020), fisheries (Suwandi et al. 2013; Pasaribu, 2019), and animal husbandry (Suwandi et al., 2013; Winarso and Basuno, 2013).

In the social aspect, oil palm plantation companies also run programs to improve social welfare by improving access to basic needs, such as education (Myth 4-10) and health (Myth 4-11). CSR programs for the local community are aimed at education and training (32 percent), public infrastructure and facilities (21 percent). The remaining 47 percent is for constructing places of worship, organizing health services and nature conservation, and providing aids for victims of natural disasters (Figure 4.7).

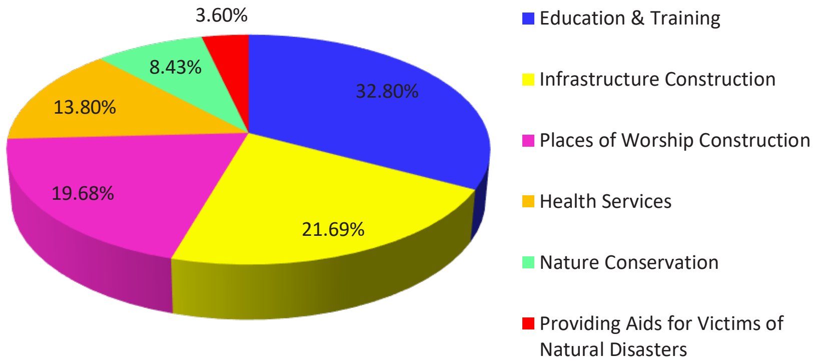


Figure 4.7. Distribution of CSR programs of oil palm plantation companies in Indonesia (Source: PASPI, 2014)

The results of the study is also confirmed by many other empirical studies (Budidarsono *et al.,* 2013; PASPI, 2014; Marwan *et al.,* 2016; Satria, 2017; Baihaqi, 2019; Zainuri *et al*., 2021) that reveal the CSR programs run by oil palm plantation companies directly contribute to the construction of infrastructure, such as education infrastructure (kindergartens, elementary schools, junior high schools, high schools) and the provision of school buses, clinics, ambulances, places of worship, and roads/bridges. Other CSR programs in the social aspect are also intermittent in nature, such as assistance during religious festivals, cultural days, or natural disasters

(Marwan *et al.,* 2016; Baihaqi, 2019; Fajrin dan Anshari, 2019; Syahrida *et al.,* 2019). In environmental CSR, the programs include, among others, forest fire prevention (Baihaqi et al., 2020), reforestation (Satria, 2017), conservation forest management, and utilization of vacant land to grow productive plants (Suwandi et al. al., 2013).

Oil palm plantations have also become more inclusive since the government developed partnership programs. In Indonesia, the growth of oil palm plantations, today found from Sabang to Merauke, is a direct result of many policies made by the Government of Indonesia. One of the policies in the initial period of developing oil palm plantations in Indonesia is the nucleus estate and smallholder attached to the transmigration program (NES-Trans/*PIR-Trans*) (PASPI, 2014; Kasryno, 2015; Gatto *et al.,* 2017). The policy is another model of the nucleus estate and smallholder partnership attached to the transmigration program. It aims to accelerate the development of isolated or underdeveloped areas by developing oil palm plantations expected to improve people's welfare.

People from diverse ethnic groups participated in the transmigration program and moved to Sumatra and Kalimantan. Afterward, they cultivated the land provided by the Government of Indonesia by growing oil palm trees. In addition, spontaneous migration from one area to an area that develops oil palm plantations has intensified since 2000, where people move as workforce, supply service providers, groceries/food traders, and oil palm smallholders. This phenomenon indicates that the NES-Trans (*PIR-Trans*) partnership model not only accelerates an area's development and economic growth but also gives birth to ethnic diversity or heterogeneous society, both in the oil palm plantations and in the rural areas.

The realization of ethnic diversity and social heterogeneity is also an indicator that must be achieved to ensure successful village development, which falls under the Social Capital Dimension and reflects social resilience (Ministry of Villages, Disadvantaged Regions and Transmigration, 2021). According to Statistics Indonesia (2014) and the Ministry of Villages, Disadvantaged Regions, and Transmigration (2021), social heterogeneity is achieved when a village hosts diverse ethnic groups. A study by PASPI (2022) reveals that there are more diverse ethnic groups in Oil Palm Villages than Non-Oil Palm Villages. The social heterogeneity in Oil Palm Villages proves that oil palm plantations serve the function mandated by the Law on Plantation, namely the socio-cultural function to connect and unite the people.

An ethnically diverse (heterogenous) community is inclusive as it has higher tolerance and openness toward differences and diversity. The acculturation in such a community positively impacts the work environment, such as improved knowledge, productivity, and innovation. Various empirical studies on human resources management (Van Ewijk, 2011; Adkins, 2016; Syamsuar and Ginting, 2020) show that an organization capable of managing diversity creates better innovations and excels in its field.

From the sociological perspective on villages and agriculture, diverse ethnic groups thriving in Oil Palm Villages will strengthen the social capital and bring about collective acts, followed by better relationships and partnerships with the government, private sector, and other village communities (Tonny et al., 2022). This social ecosystem in the surrounding areas of oil palm plantations is expected to boost the local community's economic growth and well-being.

The above description shows that oil palm companies are now more economically, socially, and environmentally inclusive. Ethnic diversity (social heterogeneity) present in the communities surrounding oil palm plantations in Indonesia indicates that the oil palm sector is inclusive. The CSR programs incorporating economic, social, and environmental elements are another evidence of this inclusivity. This inclusivity is achieved by integrating oil palm plantations into the local community. The scale and scope of each oil palm company's CSR programs vary, depending on its business scale and growth stage. Oil palm companies that are still in their investment stage (in which their plantations have yet to yield profits) surely can only hold small-scale CSR programs with limited scope.

MYTH 4-14

Oil palm plantations exploit workers

FACT

Oil palm plantation-related labor issues are among the issues attracting global attention. Examples of such issues include wage, gender, and freedom of association. Labor issues are global in various sectors in many countries, not just in the oil palm plantation.

Several Non-Government Organizations (NGOs) noted that workers' exploitations and violations of workers'/employees' rights have occurred in

Indonesia's oil palm plantation companies. These NGOs mentioned several violations of workers'/employees' rights, such as low wages, steep targets, and the absence of Personal Protective Equipment (PPE).

Labor protection in Indonesia, including that for oil palm plantations, has been regulated in Law No. 11 of 2020 on Job Creation; Government Regulation No. 35 of 2021 on Fixed Term Employment Contract, Outsourcing, Working Time and Rest Time, and Termination; Government Regulation No. 36 of 2021 on Wages; and Government Regulation No. 34 of 2001 on Foreign Workers Utilization.

Specifically for oil palm plantations, workers' rights-related arrangement and protection are elements of ISPO certification. Such an arrangement and protection are regulated in Law No. 18 of 2004 in conjunction with Law No. 39 of 2014 on Plantation Sector; Regulation of the Minister of Agriculture No. 19 of 2011 in conjunction with Regulation of the Minister of Agriculture No. 11 of 2015 in conjunction with Regulation of the Minister of Agriculture No. 38 of 2020 on Indonesian Sustainable Palm Oil (ISPO), further regulated by Presidential Regulation No. 44 of 2020 on Indonesian Sustainable Palm Oil (ISPO).

These regulations mandate that oil palm companies uphold the principles of workers' protection and guarantee the fulfillment of workers' rights, such as their right to occupational health, safety, and security. ISPO certificate given to an oil palm plantation company shows that the company has implemented good employee utilization practices. In addition to the government, the commitment to protecting workers in the oil palm sector also comes from the Indonesian Palm Oil Association (GAPKI), which collaborates with the International Labor Organization (ILO). This commitment aims to develop and promote a system of suitable work practices for the oil palm sector.

Several empirical studies show evidence of the realization of the oil palm plantation companies' commitment to implementing suitable work practices for their employees. Employees of the oil palm companies in Riau (Rahman and Hidayat, 2014; Mansukra *et al.*, 2017), North Sumatra (Sari, 2020; Sudarma, 2021), Aceh (Mahyuddin and Setiadi, 2020), Jambi (Hidayat *et al.*, 2019), and Banten (Lestari, 2008) gave high satisfaction rate since they felt that the wage given is appropriate for the workload and in line with the standards and they were given benefits, bonuses, health insurance, as well as occupational safety and security guarantee by their companies. The same can be seen among oil palm companies' employees in Johor, Malaysia

(Bahruni, 2015). Such a high satisfaction rate would be impossible if these employees were massively exploited.

The data above shows that oil palm companies and the Government of Indonesia are strongly committed to creating a proper work climate and protecting workers' rights in the country's oil palm sector. There is certainly a possibility that there have been violations against workers' rights in some oil palm plantation companies. In this case, the violations constitute legal violations and must be resolved according to the applicable rules. However, generally, oil palm plantation companies have already put in place the appropriate Standard Operational Procedure (SOP), and their attempt to protect workers is on the right track.

MYTH 4-15

Oil palm plantations employ child labor

FACT

In the last few years, NGOs have published more content and accusations of child labor (below age 18) toward oil palm companies. Such accusations stemmed from pictures of children in oil palm plantations taken by the relevant companies. Such accusations are unreasonable and further show that NGOs are using children as a means to their goal. The accusations abuse Indonesian children and their parents.

The Indonesian law on labor (see Myth 4-14) forbids the use of child labor. The definition of a worker in Indonesia, as provided by Statistics Indonesia, is a citizen aged 15 or above. In reality, oil palm plantation companies only hire prospective workers with an Identity Card (*Kartu Tanda Penduduk/KTP*). Indonesian regulations require people aged 17 to have an Identity Card.

Apart from the policies, technically, the work at oil palm plantations cannot be completed by children. Work such as weeding, harvesting, pest control, and FFB transportation demand great physical strength that children do not have.

Children's presence in certain places does not mean they are involved in the activities conducted at that place. To illustrate, when we see children at a mall, we certainly cannot assume that they are selling goods there. Such an assumption would be wrong since they might have been brought to the mall by their parents for shopping. The same applies to oil palm plantations.

The presence of children on the plantation does not mean they are engaged as workers there.

In rural areas, children have a strong bond with other family members. Those coming from rural areas understand this. Children often go to the farm or plantation with their parents. This is a social interaction between children and parents, a protective mechanism, and education on responsibility from the parents to their children. When a child uses a hoe, this action is merely a form of education or fun activity between family members whose goal is to instill the knowledge of family responsibility.

The issue of child labor has been a focus of Indonesian oil palm plantation companies. Oil palm association with ILO, JARAK, PAACLA Indonesia, PKPA, and organizations specializing in labor/gender have developed the "*Panduan Praktis dan Praktik Baik Sawit Indonesia Ramah Anak*" (Practical Guidance and Best Practices of Child-Friendly Oil Palm Plantation). The collaboration with child protection actors has created a child-friendly oil palm business ecosystem and encouraged oil palm plantation companies to provide a facility to administer essential services for children, such as daycare facilities (for children under five/*balita*) at the workplace, healthcare facilities for children, and formal and informal education facility.

The above description shows that the national, sectoral, and industrial policies and corporate-level SOP leave no room for the utilization of child labor. Conversely, oil palm plantation companies must establish facilities to protect and fulfill children's basic needs to ensure their growth and development as future plantation sector actors.

MYTH 4-16

Oil palm plantations are not gender friendly

FACT

Gender equality has always been an international issue. Currently, gender equality is also among the hot topics related to the oil palm sector that is discussed globally. In light of that, the United Nations (UN) incorporated gender equality as one of the goals (SDG-5) of the Sustainable Development Goals (SDG). This ensures that all countries, industries, companies, and the oil palm sector contribute to the realization of gender equality.

Workers engaged in the oil palm sector (smallholders and company employees) are female and male. The work for male and female workers is divided based on their core competency. This serves as a form of worker protection. Since the tasks completed in oil palm plantations require physical strength of a particular level, most of the workers on the plantation are men (Villamor *et al.,* 2015; Mehraban *et al.,* 2022). This gender stereotype gave rise to the issue of gender equality among women in the oil palm sector.

The policies stated below and the ideology behind the law on labor (see Myth 4-14) uphold gender protection and equality. Stakeholders' commitment to realizing gender equality in oil palm plantations is well articulated in the ISPO certificate (Presidential Regulation No. 44 of 2020 and Regulation of the Minister of Agriculture No. 38 of 2020) and National Action Plan on Sustainable Oil Palm Plantation (Presidential Instruction No. 6 of 2019). The said regulation incorporates zero gender discrimination (based on sex) and gender responsiveness principles.

The Ministry of Women's Empowerment and Child Protection and NGOs specializing in labor/gender are also committed to realizing gender equality. Such a commitment is indicated in the technical guidance for protecting workers' rights in oil palm plantations under the National Action Plan on Sustainable Oil Palm Plantation. Technical guidance has been made into regulations on protecting female workers at the company level.

Generally, there are two vital components in company regulations to promote gender equality and protection for female workers on oil palm plantations (IPOA, 2021). *First,* gender equality in terms of job opportunities and protection against gender discrimination. This is done by ensuring the female workers' representation in the overall company lines of business, from the plantation to the back office. In terms of operational activities, female workers can be put in charge of weeding, fertilization, maintenance, germination, and fruit picking. Female workers can be assigned strategic roles at the back office, such as internal auditors; staff members of the occupational health, safety, and security unit; staff members of the approval commission; staff members; secretaries; and treasurers. Oil palm companies can also encourage female workers to apply for leadership/top management positions and promote transparency in the recruitment process.

Second, female workers' rights protection. Company regulations must protect females' basic rights (such as pregnancy leave, parental leave, miscarriage leave, menstrual leave, and breastfeeding) and female workers' rights (such as wage, rest time, training, promotion, and insurance).

Companies must also provide facilities to cover and protect the female workers' rights and needs, such as breastfeeding rooms, daycare facilities, health clinics and routine medical checkup facilities, clean sanitation facilities, decent resting areas, PPE, and safe work equipment (including the automated ones) up to alternative works for pregnant and breastfeeding women.

A token of the company's commitment to female workers' protection is the establishment of the Gender Committee. It is where female workers give inputs to the company's management to ensure equality, justice, protection, and empowerment for women. Additionally, the committee also protects female workers from sexual abuse and violence.

The commitment of oil palm companies to fulfilling and protecting female workers' rights can be seen in, among others, the high satisfaction rate given by female workers. In addition to economic compensation and incentive (Bahruni, 2015; Kamaruddin et al., 2016; Hee et al., 2019), fulfilled basic needs and protected women's basic rights (to menstrual leave, parental leave, and others), zero discrimination, and provision of health and safety facility result in higher work satisfaction rate among female workers in oil palm plantation companies compared to male workers (Rahman and Hidayat, 2014; Siahaan, 2022). Such a relatively high satisfaction rate among female workers can be achieved only when there are zero discrimination and women's rights violation.

The above description shows that from the company's ideology and policy, to the company's SOP, the palm oil industry is on the right track to becoming a gender-friendly industry and that gender equality is part of the efforts to realize sustainable palm oil industry. There is certainly a possibility that there have been violations against gender equality in some oil palm companies. In this case, such violations are against the applicable laws and regulations and/or stakeholders' commitment that needs to be immediately resolved.

MYTH 4-17

Oil palm plantations cause agrarian conflicts

FACT

Agrarian conflict is among the oldest conflicts occurring throughout human history. Almost every country has experienced agrarian conflict involving the government, local community, and settler communities. Such a conflict is usually related to land ownership, use, existence, and economic resources/livelihood sources.

Since the reform era, the Government of Indonesia has provided enough room for people in each region to give aspirations and fight for their rights in line with the country's applicable laws and regulations. These also apply to the people's agrarian rights. In reality, people give aspirations or raise demands regarding their agrarian rights to the government or other agencies. In Indonesia, a state ruled by law, agrarian conflicts certainly have always been solved through the applicable judicial system.

Table 4.2. Number of Agrarian Conflicts in Indonesia in 2021

Province	Number of Case	Province	Number of Case
East Java*	20	East Nusa Tenggara *	5
East Kalimantan	19	Southeast Sulawesi*	4
Central Java*	18	Lampung*	3
West Java*	17	Maluku*	3
Riau	16	Yogyakarta*	3
South Sulawesi*	12	Banten*	3
South Sumatra	8	West Kalimantan	3
Bengkulu*	8	North Kalimantan	3
North Sulawesi*	7	South Kalimantan	3
Jambi	7	Papua*	3
North Sumatra	6	Aceh	2
Jakarta*	6	North Maluku*	2
Central Kalimantan	6	Gorontalo*	2
Central Sulawesi*	6	Bali*	1
West Sumatra*	5	Riau Islands*	1
West Nusa Tenggara *	5	Bangka Belitung*	1
Indonesia			207

Source: Consortium for Agrarian Reform, 2021
Note: *) Non-oil palm center provinces

Agrarian conflicts occur in all provinces, those with and without oil palm plantations. Based on the report by the Consortium for Agrarian Reform, there were 207 cases of agrarian conflict in 2021 (Table 4.2). From an agrarian conflict distribution perspective, five Indonesian provinces have the highest number of agrarian conflicts: East Java, East Kalimantan, Central Java, West Java, and Riau.

The three provinces with the highest number of agrarian conflicts are East Java, Central Java, and West Java, which are non-oil palm center provinces. Agrarian conflicts also happen in oil palm center provinces, such as East Kalimantan, Riau, South Sumatra, Jambi, and North Sumatra; however, the number is lower than that of non-oil palm center provinces. These conflicts are mostly caused by problematic land ownership (Rist et al., 2010; Obidzinksi et al., 2018; Santika et al., 2019; Qaim et al., 2020).

The data shows no correlation between agrarian conflicts and oil palm plantations. With or without oil palm plantations, agrarian conflicts will still happen. The government is solving agrarian conflicts in oil palm center and non-oil palm center provinces in line with the constitution.

To address and prevent agrarian conflicts related to oil palm plantations, the government is developing various breakthroughs such as the Job Creation law, One Map Policy, and land certification program. Additionally, proof of legal land ownership is required to acquire ISPO. A principle to fulfill by oil palm companies to acquire ISPO is compliance with the laws and regulations. This principle comprises two important elements, namely proof of legal land ownership (includes land use permit, land ownership certificate, land acquisition proof, land dispute proof, abandoned land proof, and overlapping land use certificate) and legal business ownership (includes proof of legal entity status, environmental permit, smallholder plantation permit, and plantation permit). The fulfillment of the two elements is expected to reduce the potential agrarian conflicts.

The above explanation shows that agrarian conflicts occur in both oil palm center and non-oil palm center regions. The existing agrarian conflicts are now being solved in line with the applicable laws and regulations. The government has tried to resolve agrarian conflicts in various sectors and regions by implementing sustainable oil palm plantation governance that includes the requirement for oil palm companies to provide proof of legal ownership of the plantations.

MYTH 4-18

Oil palm plantation companies restrict their employees' right to freedom of association

FACT

Oil palm plantation companies have been said to limit their employees' right to freedom of association. This is a social issue attributed to oil palm plantation companies. Such a negative narrative that oil palm plantation companies forbid and intimidate their employees to ensure they do not join labor associations is spread by labor activists. Is the narrative correct?

During the globalization and digitalization era, when social media grows exponentially, freedom of association, organization, and opinion and expression of workers can not be limited. Now, workers can communicate with workers from other companies and even those on the other side of the globe.

In Indonesia, freedom of association is recognized and protected by Article 28E paragraph (3) of the 1945 Constitution, stating that "*every person has the right to associate, assemble, and express an opinion*." The phrase "every person" in the paragraph means everybody in Indonesia, including workers in the economic sector (including oil palm plantations), has the right to associate, assemble, and express opinion, and the constitution guarantees this right.

Indonesia has also ratified the ILO Convention No. 87 of 1948 and ILO Convention No. 98 of 1956. Both conventions enforce the rights of workers to associate or assemble to advance their interests (Budiono, 2016). Indonesian workers' right to associate has been further guaranteed through the issuance of Law No. 21 of 2000 on Labor/Worker Union; Law No. 13 of 2003 on Labor; and Decree of the Minister of Manpower No. 16 of 2001 on Labor/Worker Union Registration Procedure.

As part of good corporate governance, oil palm companies are also committed to recognizing, guaranteeing, and protecting workers' right to freedom of association. The implementation of such a commitment is shown by establishing an oil palm plantation workers union at the company level and a worker federation such as the Nusantara Plantation Worker Federation (*Federasi Serikat Pekerja Perkebunan Nusantara/FSPBUN*) and Indonesian Palm Oil Trade Union Network (*Jejaring Serikat Pekerja/Serikat Buruh Sawit Indonesia/JAPBUSI*). Additionally, the establishment of oil palm associations such as the Indonesian Oil Palm Smallholders Association (*Asosiasi Petani Kelapa Sawit Indonesia/APKASINDO*), Palm Oil My Future (*Sawit Masa Depan/SAMADE*), Smallholders Group (*Kelompok Petani/POKTAN*), Association of Smallholders Group (*Gabungan Kelompok Petani/GAPOKTAN*), Oil Palm Smallholders Cooperative, and Plantation Employees Cooperative also shows the manifestation of freedom of organization or association.

Another form of freedom of association protection is also seen in an ISPO principle is Responsibility Toward Workers. Through this principle, companies are obliged to facilitate the establishment of worker unions. The established oil palm plantation worker union is expected to be one of the stakeholders' responsibilities to help create a harmonious work ecosystem and serve as a layer of protection for employees' rights.

The above description shows that from the level of the company's ideology and policy to SOP, the freedom of association of the oil palm plantation workers has always been a part of the oil palm corporate governance. Worker organization is an important partner in company management. That said, the quality and scale of plantation worker organization certainly vary between companies, depending on the level/phase of the relevant company's development.

MYTH 4-19

Oil palm plantations violate human rights

FACT

Globally, human rights protection is recognized in the Universal Declaration of Human Rights, published in 1948. Such human rights include Personal Rights, Property Rights, Rights of Legal Equality, Political Rights, Social and Cultural Rights, and Procedural Rights. Human rights recognition and protection have become the elements of the country's ideology, incorporated into the Five Principles (*Pancasila*) and the 1945 Constitution, and further translated into various regulations such as Law No. 39 of 1999 on Human Rights.

Their implementation has not been satisfactory at various regions, sectors, and national levels. Generally, since the reform era in 2000, people's awareness of human rights has improved. The improved freedom of information and the development of mass media and information technology facilitates people in reporting any suspected human rights violations to qualified agencies.

Data from the Directorate General of Human Rights (2022) indicates that Indonesian regions still have many human rights violation complaints. However, the number follows a declining trend. Throughout 2016–2021 (Table 4.3), the five provinces reporting the greatest number of suspected human rights violations include the Jakarta, West Java, North Sumatra, East Java, and Central Java.

Table 4.3. Number of Complaints about Human Rights Violations in Indonesia from 2016 to 2021

Province	**2016**	**2017**	**2020**	**2021**
Jakarta*	1,759	1,231	386	396
West Java*	634	470	296	311
North Sumatra	663	412	268	246
East Java*	588	450	268	242
Central Java*	330	279	132	147
Indonesia	6,931	5,075	2,517	2,563

Source: Directorate General of Human Rights (2022)
Note: *) Non-oil palm center provinces

Several violations of rights reported by the people to the National Commission on Human Rights include violations of the right to live, right to build a family and reproduce, right to self-development, right to justice, right to personal freedom, right to security, right to welfare, right to political participation, women's rights, child's rights, and right to be treated equally. Certainly, many such reports have not been able to be proven legally. If the event of violations of human rights in any oil palm center or non-oil palm center region, they will certainly be resolved in line with the applicable procedures and regulations.

An interesting thing seen in Table 4.3 is that reports of suspected violations of human rights in oil palm center and non-oil palm center provinces were processed by the government. Additionally, the number of human rights violations report is higher in non-oil palm center provinces.

Various human rights-related accusations are often given to the palm oil industry. These include worker exploitation, child labor utilization, gender issues, agrarian conflicts, and freedom of association limitation. These issues were raised a priority by countries importing palm oil to limit and even stop palm oil import. Are all these accusations true? Don't discriminating policies applied to the palm oil industry violate human rights?

The palm oil industry is an element of the solution to human rights fulfillment, not an element of the problem of human rights violation at the local, national, and international levels. The palm oil industry contributes to the fulfillment of human rights, such as the right to work and do business/receive decent income in Indonesia (Myth 3-11, Myth 4-03) and at the global level (Myth 3-04, Myth 4-01); right to food at the local level (Myth 3-13), national level (Myth 3-13), and global level (Myth 3-01); right to health (Myth 4-11); right to education (Myth 4-10); right to freedom from poverty in Indonesia (Myth 4-04) and the global level (Myth 4-02); and right to freedom of association and expression (Myth 4-18). With such a significant contribution, policies and movements aiming to inhibit oil palm product sales in the global market will inevitably lead to unfulfilled human rights.

Chapter 5
Myths versus Facts: Palm Oil Industry in Nutrition and Health Issues

Due to palm oil's more competitive price than other vegetable oils, there has been non-price competition in the global vegetable oil market. In the non-price competition, palm oil is linked to nutrition and health issues. Since the late 1970s, palm oil has been accused of being detrimental to health by its competitors.

Experts from Indonesia and other countries have researched palm oil consumption's nutrition and health issues. Those studies produce empirical evidence to dismiss false accusations against oil palms and provide information more widely for consumers to receive nutrition from palm oil.

This chapter dialectically discusses perceptions, opinions, and myths surrounding palm oil's nutrition and health issues with empirical evidence. With the debate between the myths and empirical evidence of palm oil's nutrition and health issues, it is expected that the global community, as the consumer of palm oil, can handle the disadvantage of misleading and incomprehensive information.

MYTH 5-01

The palm oil and coconut oil in the market are produced from the same palm seeds

FACTS

In the global vegetable oil trade, palm oil is often considered the same as coconut oil. Despite their similar names and origins from palm trees, there are differences between their compositions.

In addition, the international community has often believed that crude palm oil (CPO) is the same as crude palm kernel oil (CPKO). However, both are physically and chemically different. Crude palm oil is extracted from mesocarp, while palm kernel oil is extracted from palm kernels (Figure 5.1).

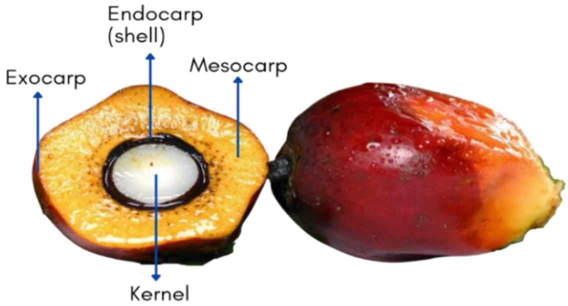


Figure 5.1. Sources of Crude Palm Oil (CPO) and Crude Palm Kernel Oil (CPKO)

Based on their composition of fatty acids, those three kinds of vegetable oils can be compared (Figure 5.2). Crude palm oil has a relatively balanced composition of saturated and unsaturated fatty acids. On the other hand, the composition of crude palm kernel oil and coconut oil is dominated by saturated fatty acids. However, coconut oil has a higher composition of saturated fatty acids than crude palm kernel oil.

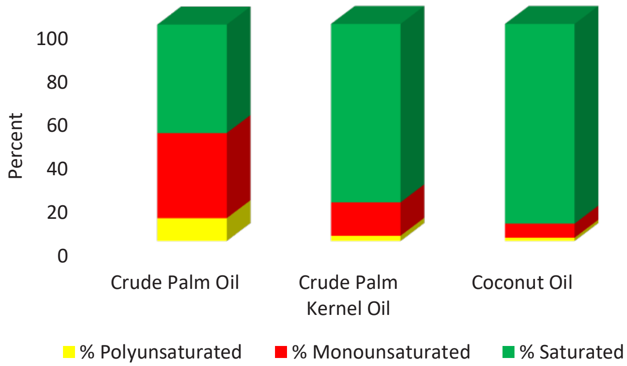


Figure 5.2. Comparison of Fatty Acids Composition in Crude Palm Oil, Crude Palm Kernel Oil, and Coconut Oil (Source: Hariyadi, 2010; MPOC, 2016)

The composition of the three vegetable oils is also different in the lauric acid content. Crude palm oil contains about 0.1-1 percent of lauric acid (Hariyadi, 2010); crude palm kernel oil contains around 46-52 percent of lauric acid (Ketaren, 2008); and coconut oil contains about 48 percent of lauric acid (Supriatna and Mala, 2019; Isyanti and Sirait, 2021). Due to their high lauric acid content, crude palm kernel oil and coconut oil are classified into lauric oils as they have low degrees of unsaturation and high oxidative stability (Nyberg, 1970).

MYTH 5-02

Palm oil is bad for our health as it contains unbalanced saturated and unsaturated fats

FACTS

Since the 1980s, the American Soybean Association (ASA) has pioneered an anti-tropical oil (palm oil and coconut oil) movement. Compared to other vegetable oils, the high content of saturated fatty acids in palm oil is considered detrimental to health as it leads to chronic diseases.

The campaign against the high content of saturated fatty acids in palm oil run by the anti-oil palm parties is deemed misleading. According to nutritionists, palm oil has a relatively balanced composition of saturated and unsaturated fatty acids (Table 5.1).

Table 5.1. Composition of Fatty Acids in Palm Oil

Fatty Acids	% Of the Total Fatty Acids	
	Range	Average
Lauric Acid (C12:0)	0.1-1.0	0.2
Myristic Acid (C14:0)	0.9-1.5	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
Arachidonic Acid (C20:0)	0.2-0.7	0.4

Source: Hariyadi (2010)

The proportion of saturated fatty acids in palm oil is around 50 percent, comprised of 44 percent palmitic acid and 4.5 percent stearic acid. Meanwhile, the remaining 50 percent consists of unsaturated fatty acids, which comprise 40 percent of monounsaturated fatty acids (MUFA) and 10 percent of polyunsaturated fatty acids (PUFA). MUFA content in palm oil comprises 39.2 percent oleic acid, and 0.1 percent of palmitoleic acid. Meanwhile, PUFA in palm oil comprises 10.1 percent of linoleic acid and 0.4 percent of linolenic acid.

Palm oil is not a saturated vegetable oil. However, it is a monounsaturated oil (USDA, 1979; Cottrell, 1991; Small, 1991; Choudhury et al., 1995; Kritchevsky et al., 2000; Ong and Goh, 2002; FAO, 2010; Hariyadi, 2010; Giriwono and Andarwulan, 2016). Thus, palm oil has a relatively balanced composition of saturated and unsaturated fatty acids. According to nutritionists, the balance is good for health.

MYTH 5-03

Vitamin A content in palm oil is lower than in another foodstuff

FACTS

Palm oil is a foodstuff containing energy and fatty acids. In addition to energy, it is a rich source of vitamin A compared to another foodstuff (Table 5.2). The data above shows that palm oil (CPO and red palm oil) is rich in vitamin A. For every same volume, the vitamin A content in palm oil is 15 times as high as vitamin A in a carrot. Even palm oil contains vitamin A almost 100 times as high as a banana.

Table 5.2. Comparison of the Carotenoid Content (Retinol Equivalents) between Palm Oil and Other Foodstuffs

Foodstuff	µg Equivalent to Retinol/100 g (edible)
Orange	21
Banana	50
Tomato	130
Carrot	400
Red Palm Oil (*refined*)	5,000
Crude Palm Oil (CPO)	6,700

Source: Hariyadi (2010)

Several empirical studies (Nagendran et al., 2000; Mayamol et al., 2007; Mukherjee and Mitra, 2009; Dauqan et al., 2011) also reveal that palm oil is "the world's richest natural source of caretenoids." Beta carotene/carotenoids in palm oil play the role of antioxidants and are a precursor and source of vitamin A (Krinsky, 1993). The high carotene content in palm oil can be seen from its red-orange color.

Research on health/medicine shows that vitamin A in palm oil is good for health. For instance, it prevents vitamin A deficiency, prevents and overcomes blindness, and boosts immunity. Furthermore, it prevents cancer/tumor, inhibits hepatomegaly, boosts immunity, reduces cholesterol, helps mental functions, prevents coronary heart and vascular diseases, etc. (Oey et al., 1967; Karyadi et al., 1968; Muhilal et al., 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). Natural antioxidants in palm oil are also a buffer against free radicals and protect from diseases such as cellular aging, atherosclerosis, cancer, arthritis, and Alzheimer's (Mukherjee and Mitra, 2009).

Vitamin A in palm oil prevents diseases caused by vitamin A deficiency, such as blindness, xerophthalmia, and hemeralopia. Research conducted by the Department of Health of the Republic of Indonesia from 1963-1965 shows that red palm oil (RPO) can improve the status of vitamin A when viewed from the increase of vitamin A content in children's serums (Oey et al., 1967). Likewise, a study by the Bogor Center for Research and Development of Nutrition (Muhilal et al., 1991) reveals that palm oil can cure xerophthalmia, i.e., hemeralopia (night blindness).

Therefore, palm oil has more vitamin A than other foodstuff. With its high vitamin A content, palm oil is rich in vitamins and can “cure” diseases.

MYTH 5-04

Vitamin E content in palm oil is lower than in other vegetable oils

FACTS

Vitamin E is an essential nutrient for human health. It acts as an antioxidant, prevents early aging, improves skin health, has beneficial impacts on reproduction, prevents atherosclerosis, prevents cancer, and stimulates immunity (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; Nesaretnam, 2008; Ng et al., 2009; Sen et al., 2010; Anggarwal et al., 2010; Nesaretnam and Meganathan, 2010; Gopalan et al., 2014).

The human body cannot produce vitamin E, so it takes vitamin E from food intake. One of the foodstuffs rich in vitamin E is palm oil. Palm oil contains more vitamin E than other vegetable oils (Table 5.3). Palm oil contains 1,172 ppm of vitamin E, higher than soybean oil (958 ppm), sunflower oil (546 ppm), and corn oil (782 ppm).

Table 5.3. Comparison of the Vitamin E Content between Palm Oil and Other Vegetable Oils

Vegetable Oils	Content of Vitamin E (ppm)
Palm Oil	1,172
Soybean Oil	958
Corn Oil	782
Cottonseed Oil	776
Sunflower Oil	546
Peanut Oil	367
Olive Oil	51
Coconut Oil	36

Source: Slover, (1971); Gunstone (1986); Palm Oil Human Nutrition (1989)

Interestingly, the content of vitamin E in palm oil is made up of tocopherols (20 percent) and tocotrienols (80 percent) (Man and Haryati, 1997). Almost all vegetable oils contain tocopherols. Nevertheless, only palm oil is rich in tocopherols and tocotrienols. So much so it is called "the richest natural source of tocotrienols" (Chow, 1992; Sheppard et al., 1993; EFSA, 2008).

Tocopherols and tocotrienols act as antioxidants. However, a study shows that alpha tocotrienols are 40-60 times as effective and strong as alpha tocopherols in fighting free radicals (Serbinova et al., 1991). It shows that palm oil is a source of enormously powerful antioxidants.

Several empirical studies report that the high content of tocotrienols in palm oil can reduce plasma cholesterol, inhibit cancer cells, and protect cellular membranes against oxidative damage (Nesaretnam et al., 1995; Kamat et al., 1997). The latest research (Zainal, 2022) also reveals that the high content of tocotrienols in palm oil can prevent age-related diseases such as dementia, Alzheimer, stroke, cardiovascular disease, and skin damage.

Therefore, palm oil is a rich source of vitamin E. In addition, as tocotrienols dominate vitamin E, palm oil contains a powerful antioxidant against free radicals.

MYTH 5-05

Palm oil does not contain bioactive compounds needed for our health

FACTS

Bioactive compounds (phytonutrients or micronutrients) are essential nutrients for health. Palm oil is one of the foodstuffs rich in bioactive compounds (Table 5.4) such as carotenes, tocopherols and tocotrienols, phytosterols, squalene, coenzyme Q_{10}, phenolics, ubiquinone, and other minor components (Goh et al., 1985; Tay et al., 2000; Berger, 2007; Kumar and Krishna, 2014).

Table 5.4. Composition of Bioactive Compounds in Palm Oil

Bioactive Compounds	Concentration (ppm)
Carotenoids	500-700
Vitamin E (tocopherols and tocotrienols)	600-1,000
Phystosterols	300-620
Squalene	250-540
Phospholipids	20-100
Coenzyme Q10	10-80
Polyphenols	40-70

Source: Mukherjee and Mitra (2009), Longanathan et al. (2010, 2017), Hariyadi (2020)

In addition to vitamin E (tocols) and vitamin A (carotenoids), one of the bioactive compounds with highest concentration in palm oil is phytosterols. Phytosterols are plant sterols, the structure of which is similar to that of cholesterol (Pateh et al., 2009). They are good for health as they can reduce the level of plasma cholesterol and increase cholesterol excretion (Miettinen et al., 2000; Zadak et al., 2006; Silalahi, 2006), have cardio-protective effects (Hariyadi, 2020), and prevent cancer (Awad and Fink, 2000). As cited by the European Journal of Clinical Nutrition (2009), phytosterols can prevent several kinds of cancer, such as lung, ovarian, and colorectal cancer (Fauziati et al., 2019).

Squalene is a component of bioactive compounds found in palm oil (Kelly, 1999). Its consumption is good for the human body as it can protect the heart, inhibit cholesterol synthesis, and prevent cancer (Longganathan et al., 2010). Squalene is used in various skincare products as it can moisturize skin (particularly sensitive skin), add nutrition to skin sebum, and repair skin damaged by UV light (Sinaga, 2021). In addition, squalene is an antioxidant that can prevent inflammations and tumors. Thus, it protects the skin from damage caused by free radicals, regenerates skin, and treats acne and oily skin.

Coenzyme Q10 or ubiquinone is a component of bioactive compounds in palm oil. Despite its relatively small composition at 10-80 ppm, its antioxidant capacity is ten times as high as that of vitamin E (Ng et al., 2006). Therefore, this bioactive compound prevents cancer (Portakal et al., 2000) and is good for skin health by reducing wrinkles, fighting inflammations, and skin aging, so it is used in skin care products (Sinaga, 2021).

Other components of bioactive compounds in palm oil are phospholipids and polyphenols. Despite their relatively minimal composition in palm oil, phospholipids are good for brain development (Suzuki et al., 2000) to improve memory and prevent impaired brain functions due to aging (Jager et al., 2007). The high content of antioxidants in polyphenols prevents cancer (Nair et al., 2004; Fink et al., 2007).

The description above shows that palm oil contains bioactive compounds, which are vital for body health. Those bioactive compounds are consumed when palm oil is consumed. In other words, consumers can gain additional benefits from bioactive compounds for free when consuming palm oil.

MYTH 5-06

Palm oil does not contain essential fatty acids for the human body

FACTS

From the perspective of nutrition science, essential fatty acids needed by the body are linoleic acid (C18:2) or omega-6 and linolenic acid (C18:3) or omega-3. The body needs essential fatty acids to absorb more nutrients, form cells and develop the immune system. For pregnant women, they are essential for forming the fetus' body tissues, particularly the brain and eyes

(Paramaiswari, 2016). Infants and children need essential fatty acids to form body tissues and cells and develop their brains (Nahrowi, 2015).

The body cannot synthesize those essential fatty acids provided by food intake. Palm oil naturally contains adequate balanced essential fatty acids. Compared to breast milk as the standard comparison of the biological value, the composition of essential fatty acids in palm oil is almost the same as in breast milk (Table 5.5).

Table 5.5. Comparison of Fatty Acids Composition between Palm Oil and Breast Milk

Types of Fatty Acids	Palm Oil[a] (%)	Breast Milk[b] (%)
<C14:0	0.9-1.5	13.5
C16:0	41.8-49.3	32.2
C18:0	4.1-5.1	6.9
C18:1	36.3-40.8	36.5
C18:2	8.3-11.0	9.5
C18:3	0.0-0.6	1.4
C20:0	0.2-0.7	-

Source: [a]Hariyadi (2010), [b]Muhilal (1998)

Palm oil contains 8.3-11 percent linoleic acid (C18:2), while breast milk contains 9.5 percent. Likewise, palm oil contains 0-0.6 percent of linolenic acid (C18:3), while breast milk contains 1.4 percent. In addition, palm oil contains a non-essential fatty acid, i.e., oleic acid (C18:1), with a proportion of 36.3-40.8 percent, while breast milk contains 36.5 percent. It shows that palm oil and breast milk have almost the same composition of essential fatty acids.

One of the main components of breast milk is palmitic acid (Genova et al., 2018). Breast milk contains 25 percent palmitic acid essential for infant development (Marangoni et al., 2000). On the other hand, palm oil contains 41.8-45.8 percent of palmitic acid (Table 5.1). The high content of palmitic acid in palm oil can be used as a human milk fat analog that is safe, relatively affordable, and halal in formula milk (to replace breast milk) (Karouw, 2014).

The data shows that palm oil contains balanced essential fatty acids, and their composition is similar to breast milk. With the composition of fatty acids, palm oil can be a raw material for formula milk.

MYTH 5-07

Palm oil contains trans-fatty acids

FACTS

Trans-fatty acids are harmful for human health (FAO, 2010). Consuming oil containing trans-fatty acids increases the risk of heart disease and obesity (Ascherio et al., 1996; Hu et al., 1997; Mozaffarian et al., 2006). Hence, health institutions/organizations in all countries, particularly Western countries, have recommended a minimum consumption. They have even banned trans-fatty acids from being used in foodstuff.

Trans-fatty acids are formed during the hydrogenation process to make vegetable oils more solid in making edible oil. The hydrogenation process (particularly partial hydrogenation) will cause the configuration of unsaturated fatty acids to change from cis to trans (Hariyadi, 2010).

Vegetable oils with the composition polyunsaturated fatty acids (such as soybean oil, sunflower oil, and corn oil) tend to be liquid at room temperature. They need hydrogenating to be semi-solid. Therefore, their specifications meet the need of the food industry to produce foods such as margarine/butter, shortening, and bread (MPOC, 2016). For this reason, processing vegetable oils with such a composition of fatty acids through the hydrogenation process results in trans-fatty acids in those vegetable oils. Hariyadi (2010) reveals that 13-30 percent of trans-fatty acids in hydrogenated soybean oil.

Unlike other vegetable oils, palm oil naturally has a balanced composition of saturated and unsaturated fatty acids. It is semi-solid with a melting point of 33–39 degrees Celcius. Thus, it needs no hydrogenation to be used as fat in food. In other words, trans-fatty acids are not formed, so palm oil is free of trans-fatty acids (Otero, 1997; Hariyadi, 2010).

Therefore, palm oil and palm oil-based food products do not contain trans-fatty acids. With so many benefits, palm oil, particularly the stearin fraction, can be a natural alternative to replace hydrogenated vegetable oils containing trans-fatty acids (Hariyadi, 2010; May and Nesaretnam, 2014; Giriwono and Andarwulan, 2016).

MYTH 5-08

Palm oil contains cholesterol

FACTS

Cholesterol is an imminent danger as it is deemed to trigger serious diseases such as cancer and heart disease. Thus, health organizations urge a low-cholesterol diet. "Cholesterol free" is even the jargon of various products in the intense trade competition.

Cholesterol is one of the health issues related to palm oil. The perception of palm oil containing cholesterol has become a myth. The myth is so popular that people fear consuming fried foods with palm oil.

This perception results from the negative/black campaign by ASA in the early 1980s. To discredit tropical vegetable oils, particularly palm oil, which started to threaten the soybean oil market worldwide, ASA spread propaganda by saying that palm oil contained cholesterol. They even proposed that the United States government should ban palm oil imports. However, nutrition and health experts from various countries have never proven the campaign in their studies.

No nutrition experts have stated that vegetable cooking oils, such as palm cooking oil, contain cholesterol. Cholesterol is only produced by humans and animals, while plants cannot produce cholesterol (Calloway dan Kurtz, 1956; USDA, 1979; Cottrell, 1991; Muchtadi, 1998; Muhilal, 1998; Hariyadi, 2010; Giriwono and Andarwulan 2016).

Instead, palm oil contains phytosterols; which are plant sterols as bioactive compounds to reduce blood cholesterol levels (Fauziati et al., 2019). It shows that palm oil tends to be "net neutral" as it does not affect cholesterol levels. Other bioactive compounds in palm oil, such as squalene and polyphenols, can also inhibit cholesterol absorption, reabsorption, and synthesis (Longganathan et al., 2010; Hariyadi, 2020).

MYTH 5-09

Palm oil consumption increases blood cholesterol levels and triggers heart diseases and cardiovascular/atherosclerotic diseases

FACTS

Anti-palm oil parties perpetuate myths/issues by saying that palm oil has a high palmitic acid content (including saturated fatty acids) (Table 5.1). A myth has persisted that palm oil consumption can increase cholesterol levels and trigger cardiovascular diseases.

Naturally, cholesterol is an important fat for body health. However, if its levels are too high and unbalanced, it is not good for health.

Three fractions of fat determine the quality of cholesterol, i.e., LDL (Low-Density Lipoprotein) or bad cholesterol, HDL (High-Density Lipoprotein) or good cholesterol, and Fatty Acids (Triglycerides). High Triglycerides and LDL can endanger health. In contrast, increasing HDL to a certain level is expected and beneficial to health. In other words, everything that can increase LDL and Triglycerides increases bad cholesterol levels. If HDL increases, there is more good cholesterol.

Nutrition and health experts have proven the correlation between palm oil consumption and cholesterol. Dozens of studies from many countries have revealed it and been published in international journals (such as the American Journal of Clinic Nutrition and the Journal of Nutrition Biochemistry). They have tested whether palm oil consumption increases cholesterol. A study by Mien et al. (1989) reveals that the consumption of palm oil can decrease LDL by 21 percent, lower Triglycerides by 14 percent, and increase HDL by 24 percent. In other words, palm oil consumption lowers bad cholesterol and increases good cholesterol, so benefits the body's health.

Other studies conducted by experts (Lindsey et al., 1990; Hayes et al., 1995; Ng et al., 1992; Goodnight et al., 1992; Truswell et 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) conclude that consuming palm cooking oil does not increase cholesterol in the body. In contrast, palm oil consumption improves cholesterol by increasing good cholesterol (HDL), decreasing the levels of bad cholesterol (LDL and Triglycerides), and reducing body fat deposition. Therefore, consuming palm oil can minimize/prevent diseases associated with the levels and quality of blood cholesterol, such as cardiovascular diseases/atherosclerosis.

The correlation between palm oil and cardiovascular diseases is still debatable. A study by Marangoni et al. (2017) reveals that palm oil consumed by humans (at the consumption limit of saturated fatty acid less than 10 percent of the total energy) does not affect the risk of heart disease. A study by Odia et al. (2015) summarizes scientific studies showing that palm oil consumed by animals and humans does not increase serum cholesterol. Thus, it is believed to pose no additional risk of cardiovascular diseases.

The description above shows that there is no strong evidence of the consumption of palm oil which increases blood cholesterol level and therefore triggers heart disease. Instead, those studies reveal that palm oil minimizes the risk of heart disease. Palm oil contains balanced fatty acids (Myth 5-01), is free of trans-fatty acids (Myth 5-07) and contains bioactive compounds (Myth 5-05) such as carotenoids (vitamin A), tocopherols and tocotrienols (vitamin E), squalene, dan ubiquinone. Thus, it protects the heart or has cardioprotective effects.

MYTH 5-10

Palm oil is carcinogenic

FACTS

In addition to cardiovascular diseases, the relatively high content of palmitic acid (saturated fatty acids) in palm oil is also believed to cause cancer. The issue is raised in studies published in international journals, one of which was conducted by Pascual et al. (2021). The study is based on excessive palm oil consumption, i.e., 42 percent of the total calories or more than normal intake (normal intake is no more than 30 percent of the total fat with the content of saturated fatty acids less than 10 percent) (Raharjo, 2022).

Previous studies by Fattore and Fanelli (2013) and Gesteiro et al. (2019) report contradictory findings. Both studies show no specific evidence that palm oil consumption increases cancer risk. Even studies show that palm oil consumption can inhibit the development of cancer cells; reduce and control the growth (weight and volume) of tumors; and prevent other degenerative diseases (Sylvester et al., 1986; Chong, 1987; Sundram et al., 1989; Komiyama et al., 1989; Muhilal et al., 1991; Iwasaki and Murokoshi, 1992; Goh et al., 1994; Guthrie et al., 1993, 1995).

Palm oil is rich in antioxidants such as carotenes (vitamin A) and tocopherols and tocotrienols (vitamin E), so it can prevent cancer by fighting free radicals causing cancer cells mutation (Sundram et al., 1990; Oluba et al., 2009). It is worth noting that palm oil has a higher content of antioxidants, where its content of tocotrienols is twice as high as soybean oil's content of tocotrienols (Cho et al., 2009), so it can prevent cancer better (McIntyre et al., 2000).

From the description above, no empirical study has proven that palm oil consumption causes cancer. Instead, the high content of antioxidants in palm oil prevents the growth of cancer cells. In addition to carotenoids, tocopherols, and tocotrienols, which are rich in antioxidants, and other bioactive compounds in palm oil are phytosterols, squalene, polyphenols, and coenzyme Q10 (ubiquinone) have function as anti-cancer (Loganathan et al., 2010).

MYTH 5-11

Palm oil consumption may lead to diabetes

FACTS

Over the past few years, vegetable oil consumption has been linked to diabetes. Only a few studies into the impact of palm oil consumption on diabetes have been conducted by nutrition and health experts, as the case is rare.

There has been limited evidence of the effect of palm oil consumption on glucose metabolism biomarkers (Zulkiply et al., 2019). The study also reveals no additional benefit of replacing palm oil with other vegetable oils rich in monounsaturated fatty acids or polyunsaturated fatty acids for changes in glucose metabolism.

Meanwhile, several studies (Odia et al., 2015; Marangoni et al., 2017; Genova et al., 2018) show that palm oil consumption in a balanced diet does not seem to increase the risk of diabetes among adults or the pediatric population.

Diabetes is about insulin secretion crucial for blood glucose metabolism. Several studies show that palm oil consumption does not affect insulin secretion, so it does not cause diabetes but tends to reduce diabetes cases. Studies conducted by Sundram et al. (2007), Peairs et al. (2011), and Filippou et al. (2014) reveal that palm oil consumption does not affect the rate of activities/function of insulin (secretion) and blood glucose levels. Even a study by Bovet et al. (2009) reveals that lower palm oil consumption increases diabetes cases.

Interestingly, consuming fully hydrogenated soybean oil and partially hydrogenated soybean oil inhibits the production of insulin glands, increases blood glucose levels, and lowers HDL cholesterol (Sundram et al., 2007). Therefore, consuming palm oil as a foodstuff does not affect insulin secretion and diabetes. In contrast, hydrogenated soybean oil consumption inhibits insulin production, which is likely to cause more diabetes cases.

From the description above, no substantial evidence has confirmed that palm oil consumption leads to diabetes. Despite their limited number, several studies show that palm oil consumption does not affect insulin secretion and it does not cause diabetes. Besides, the anti-diabetic feature of tocotrienols in palm oil is good for health (Budin et al., 2009; Muharis et al., 2010; Longganathan et al., 2010).

MYTH 5-12

Palm oil consumption may lead to obesity

FACTS

Obesity has now been a health issue on which the global community focuses. The World Health Organization (WHO) has even classified obesity as a global epidemic requiring an immediate solution, as it relates closely to weight gain that might increase the risk of chronic diseases such as cardiovascular diseases, diabetes mellitus, stroke, and several types of cancer.

Several studies (Murase et al., 2001; Yusuf et al., 2005) reveal a close correlation between saturated fat consumption and obesity. Based on the results of those studies, palm oil containing a high proportion of saturated fatty acids (Table 5.1) is deemed to trigger obesity and cardiovascular diseases (Chong and Ng, 1991; Sowers, 2003). However, in addition to saturated fatty acids, palm oil has a relatively high content of unsaturated fatty acids, and thus, its fatty acids tend to be unsaturated.

According to WHO, obesity is the excessive accumulation of body fat due to an imbalance between energy intake and energy expenditure for a long time. Palm oil is a source of fat important for the body as a source of energy; provides essential fatty acids for the body; helps absorb vitamins A, D, E, and K; and provides the vital substrate to synthesize metabolically active compounds such as steroids, testosterone, estrogen, and progesterone (MPOC, 2016; Olabiyi et al., 2021).

Nonetheless, it is an exaggeration to say that palm oil consumption directly causes obesity. Several factors, such as dietary habits, activities, and lifestyle, influence obesity. It was also reported by Muhamad et al. (2018). He summarizes several studies and concludes that there is no clear and strong evidence of the close correlation between palm oil consumption and obesity.

To fight obesity, saturated fatty acids in palm oil should not be blamed. Instead, to prevent overweight and obesity, it takes balanced energy and healthy fat to replace simple carbohydrates and refined sugar. Palm oil is an alternative in diets to reduce the risk of obesity as it is free of trans-fatty acids and cholesterol.

MYTH 5-13

Palm cooking oil is bad for our health due to its contents, instead of its misuse

FACTS

Most of the cooking oil sold and consumed by Indonesians is palm cooking oil. Naturally, palm oil provides many benefits. Palm oil has balanced nutrition and nutrients (Myth 5-02 to Myth 5-05). Palm oil has physical and chemical features such as high oxidative stability, stability at high temperatures, high smoke points, non-rancidity and durability in storage, low oil absorption of food, and odorlessness (Hariyadi, 2010; MPOC, 2018). Therefore, it is the best cooking oil for deep frying or sauteing.

Despite those benefits, negative perceptions dan myths surrounding palm cooking oil consumption have long been widespread. Misleading information and media framing create negative perceptions of palm cooking oil among global consumers. Thus, palm cooking oil is deemed to raise cholesterol, triggering chronic diseases such as cardiovascular diseases (Myth 5-09), cancer (Myth 5-10), diabetes (Myth 5-11), and obesity (Myth 5-12).

The negative perceptions and myths must be debunked by the fact that the danger lies in palm cooking oil misuse instead of palm cooking oil itself. The repeated use of palm cooking oil at high temperatures (160-180 degrees Celcius) triggers oxidation reactions. Thus, its quality becomes poorer, as shown by its rancid odor and free radicals detrimental to health (Ketaren, 1986; Retno, 1995; Husnah and Nurlela, 2020; Sinaga, 2021). Repeated use palm cooking oil (used cooking oil) also decreases the oil's nutritional value (Zahra et al., 2013).

The description shows that in terms of nutrition, palm cooking oil is a healthy food source. Nonetheless, if it is misused like waste cooking oil/used cooking oil, repeatedly used palm cooking oil decreases its nutritional value and is detrimental to health. Therefore, to derive its benefits, the public should be educated about how to use palm cooking oil efficiently.

MYTH 5-14

Red palm oil has worse contents, whicts bad for our health

FACTS

Nutrition researchers call palm oil "the world's richest natural source of carotenoids". The yellowish-red color in CPO reflects the high content of carotenoids as a precursor to vitamin A (Myth 5-03). Palm oil is also rich in vitamin E (Myth 5-04) and other bioactive compounds beneficial to the human body (Myth 5-05).

As a foodstuff, it is most often used as cooking oil. The use of technology in processing palm oil into cooking oil reduces and even eliminates carotenes to produce golden yellow cooking oil (Yuliasari et al., 2014) to suits Indonesians' preferences. As people prefer and consume white cooking oil (coconut oil, palm kernel oil) and yellow cooking oil (palm oil), the standard color for cooking oil in the market is white and yellow.

Red palm oil/red palm olein is produced to maintain the content of natural bioactive compounds in palm oil. Red palm oil is processed with adaptation to technology, without bleaching and deodorization at low temperatures (Alyas et al., 2006; Ayustaningwarno, 2012; Hasibuan et al., 2021). With the processing modification, red palm oil still has a higher content of bioactive compounds (Table 5.6).

The bioactive compounds in red palm oil and CPO are relatively the same. Several studies (Nesaretnam et al., 2002; Kritchevsky et al., 2002; Cooper et al., 2002; Oguntibeju, 2009; Ayeleso et al., 2012; Katengua-Thamahane et al., 2014; Loganathan et al., 2017; Sinaga, 2021; Olabiyi et al., 2021) reveal that the high content of antioxidants from carotenes, vitamin E (tocopherols and tocotrienols), and other bioactive compounds in red palm oil is beneficial to health. It prevents cancer, protects the heart, prevents atherosclerosis, lowers cholesterol, reduces blood pressure, makes reproductive organs healthy, boosts metabolism related to diabetes, protects cells in the body against damage and inflammations, improves brain health, and maintains immunity.

Table 5.6. Composition of Bioactive Compounds in Red Palm Oil

Bioactive Compounds	Concentration (ppm)
Carotenoids	600-750
Vitamin E	717-863
Phystosterols	235-365
Squalene	14-15
Coenzyme Q10/Ubiquinone	18-25

Source: Tay et al. (2000), Longganathan et al. 2017

The high content of carotenes in red palm oil is a rich source of vitamin A, so it reduces and prevents vitamin A deficiency (Scrimshow, 2000; Longganathan et al., 2017), such as stunting. To prevent stunting, red palm oil can be further processed into fortified foods (e.g., palm cooking oil) and health supplement products (Hasibuan and Siahaan, 2014; PASPI Monitor, 2021[k]).

MYTH 5-15

Cooking oil is the only food product using palm oil

FACTS

African people had consumed palm oil as a food source and traditional medicine before colonialism came in the 18th century. Ripe palm oil is extracted, and its fruits are fermented to make wine (Carrere, 2013). Until now, around 70-90 percent of the world's palm oil is used for food products (Sheil et al., 2009; Shimizu and Descrochers, 2012; Gaskell, 2012; Kojima et al., 2016; Parcell et al., 2018; Hariyadi, 2020).

Palm oil is stable at high temperature during oxidation or other degradation processes, contains natural preservatives which make it durable, has smooth and creamy texture, odorless, tasteless, tends to crystalize, and contains healthy nutrition and nutrients for the body

(Hariyadi, 2014; Pande et al., 2012; Mba et al., 2015). It has a unique and balanced composition of saturated and unsaturated fatty acids, rendering it a versatile material for derivatives or versatile functionality (MPOC, 2018), such as for emulsifiers and stabilizers. The global food industry prefers palm oil due to its more competitive (affordable) price and its stable and abundant supply throughout the year.

Cooking oil is one of the palm oil-based food products (mainly from the olein fraction) widely used in household and industrial consumption. With the benefits above, palm cooking oil is "the gold standard in frying" (Hariyadi, 2014). In addition to palm cooking oil, many other palm oil-based food products have been widely used across the globe. Food products made from palm oil processing can be classified as culinary oils/fats, bakery oils/fats, chocolate and confectionery fats, dairy fats alternatives, and functional oils/fats (Figure 5.3). Besides food products, palm oil processing creates non-food products, as shown in Table 5.7.

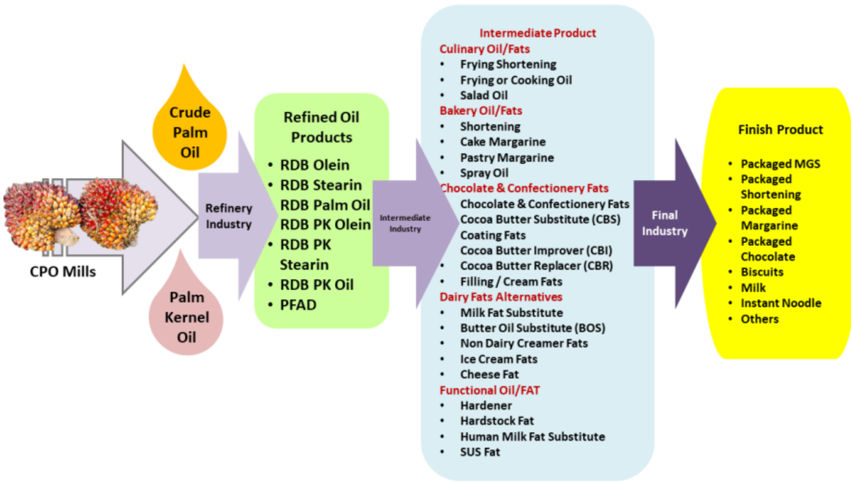


Figure 5.3. Industrial Tree of Palm Oil-based Food Products (Oleofood Products)

Palm oil processing results in two fractions, i.e., olein and stearin. Olein is the liquid fraction used in palm cooking oil (culinary oils). On the other hand, stearin is a solid fraction at room temperature. It is widely used as the component of hard fat for bakery oils/fats products such as margarine and shortening for cake, bread, pastry, biscuits, instant noodles, etc.

Table 5.7 Use of Palm Oil for Food Products, Pharmaceuticals, Toiletries, Cosmetics, and Energy and Lubricants

FOOD PRODUCTS	
Cooking Oils Margarine Trans-free Margarine Palm Based Pourable Margarine Reduced Fat Spreads Shortening Vanaspati Bakery Fats Biscuit Fats Peanut Butter Flour Confectionery Pastry Drycake and Pastry Mixed Palm-based Spray Oil Frying Oils and Fats Potato Chips	Expanded and Extruded Snacks Nuts (Dried) Doughnuts Oriental Noodles Confectionary Fat and Coating Sugar Confectionary Ice Cream Filled Milk Coffee Whiteners Palm-based Coconut Milk Powder Palm-based Processed Cheese Microencapsulated Palm-based Product Palm-based Yoghurt Palm Olein Salad Dressing Soup Mixes Emulsifiers
PRODUCTS: PHARMACEUTICALS, HEALTH PRODUCTS, TOILETRIES, COSMETICS	
Vitamin E Provitamin A (Carotene) Microencapsulated Laundry Soap Bath Soap Transparent Soap Moisturizing Cream Anti-Wrinkle Cream Skin Whitening Cream Sunscreen Cream Skin Whitening Cream Shower Bath	Body Scrub Body deodorant Colored Cosmetic Shampoo Conditioner Hand Wash Oral Care Detergent Lotion Lipstick Antioxidant
FUELS & LUBRICANTS	
Biodiesel Fuel Hydraulic Fluid Gear Oil Chainsaw Oil Compressor Oil Turbine Oil Bioelectricity	Transformer Oil Metal Working Fluid Drilling Mud Grease Car Shampoo Ethanol/Biopremium Biogas

Source: MPOB (2013)

Palm oil also contains specialty fats as an alternative to vegetable/animal fats. Palm oil-based specialty fats can replace cacao fats in chocolate-based products (such as cocoa butter replacers/substitutes). It can also replace animal fats in creamer products (non-diary creamer), cheese, ice cream, etc. Palm oil-based specialty fats also have certain functionality (functional oils/fats). In terms of health, it plays the role of human milk fat substitutes found in formula milk products.

Oil palm-based food products can also be made from processing biomass such as oil palm trunks. The trunks contain sap which can be processed into red palm sugar (Agustira et al., 2019; PASPI Monitor, 2019[g]). Red palm sugar is healthier than other red sugar due to its fructose composition. Therefore, diabetes patients are recommended to consume it.

In addition to being processed into food products, palm oil can be processed into health products, such as vitamins or supplements. Bioactive compounds in palm oil, such as carotenes, tocopherols, and tocotrienols, can be used as health supplement products to maintain body health (Tarigan et al., 2022). Even red palm oil has been processed into superfood products that are sold in the Indonesian and Malaysian market.

The description above shows food products and non-food ones from oil palm (oil and biomass) processing. The research and development of palm oil downstreaming will promote the downstreaming of other food and non-food products to meet the global community's needs.

MYTH 5-16

Palm oil products do not improve skin health

FACTS

Palm oil is one of the sources of natural oleochemicals in nature. One of the processed products (finished products) from palm oil oleochemicals widely used across the globe is biosurfactants such as personal care and toiletry products like soap, detergent, shampoo, skincare, cosmetics, etc. (Table 5.7). Palm oil biosurfactants can replace petrochemical surfactants (from fossils) which are relatively harmful to the environment and non-renewable (Hambali et al., 2019).

Palm oil-based biosurfactants in soap, detergent, and other cleaning products are well-dispersed with good saponification, particularly in water (Hambali, 2019; Hidayati et al., 2005). Palm oil biosurfactants can reduce water surface tension. Therefore, it can play the role of the cleansing agent, which produces the effect of a lot of foam. It has the characteristic of broad-spectrum microbes, killing bacteria and viruses effectively. In addition, it can easily remove dirt, but maintain skin health.

Palm oil and its derivatives are more widely used skin care products by the global community. It is because palm oil is a natural product safer than mineral oil and has better synthesis components. Palm oil-based skin care products are free of polycyclic aromatic hydrocarbon compounds harmful to human skin.

In palm oil, bioactive compound components, such as carotenes (vitamin A) and vitamin E, are rich in antioxidants. Therefore, they are suitable for skin health and beauty by moisturizing skin, treating burns faster, regenerating skin, slowing aging (anti-aging), etc. (Longganathan et al., 2010). Other bioactive compounds in palm oil, such as squalene and ubiquinone, are also widely used in skin care products (Sinaga, 2021).

Squalene can moisturize skin (particularly sensitive), repair skin damaged by UV light, and eliminate acne and oily skin. Meanwhile, the combination of ubiquinone and carotenes can effectively for anti-aging skin, reduce wrinkles, and fight inflammation. With its palmitic acid content, palm oil is non-comedogenic, making the product safer for all skin types.

The description above shows that palm oil is widely and variedly used in toiletry and personal care (including skincare) products. The content of bioactive compounds in palm oil makes better toiletry and skin care products as they can bring additional benefits to skin health. If consumers are more aware of more natural and sustainable products, palm oil is expected to be widely used in toiletry and skin care products.

MYTH 5-17

Palm oil does not protect our health during the Covid-19 pandemic

FACTS

The Covid-19 pandemic is a global crisis in the 21st century. The Covid-19 virus and its variants have led to millions of deaths in various countries. Throughout the world, there are more and more confirmed Covid-19 cases, and it shows that the virus is around.

The global community must live with the Covid-19 virus and its variants, trying to adapt to it to remain productive. In adapting to the New Normal era, the global community gets vaccinated and maintains health and immunity by consuming nutritious foods and observing personal hygiene.

The palm oil industry can help the global community adapt to the Covid-19 pandemic. The role is to make nutritious food and toiletry products from palm oil (PASPI Monitor, 2020[m]).

Palm oil is widely used in food and health products (Myth 5-15), such as cooking oil, margarine, specialty fats, and supplements/vitamins. In addition to providing calorie intake, palm oil-based food consumption maintains health, particularly during the Covid-19 pandemic. The content of carotenes (vitamin A), tocopherols and tocotrienols (vitamin E), and other bioactive compound components in palm oil can play the role of antioxidants to fight free radicals and boost immunity.

Raharjo (2021) reveals other benefits of palm oil related to the Covid-19 virus. Palmitic acid in red palm oil consists mainly of 60 percent of phospholipids, the pulmonary alveoli's inner cavity layer. Those phospholipids maintain lung health as they play the role of surfactants to ease gas (oxygen and carbon dioxide) exchange from the alveoli's cavity to blood vessels or vice versa. When someone contracts the Covid-19 virus, lung alveoli cells cannot produce phospholipids, making the gas exchange difficult. For this reason, palmitic acid intake should be controlled to maintain lung health.

The Indonesian Oil Palm Research Institute-IOPRI (*Pusat Penelitian Kelapa Sawit/PPKS*) is conducting a study into developing new products/materials from palm oil to boost the immune system's defense against viruses and bacteria, including the Covid-19 virus (PASPI Monitor, 2020[m]). The research used lauric acid in palm kernel oil as an immunomodulatory material to modulate the immune system to prevent viral infections (Panjaitan, 2020).

The role of the palm oil industry during the Covid-19 pandemic is shown by its toiletry products (Myth 5-16). In addition to toiletry products from palm oil-based oleochemicals already known by the public (such as soap, detergent, etc.), the palm oil industry is innovating the production of hand sanitizers and biodisinfectants to observe personal and environmental hygiene during the pandemic.

Amid the pandemic, the global community follows health protocols by washing hands and observing personal and environmental hygiene as new habits. Therefore, there is more demand for toiletry products from palm oil-based oleochemicals (Hutabarat, 2021).

The description above shows that the palm oil industry provides food and toiletry products the global community needs to adapt to the Covid-19 pandemic. It shows that palm oil is part of the solution to the New Normal adaptation.

Chapter 6
Myths and Facts:
Palm Oil Industry in Environmental Issues

The palm oil industry has been under massive scrutiny from the global community in the last three decades. The growth of palm oil production, defined as the tropical oil crop revolution by Byarlee et al. (2016), not only changed the structure of the global vegetable oil market, but also caused controversy. One of the controversies surrounding palm oil concerns environmental issues.

As palm oil has a more competitive price than other vegetable oils, the competition has shifted to a non-price one, highlighting environmental and social issues.

The growth of the global palm oil industry is often associated with deforestation, biodiversity loss, carbon emission, pollution, and even global warming and climate change (such as floods, landslides, and forest and land fires). Palm oil competitors launch a smear campaign by using these environmental issues as a narrative to damage the reputation of palm oil among global consumers. In fact, the negative narratives are also used as a basis for trade policies that tend to disfavor and harm palm oil.

This chapter will dialectically cover the common accusations against the palm oil industry regarding global, national, regional, and local environmental issues.

MYTH 6-01

Global warming is caused by the development of oil palm plantations

FACTS

Global warming is one of the most prominent issues of this century, drawing the global community's attention due to its extensive impacts. Global warming occurs due to the increasing intensity of greenhouse gases (GHGs) in the earth's atmosphere. The earth's atmosphere is naturally composed of GHGs, primarily water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), and nitrogen (N_2), each with its safe level of concentration. The GHG creates a natural process called the greenhouse effect in the earth's atmosphere as a natural mechanism to keep and maintain the temperature suitable for life on earth.

With the naturally occurring greenhouse effect, some of the sun's heat is trapped in the earth's atmosphere, and some heat is reflected into space (Figure 6.1). Without the naturally occurring greenhouse effect, the sun's heat would be reflected into space. As a result, the earth's temperature would be very low (not suitable for life).

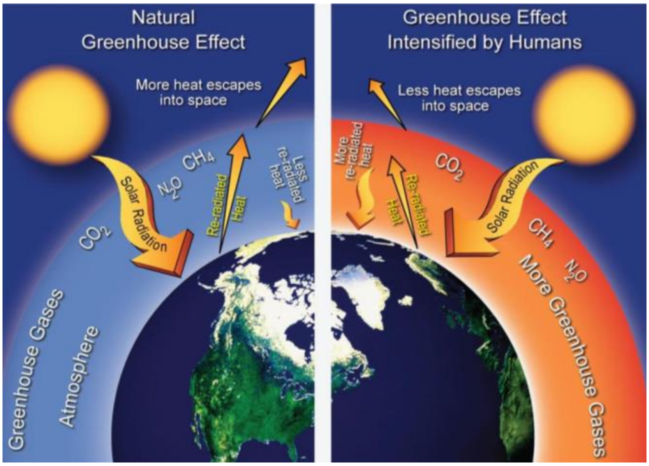


Figure 6.1 Greenhouse Effect Mechanism in the Global Warming Phenomenon (Source: US Global Change Research Program)

The intensity of the naturally-occurring GHGs increases when the atmospheric concentration of GHGs rises beyond safe levels. The increased concentration is a result of rising GHG emissions from human activities and artificial gases such as Chlorofluorocarbon (CFC) and halogens (enhanced greenhouse effect).

The Intergovernmental Panel on Climate Change or IPCC (1991) reveals that the atmospheric concentrations of GHGs have increased since the pre-industrial times (the 1800s). According to IPCC (1991), the atmospheric concentrations of CO_2 have increased from 280 ppmv (parts per million by volume) in the 1800s to 353 ppmv in 1990. The atmospheric concentrations of CO_2 in 2005 increased to 379 ppmv, 396 ppmv in 2013, 399 ppmv in 2015, and continued to increase to 407 ppmv in 2018 (IEA, 2013, 2016, 2019). The

National Aeronautics and Space Administration (NASA) reveals that as of May 2022, the atmospheric concentrations of CO_2 reached 417.6 ppmv.

From the 1800s to 1990, the atmospheric concentrations of other GHGs also increased, namely CH_4 from 0.8 ppmv to 1.72 ppmv, N_2O from 288 ppbv (parts per billion by volume) to 310 ppbv, and CFC from zero to 280-484 pptv (parts per trillion by volume).

In line with the findings of the above study, Olivier et al. (2022) reveals an increase in GHG emissions (CO_2 equivalent) in the earth's atmosphere from 32.9 Gt CO_2 eq in 1990 to 49.8 Gt CO_2 eq in 2020 (Figure 6.2). From 1990 to 2020, CO_2 emissions recorded the highest increase compared to other GHGs, from 22.7 Gt CO_2 to 49.8 Gt CO_2. CH_4 also increased from 6,196 Mt CO_2 eq to 7,732 Mt CO_2 eq, N_2O from 2,329 Mt CO_2 eq to 2,958 Mt CO_2 eq, and F-gases from 352 Mt CO_2 eq to 1,328 Mt CO_2 eq.

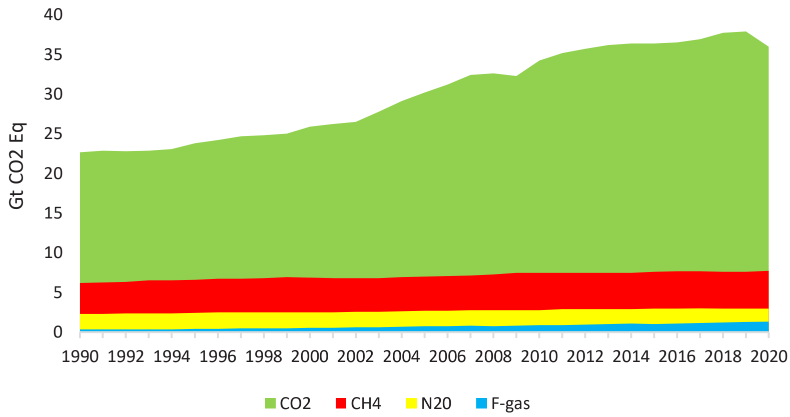


Figure 6.2. Trend of Greenhouse Gases Emission in Earth's Atmosphere (Source: Olivier et al., 2022)

As the intensity of GHGs increases, more radiation/heat from the sun is trapped in the earth's atmosphere beyond the safe levels. Thus, the earth's average temperature is rising (Soemarwoto, 1992). This increase in the earth's temperature is known as global warming.

The description above shows that oil palm plantations do not cause global warming. The atmospheric concentrations of GHGs have increased due to human activities since the pre-industrial times (the 1800s) until today, which, in turn, increased the intensity of the GHGs in the earth's atmosphere, trapping more heat from the sun. This is the main cause of global warming.

MYTH 6-02

Climate change is caused by the expansion of oil palm plantations

FACTS

Climate change is an environmental issue that threatens the lives of people around the world. Climate change results from global warming (IPCC, 1991; Soemarwoto, 1992; IEA, 2014), so it has nothing to do with the expansion of global oil palm plantations.

As more of the sun's heat gets trapped in the earth's atmosphere, it contributes to climate change (Figure 6.3) due to, among others: (1) more evaporation; (2) increasing sea surface temperature; (3) change in plants and animals; and (4) melting ice and snow. The combination of these has resulted in increased precipitation, storms, floods, droughts, fires, and climate anomalies. All of these impacts of climate change are felt around the world.

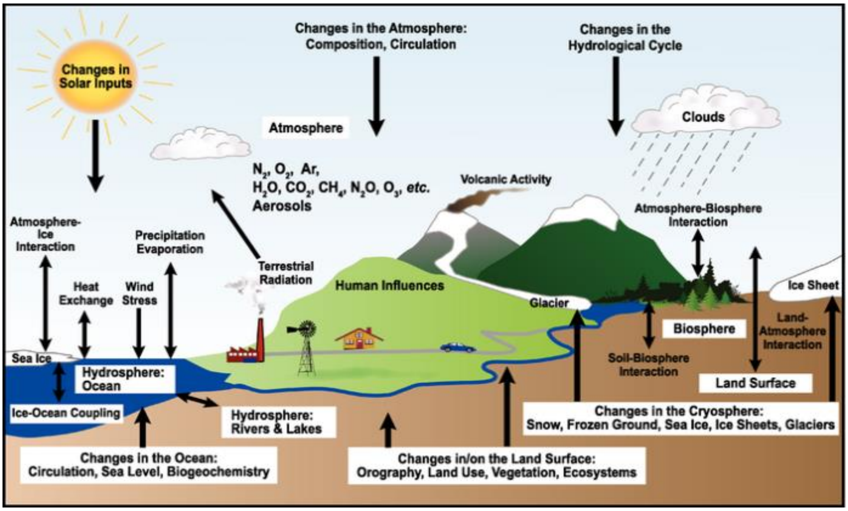


Figure 6.3. Global Climate Change as a Result of Global Warming (Source: Ray, 2009)

Therefore, it is evident that global warming, not oil palm plantations, causes ongoing climate change. Scapegoating oil palm plantations for climate change will not solve the crisis and will only mislead the global community.

MYTH 6-03

Oil palm plantation sector is the largest contributor to global GHG emissions

FACTS

Oil palm plantations are commonly accused of being the largest contributor to global GHG emissions. The accusation is not in line with empirical data and facts. Empirical studies (IEA, 2016; Olivier et al., 2022) reveal that the energy (fossil fuels) sector is the largest contributor to global GHG emissions, followed by agriculture, industry, waste, and so on.

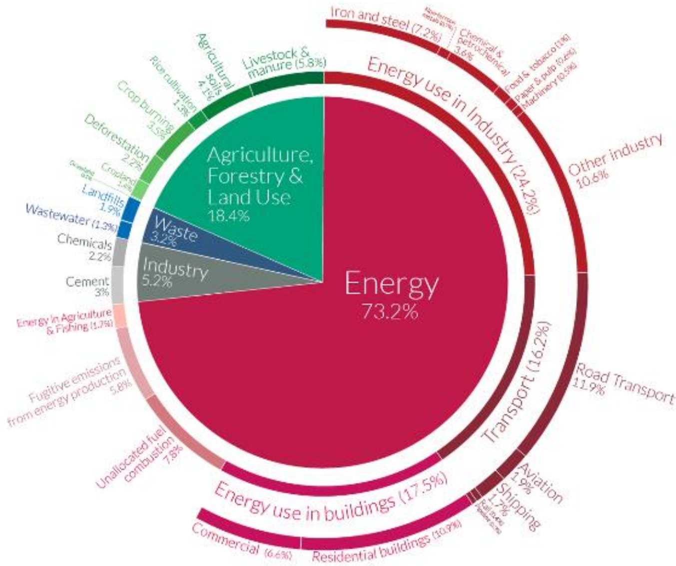


Figure 6.4. GHG Emissions by Sector (Source: WRI, 2021)

WRI's (2021) study reveals which sectors are the largest contributor to global GHG emissions (Figure 6.4). The total global GHG emissions is 49.4 Gt CO_2 eq. The energy (fossil fuels) sector is responsible for around 73.2 percent of global GHG emissions, which come from energy consumption in industry, buildings (commercial and residential), and transportation. The agriculture, forestry, and land use sector are the second largest contributor, representing around 18.4 percent of global GHG emissions, followed by the industry sector (5.2 percent) and waste sector (3.2 percent).

The five largest contributors to global GHG emissions in the agriculture, forestry, and land use sector is livestock and manure (5.8 percent), agricultural soils (4.1 percent), crop burning (3.8 percent), forest land (2.2 percent), and cropland (1.4 percent). The data shows that global oil palm plantations are not among the primary sources of or the largest contributors to global GHG emissions.

MYTH 6-04

Global GHG emissions have rapidly increased since the global oil palm boom started

FACTS

Atmospheric concentrations of GHGs have increased since the beginning of human civilization (Figure 6.5). The atmospheric concentrations of CO_2 in pre-industrial times were still around 180-280 ppmv and increased to 353 ppmv in 1990. The atmospheric concentrations continued to increase to 379 ppmv in 2005, 399 ppmv in 2015, and 407 ppmv in 2018 (IEA, 2019).

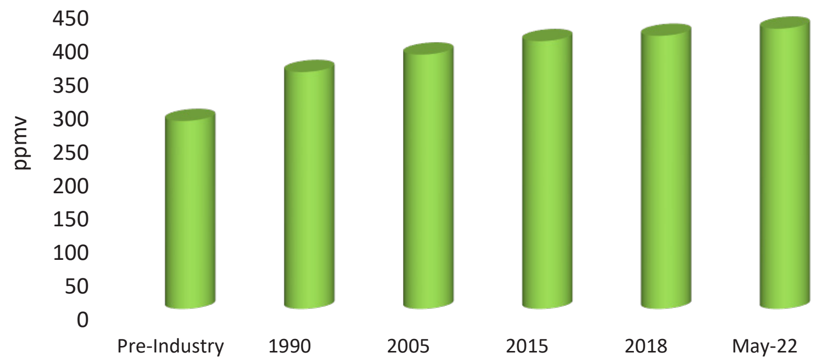


Figure 6.5. Trend of Atmospheric Concentrations of CO_2 since the Age of Civilization to the Present Day (Source: IEA, 2019)

In line with the sources of global emissions (Myth 6-03), atmospheric concentrations of GHGs are believed to have rapidly increased after the industrial and green revolutions. The economic development model follows the Environmental Kuznets Curve (EKC) hypothesis in developed and developing countries (Auci and Trovato, 2011; Caravki and Alkalin, 2017); therefore, GHG emissions increase during the economic development process. At the initial period of economic development in a country, GHG concentrations tend to increase as economic activities intensify or per capita income grows. The country will reduce GHG emissions after a certain level of per capita income or economic growth.

Based on the historical data on increasing atmospheric concentrations of GHGs, it is evident that facts and data do not support the link between oil palm plantations and rising GHG emissions. Global oil palm plantations only began to grow after the 1900s, and even back then, the plantations only occupied relatively small areas. The lack of a link is also supported by the data (Figure 6.4) showing that oil palm plantations are not among the largest contributors to global GHG emissions.

MYTH 6-05

Indonesia is one of the top global GHG emitters

FACTS

A study by Ritche and Roser (2017) reveals which countries have been the largest contributors to global GHG emissions since the 1700s (Figure 6.6). From the early 1700s to the 1800s, the United Kingdom was the largest contributor to global GHG emissions. Then, in the early 1800s, the European Union emerged as the largest contributor to global GHG emissions. Since the 1800s, the United States emerged as one of the top three contributors to global GHG emissions, followed by India and China.

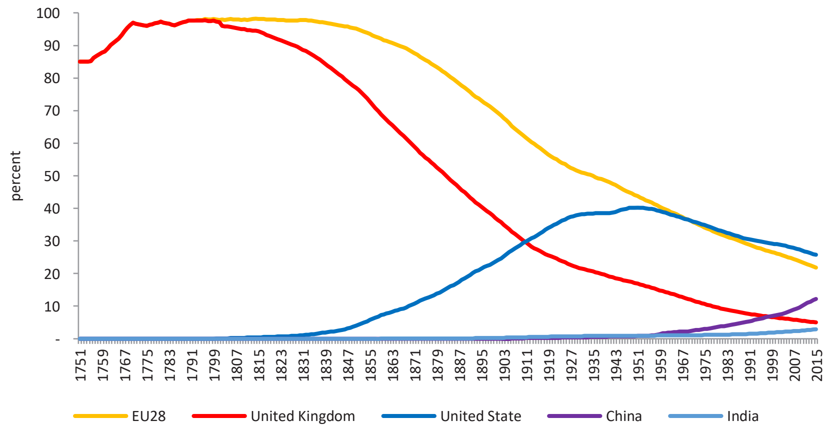


Figure 6.6. Trend of Countrie Contributing to Global CO_2 Emissions Since the Age of Civilization (Source: Our World)

The results of this study are consistent with historical facts regarding the industrial revolution that began in the United Kingdom in the 1760s before spreading to mainland Europe. The United States' contribution to global GHG emissions increased from the 19th century to the early 20th century. This is connected to the industrial and agricultural revolutions that occurred during that period in the United States.

The European Union (including the United Kingdom), the United States, China, and India have consistently become the largest contributors to global GHG emissions until today. They are responsible for 51.3 percent of global GHG emissions in 2020 (Figure 6.7). China is the top GHG emitting country with total emissions of 14.3 Gt CO_2 eq (28.7 percent), followed by the United States at 5.64 Gt CO_2 eq (11.3 percent), European Union at 3.44 Gt CO_2 eq (6.9 percent), and India at 2.21 Gt CO_2 eq (4.4 percent).

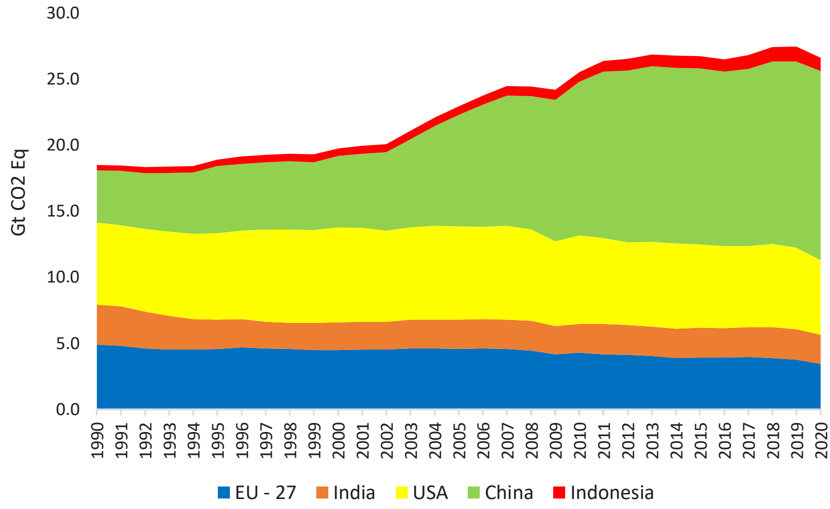


Figure 6.7. Comparison of Indonesia's GHG Emission against the World's Top 4 Emitters (Source: Oliver et al., 2022)

Indonesia's GHG emissions are smaller than these top four GHG emitters at 1.04 Gt CO_2 eq in 2020. Indonesia is responsible for 2.1 percent of global GHG emissions, smaller than that of the largest contributors. Thus, the accusation that Indonesia as one of the top GHG emitting countries is not in line with the existing facts and data.

MYTH 6-06

Emissions of Land Use, Land-Use Change, and Forestry (LULUCF) greatly contribute to global GHG emissions

FACTS

Land Use, Land-Use Change, and Forestry (LULUCF) activities commonly occur in developing countries. Land use change (LUC) and forest conversion to non-forest are still commonplace in developing countries.

LULUCF does not always emit GHGs, depending on the carbon stocks. Suppose a LUC involves converting lands with higher carbon stocks into lands with lower carbon stocks, for example, an oil palm plantation into shrubland. In that case, this conversion will be followed by increased emissions (carbon sources). This is because the carbon stocks of oil palm plantations are higher than shrubland. On the contrary, if a LUC involves converting lands with lower carbon stocks into lands with higher carbon stocks, for example, shrubland into an oil palm plantation, then this conversion will absorb CO_2 emissions (carbon sinks).

Indirect Land Use Change (ILUC) is part of the LULUCF. The Council of the European Union (2018) describes ILUC as follows: *"Indirect land-use change occurs when the cultivation of crops for biofuels, bioliquids and biomass fuels displaces traditional production of crops for food and feed purposes. This additional demand may increase the pressure on land and can lead to the extension of agricultural land into areas with high carbon stock such as forests, wetlands and peat land causing additional greenhouse gas emissions".* The keyword in ILUC is Land Use Change (LUC), while the factors driving the LUC can be direct (dLUC) or indirect (ILUC). Thus, dLUC and ILUC should have been factored in when calculating emissions from global LULUCF.

Internationally (Figure 6.8), total global GHG emissions in 2019 amounted to 51.7 Gt CO_2 eq (excluding emissions from LULUCF). If emissions from LULUCF were included, total global GHG emissions reached 58.8 Gt CO_2 eq. Emissions from LULUCF were 7.1 Gt CO_2 eq, representing 12 percent of global GHG emissions in 2019.

Thus, the contribution of LULUCF to global GHG emissions is relatively small, under the GHG emissions from both the energy and agriculture sectors. Considering this fact, it is better to stop distressing emissions from LULUCF, including emissions from ILUC, to reduce global GHG emissions-

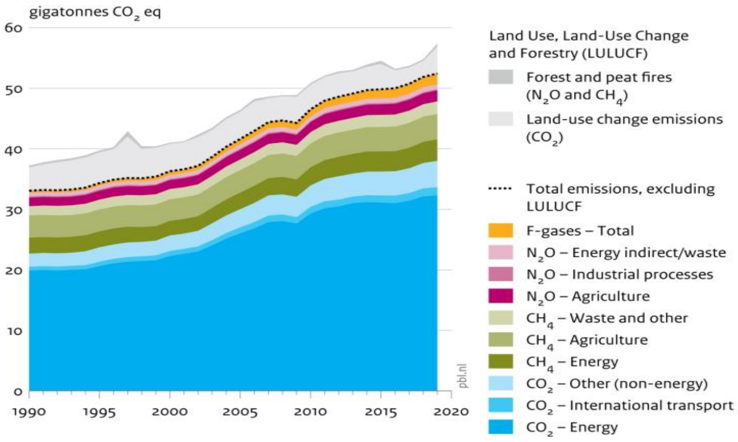


Figure 6.8 Trend of LULUCF Emissions Compared to Global GHG Emissions (Source: Olivier et al., 2022)

Reducing the use of fossil fuels worldwide remains the most strategic step to reduce global GHG emissions.

MYTH 6-07

Oil palm plantations are the main contributor to global GHG emissions in the agriculture sector

FACTS

All human activities produce GHG emissions, including those in the agricultural sector. As part of the agriculture sector, oil palm plantations absorb carbon dioxide (CO_2) and produce emissions. However, more carbon dioxide is absorbed than released into the earth's atmosphere. Are oil palm plantations the largest contributor to global GHG emissions? This question needs to be discussed.

The global agriculture sector (including oil palm plantations) in 2019 contributed to 20 percent (10.6 Gt CO_2 eq) of global GHG emissions world (Olivier et al., 2022). FAO (2021) reveals that the largest source of emissions in the agriculture sector (Figure 6.9) is the livestock sector, with a 76 percent contribution. Emissions from the global livestock sector include enteric fermentation (67 percent), manure management (7 percent), manure left on pasture (2 percent), and manure applied to soils (0.4 percent).

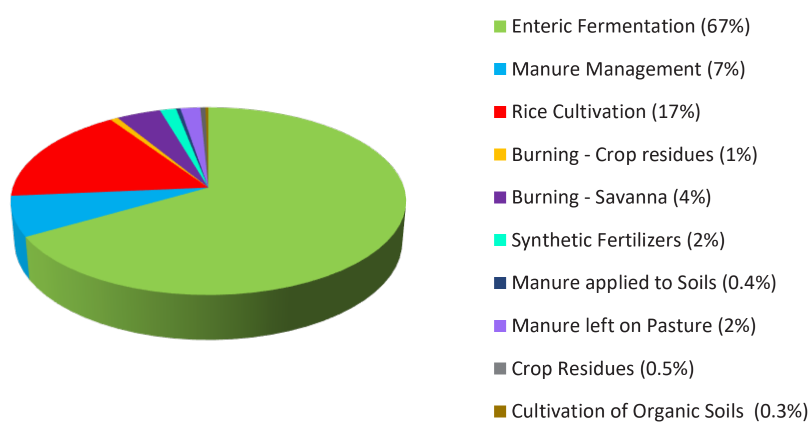


Figure 6.9. Sources of Emission from the Global Agriculture Sector (Source: FAO, 2020)

In addition to livestock, rice cultivation is another major contributor to emissions in the agriculture sector, with a 17 percent share. Emissions are also produced by savanna and crop residue burning, with contributions of 4 percent and 1 percent, respectively. Synthetic fertilizers contribute to 2 percent of global GHG emissions, and cultivated organic soils also produce emissions with a 0.3 percent share.

The data above shows that the livestock and rice cultivation sectors are responsible for around 93 percent of the global GHG emissions in the agriculture sector. Oil palm plantations are not part of the livestock and rice cultivation sectors. Thus, it is clear that oil palm plantations are not among the largest contributors to global GHG emissions in the agriculture sector.

MYTH 6-08

Palm oil produces the most emissions compared to other vegetable oils

FACTS

Vegetable oil is one of the foods that FAO recommends for consumption by the global community. There are 17 sources of vegetable oil. Four of them are the major ones, making up 90 percent of global vegetable oil production. They are palm oil, soybean oil, rapeseed oil, and sunflower oil. The question is, which produces the most and the least emissions of the four major vegetable oils?

According to the studies conducted by Beyer et al. (2020) and Beyer and Rademacher (2021), at the global level, for every ton of vegetable oil produced (Figure 6.10), soybean oil produces the most emissions, followed by peanut oil, rapeseed oil, and sunflower oil. On the other hand, palm oil produces the least emissions.

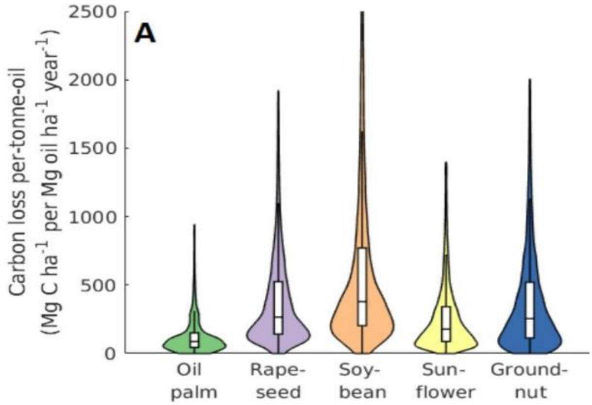


Figure 6.10. Comparison of Carbon Emissions among the Global Sources of Vegetable Oil (Source: Beyer et al., 2020; Beyer and Rademacher, 2021; PASPI Monitor, 2021[b])

Compared to the carbon emissions from palm oil production, those from soybean oil, peanut oil, rapeseed oil, and sunflower oil are higher by 425 percent, 424 percent, 242 percent, and 225 percent, respectively. The results of these studies prove that vegetable oil production with palm oil as the source results in the least emissions, while the production of other vegetable oils results in more carbon emissions.

MYTH 6-09

Oil palm plantations are not a net carbon sink

FACTS

Every second, carbon dioxide is accumulated in the earth's atmosphere as a waste product of human activities. Humans, animals, motor vehicles, and industries worldwide release excess carbon dioxide (GHG emissions) into the earth's atmosphere, leading to global warming (Myth 6-01). Reducing the emissions is not enough to lower the atmospheric concentrations of GHGs. It is also important that GHGs get reabsorbed.

Like other crops/plants, oil palm plantations provide a solution to climate change by acting as carbon sinks (PASPI Monitor, 2020[g]; 2021[ac]). Through photosynthetic assimilation, oil palm trees absorb CO_2 from the earth's atmosphere (Hardter et al., 1997; Henson, 1999; Fairhurst and Hardter, 2003) and store it as carbon stocks in the form of above-ground biomass or below-ground biomass.

Oil palm trees are a fast-growing perennial crop with an extensive, relatively large root system, and the trees have a high yield with a life cycle of 25 years or more. With the trees having such characteristics, oil palm plantations act as carbon sinks, a "biological engine" that absorbs a large amount of carbon dioxide from the earth's atmosphere.

According to the study by Henson (1999), the average net carbon sink of oil palm plantations is 64.5 tons of CO_2 per hectare per year (Table 6.1). Oil palm plantations have a higher net CO_2 absorption than tropical forests do. This indicates that oil palm plantations absorb more carbon dioxide from the earth's atmosphere and produce oxygen than tropical forests (PASPI Monitor, 2021[af]).

Table 6.1. Carbon Sink of Oil Palm Plantations against Tropical Forests

Indicator	Tropical Forests	Oil Palm Plantations
Gross assimilation (tons of CO_2/ha/year)	163.5	161.0
Total respiration (tons of CO_2/ha/year)	121.1	96.5
Net assimilation (tons of CO_2/ha/year)	42.4	64.5
Oxygen production (tons of O_2/ha/year)	7.09	18.70
Leaf area index	7.3	5.6
Photosynthetic efficiency (%)	1.73	3.18
Radiation conversion efficiency (g/MJ)	0.86	1.68
Total biomass per area (tons/ha)	431	100
Biomass increment (tons/ha/year)	5.8	8.3
Dry matter productivity (tons/ha/year)	25.7	36.5

Source: Henson (1999); IOPRI (2004, 2005)

The description above shows that oil palm plantations are a net carbon sink. Therefore, oil palm plantations are part of the solution to reducing global carbon emissions from the earth's atmosphere. Oil palm plantations can help in two ways. The first is by reabsorbing carbon dioxide from the earth's atmosphere through photosynthetic assimilation. The second is by reducing carbon dioxide emissions using low-emission palm oil-based biofuels as a substitute for high-emission fossil fuels.

MYTH 6-10

Emission saving capability of palm oil biodiesel is lower than those of biodiesel from other vegetable oils

FACTS

There is a long-running debate among experts over the emission saving of many sources of biodiesel. The debate revolves around what methodology should be used to measure the emission saving, whether it is only one or a combination of direct emission, direct land use change emission, and indirect land use change emission. The uncertainty of the emission saving extent rises due to the many uncertainties in the life cycle assessment used in the three methodologies (Liska and Cassman, 2008; Liska et al., 2009; Malca and Freire, 2011; Liska, 2015).

Through photosynthesis, oil palm trees can absorb more carbon dioxide than it emits (carbon sink) (Myth 6.09) and store it (carbon sequestration) in the form of biomass (Myth 6.26) and oils. Compared to other sources of vegetable oil (Myth 6-08), emissions from palm oil are much lower.

Among the biodiesel sourced from vegetable oil as the main feedstock, palm-based biodiesel produces the lowest emissions compared to soybean-, rapeseed-, and sunflower-based biodiesels. Moreover, when compared to the carbon emissions from fossil diesel fuel, palm-based biodiesel has much lower emissions.

Many studies show that the emission saving of palm-based biodiesel varies between researchers. The European Commission's Joint Research Center (2013) reveals that palm-based biodiesel produced in CPO mills applying a methane capture technology can cut emissions by 62 percent (Figure 6.11). This emission saving is higher than those of biodiesel from other vegetable oils, such as rapeseed-, soybean-, and sunflower-based biodiesels, each with 45 percent, 40 percent, and 58 percent capability.

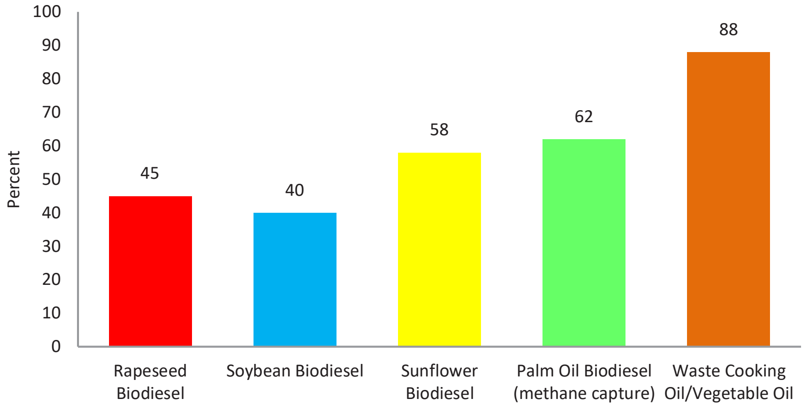


Figure 6.11. Reduction of CO_2 Emissions from Different Feedstock Materials for Biodiesel Compared to Diesel Emissions (Source: European Commission's Joint Research Centre, 2013)

The results of a study conducted by Mathews and Ardyanto (2015) also support the findings of the European Union, stating that using palm-based biodiesel as a substitute for fossil diesel fuel can reduce GHG emissions by more than 60 percent. A study by Euro Lex (2009) also reveals that palm-based biodiesel can cut emissions by around 62 percent compared to emissions from fossil fuels. Many scientific studies (Figure 6.12) conducted by experts also show that palm-based biodiesel can cut emissions by 40-71 percent.

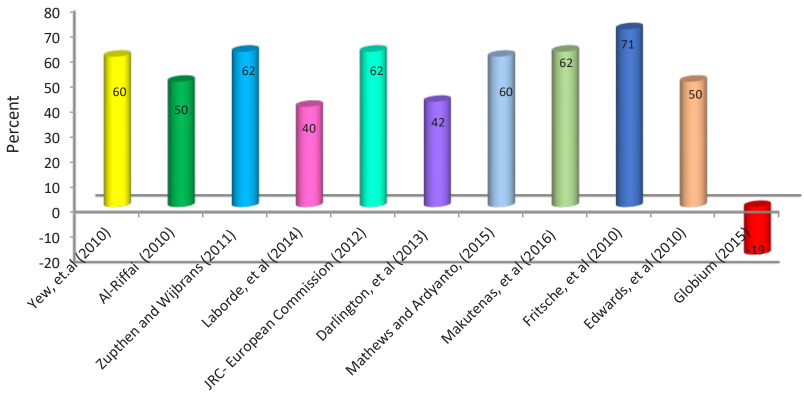


Figure 6.12. International Researchers on Emission Saving of Palm-based Biodiesel (Source: PASPI Monitor, 2020g)

The description above shows that the GHG emission saving of palm-based biodiesel is higher than that of soybean-, rapeseed-, and sunflower-based biodiesels. In other words, using palm-based biodiesel as a substitute for fossil diesel fuel can reduce GHG emissions higher than biodiesel from other vegetable oils.

MYTH 6-11

Global palm oil industry is not a solution to the Net Carbon Sink (NCS)

FACTS

Global emissions reduction has become a hot topic recently, especially after COP-26 was held in Glasgow in November 2021. Countries worldwide, including Indonesia, plan to reach the Net Zero Emissions (NZE) target by 2060 or earlier. To reach it, all sectors are expected to help reach the Net Carbon Sink (NCS).

As an important industry/economic sector nationwide and worldwide, the palm oil industry has the potential to become an economic sector that helps reach NCS (PASPI Monitor, 2021[s]). Oil palm plantations naturally absorb more carbon dioxide from the earth's atmosphere than it releases into the earth's atmosphere (Myth 6-09), thus helping reach NCS. In addition, using palm-based bioenergy/biofuel, such as palm oil-based biodiesel (Myth 6-10) as a substitute for fossil fuel can reduce global carbon emissions in the earth's atmosphere.

Boosting the contribution of oil palm plantations to reaching NCS can be done by improving the management and processing technology. The technology that can be applied includes methane capture technology, where emissions can be reduced by capturing methane in the Palm Oil Mill Effluent (POME). In addition, oil palm biomass can be used as a source of energy to substitute fossil fuel in the CPO mills. Bio-organic fertilizers can also be substituted for inorganic fertilizers. With this approach, GHG emissions from oil palm plantations can be reduced.

Many studies (Yee et al., 2009; Matthews and Ardianto, 2015; Seng and Tamahrajah, 2021; Vicenza, 2021) show that GHG emissions can be significantly reduced by management improvement, Good Agricultural Practices (GAP) optimization in oil palm plantations, and processing technology maximization in CPO mills (Figure 6.13).

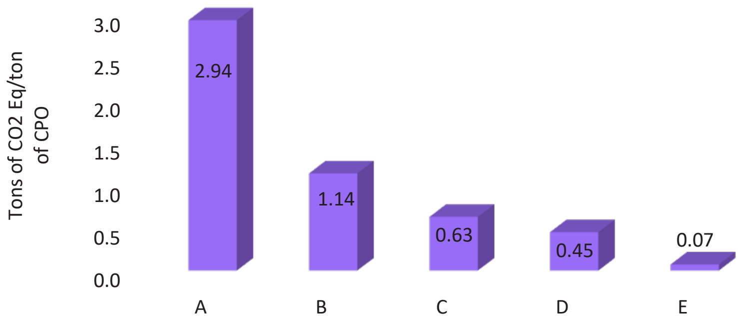


Figure 6.13. GHG Emissions in Different Conditions of Management, GAP, and Technology in Oil Palm Plantations and CPO Mills

Note:
A : Oil palm plantations + No GAP - No methane capture – No biomass energy
B : Oil palm plantations + GAP – No methane capture – No biomass energy
C : Oil palm plantations + GAP – Biomass energy - No methane capture
D : Oil palm plantations + GAP + Methane capture - No biomass energy
E : Oil palm plantations + GAP + Methane capture + Biomass energy

In condition (A), oil palm plantations do not fully implement GAP and do not use methane capture technology to process POME. The CPO mills use energy from external sources (electricity, fossil diesel fuel). The plantations produce relatively high carbon dioxide emissions, reaching 2.94 tons CO_2 eq per ton of CPO.

Significant energy saving occurs in condition (E), where oil palm plantations fully implement GAP and methane capture technology and use POME-based biogas and oil palm biomass as energy sources in CPO mills. The condition produces very low carbon dioxide levels at only 0.07 tons CO_2 eq per ton of CPO.

These studies show that by implementing GAP and methane capture technology and using oil palm biomass and POME-based biogas as energy sources in CPO mills, emissions can be reduced by around 96 percent. By producing low emissions and acting as a carbon sink through photosynthesis, oil palm plantations can contribute more to reaching the NCS target.

By improving productivity, its capacity as a carbon sink can increase (PASPI Monitor, 2021[b]). The studies by Beyer et al. (2020) and Beyer and Rademacher (2021) reveal that improving palm oil productivity by 54 percent will reduce emissions from oil palm plantations by 35 percent. By doing so, the capacity as a carbon sink through photosynthesis will be increased, and the carbon source per ton of palm oil produced will be reduced. Thus, the overall emissions can be reduced.

Therefore, the palm oil industry has great potential as contributor in reaching the NCS target. With the ongoing efforts such as GAP, methane capture technology, POME-based biogas, oil palm biomass, and increasing productivity, the palm oil industry can be part of the solution to reaching the NCS target.

MYTH 6-12

All countries use the same definitions of forest and deforestation

FACTS

Countries worldwide adopt different definitions of forest and deforestation by considering tree density, tree height, land use, legal standing, and ecological functions (Schuck et al., 2002; FAO, 2018; PASPI Monitor, 2022[a]). A study by Lund (2013) classified the definitions of forest based on administrative, land cover, land use, and land capability aspects. The study also finds nearly 1,600 definitions of forest and nearly 240 definitions of tree adopted by countries worldwide at the local, national, and international levels.

The definition of the forest also varies between countries. A study by Schuck et al. (2002) finds that forestry terms and definitions greatly vary among European countries. Germany defines forest area as "*sum total of all areas defined as forest, consisting of a productives wooded area and non-wooded area*". Meanwhile, Norway defines forest as "*productive forest land* (*as average potential production higher* 1 m^3/ha/year) *and non-productive forest land* (*average potential production* 0.1-1.0 m^3/ha/year)". Meanwhile, France defines forest as "*have a tree* (*diameter* >7.5 cm), *have a crown cover percentage reaching at least 10 percent and there are more 500 steam per hectare that viable trees*."

In Indonesia, the terms "*hutan*" (forest) and "*kebun*" (plantation) are used interchangeably, such as "*hutan karet*" (rubber forest) and "*kebun karet*" (rubber plantation), or "*kebun bambu*" (bamboo plantation) and "*hutan bambu*" (bamboo forest) (Soemarwoto, 1992). Under Law No. 41 of 1999 on Forestry, a forest is defined as "*a terrestrial ecosystem containing* *biological resources dominated by trees in their natural environment, each of which is inseparable from another*."

International organizations also define forests for their respective organizational purposes. The European Union in the Renewable Energy Directive (EU RED II) defines forest as "*continuously forested areas, namely land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30 %, or trees able to reach those thresholds in situ; land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10 % and 30 %, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that*."

The Intergovernmental Panel on Climate Change (IPCC) in Kyoto Protocol defines forest as "*forest is a minimum area of land of 0.05 – 1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10 – 30 per cent with trees with the potential to reach a minimum height of 2 – 5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high portion of the ground or open forest. young natural stands and all plantations which have yet to reach a crown density of 10 – 30 per cent or tree height of 2 – 5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes, but which are expected to revert to forest*".

FAO (2000) states the following regarding forest: "*forest includes natural forests and forest plantations. It is used to refer to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests are determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m. Young stands that have not yet but are expected to reach a crown density of 10 percent and tree height of 5 m are included under forest, as are temporarily unstocked areas. The term includes forests used for purposes of production, protection, multiple-use or conservation (i.e., forest in national parks, nature reserves and other protected areas), as well as forest stands on agricultural lands (e.g., windbreaks and shelterbelts of trees with a width of more than 20 m), and rubberwood plantations and cork oak stands. The term specifically excludes stands of trees established primarily for agricultural production, for example fruit tree plantations. It also excludes trees planted in agroforestry systems*".

These various definitions of forest have led to different interpretations of deforestation, at least as many as there are definitions of forest available. Deforestation also varies between countries or organizations, depending on which definition of forest is adopted.

The World Bank defines deforestation as the permanent or temporary loss of forest cover or non-timber forest cover. The United Nations Framework Convention on Climate Change (UNFCCC) (2001) defines deforestation as "*the direct human-induced conversion of forested land to non-forested land*." In Indonesia, the definition of deforestation under the Regulation of Minister of Forestry No. 30 of 2009 is "*the permanent change of forested land to non-forested land as a result of human activities*".

According to FAO (2000), deforestation is "*The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold. Deforestation implies the long-term or permanent loss of forest cover and transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation. Deforestation includes areas of forest converted to agriculture, pasture, water reservoirs, and urban areas. The term specifically excludes areas where the trees have been removed because of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Unless logging is followed by the clearing of the remaining logged-over forest for the introduction of alternative land uses or the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition. In areas of shifting agriculture, forest, forest fallow, and agricultural lands appear in a dynamic pattern where deforestation and the return of forest frequently occur in small patches. To simplify reporting of such areas, the net change over a larger area is typically used. Deforestation also includes areas where, for example, the impact of disturbance, overutilization, or changing environmental conditions affects the forest to the extent that it cannot sustain a tree cover above the 10 percent threshold*".

Therefore, it is obvious that the varying definitions of the forest will lead to varying definitions of deforestation between countries. Shrubland is not categorized as a forest in tropical countries such as Indonesia, but it is classified as a forest based on FAO's definition. Likewise, a savanna cannot be considered a forest based on FAO's definition, but African countries classify it as a forest.

To understand whether land-use change in a particular area is related to deforestation, it is important to use the same definition of forest adopted in that area. FAO's definition is used by many, but not all countries, or even other international organizations, adopt it.

Using FAO's definition, an ecosystem in the European Union, United Kingdom, or the United States can be categorized as a forest. But in tropical countries, the same ecosystem may not be considered a forest. For example, Indonesia (Gunarso et al., 2013; Santosa et al., 2020; Santosa, 2021; Suharto et al., 2019) has 23 types of terrestrial ecosystems, but only 5 of them are classified as forests. In contrast, by FAO's definition, 20 types of ecosystems fall into the forest category. In Indonesia, non-forested areas are administratively categorized as forests. However, according to FAO, these non-forested areas are not categorized as forests.

The different definitions and contexts of forest and deforestation have led to a great deal of uncertainty in defining and implementing policies on the relationships between forests, deforestation, and commodity markets such as palm oil. The uncertainty will cause long-standing disagreement, leading to everyone's waste of time, money, and energy.

MYTH 6-13

Deforestation only occurs in palm oil producing countries

FACTS

The environmental issue of deforestation has come under public scrutiny. Deforestation is linked to oil palm plantations (Wicke et al., 2008; Vijay et al., 2016; European Parliament, 2017), creating a narrative that deforestation is inevitable and only occurs in palm oil-producing countries. Is it true that deforestation is unique to palm oil-producing countries?

Deforestation is a normal phenomenon in every country and every era of human civilization. Due to population growth, the demands for space used as residential/housing, farmland, infrastructure, and commercial areas/industries are rising in all countries. This situation also has led to the conversion of forested land to non-forested land (deforestation).

The economic development in temperate zones (such as mainland Europe and North America) led to temperate deforestation until the 1990s, which peaked before the 1700s (Figure 6.14). The economic development in tropical countries also led to tropical deforestation in the 1900s. Tropical deforestation peaked in 1950-1979 (FAO, 2012; Roser, 2012).

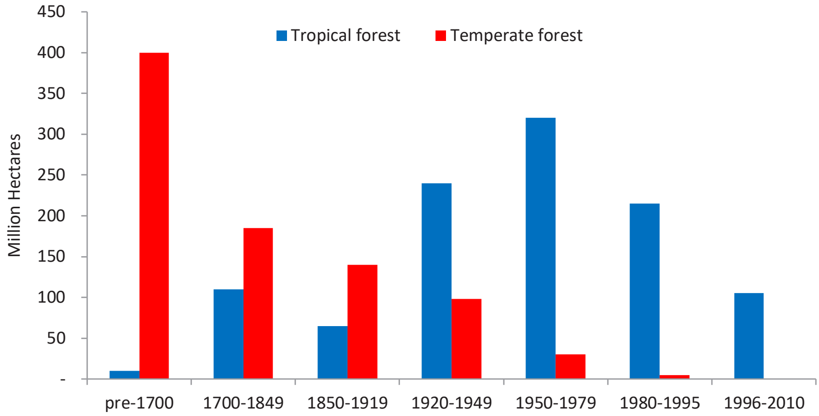


Figure 6.14. Deforestation by Type of Forest from Pre-1700 to 2010 (Source: FAO, 2012)

This history of temperate and tropical deforestation is also supported by the study conducted by Matthew (1983). From pre-agricultural times until 1980 (Table 6.2), global deforestation reached 701 million hectares, consisting of non-tropical deforestation (653 million hectares) and tropical deforestation (48 million hectares).

Table 6.2. Global Deforestation from Pre-agricultural Times until 1980

	Pre-agricultural Vegetation	Vegetation in 1980	Deforestation	
	million hectares	million hectares	million hectares	%
Global forest area	4,628	3,927	701	15.15
Tropical rainforest	1,277	1,229	48	3.75
Non-tropical forest	3,351	2,698	653	19.50
Woodland	1,523	1,310	213	13.80
Shrubland	1,299	1,212	87	6.70
Grassland	3,309	2,743	647	19.10
Tundra	734	734	-	-
Desert	1,582	1,557	25	1.60
Farmland	93	1,756	-1663	-

Source: Matthew (1983)

The study by Houghton (1996) also confirms this deforestation history. From 1850 to 1990, land clearing increased from 289 million hectares to 2.52 billion hectares worldwide. The land clearing comprised 1.6 billion hectares of temperate grassland, 508 million hectares of tropical forest, 91 million hectares of temperate forest, and 4 hectares of boreal forest.

Most temperate deforestation occurs in Europe and North America, as evidenced in how forest cover had decreased in European countries (Figure 6.15) since before the 1800s (Kaplan et al., 2009) and in North America (Figure 6.16) (USDA, 2014). The loss of virgin forests also confirms deforestation in Europe. The studies by Sabatini et al. (2018) and Barredo et al. (2021) reveal that Europe's last primary forests cover 1.4 million hectares in Finland, Ukraine, Bulgaria, and Romania.

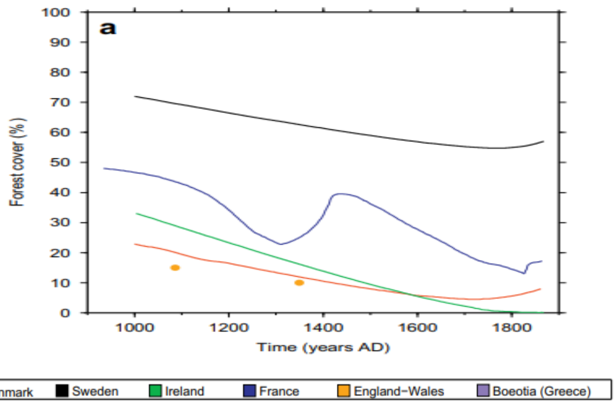


Figure 6.15 History of Forest Cover Decrease in Europe (Source: Kaplan et al, 2009)

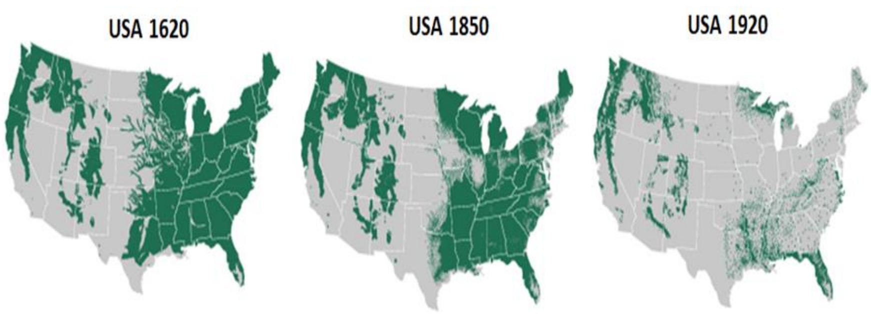


Figure 6.16. History of Deforestation in the United States in 1620–1920 (Source: USDA, 2014)

The description above affirms that deforestation is a normal phenomenon during economic development in every country and every era of human civilization. The economic development of today's developed countries, such as countries in Europe and North America, began with deforestation. This is also true for developing countries. It appears that deforestation is the only option to start economic development. The progress and wealth the global community enjoys today have historical roots in deforestation.

MYTH 6-14

The worst deforestation in the world occurs in the world's largest producers of palm oil

FACTS

Southeast Asia is the main palm oil-producing region, specifically Indonesia, Malaysia, and Thailand. Around 75 percent of the world's oil palm plantations are in Southeast Asia.

As discussed earlier, deforestation is a normal phenomenon during global economic development that has occurred since the start of the agricultural era until today (Myth 6-13). The increasing demand for food, residential/housing, facilities, and infrastructure are the top drivers of global deforestation.

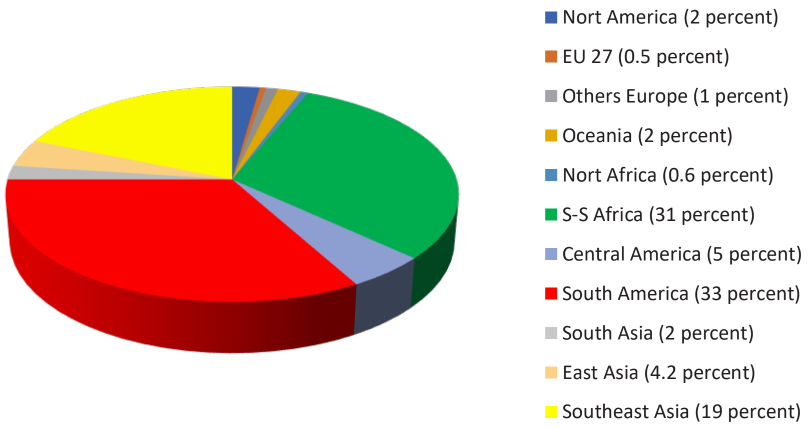


Figure 6.17. Driver Regions of Global Deforestation in 1990–2008 (Source: European Commission, 2013)

According to a European Commission (2013) study, the world lost 239 million hectares of forest due to deforestation between 1990 and 2008 (Figure 6.17). During this period, global deforestation occurred in America (40 percent), Africa (31.6 percent), and Asia (26.2 percent). The rest occurred in Europe (1.5 percent) and Oceania (2 percent).

During the same period, the main regions with deforestation worldwide were America (South America and Central America) and Africa. Around 71 percent of global deforestation occurred in these regions, whereas deforestation in Southeast Asia only represented 19 percent of the global share.

Based on the data above, Southeast Asia, the main palm oil-producing region, is clearly not the top driver of global deforestation. Deforestation in Southeast Asia only accounted for 19 percent of global deforestation, much smaller than South America (33 percent) and Africa (31.6 percent).

MYTH 6-15

Oil palm is the main commodity driving global deforestation

FACTS

The fast and revolutionary change in the palm oil industry (Byarlee et al., 2016) has led to the accusations that oil palm is the top driver of global deforestation (Wicke et al., 2008; Vijay et al., 2016; European Parliament, 2017). The attribution of deforestation to oil palm plantations is a new argument for protection against the trade of palm oil and its derivatives by the European Union and the United States.

The study by the European Commission (2013) reveals that the top four drivers of global deforestation between 1990 and 2008 were the agriculture sector (54 percent), natural hazards (17 percent), expansion of urban areas and infrastructure (4 percent), and industrial roundwood production (2 percent). These drivers are consistent with the history and drivers of global deforestation (Myth 6-13), where the demand for space for food production and residential/housing is the top driver of global deforestation.

The findings of this study are supported by an FAO report (2016) stating that the agriculture sector remains a major driver of global deforestation. Likewise, Kissinger et al. (2012) state that the direct drivers of deforestation are agricultural expansion, timber extraction and logging activities, urban expansion, and mining.

Within the agricultural expansion sector (excluding natural hazards and the unexplained factor), the commodities driving the global deforestation between 1990 and 2008 (Figure 6.18) were livestock products (24 percent), cereals (8 percent), soybeans (6 percent), roots pulses (4 percent), and other crops (4 percent).

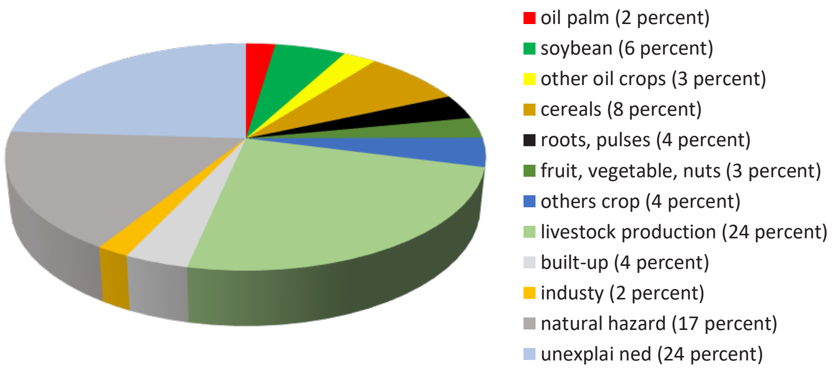


Figure 6.18. Driver Agricultural Commodities of Global Deforestation in 1990–2008 (Source: European Commission, 2013)

In terms of agricultural commodities, the expansion of cereal crops (8 percent) and soybean crops (6 percent) were the largest drivers of deforestation, whereas oil palm expansion only represented 2 percent of global deforestation. In fact, the history of four major vegetable oil expansions (Myth 2-01) also shows that the largest driver of deforestation is soybean, followed by rapeseed and sunflower. Oil palm, on the other hand, only takes a smaller share.

MYTH 6-16

Palm oil is the source of vegetable oil with the highest deforestation rate in the world

FACTS

As the four major vegetable oil crops, oil palm, soybean, rapeseed, and sunflower supply around 85-90 percent of the world's vegetable oil. According to the data from USDA (2021) and Oil World (2020), the plantation area of four major vegetable oil crops have rapidly expanded in the last 20 years (Myth 2-01).

USDA data (2021) states that an oil palm tree can produce 3.36 tons of vegetable oil per annum per hectare. Meanwhile, other vegetable oil sources are less productive than oil palms. Sunflower productivity is 0.78 tons per hectare, while rapeseed and soybean are only 0.75 tons per hectare and 0.47 tons per hectare, respectively. It shows that the productivity of oil palms per hectare was 4-7 times as high as other main vegetable oil sources (Myth 2-03). In the context of the global supply of vegetable oils, the question is, which vegetable oil crop causes the lowest levels of deforestation?

The data on their productivity has implicitly shown how extensive the deforestation caused by each source of vegetable oil is. Suppose the deforestation index is defined as the land index required to produce a ton of vegetable oil. In that case, a comparison can be made about which source of vegetable oil causes the highest levels of deforestation and which causes the lowest.

Assuming that all vegetable oils expansion leads to deforestation and using deforestation caused by palm oil as a benchmark (index=100), the deforestation indexes of soybean oil, rapeseed oil, and sunflower oil respectively are 710, 448, and 430 (Figure 6.19).

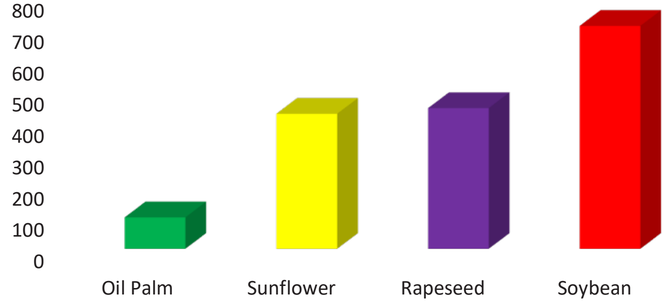


Figure 6.19. Index of Deforestation due to Oil Palm Versus Other Sources of Vegetable Oil

Using the deforestation caused by palm oil as a benchmark, the deforestation caused by soybean oil is 7.1 times higher than that of palm oil. On the other hand, the deforestation caused by rapeseed and sunflower oil is respectively 4.48 times and 4.3 times higher than palm oil.

The data above indicates that palm oil is the vegetable oil with the lowest levels of deforestation, while other vegetable oils cause higher levels of deforestation. In 2021, palm oil production accounted for 43 percent of global vegetable oil production. Thus, the deforestation index shows that 57 percent of global vegetable oils were produced from sources that cause high levels of deforestation. Only 43 percent of global vegetable oils were produced from sources that cause relatively low levels of deforestation. Suppose the global community wants to reduce deforestation in the context of vegetable oil supply. In that case, the proportion of vegetable oil production should be changed by increasing the share of palm oil production, since oil palm causes the lowest levels of deforestation.

MYTH 6-17

Indonesia has the largest peatland areas in the world that should be maintained as global carbon sinks

FACTS

Peatlands are formed when partially decayed plant materials or organic matter (biomass) decompose in waterlogged conditions, where the organic matter accumulates faster than it decomposes. Peatlands have a hydrological function because they can store a large amount of groundwater and carbon since they are composed of organic matter.

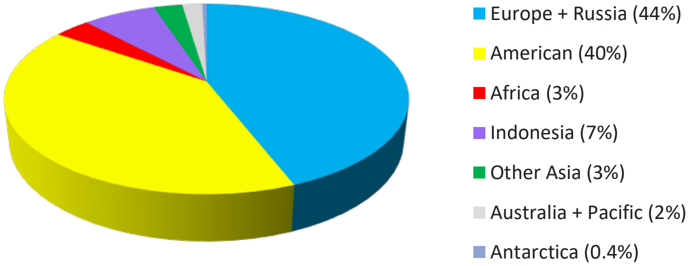


Figure 6.20. Global Distribution of Peatland in 1990–2008 (Source: Joosten, 2009; Wetlands International, 2008)

Peatlands are present in many countries, including those in the tropical and temperate zones. However, both zones have different types of peat. Based on the data from Wetlands International, the global area of peatlands are 381.4 million hectares which spread (Figure 6.20) from Europe and Russia (44 percent), America (40 percent), Africa (3 percent), Indonesia (7 percent), other Asia (3 percent), Australia and the Pacific (2 percent), and Antarctica (0.4 percent). The total peatland area by country, from the largest to the smallest, is Russia (137.5 million hectares), Canada (113.4 million hectares), the United States (22.4 million hectares), and Indonesia (18.5 million hectares).

Ritung et al. (2019) state that Indonesia has 13.4 million hectares of peatlands. The data discrepancy between Wetlands International (2018) dan Ritung et al. (2019) probably arises due to the different treatment of tidal lands, as most of them are not peatlands in Indonesia.

The data shows that Indonesia does not have the largest area of peatlands, though the country is among the top four countries with the largest area of peatlands in the world. Obviously, peatlands should be preserved through protection efforts (protected peat swamp forest) and sustainable uses (peatlands for cultivation).

MYTH 6-18

Indonesia has the highest rate of converting peatlands to farmland

FACTS

Peatlands have long been used globally for various purposes, even as early as agriculture. Rapid population growth, economic development, and increasingly limited mineral lands have led people in many countries to use peatlands for agriculture and other purposes.

Based on the data from Wetlands International (2008), most (around 80 percent) of the peatlands worldwide are used for agricultural activities, and only 20 percent as (protected) peat swamp forests. Regions that use peatlands for agriculture are Africa (65 percent), America (75 percent), Europe (67 percent), and Asia (89 percent).

The total area of peatlands used for agriculture globally is 296.3 million hectares (Figure 6.21), which are mostly located in Asia (44 percent), America (39 percent), and Europe (11 percent). The rest are in Africa (3 percent), Australia and the Pacific (2 percent), and Antarctica (1 percent). By country, Russia uses the largest area of peatlands for agriculture. Russia's area of peatlands reaches 137 million hectares, and around 94 percent (130 million hectares) are used for agriculture. The United States uses around 55 percent (12.4 million hectares) of its 22 million hectares of peatlands for agriculture.

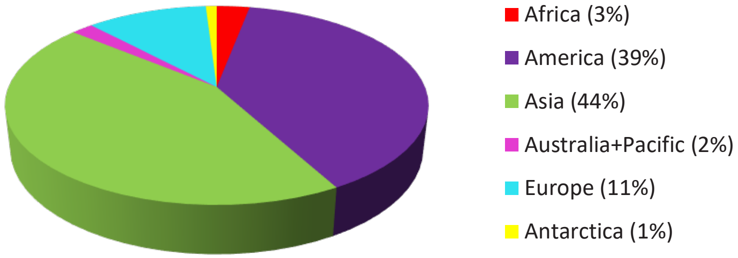


Figure 6.21. Global Distribution of Agriculture on Peatlands (Source: Joosten, 2009)

The data from Wetlands International also shows that around 12.5 million hectares of Indonesia's peatlands are secondary or degraded peatlands damaged due to conversion to farmlands and peatland fires (Joosten, 2009). The Indonesian Agency for Agricultural Research and Development in 2008 (Agus and Subiksa, 2008) stated that 6.05 million hectares of Indonesia's peatlands are used and suitable for agriculture. In line with this data, Ritung and Sukarman (2016) state that around 5.58 million hectares of Indonesia's peatlands are potential for agricultural uses. Lastly, Ritung et al. (2019) state that around 5.59 million hectares of Indonesia's peatlands are used for agriculture and plantations.

The data above shows that the peatlands are used for agriculture in almost all countries/regions with peatlands, including Indonesia. Russia and the United States are listed as countries using the largest area of peatlands for agriculture, not Indonesia.

MYTH 6-19

European Union conserve their peatlands, while Indonesia damages its peatlands

FACTS

Since early human civilization, peatlands have long been used in Europe for agriculture and other activities, including peat as a fuel source. The Fuel Peat Industry in the EU reported (VTT, 2005) that peatlands in Europe have been used for agriculture (horticulture) and as a fuel/energy (Table 6.3).

Table 6.3. Peatland Use in Europe

Peatland Use	Europe
Fuel peat resources, ktoe	1,655,500
Annual peat use, ktoe	3,635
Annual horticultural peat production, million m3	10.6
Number of peat producers	651
Number of machine and boiler manufactures	41
Number of peat-fired power plants	117
Number of people getting heating energy from peat	1,960,720
Value of domestic trade, million Euro	426
Value of international trade, million Euro	214
Employment of fuel and horticultural peat production and fuel peat use, man-years	27,760

Source: *RESEARCH REPORT VTT–R-045-48-0*

1) The number of boilers is 35 in 22 power plants in Estonia

According to the World Energy Council (2013), Europe is the world's largest consumer and producer of peat fuel. There are currently at least 117 power plants and 651 peat-producing companies across Finland, Ireland, Sweden, Estonia, Latvia, Lithuania, and other European countries. These companies use peat to produce 1.65 million ktoe of fuel to meet the energy needs of 1.96 million people.

Table 6.4. Area of Peatlands Lost in Europe and Russia

Country	Peatland Loss (ha)[1]	Peatland Loss (%)[2]
Russia	4,359,000	18
Finland	1,657,100	17
Netherlands	1,154,900	77
Denmark	872,400	87
Poland	847,200	42
Belarus	702,800	24
Sweden	437,700	6
Ukraine	334,400	30
UK	188,700	10
Switzerland	171,200	86
Total in Europe	10,725,400	21

Source:
1. Wetlands International (2010)
2. International Mire Conservation Group and International Peatland Society (2002)

Peat extraction has caused the loss of around 10.73 million hectares of peatlands across Europe (International Mire Conservation Group and International Peatland Society, 2002; Wetlands International, 2010). The largest area of peatland loss in Europe (Table 6.4) has occurred in Russia, with about 4.36 million hectares, followed by Finland (1.65 million hectares) and the Netherlands (1.15 million hectares).

The data shows that European countries have exploited peatlands while neglecting their sustainability. The total area of peatlands lost proves that Europe has failed to preserve peatlands. In contrast, with a total peatland area of only 13.4 million hectares, Indonesia utilizes 41 percent for agricultural purposes and designates the remaining 59 percent as protected peat areas.

MYTH 6-20

Oil palm plantations on peatlands increase GHG emissions

FACTS

Establishing oil palm plantations on peatlands has drawn sharp criticism from national and international environmental NGOs and activists. They consider the entire process, from clearing peatlands to cultivating oil palm on the peatlands, contributes to an increase in greenhouse gas (GHG) emissions because peatlands are rich in carbon stock. They also allege that oil palm plantations on Indonesian and Malaysian peatlands are major contributors to carbon emissions (PASPI Monitor, 2020[n]).

In fact, establishing oil palm plantations on peatlands is part of a sustainable peat restoration effort because it adopts a sustainable peatland cultivation approach. The utilization of peat depends on water management. Peat is formed in anaerobic (reductive) conditions. If drainage canals are constructed, the upper layer of peat becomes aerobic (oxidative) and easily decomposes, resulting in net CO_2 emissions. CO_2 emissions can be reduced by keeping the upper layer of peat moist (Marwanto et al., 2019).

The total CO_2 emitted from the soil surface is produced by autotrophic respiration (root respiration) and heterotrophic respiration. The amount of CO_2 released from root respiration highly depends on plant age. The CO_2 released from root respiration of a six-year-old oil palm plant is around 30 percent (Dariah et al., 2014) of total soil respiration, while that of a 14- to 15-year-old oil palm plant is around 74 percent (Sabiham et al., 2014). Plants reabsorb most of the total CO_2 emitted from the soil surface while the remainder is emitted into the atmosphere as net CO_2 emissions. The amount of CO_2 reabsorbed by plants is greater than that released from root respiration.

Oil palm plantations can increase biomass and carbon stocks in peatlands as the plants age (Chan, 2002). In line with that study, a study by Sabiham (2013) shows that the carbon stock in the upper layer of a peatland increases as the age of the oil palm plants increases. Carbon stocks in secondary peat forests amount to 57.3 tonnes per hectare, while carbon stocks in oil palm plantations aged 14-15 years reach 73 tonnes per hectare.

The campaign by anti-palm oil NGOs alleging that using peat lands for oil palm cultivation increases GHG emissions is inaccurate. On the contrary, according to various studies, using peatlands for oil palm plantations with good management can reduce peatland emissions (Table 6.5).

Table 6.5. CO_2 Emissions from Oil Palm Plantations on Peatlands According to Studies

Types of Peatland Use	**Emission (tonne sof CO_2/ha/year)**	**Researchers**
Primary peat forest	78.5	Melling et al. (2007)
Secondary peat forest	127.0	Hadi et al. (2001)
Peat oil palm plantation	57.6	Melling et al. (2007)
Peat oil palm plantation	55.0	Melling et al. (2005)
Peat oil palm plantation	54.0	Hooijer et al. (2006)
Peat oil palm plantation	54.0	Murayama & Bakar (1996)
Peat oil palm plantation	38.0	Melling & Henson (2009)
Peat oil palm plantation	31.4	Germer & Sauaerborn (2008)
Peat oil palm plantation (dry season)	16.1	Sabiham et al. (2021)
Peat oil palm plantation (wet season)	20.4	Sabiham et al. (2021)

GHG emissions from secondary peat forests (degraded peatlands) are around 127 tons of CO_2/ha/year (Hadi et al., 2001). By planting oil palm trees on peatlands, GHG emissions are reduced to 31-58 tons of CO_2/ha/year (Murayama & Bakar, 1996; Melling et al., 2005, 2007; Hooijer et al., 2006; Germer & Sauaerborn, 2008; Melling & Henson, 2009). This means converting secondary peat forests into oil palm plantations can reduce CO_2 emissions.

IPB University (Sabiham et al., 2021) conducted a more detailed study by measuring CO_2 emissions released into the atmosphere from oil palm plantations on peatlands during the dry and rainy seasons. During the dry season, the CO_2 released into the atmosphere amounts to 16.1 tons/ha/year, while the plants' absorbed amounts to 60.6 tons/ha/year, hence a Net Carbon Sink (NCS) of 54.6 tons/ha/year. During the wet season, the CO_2 released into the atmosphere from oil palm plantations on peatlands amounts to 20.4 tons/ha/year, while the oil palm trees absorbed amounts to 23.7 tons/ha/year. Thus, oil palm plantations on peatlands during the wet season serve as an NCS of 3.3 tons/ha/year.

These empirical facts are proof that the allegation against oil palm plantations on peatlands is not valid. The establishment of oil palm plantations on peatlands does not increase GHG emissions. In fact, oil palm plantations on peatlands are a net carbon sink.

MYTH 6-21

Production of palm oil causes worse biodiversity loss than that of other vegetable oils does

FACTS

The relatively rapid expansion of oil palm plantations in the past 20 years has often been accused of causing biodiversity loss (Fitzherbert et al., 2008; Koh and Wilcove, 2008; Foster et al., 2011; Savilaakso et al., 2014; Vijay et al., 2016; Austin et al., 2019; Qaim et al., 2020). The attribution of biodiversity loss to oil palm plantations has also resulted in the European Union's classification of palm oil and its derivative products as high-risk commodities.

All activities that convert forests into non-forests, whether for vegetable oil plantations, cereal farms, livestock, settlements, or others, cause biodiversity loss. Likewise, the expanded production of globally consumed vegetable oils, such as palm oil, soybean oil, rapeseed oil, and sunflower oil, also causes biodiversity loss. Therefore, it is not a matter of whether biodiversity loss is caused but rather how high the biodiversity loss is caused. Is the biodiversity loss caused by the production of palm oil higher than that by the production of soybean oil, rapeseed oil, or sunflower oil?

Beyer et al. (2020) and Beyer & Rademacher (2021) conducted a comparative study of biodiversity before and after land covers were converted to vegetable oil crops. The study used Species Richness Loss (SRL) as an indicator to measure biodiversity loss per liter of vegetable oil (Figure 6.22).

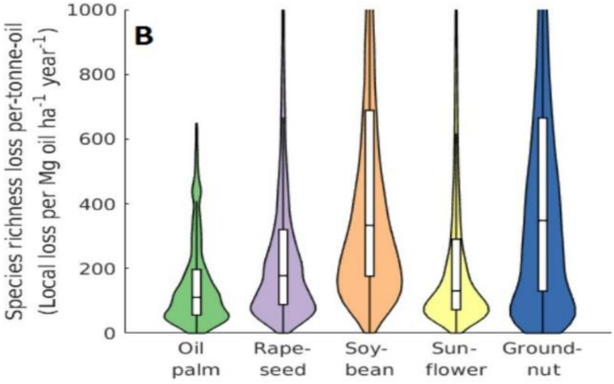


Figure 6.22. Comparison of Species Richness Loss due to Oil Palm Versus Other Vegetable Oil Crops (Source: Beyer et al., 2020; Beyer & Rademacher, 2021)

The study results revealed that the biodiversity loss driven by palm oil production was lower than that of soybean oil, peanut oil, sunflower oil, and rapeseed oil. Relative to the SRL of palm oil, the SRL index for soybean oil was 284 percent, rapeseed oil 179 percent, and sunflower oil 144 percent. This means that, with SRL as an indicator of biodiversity loss, palm oil causes the lowest biodiversity loss among vegetable oil, while soybean oil drives the highest biodiversity loss (PASPI Monitor, 2021[a]).

Understandably, the biodiversity loss due to palm oil is relatively lower compared to other vegetable oil. Oil palm plantations are developed in tropical areas rich in sunlight and water. Unlike other major vegetable oil crops (soybean, rapeseed, sunflower), which are relatively small and classified as seasonal crops, oil palm is a relatively large perennial crop with a productive life cycle of 25-30 years, grows relatively fast, and has a canopy cover of almost 100 percent, so the biodiversity in the plantation area will increase again as the trees get older.

MYTH 6-22

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

FACTS

National and international anti-palm oil NGOs, often affiliated with other vegetable oil-producing countries (palm oil competitors), have been attacking the national palm oil industry by accusing oil palm plantations of causing forest and land fires in Indonesia. The issue is framed and then spread worldwide through various media outlets, such as newspapers, television, radio, and social media platforms. The global community is heavily focused on Indonesia's forest and land fires as if the phenomenon is specific only to Indonesia. Therefore, looking at empirical data on forest and land fires in Indonesia and other countries is necessary.

Forest and land fires are detrimental regardless of which country they occur and what causes them. They cause health problems for surrounding communities, biodiversity loss, air pollution, and economic losses. Therefore, they must be prevented as much as possible. In fact, forest and land fires occur in many countries and are part of the global climate change phenomenon (Myth 6-02).

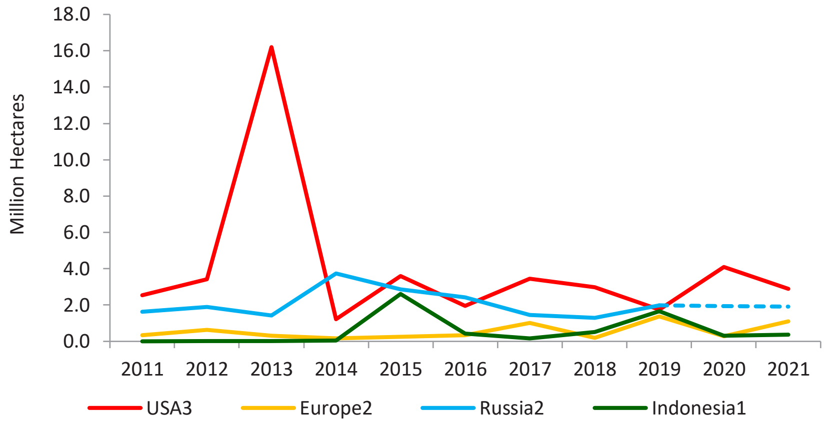


Figure 6.23. Comparison of Average Area of Forest Fires in Different Countries (Source: [1]Ministry of the Environment and Forestry, [2]European Forest Fire Information System (EFFIS), [3]National Interagency Fire Center (NIFC))

During 2011-2021 (Figure 6.23), the average area of forest and land fires per year in the US was the largest compared to that in Europe and even Indonesia. The average area of forest and land fires per year in the US was around 4 million hectares, while it was around 2 million hectares in Russia and around 0.5 million hectares both in Indonesia and Europe. The biggest forest and land fires generally occur during El Niño. Strong El Niño hit

Indonesia in 2015 and 2019 (PASPI Monitor, 2020[j]; Harsoyo & Athohilah, 2022).

It appears that forest and land fires in developed and developing countries are not necessarily related to forest and land management. The facts above show that advanced technology and equipment, good management, disciplined government bureaucracy, substantial funds, and strong national ethos of the developed countries, such as the US and European countries, cannot prevent forest and land fires. Other variables are still beyond human control.

Even the forest and land fires that have occurred so far are not necessarily related to the presence or absence of certain commodities, such as oil palm. Developed countries, such as the US, European countries, and Russia, do not have oil palm plantations, but forest and land fires there are relatively bigger than in Indonesia.

MYTH 6-23

Oil palm leads to worse water/soil pollution than other vegetable oil crops

FACTS

The world's three main vegetable oil crops are palm, soybean, and rapeseed, have different agronomic characteristics. Oil palm is a large tropical perennial vegetable oil plant with a productive life cycle of 25-30 years and high oil productivity. In contrast, soybean and rapeseed are generally sub-tropical seasonal crops with low oil productivity relative to oil palm.

Oil production from these plants uses inputs, including nitrogen (N) and phosphate (P_2O_5) fertilizers and pesticides. FAO data (2013) shows that the volume of fertilizers and pesticides used to produce one tonne of oil from the three crops varies (Table 6.6).

For every tonne of oil produced, soybean uses more nitrogen and phosphate fertilizers and pesticides than rapeseed and oil palm do. The amount of fertilizers and pesticides used for rapeseed is also greater than for oil palm. Overall, oil palm is the vegetable oil crop that uses the least amount of fertilizers and pesticides per tonne of oil produced.

Plants do not fully absorb fertilizers and pesticides applied to plants. Some portions are wasted as emissions or soil and water pollutants.

Inorganic nitrogen fertilizer is a source of NO_2 emissions in agriculture (FAO, 2020; PASPI Monitor, 2020[a]; Olivier et al., 2022).

Table 6.6. Comparison of Inputs and Pollutants Used to Produce One Ton of Vegetable Oil

Indicator	Palm Oil	Soybean Oil	Rapeseed Oil
Use of Production Inputs			
N (kg/ton of oil)	47	315	99
P_2O_5 (kg/ton of oil)	8	77	42
Pesticide/Herbicide (kg/ton of oil)	2	29	11
Water/Soil Pollution			
N (kg/ton of oil)	5	32	10
P_2O_5 (kg/ton of oil)	2	23	13
Pesticide/Herbicide (kg/ton of oil)	0.4	23	9

Source: FAO (2013)

For every ton of oil produced (Table 6.6), the amount of pollutants from fertilizer and pesticide residues in soybean is greater than in rapeseed and oil palm. Among the three vegetable oil crops, oil palm produces the least pollutants from the fertilizers and pesticides used.

The data above shows that the source of vegetable oil that produces the least amount of pollutants is palm oil, followed by rapeseed and soybean. In supplying world vegetable oil, the ideal first best condition is to choose vegetable oil plants with zero pollutants. Unfortunately, there is almost no process for producing vegetable oil on this earth with zero pollutants from fertilizers and pesticides. Therefore, the available option is a vegetable oil that produces minimal pollutants, namely palm oil.

MYTH 6-24

Oil palms need much water and cause drought

FACTS

Oil palm is often accused of being a plant that consumes a lot of water, so the development of oil palm plantations is rumored to have caused drought in the areas concerned. Such rumor is deliberately spread massively and intensively to build an opinion that droughts in various parts of the world result from the development of oil palm plantations.

The phenomenon of drought in various parts of the world is part of the impact of global climate change (Myth 6-02). The total area of global oil palm plantations in 2021 was only around 25 million hectares or 0.16 percent of the world's total land area, which is highly insignificant to affect the world's ecosystems. Droughts in Europe, America, Africa, and other parts of the world are unrelated to oil palm plantations. Like other sectors, the world's oil palm plantations are also a victim of drought rather than a cause.

All plants need water. The amount of water needed depends on various factors, including the size of the plant. Larger plants need more water than smaller plants. However, small plants are not necessarily more water-efficient than large ones. It is necessary to use proportional (apple-to-apple) indicators to compare objectively.

Coster (1938) observed the amount of water the plants need using evapotranspiration as an indicator (Figure 6.24). The study found that bamboo and river tamarind are among the plants that consume the most water at around 3,000 mm per year. Acacia uses 2,400 mm of water per year, chinese albizia 2,300 mm per year, pine, and rubber trees about 1,300 mm per year, respectively. Oil palm only needs about 1,104 mm of water per year.

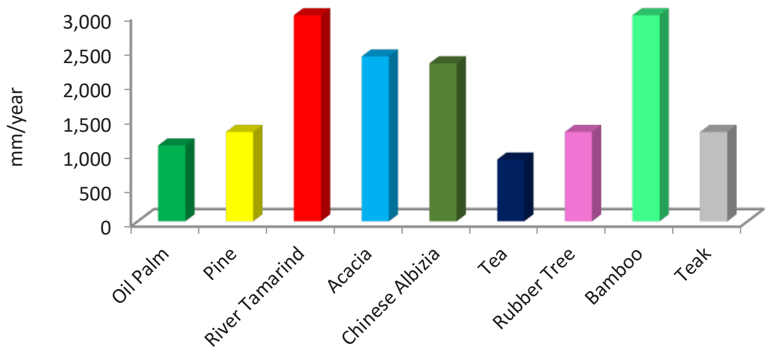


Figure 6.24. Comparison of Water Requirement of Oil Palm Versus Other Crops Based on Evaporation Level (Source: Coster, 1938)

In terms of rainwater utilization, Pasaribu et al. (2012) found that rainwater used by oil palm plantations accounts for 40 percent of the annual rainfall (Figure 6.25). This percentage is lower than mahogany (58 percent) and pine (65 percent).

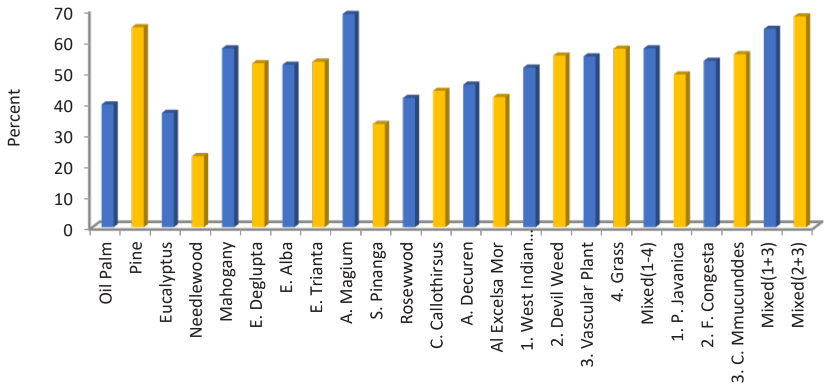


Figure 6.25. Percentage of Annual Rainfall Volume Used by Oil Palm Versus Forest Plants (Source: Pasaribu et al., 2012)

Pine, acacia, and chinese albizia have been popular as forest plants in reforestation programs and industrial tree plantations. These forest plants apparently consume a relatively large amount of water. Oil palm, which has been accused of consuming much water, ironically requires far less water than these forest plants, even compared to the rubber tree.

Apart from evapotranspiration, a comparison of water requirements for agricultural commodities can also use the water footprint as an indicator. Water footprint can be defined as the total volume of freshwater used by agricultural commodities to produce a product.

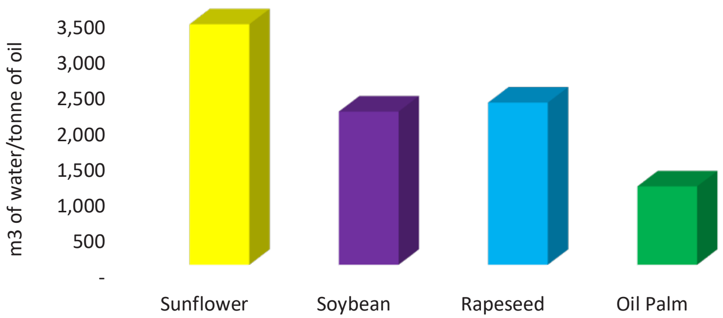


Figure 6.26. Comparison of Water Footprint of Oil Palm Versus Other Vegetable Oil Crops (Source: Mekonnen & Hoekstra, 2010)

The vegetable oil crop with the largest water footprint (Figure 6.26) is sunflower (3,366 m^3 per ton), followed by rapeseed (2,271 m^3 per ton) and then soybean (2,145 m^3 per ton). Meanwhile, the water footprint of oil palm is only 1,098 m^3 per ton, the lowest among the world's major vegetable oil crops (Mekonnen & Hoekstra, 2010; Safitri et al., 2018).

These studies show that oil palm is relatively water-efficient compared to forest plants and the world's other main vegetable oil crops. These empirical facts disprove the rumor that has been spread by anti-palm oil NGOs and their networks in many countries that oil palm consumes a lot of water.

Not only does oil palm consume less water, but it also has a mechanism to conserve soil and water. Oil palm comes from Africa, where water is limited, enabling the plant to save water. Oil palm has an ecophysiological adaptation system through a layered morphological structure of leaf sheaths (Turner & Gilbanks, 1974; Harahap, 2006; Harry et al., 2016) and a massive, broad, and deep fibrous root system that serves as a natural biopore system (Harahap, 2007; Harianja, 2009).

The biopores increase in number as the plant ages. Natural biopores play a role in increasing the capacity of oil palm to absorb/hold water by increasing rainwater infiltration into the soil, thereby reducing water run-off, and storing water reserves in the soil.

With such a morphological structure, oil palm can conserve water and store water reserves, so it does not cause water scarcity. Research by Allen et al. (1998) and by Rusmayadi (2011) revealed that the water-holding capacity of oil palm plantations is better than that of rubber plantations. Hence, the soil water content in oil palm plantations is higher than in rubber plantations.

Referring to the concept of multifunctional agriculture (Huylenbroeck et al., 2007), oil palm plantations have the blue function/service or hydrological conservation function (Harahap, 2007). The hydrological function attached to oil palm plantations is shown by the two natural mechanisms of oil palm are the root system and leaf sheath structure as described above.

The function of conserving soil and water in oil palm plantations is demonstrated by the structure of the layered leaf sheaths so that they can cover almost 100 percent of the land (canopy cover) at maturity. Such a structure of the leaf sheath protects the soil from the direct blows of rainwater, thereby minimizing soil erosion due to water run-off.

The hydrological conservation function of oil palm plantations is relatively the same as that of forests (Table 6.7). Indicators of evapotranspiration, groundwater reserves, rainwater infiltration volume, infiltration rate, and air humidity (microclimate) in oil palm plantations and tropical rainforests are relatively the same.

Table 6.7. Comparison of Water Management between Oil Palm Plantations and Tropical Forests

Indicator	Tropical Forest	Oil Palm Plantation
Evapotranspiration (mm/year)	1,560-1,620	1,610-1,750
Groundwater reserve up to 200 cm depth (mm)	59-727	75-739
Rainwater infiltration volume (%)	85	87
Rainwater infiltration rate into 0-40 cm solum depth (ml/cm^3/minute)	30-90	10-30
Humidity (%)	90-93	85-90

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

From the description above, oil palm is relatively water efficient, conserves soil and water, and preserves the hydrological cycle. Such a function lasts quite a long time, around 25 years, from when the oil palm is planted until it is replanted.

MYTH 6-25

Palm oil biofuel needs more water than other biofuel crops

FACTS

Water use in the agricultural sector is a topic of global discussion. Global water consumption has increased almost sevenfold over the past century (Gleick, 2000). Agriculture is the sector with the largest global consumption of fresh water, with an 85 percent share (Hoekstra & Chapagain, 2007).

In this regard, palm oil is also often rumored to be a biofuel feedstock that is not environmentally friendly because it consumes a lot of water for each output produced. Is this accusation true?

To answer this critical question, it is necessary to look at a comparative empirical study on water use to produce one gigajoule (GJ) of bioenergy. A study by Gerbens-Leenes et al. (2009) revealed that oil palm is the lowest (after sugarcane) in water consumption for every GJ of bioenergy produced (Figure 6.27).

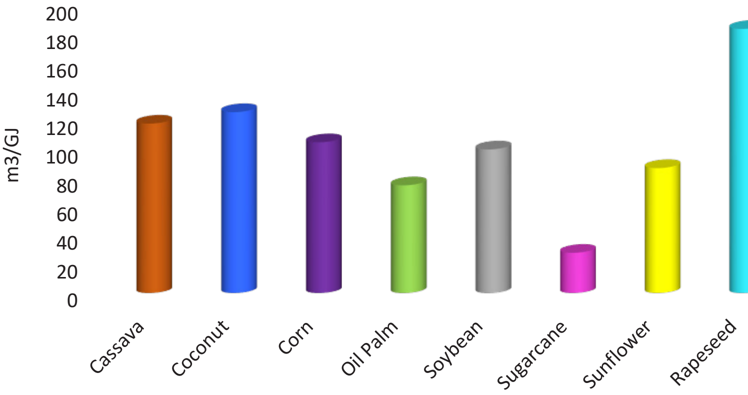


Figure 6.27. Average Water Needs to Produce Each Gigajoule of Bioenergy (Source: Gerbens-Leenes et al., 2009)

The most water-consuming bioenergy-producing crop is rapeseed, followed by coconut, cassava, corn, soybean, and sunflower. To produce one gigajoule of bioenergy, rapeseed requires 184 m^3 of water. Meanwhile, coconut requires around 126 m^3 of water. As an ethanol-producing plant, cassava needs approximately 118 m^3 of water. Meanwhile, soybean consumes an average of 100 m^3 of water. Sugarcane and oil palm are the most efficient regarding water consumption per gigajoule of bioenergy produced. Based on the above data, oil palm is relatively water-efficient in producing bioenergy. For every gigajoule of bioenergy produced, oil palm only uses 75 m^3 of water.

MYTH 6-26

Oil palm plantations lead to soil infertility

FACTS

With common sense alone, it's easy to understand that any plant on this earth preserves the environment. There is no single theory that says certain plants harm the environment. The government and environmental activists have long promoted planting a million trees. Arab countries dominated by deserts are even trying to be green by planting date palm trees, among others.

Since 1911, Indonesia has established oil palm plantations in various regions, such as Pulo Raja (Asahan, North Sumatra), Tanah Itam Ulu (Batubara, North Sumatra), and Sei Liput (Aceh). For 111 years, these oil palm plantations have remained the same instead of turning into deserts. The accusation that oil palm plantations create barren land is related to the accusation that oil palm depletes water and causes drought (Myth 6-24).

Many studies have proven that biomass is an important component of soil fertility in oil palm plantations. Through photosynthesis, carbon from the earth's atmosphere is absorbed by oil palm plantations. Then, through biosequestration, it is stored in the biomass of oil palm trees (above-ground biomass) and the roots (under-ground biomass) as soil organic and inorganic carbon.

Chan (2002) estimated that the above-ground biomass and carbon stocks resulting from carbon sequestration in oil palm plantations ranged from 5.8 tons per hectare (in immature plantations) to 45.3 tons per hectare (in plantations aged 20-24 years), with an average of 30 tons of carbon per hectare (Table 6.8).

Table 6.8. Volume of Biomass and Carbon Stocks in Oil Palm Plantations

Age (year)	**Biomass Stock (tonne/ha)**	**Carbon Stock (tonne/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 (2002)

In immature plantations, the volume of biomass was recorded at around 14.5 tonnes per hectare, then continued to increase to about 113 tonnes per hectare at 19-24 years. Most of the biomass returns to the oil palm plantation area during the cultivation and replanting periods to add organic matter to the land, thereby increasing soil fertility.

Kusumawati et al. (2021) found that a one-year-old oil palm plantation contained a carbon stock of 43.5 tons per hectare, while a 28-year-old oil palm plantation had a carbon stock of 74.7 tons per hectare. Khasanah (2019) study also revealed that the average carbon stock in above-ground biomass in Indonesian oil palm plantations reached 40 tons per hectare.

The biomass content increased not only in the above-ground biomass but also in the below-ground biomass in the rhizosphere, namely in the biopores of oil palm roots (Figure 6.28).

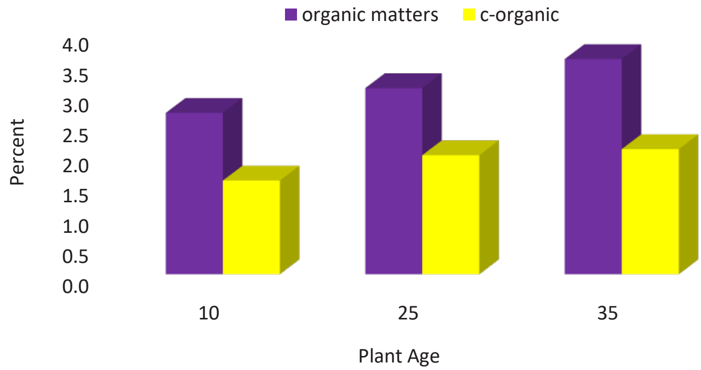


Figure 6.28. Content of Organic and C-Organic Matters in Oil Palm's Root Zone Increases as Its Ages (Source: Harianja, 2009)

Besides increasing biomass, soil fertility is maintained through fertilization based on plants' age and productivity. Planting legume cover crops during the cultivation of immature crops (0-4 years) also serves to increase soil fertility (Prawirosukarto et al., 2005; Yasin et al., 2006). With the biomass of oil palm plantations increasing and being returned to the soil, coupled with the soil and water conservation function and good fertilization, it is almost impossible for an oil palm plantation land to decrease in fertility, let alone become a desert.

MYTH 6-27

Forests can harvest solar energy better than oil palm plantations do

FACTS

Oil palm plantations are a connecting link between solar energy and humans. Through photosynthesis in oil palm, photon energy from the sun is harvested and stored in the form of chemical energy as palm oil and biomass.

A comparison of oil palm plantations' and forests' ability to harvest solar energy is shown in Table 6.9. Oil palm plantations are relatively superior to forests based on the indicators of photosynthetic efficiency, radiation conversion efficiency, incremental biomass, and dry matter productivity. On the other hand, forests are relatively superior in terms of leaf area index and total biomass stock. Therefore, oil palm plantations are superior to forests in harvesting solar energy.

Table 6.9. Effectiveness of Solar Energy Harvesting in Oil Palm Plantations and Tropical Forests

Indicator	Tropical Forest	Oil Palm Plantation
Leaf area index	7.3	5.6
Photosynthetic efficiency (%)	1.73	3.18
Radiation conversion efficiency (g/mj)	0.86	1.68
Total biomass in the area (tonne/ha)	431	100
Incremental biomass (tonne/ha/year)	5.8	8.3
Dry matter productivity (tonne/ha/year)	25.7	36.5

Source: IOPRI (2004, 2005)

In terms of the efficiency of energy production, the amount of carbon dioxide absorbed, and the amount of oxygen produced, oil palm plantations are better than forests. However, in terms of capacity to store biomass and carbon stocks, forests are better than oil palm plantations.

MYTH 6-28

"No Palm Oil" and "Palm Oil Free" movements, and "Phase-out" and "Deforestation-free" policies are aimed at global environmental conservation

FACTS

In the past twenty years, the association of palm oil with environmental issues (deforestation, biodiversity loss, emissions, and pollution) has intensified, giving rise to the anti-palm oil or "No Palm Oil" movement. The movement is driven by NGOs and their networks in developed countries, such as members of the European Union, the United States, and others. These NGOs have even urged using the "Palm Oil Free" label on the packaging of palm oil-based products, such as food, toiletry, and other products (PASPI, 2015; Kumar et al., 2015). The use of this label aims to shape public opinion that discredits palm oil so that global consumers will reduce or even stop consuming palm oil-based products.

They have also intensified lobbying to influence and force government policies to restrict or even eliminate palm oil in global trade. The European Union issued a phase-out policy in RED II and ILUC to eliminate palm oil as feedstock for biofuels in its 2020-2030 renewable energy policy (PASPI Monitor, 2019[c,h]; Suharto et al., 2019). The European Union also adopted a Regulation on Deforestation-Free Commodities/Products or a "Deforestration-free" policy which will come into force in 2023. This policy follows the existing policies, including the US FOREST Act of 2021 and the UK Environment Act of 2021 (PASPI Monitor, 2022[b,e,i]).

The "No Palm Oil" and "Palm Oil Free" movements, as well as the "Phase-out" and "Deforestation-free" policies, aim to create a "World Without Palm Oil". Can a "World Without Palm Oil" reduce global deforestation, biodiversity loss, GHG emissions, and soil and water pollution? It is necessary to consider the following to answer this question.

According to USDA data, the total world production/consumption of palm oil reached 75.5 million tonnes in 2021. In a "World without Palm Oil", the global community will have to find a substitute for palm oil with a volume of 75.5 million tonnes per year from other vegetable oil sources, such as soybean, rapeseed, and sunflower (Table 6.10). Referring to the total area and productivity in 2021 (USDA, 2022), soybean, rapeseed, and sunflower plantations in these vegetable oil-producing countries need to be expanded if the "World without Palm Oil" scenario is to be implemented.

The "World with Palm Oil" (P0) was the actual condition in 2021, where the total area of the world's four vegetable oil plantations reached 221.3 million hectares with a total vegetable oil production of 186.8 million tons. Meanwhile, the "World without Palm Oil" (P1) is a hypothetical scenario in the absence of palm oil. To produce 186.6 million tons of world vegetable oil under scenario S1, the global community will have to increase the production of soybean oil, rapeseed oil, and sunflower oil proportionally by 55 percent, 25 percent, and 20 percent, respectively.

Table 6.10. Global Deforestation Increases without Palm Oil in the World

Description	World with Palm Oil (P0)	World without Palm Oil (P1)	Increased Global Deforestation
Plantation (million hectares)			
Soybean	130.0	218.3	88.3
Rapeseed	37.8	63.4	25.7
Sunflower	28.4	47.7	19.3
Oil Palm	25.1	-	-
Total	221.3	329.4	133.2
Vegetable oil production (million tons)	186.8	186.8	

Source: PASPI (2022)

Under scenario S1, soybean plantations will expand globally from 130 million to 218.3 million hectares, rapeseed plantations from 37.8 million to 63.4 million hectares, and sunflower plantations from 28.4 million to 47.7 million hectares. Thus, the total area of the three vegetable oil plantations under scenario S1 will reach 329.4 million hectares.

The difference between the total area of vegetable oil plantations under scenario S1 and scenario S0 is 133.2 million hectares. This means that global deforestation due to the replacement of palm oil in the "World without Palm Oil" will increase to 133.2 million hectares from the expansion of soybean plantations (88.3 million hectares), rapeseed plantations (25.7 million hectares), and sunflower plantations (19.3 million hectares).

The data in the table above shows that replacing palm oil with other vegetable oil sources will increase global deforestation to 133.2 million hectares. Wouldn't a "World without Palm Oil" lead to an expansion of global deforestation?

A "World without Palm Oil" would result not only in an expansion of global deforestation. Referring to Myth 6-21, the increase in deforestation would increase biodiversity loss. This means that global vegetable oil supplies in a "World without Palm Oil" would be sourced from vegetable oil crops with higher biodiversity loss.

In addition, referring to Myth 6-08, a "World without Palm Oil" would also increase carbon emissions. This means that global vegetable oil supplies in a "World without Palm Oil" would be sourced from vegetable oil crops with higher emissions. This is very ironic because there is a movement to force the global supply of vegetable oils from higher-emission crops. In contrast, the global community struggles to reduce emissions in every area of life.

A "World without Palm Oil" would increase deforestation, biodiversity loss, emissions, and land and water pollution. Referring to Myth 6-23, substituting palm oil for soybean and/or rapeseed oil is equivalent to supplying global vegetable oils from crops with more pollutants from fertilizer and pesticide residues.

The illustration above shows that the "World without Palm Oil" created by the "No Palm Oil" and "Palm Oil Free" movements, as well as the "Phase-out" and "Deforestation-free" policies would worsen the global environment due to increased deforestation, biodiversity loss, emissions, land, and water pollutants. Diverting global consumers from palm oil to other inferior vegetable oils in terms of environmental impacts would harm the global community and reduce the quality of the global environment.

MYTH 6-29

Oil palm plantations are the main driver of forest land use conversion in Indonesia

FACTS

The accusation that oil palm plantations are the main driver of forest land use conversion (deforestation) has often been thrown by researchers (Thiollay, 1999; Donald, 2004; Dumbrell and Hill, 2005; Pacienca and Prado, 2005; Benayas et al., 2007; Steveson and Aldana, 2008; Koh and Wilcove, 2008; Byarlee et al., 2016; Vijay et al., 2016).

The definitions of forest and deforestation are still being debated globally (Myth 6-12). The starting point for deforestation, the administrative and technical definitions of deforestation, and other matters related to deforestation have not yet been agreed upon internationally. In fact, almost no country has explicitly banned deforestation.

Deforestation has been a common phenomenon as urban development progresses in all countries since thousands of years ago (Myth 6-13 and Myth 6-14). The deforestation trend in a country follows its urban development. In Europe, deforestation started before the 17th century. Meanwhile, deforestation in America took place from 1620 to 1950. In the tropics, deforestation begun around the 19th century. No country in the world, including Indonesia, has escaped deforestation.

Deforestation has occurred in Indonesia since the British, Dutch, and Japanese colonial eras and has continued into the current development era (PASPI, 2014; Santosa et al., 2020). As in every country, forest conversion is a way to meet the need for space for development. Population growth and development expansion in all sectors, especially to meet the need for food and space.

Indonesia's land area is 187.8 million hectares. Before 1950 (including the colonial period), deforestation had reached 25.5 million hectares (Figure 6.29). Indonesia's forest area in 1950 was 162.3 million hectares. Then, deforestation of 68.1 million hectares occurred from 1950-1985. Meanwhile, the expansion of oil palm plantations during the same period was only around 0.6 million hectares or only 0.9 percent of the total area of deforestation.

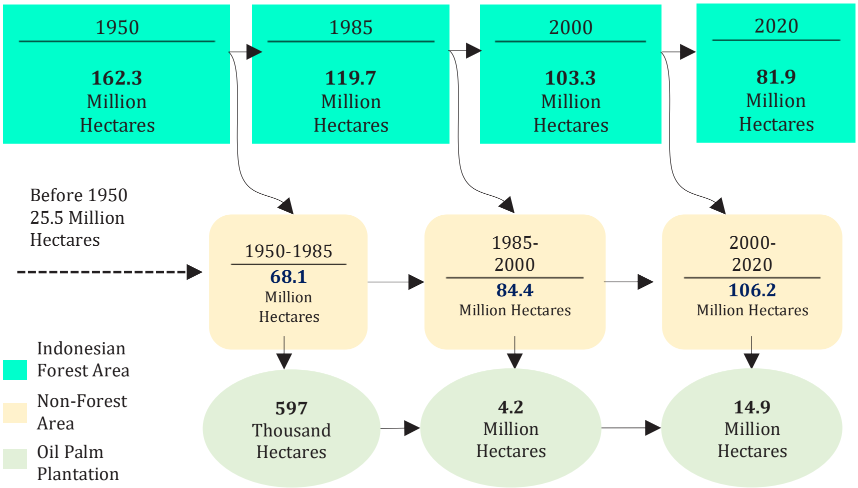


Figure 6.29. History of Total Forest and Deforestation Areas in Indonesia (Source: Hanibal, 1950; PASPI, 2014; PASPI Monitor, 2020c; Santosa et al., 2020; Ministry of Environment and Forestry, 2021; Ministry of Agriculture, 2021)

Deforestation in Indonesia started during the colonial era and intensified during the New Order era (PASPI Monitor, 2020[c]). During the New Order (1969-2000), the Ministry of Forestry uncontrollably issued massive logging permits as reflected in the number and extent of forest concession rights granted to logging companies (Pagiola, 2000; Kartodihardjo and Supriono, 2000). The total area of forest concession rights granted during the New Order 61.7 million hectares in 1993 and 69.4 million hectares in 2000 (Ministry of Forestry, 2014). Meanwhile, it was estimated that around 95 million hectares of production forest (as determined by TGHK, 1984) had unrecorded logging activities during the New Order.

Along with the increasing need for space, the conversion of forest land use in Indonesia also increased cumulatively to 106.2 million hectares during 1950-2020. Among others, lands with ex-forest concession rights were used for settlement and agricultural development purposes in the transmigration program (Tjondronegoro, 2004).

Thus, until 2020, the conversion of forest land use in Indonesia had reached 106.2 million hectares or around 57 percent of Indonesia's total land area. Meanwhile, during the same period, the Oil Palm Plantation Statistics recorded that the total area of Indonesian oil palm plantations was only 14.9 million hectares (Ministry of Agriculture, 2021). This means that of the 106.2 million hectares of deforestation, only 14 percent of the area turned into oil palm plantations. The remaining 86 percent was used for residential, urban, infrastructure, and agricultural purposes. It should be noted that most of the land used for oil palm plantations is not directly from forest conversion, but from forest conversion to shrubs or degraded land before being converted into oil palm plantations (Santosa, 2019; Roda, 2019).

The data above proves that oil palm plantations are not Indonesia's main driver of deforestation. Land use for oil palm plantations until 2020 had only reached 14 percent of the total area of forest conversion since the colonial era. In fact, the total area of Indonesia's oil palm plantations was only 8 percent of Indonesia's total land area.

MYTH 6-30

Oil palm plantations in Indonesia result from forest conversion (deforestation)

FACTS

The narrative that the expansion of oil palm plantations in Indonesia results directly from forest conversion is often used by anti-palm oil NGOs in their negative campaigns. Koh and Wilcove (2008) study also stated that at least 67 percent of Indonesian oil palm plantations resulted from primary and secondary forest conversion. A study by Fitzherdbert et al. (2008) also claimed that the expansion of Indonesian oil palm plantations in 1990-2015 was the result of around 16 percent conversion of forests to oil palm plantations. It appears that the definition of forest used in the studies by Koh and Wilcove (2008) and by Fitzherdbert et al. (2008) is unclear and different from that used in Indonesia.

To clarify this narrative, it is necessary to trace the origins of oil palm plantations in Indonesia (PASPI Monitor, 2021 [ab]). Land in Indonesia is divided into 22 types of ecosystems, including undisturbed upland forest and bare soil, of which only four types are categorized as forest (Gunarso et al., 2012; Suharto et al., 2019; Santosa et al., 2020).

A study on the origins of oil palm plantations in Indonesia was carried out by Gunarso et al. (2013) for the 1990-2010 period and continued by Suharto et al. (2019) for the 2010-2018 period (Figure 6.30). The study used land use change data from satellite imagery released by the Planning Agency of the Ministry of Environment and Forestry.

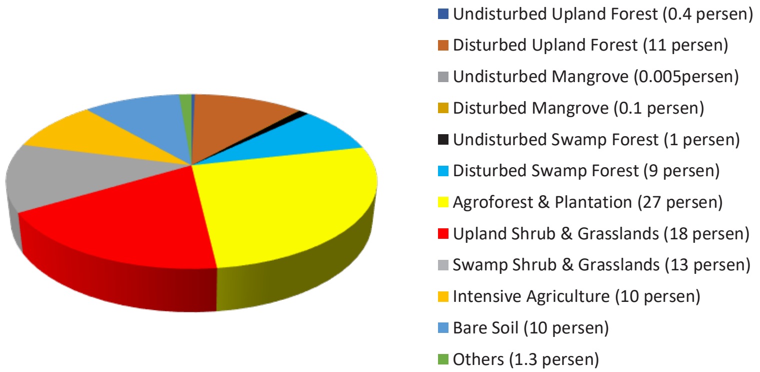


Figure 6.30. Origins of Oil Palm Plantation Lands in Indonesia in 1990-2018 (Source: Gunarso et al., 2013; Suharto et al., 2019)

The diagram above shows that the largest land used for the expansion of oil palm plantations in Indonesia during the 1990-2018 period was degraded land at 61.6 percent. Degraded land includes the categories of upland shrub & grassland, swamp shrub & grassland, disturbed swamp forest, disturbed upland forest, bare soil, and others.

The second largest source of land for Indonesian oil palm plantations was agricultural/plantation land at 37 percent, which includes intensive agriculture, plantation, and agroforestry categories. The remaining 1.4 percent was undisturbed upland forest, undisturbed swamp forest, and undisturbed mangroves.

The data above shows that most of Indonesia's oil palm plantations (98.6 percent) did not originate from primary forest conversion or deforestation. Likewise, studies by Erniwati et al. (2017), Sunkar et al. (2018), Roda (2019), and Santosa et al. (2020) revealed that deforestation in Indonesia did not have a direct positive correlation with the expansion of oil palm plantations.

MYTH 6-31

Oil palm plantations in Indonesia increasingly cause degraded land socially, economically, and ecologically

FACTS

Most of the land for oil palm plantations in Indonesia originates from degraded land in remote, peripheral, isolated, and underdeveloped areas, most of which are ex-logging lands (critical lands). Ex-logging lands that turn into scrublands are not only socially, economically, and ecologically degraded, but also poor and underdeveloped.

The presence of oil palm plantations restores such areas socially, economically, and ecologically. Economically degraded lands gradually turn into oil palm plantations. They grow into new economic centers in local areas (Myth 3-06), increasing smallholders' income (Myth 3-11) and regional economic growth (Myth 3-08), thereby contributing to National GDP (Myth 3-07), and become a source of foreign export exchange (Myth 3-19) to improve the trade balance (Myth 3-20) and increase government revenue (Myth 3-21).

Oil palm plantations also socially restore the areas by creating job opportunities (Myth 4-03), thereby reducing rural (Myth 4-06) and national poverty (Myth 4-04). In addition, the presence of oil palm plantations also increases community access to infrastructure (Myth 4-08) as well as social (Myth 4-13), educational (Myth 4-10), and health facilities (Myth 4-11).

Oil palm plantations also restore the areas ecologically. The presence of oil palm plantations revitalizes the ecology of the land degraded by logging activities and forest and land fires. In addition, oil palm plantations restore ecological functions, such as carbon sinks (Myth 6-09), land fertilization (Myth 6-26), soil and water conservation, and the hydrological cycle (Myth 6-24).

MYTH 6-32

Biodiversity loss in Indonesia is caused by the development of oil palm plantations

FACTS

In addition to clearing tropical forests, the expansion of Indonesian oil palm plantations is also often accused of threatening wildlife habitat, thereby causing biodiversity loss (Fitzherbert et al., 2008; Koh and Wilcove, 2008; Wicke et al., 2011). News by anti-palm oil NGOs in Indonesia and abroad often report that wild animals, especially protected animals (such as orangutans or *mawas*, Sumatran tigers, Sumatran elephants) are threatened with extinction due to the expansion of oil palm plantations in Indonesia. They usually attribute the threat from wildlife habitat to the expansion of oil palm plantations. Is this accusation true?

Indonesia is unlike Europe and North America which cleared all their primary forests during the early stages of development, so they no longer have virgin forests as homes for wild animals and another biodiversity (Myth 7-04). Therefore, Europe and North America are working on the reforestation of former agricultural lands.

Indonesia has long determined that a minimum of 30 percent of the land is maintained as virgin forests, including protected and conservation forests. The forests are protected virgin forests. This policy is regulated by Law No. 41 of 1999 on Forestry; Law No. 5 of 1990 on Conservation of Living Resources and Their Ecosystems, Law No. 26 of 2007 on Spatial Planning; and Law No. 11 of 2020 on Job Creation.

In general, of the total area of cultivation rights granted by the government to corporations, only around 60 percent is used for oil palm plantations. The remaining 40 percent is used for High Conservation Value (HCV)/High Carbon Stock (HCS), employee housing, offices, and public and social facilities. The HCV and HCS areas are intended for conserving biodiversity and living resources in plantation cultivation areas.

In addition to cultivation areas, the largest areas for biodiversity and living resource conservation are protected forests and conservation forests. In general, protected and conservation forests protect and house wild animals (such as orangutans or *mawas*, Sumatran tigers, elephants, horned rhinoceros, Komodo dragons, etc.) and another biodiversity. In addition, protected and conservation forests also protect nature and preserve high carbon stocks.

Biodiversity conservation in Indonesia consists of in-situ and ex-situ conservation. In situ conservation is carried out in natural habitats in the form of protected forests and conservation forests (virgin forests). Ex-situ biodiversity conservation is maintaining flora and fauna in artificial habitats (resembling natural ones) outside their habitats in the form of forest parks and zoos.

The functions of protected/conservation forests in Indonesia (Table 6.11) are divided into strict nature reserves and wildlife sanctuaries. Moreover, there are nature conservation areas, which consist of national parks, nature recreational parks, grand forest parks, and hunting parks.

Table 6.11. Functions of High Conservation Value (HCV) of Protected and Conservation Forests in Indonesia

No.	Conservation Area by Function	Amount (unit)	Area (hectares)
1	Strict Nature Reserve	212	4,178,626
2	Wildlife Sanctuary	80	4,895,320
3	National Park	54	16,247,460
4	Nature Recreational Park	133	798,323
5	Grand Forest Park	36	373,089
6	Hunting Park	11	171,821
7	Nature Reserve Area/Nature Conservation Area	34	384,294
Total		560	27,048,933

Source: Ministry of The Environment and Forestry, 2021

In addition to protected and conservation areas, the laws above regulate the allocation of cultivation areas that can be utilized for community activities in the agricultural/plantation, production forest, mining, urban, residential, and other sectors. Oil palm plantations in Indonesia are among the sectors developed by the community in cultivation areas or outside protected and conservation forests.

Based on the description above, the preservation of native tropical biodiversity in Indonesia is still well-maintained. The expansion of commercial economic sectors, including oil palm plantations, is carried out in cultivation areas, not forest areas.

MYTH 6-33

Biodiversity in oil palm plantations is scanty

FACTS

Oil palm tree has minimal tillage and weeding, no ratoons, tall trees with relatively large diameters, and almost 100 percent canopy cover at maturity. Oil palm tree grow and are productive over a 25-30 year life cycle.

During land clearing or planting, some fauna biodiversity may migrate to the surrounding area but will return to the oil palm plantation later. With a production cycle (life span) of 25-30 years, oil palm plantations are possible to grow biodiversity (except for large mammals) as the trees grow older (PASPI Monitor, 2021[a]).

Empirical studies (Erniwati et al., 2017; Santosa et al., 2017; Santosa & Purnamasari, 2017; Suharto et al., 2019) reveal that the types of biodiversity in mature oil palm plantations (Table 6.12) are not necessarily less than those in the lands before being converted into oil palm plantations (ecosystem benchmark) and in the surrounding forested areas (High Conservation Value/HCV).

The studies reveal that the types of biodiversity in oil palm plantations are not necessarily less than those in the ecosystem benchmark and those in the HCV area. In fact, oil palm plantations in several research location areas increased the number of biodiversity species, such as herpetofauna and butterflies, compared to the number of biodiversity species in the ecosystem benchmark and HCV area.

An oil palm plantation ecosystem consists of several habitat types, such as young, medium-aged, and old-aged oil palm trees, shrubs, and the HCV area that remains forested. These diverse habitats are areas for the growth and development of flora and fauna in the oil palm plantations ecosystem. This also shows that biodiversity in oil palm plantations is not necessarily lower than in forested lands.

Table 6.12. Comparison of the Number of Biodiversity Types in Oil Palm Plantations, Ecosystem Benchmark, and HCV

Taska / Ecosystem	North Sumatra	Riau	South Sumatra	West Kalimantan	Central Kalimantan	West Sulawesi
MAMMAL						
Benchmark*	2-4	0-7	3	0-4	0-3	0-2
Oil Palm Plantation	3-5	0-5	4	3-4	1-4	1
HCV	2-4	2-6	4	3-7	3-6	3
BIRD						
Benchmark*	12-21	9-32	35	7-26	13-30	12-36
Oil Palm Plantation	17	14-21	26	11-19	9-22	17-33
HCV	10-24	9-27	33	14-23	17-33	20-22
HERPETOFAUNA						
Benchmark*	7-9	3-13	11	2-13	4-12	4-5
Oil Palm Plantation	9-14	6-16	18	7-12	9-13	3-11
HCV	6-7	2-11	6	4-11	9-15	6
BUTTERFLY						
Benchmark*	17-22	11-29	14	3-21	5-19	10-23
Oil Palm Plantation	13-23	12-31	30	11-20	14-28	10-19
HCV	10-19	9-22	12	6-26	15-37	12
PLANT						
Benchmark*	51-66	25-120	8	31-71	5-22	25-53
Oil Palm Plantation	61-75	55-59	N/A	16-61	N/A	31-39
HCV	73-85	8-129	15	34-99	6-51	45-50

Source: Erniwati et al. (2017), Santosa et al. (2017), Santosa & Purnamasari (2017), Suharto et al. (2019)

In addition, biodiversity is preserved in the cultivation system of oil palm plantations. During the planting and cultivation of immature crops, legume cover crops, such as *Calopogonium sp*., *Pueraria sp., Mucuna sp., Centrosema sp.*, are also planted between oil palms (Prawirosukarto et al., 2005; Yasin et al., 2006; PASPI Monitor, 2021[l]).

Oil palm smallholders additionally develop several types of integration, such as integrating oil palms and food crops during the immature period (Partohardjono, 2003; Singerland et al., 2019; Baihaqi et al., 2020;

Kusumawati et al., 2021), as well as oil palms and cattle during the mature period (Batubara, 2004; Sinurat et al., 2004; Ilham & Saliem, 2011; Utomo & Widjaja, 2012; Winarso & Basuno, 2013). Both types aim to increase oil palm plantations biodiversity. Thus, such biodiversity in oil palm plantations during land clearing may decrease but will increase again as the oil palm plantations age.

MYTH 6-34

Oil palm plantations dominate space use and cause biodiversity loss in Sumatra

FACTS

Sumatra is the starting point for oil palm plantations establishment in Indonesia. Currently, Sumatra is still the main center of Indonesian oil palm plantations, with a share of around 63 percent of the total area of oil palm plantations in Indonesia. In this regard, anti-palm oil NGOs have alleged that the establishment of oil palm plantations has also destroyed the habitat of native Sumatran flora and fauna.

The establishment of oil palm plantations in Sumatra has followed the management based on Indonesian government regulations, which allocate forest areas and regulate the establishment of oil palm plantations outside forest areas. Sumatra's land area is 47.2 million hectares, of which 22.6 million hectares or 48 percent is used for forest areas (forested and non-forested) (Table 6.13).

Table 6.13. Land Use in Sumatra

Land Use	Thousand Hectares	Percent
Protected Area		
Conservation Forest[a]	5,063.20	10.73
Protected Forest[a]	5,604.10	11.88
Cultivation Area		
Limited Production Forest[a]	2,835.20	6.01
Production Forest[a]	7,369.50	15.62
Convertible Production Forest[a]	1,731.00	3.67
Forest Sub-total	22,603.00	47.90
Oil Palm Plantation[b]	7,945	16.84
Other Sectors	16,643	35.27
Land Total	47,190.20	100.00

Source: [a]Ministry of the Environment and Forestry (2021); [b]Ministry of Agriculture (2021)

Meanwhile, the area of oil palm plantations in Sumatra is 7.9 million hectares, or only about 17 percent of the land area of Sumatra. In other words, the largest land use in Sumatra is for forest areas and not for oil palm plantations.

According to national policy, the forested areas are "home" for native biodiversity. The biodiversity conservation area in Sumatra in the form of protected and conservation forests is 10.7 million hectares. The area is used for in-situ and ex-situ conservation across various provinces. In-situ biodiversity conservation takes the form of National Parks in Sumatra (Table 6.14).

Table 6.14. List of National Parks and Biodiversity Priorities in Sumatra

Name	Area (km^2)	Priority Plant/Animal
Batang Gadis	1,080	Rafflesia, tropical pitcher plant, Sumatran tiger, clouded leopard, tapir, siamang, sun bear
Berbak	1,627	Meranti, rattan, nibung, orchid, Sumatran tiger, sun bear, agile gibbon, clouded leopard, tapir, crocodile
Bukit Barisan Selatan	3,650	Rafflesia, umbrella-leafed palm, tropical pitcher plant, Sumatran orangutan, siamang, slow loris, Sumatran tiger, sun bear, Sumatran elephant, Sumatran rhinoceros, tapir, crocodile
Bukit Duabelas	605	Meranti, kempas, jelutong, kauri, rattan, clouded leopard, mouse-deer, sun bear, muntjac, slow loris, Sumatran tiger, sambar, hornbill
Bukit Tigapuluh	1,277	Tiger face mushroom (*Rafflesia hasseltii*), umbrella-leafed palm (*Johannesteijsmannia altifrons*). Titan arum, agarwood, Sumatran tiger, agile gibbon, siamang, tapir, Sumatran orangutan, Asian golden cat
Gunung Leuser	7,927	Rafflesia, umbrella-leafed palm, tropical pitcher plant, Sumatran orangutan, siamang, slow loris, Asian golden cat, sun bear, Sumatran rhinoceros, tapir, crocodile
Kerinci Seblat	13,750	Rafflesia, titan arum, orchid, Sumatran tiger, Sumatran elephant, tapir, sun bear, Sumatran rhinocero, Asian golden cat, black hornbill
Sembilang	2,051	Coastal She-oak, nipa palm, mangrove, Sumatran tiger, Asian golden cat, Sumatran elephant, tapir, siamang, dolphin
Siberut	1,905	Orchid, siamang, Mentawai langur, Pagai macaque, Mentawai scops owl

Source: Suharto et al., 2019

Table 6.14. List of National Parks and Biodiversity Priorities in Sumatra (Continued)

Name	Area (km^2)	Priority Plant/Animal
Tesso Nilo	1,000	Orchid, tropical pitcher plant, kempas, agarwood, jelutong, Sumatran tiger, Sumatran elephant, clouded leopard, sun bear, tapir, black hornbill, rhinoceros hornbill, false gharial
Way Kambas	1,300	Api-api, Sonneratia, nipa palm, pandan, Sumatran elephant, Sumatran rhinoceros, Sumatran tiger, siamang, sea turtle, crocodile, lesser adjutant
Zamrud	315	Monkey tamarind, punak, bastard poon tree, ramin, Sumatran tiger, sun bear, agile gibbon, napu, hornbill
Gunung Maras	168	Cratoxylum glaucum, meranti, orchid, tropical pitcher plant, kanchil, napu, junglefowl, eagle

Source: Suharto et al., 2019

An example is North Sumatra Province. It is the starting point for establishing oil palm plantations in Indonesia, and still the "home" to its native biodiversity (Table 6.15), consisting of (a) 3 National Parks covering an area of 1.26 million hectares; (b) 5 Strict Nature Reserves covering an area of 16.5 thousand hectares; and (c) 4 Wildlife Sanctuaries covering an area of 83.6 thousand hectares.

Table 6.15. In-Situ Biodiversity Conservation in North Sumatra

Name	Area (hectares)	Biodiversity
National Park		
Gunung Leuser	1,094,692	**Flora,** including: Umbrella-leafed palm (*Johannesteijsmannia altifrons*), rafflesia (*R. atjehensis* and *R. micropylora*), *Rhizanthes zippelnii*, etc. **Fauna,** including: Sumatran orangutan (*Pongo abelii*), Sumatran elephant (*Elephas maximus sumatranus*), Sumatran tiger (*Panthera tigris sumatrae*), Sumatran rhinoceros (*Dicerorhinus sumatrensis*), sambar (*Rusa unicolor*), sun bear (*Helarctos malayanus*), lar gibbon (*Hylobates lar*), siamang (*Shimphalangus sindactilus*), long-tailed macaque (*Macaca fascicularis*), Sunda pig-tailed macaque (*Macaca nemestrina*), serow (*Capricornis*), leopard (*Panthera pardus*), rhinoceros hornbill (*Buceros rhinoceros*), etc.

Source: Ministry of the Environment and Forestry

Table 6.15. In-Situ Biodiversity Conservation in North Sumatra (Continued)

Name	Area (hectares)	Biodiversity
Batang Gadis	108,000	**Flora,** including: Rafflesia (*R. atjehensis* and *R. micropylora), Ixora paludosa Kurz.*, etc. **Fauna,** including: Sumatran tiger (*Panthera tigris sumatrae*), serow (*Capricornis*), Malayan tapir (*Tapirus-indicus*), sun bear (*Helarctos malayanus*), deer (*Cervidae*), muntjac (*Muntiacini*), long-tailed macaque (*Macaca fascicularis*), siamang (*Symphalangus syndactylus*), African golden cat (*Caracal aurata*), clouded leopard (*Neofelis nebulosa*), etc
Bukit Barisan Grand Forest Park	51,600	**Flora,** including: Sumatran pine (*Pinus merkusii*), needlewood tree (*Schima wallichii*), rasamala (*Altingia excelsa*), gemor (*Alseodaphne sp.*), *Podocarpus sp.*, suren toon (*Toona sureni*), etc. **Fauna,** including: Lar gibbon (*Hylobates lar*), brahminy kite (*Haliastur indus*), hornbill (*Buceros sp.*), green junglefowl (*Gallus varius*), , etc.
Strict Nature Reserve		
Batu gajah	0.89	**Flora,** including: Sumatran pine (*Pinus merkusii*), blackboard tree (*Alstonia scholaris*), sugar palm (*Arenga pinnata*), etc. **Fauna,** including: Musang (*Paradoxurus hermaphroditus*), treeshrew (*Scandentia*), wild boar (*Sus scrofa*), ape (*Hominoidea*), spotted dove (*Spilopelia chinensis*), imperial pigeon (*Ducula*), sooty-headed bulbul (*Pycnonotus aurigaster*), etc.
Batu Ginurit	0.48	**Flora,** including: Rattan (*Calamus ciliaris*, *C. exilis*), etc. **Fauna,** including: Timor deer (*Cervus Timorensis*), Sunda pig-tailed macaque (*Macaca nemestrin*), wild boar (*Sus scrofa*), squirrel (*Sciuridae*), imperial pigeon (*Ducula*), bat (*Chiroptera*), etc.
Dolok Saut Surungan	39	**Flora,** including: Suren toon (*Toona sureni Merr.),* etc. **Fauna,** including: Wild boar (*Sus scrofa*), Timor deer (*Cervus Timorensis*), siamang (*Symphalangus syndactylus*), serow *(Capricornis)*, hornbill (*Bucerotidae)*, imperial pigeon *(Ducula),* etc.
Dolok Sibualbuali	5,000	**Flora,** including: *Rafflesia sp.,* etc. **Fauna,** including: Orangutan (*Pongo*), mouse-deer (*Tragulus*), Southern red muntjac (*Muntiacus muntjak*), Sunda pangolin (*Manis javanica*), sun bear (*Helarctos malayanus*), siamang (*Symphalangus syndactylus*), marbled cat (*Pardofelis marmorata*), wreathed hornbill (*Rhyticeros undulatus*)*,* scops owl (*Otus*), etc.

Source: Ministry of the Environment and Forestry

Table 6.15. In-Situ Biodiversity Conservation in North Sumatra (Continued)

Name	Area (hectares)	Biodiversity
Dolok Sipirok	6,970	**Flora,** including: *Rafflesia sp.*, etc. **Fauna,** including: Orangutan (*Pongo*), mouse-deer (*Tragulus*), Southern red muntjac (*Muntiacus muntjak*), Sunda pangolin (*Manis javanica*), sun bear (*Helarctos malayanus*), siamang (*Symphalangus syndactylus*), marbled cat (*Pardofelis marmorata*), wreathed hornbill (*Rhyticeros undulatus*), scops owl (*Otus*), etc.
Dolok Tinggi Raja	167	**Flora,** including: Dark red meranti (*Shorea acuminata*), canary (*Serinus canaria*), Rattan (*Calamus ciliaris, C. exilis*), orchid (*Orchidaceae*), tropical pitcher plant (*Genus nepenthes*), etc.
		Fauna, including: Sumatran tiger (*Panthera tigris sumatrae*), Java mouse-deer (*Tragulus javanicus*), Southern red muntjac (*Muntiacus muntjak*), Timor deer (*Cervus timorensis*), serow *(Capricornis)*, siamang (*Symphalangus syndactylus*), bear (*Ursidae)*, etc.
Lubuk Raya	3,050	**Flora,** including: *Rafflesia sp.*, Sumatran pine (*Pinus merkusii*), etc. **Fauna,** including: Mouse-deer (*Tragulus*), Sunda pangolin (*Manis javanica*), sun bear (*Helarctos malayanus*), siamang (*Symphalangus syndactylus*), Sunda wrinkled hornbill (*Rhabdotorrhinus corrugatus*), etc.
Martelu Purba	195	**Flora,** including: Meranti (*Shorea sp.*), etc. **Fauna,** including: Tiger (*Panthera tigris*), serow *(Capricornis)*, banded pig (*Sus scrofa vittatus*), bear (*Ursidae)*, etc.
Strict Nature Reserve		
Sei Ledong	1,100	Flora, fauna, and natural fortress
Liang Balik	0.31	**Flora,** including: Weeping fig (*Ficus benjamina*), dark red meranti (*Shorea platyclados*), mayang (*Payena acuminata*), haundolok *(Eugenia sp.*), darah-darah (*Horsfieldia sp.*), tempinis (*Sloetia elongata*), medang *sp.*), etc. **Fauna,** including: Siamang (*Symphalangus syndactylus*), agile gibbon (*Hylobates agilis*), Bengal cat (*Felis bengalensis*), marbled cat (*Pardofelis marmorata*), long-tailed macaque (*Macaca fascicularis*), spotted giant flying squirrel (*Petaurista elegans*), three-striped ground squirrel (*Lariscus insignis*), Sunda squirrel (*Sundasciurus sp.*), green pit viper (*Trimeresurus sp.*), Bornean river turtle (*Orlitia borneensis*), banded pig (*Sus scrofa vittatus*), eagle (*Accipitridae sp.*), great hornbill (*Buceros bicornis*), black-naped oriole (*Oriolus chinensis*), woodpecker (*Dinopium sp.*), white-rumped shama, sheath-tailed bat (*Emballonura sp.*), Asian water monitor (*Varanus salvator*), masked palm civet (*Paguma larvata*), etc.

Source: Ministry of the Environment and Forestry

Table 6.15. In-Situ Biodiversity Conservation in North Sumatra (Continued)

Name	Area (hectares)	Biodiversity
Sibolangit	9.15	**Flora,** including: Angsana (*Pterocarpus indicus*), tamanu (Calophyllum inophyllum), meranti (*Shorea sp.*), etc. **Fauna,** including: Banded pig (*Sus scrofa vittatus*), Java mouse-deer (*Tragulus javanicus*), Sunda pangolin (*Manis javanica*), bear cuscus (Ailurops), hornbill (*Bucerotidae*), etc.
Wildlife Sanctuary		
Barumun	40,062	**Flora,** including: *Dipterocarpaceae*, including species such as Damar hitam (*Shorea multiflora*), dark red meranti (*Shorea acuminata*), Sumatran Ru (*Casuarina sumatrana*), Sumatran pine (*Pinus merkusii*), sampinur bunga (Dacrycarpus imbricatus), sampinur tali (*Dacrydium junghuhnii*), etc. **Fauna,** including: Sumatran tiger (*Panthera tigris sumatrae*), Sumatran elephant (*Elephas maximus sumatranus*), hornbill (*Bucerotidae*), siamang (*Symphalangus syndactylus*), Malayan tapir (*Tapirus indicus*), etc.
Dolok Surungan	21,540	**Flora,** including: Anturmangun (*Casuarina sp.*), mayang (Palaquium sp.), haundolok (*Eugenia sp.*), medang (*Manglietia sp.*), etc. **Fauna,** including: Timor deer (*Cervus timorensis*), banded pig (*Sus scrofa vittatus*), Sumatran tiger (*Panthera tigris sumatrae*), etc.
Karang Gading	13,670	**Flora,** including: Bakau minyak (*Rhizophora apiculata*), lenggadai (*Bruguiera parviflora*), blind-your-eye mangrove (*Excoecaria agallocha*), cannonball mangrove (*Xylocarpus granatum*), nipa palm (*Nypa fruticans*), etc. **Fauna,** including: Long-tailed macaque (*Macaca fascicularis*), silvery lutung (*Presbytis cristata*), common kingfisher (*Alcedo atthis*), etc.
Siranggas	8,366	**Flora,** including: Hoting (*Quercus sp.*), meang (*Palaquium sp.*), plum pine (*Podocarpus sp.*), dammara (*Agathis sp.*), durian (*Durio zibethinus*), mango (*Mangifera sp.*), saptree (*Garcinia sp.*), etc. **Fauna,** including: Sumatran tiger (*Panthera tigris sumatrae*), Timor deer (*Cervus timorensis*), Java mouse-deer (*Tragulus javanicus*), bear (*Ursidae*), Sunda pangolin (*Manis javanica*), etc.

Source: Ministry of the Environment and Forestry

Likewise, Riau, the province with the largest area of oil palm plantations in Indonesia, is still a home for its native biodiversity (Table 6.16), consisting of (a) 2 National Parks covering an area of 243.1 million hectares; (b) 3 Strict Nature Reserves covering an area of 20.7 thousand hectares; and (c) a Wildlife Sanctuary.

Table 6.16. In-Situ Biodiversity Conservation in Riau

Name	Area (hectares)	Biodiversity
National Park		
Bukit Tigapuluh	143,143	**Flora,** including: Tiger face mushroom (*Rafflesia hasseltii*), umbrella-leafed palm (*Johannesteijsmannia altifrons*), mapua (*Pinanga multiflora*), dragon's blood (*Daemonorops draco*), rattan (*Calamus ciliaris*, *C. exilis*), pinang bancung (*Nenga gajah*), climbing bauhinia (*Phanera kockiana*), yellow meranti (*Shorea peltata*), kapundung (*Baccaurea racemosa*), longjack (*Eurycoma longifolia*), agarwood (*Aquilaria malaccensis*), Jelutong (*Dyera costulata*), getah merah (*Palaquium spp.*), blackboard tree (*Alstonia scholaris*), honey bee tree (*Koompassia excelsa*), rumbai (*Shorea spp.*), medang (*Litsea sp.*, *Dehaasia sp.*), kulit sapat (*Parashorea sp.*), bayur (*Pterospermum javanicum*), kayu kelat (*Eugenia sp.*), matoa (*Pometia pinnata*), etc. **Fauna,** including: White-handed gibbon (*Hylobates lar*), black-handed gibbon (*Hylobates agilis*), siamang (*Symphalangus syndactylus*), Sunda pig-tailed macaque (*Macaca nemestrina*), long-tailed macaque (*Macaca fascicularis*), silvery lutung (*Presbytis cristata*), black-crested Sumatran langur (*Presbytis melalophos*), Sunda slow loris (Nycticebus coucang), Sumatran tiger (*Panthera tigris sumatrae*), clouded leopard (*Neofelis nebulosa*), Bengal cat (*Felis bengalensis*), marbled cat (*Pardofelis marmorata*), musang (*Paradoxurus hermaphroditus*), Malayan civet (*Viverra tangalunga*), banded palm civet (*Hemigalus derbyanus*), etc.
Tesso Nilo	100,000	**Flora,** including: Wild almond (*Irvingia malayana*), kempas (*Koompassia malaccensis*), jelutong (*Dyera costulata*), kulim (*Scorodocarpus borneensis*), tembusu (*Fagraea fragrans*), agarwood (*Aquilaria malaccensis*), ramin (*Gonystylus bancanus*), tamarind-plum (*Dialium sp.*), meranti (*Shorea sp.*), keruing (*Dipterocarpus sp.*), etc. **Fauna,** including: Sumatran elephant (*Elephas maximus sumatranus*), Sumatran tiger (*Panthera tigris sumatrae*), Sunda pangolin (*Manis javanica*), Timor deer (*Cervus timorensis*), long-tailed macaque (*Macaca fascicularis*), etc.
Strict Nature Reserve		
Pulau Berkey	500	**Flora,** including: Mangrove (*Rhizophora*), api-api putih (*Avicennia alba*), pidada (*Sonneratia sp.*), rattan (*Calamus ciliaris*), cicada tree (*Ploiarium alternifolium*), etc. **Fauna,** including: White-bellied sea eagle (*Haliaeetus leucogaster*), greater coucal (*Centropus sinensis*), collared kingfisher (Halcyon chloris), scarlet-headed flowerpecker (*Dicaeum trochileum*), wild boar (*Sus scrofa*), long-tailed macaque (*Macaca fascicularis*), East Javan langur (*Trachypithecus auratus*), banded krait (*Bungarus fasciatus*), mangrove snake (*Boiga dendrophila*), etc.

Source: Ministry of the Environment and Forestry

Table 6.16. In-Situ Biodiversity Conservation in Riau (Continued)

Name	Area (hectares)	Biodiversity
Bukit Bungkuk	20,000	**Flora,** including: Meranti (*Shorea sp.*), bintangur (Calophyllum spp.), kempas (*Koompassia malaccensis Maing*), keruing (*Dipterocarpus sp.*), gutta-percha (*Palaquium gutta*), durian (*Durio sp.*), kulim (*Scorodocarpus borneensis*), suntai (*Palaquium walsurifolium*), rengas (*Gluta renghas*), etc. **Fauna,** including: Sun bear (*Helarctos malayanus*), Sumatran tiger (Panthera tigris sumatrae), Timor deer (*Cervus timorensis*), Java mouse-deer (*Tragulus javanicus*), long-tailed macaque (*Macaca fascicularis*), red junglefowl (*Gallus gallus*), chameleon (*Colates spp.*), siamang (*Symphalangus syndactylus*), etc.
Pulau Burung	200	**Flora,** including: Mangrove (*Rhizophora*), deer-pig (*Babyrousa*), etc. **Fauna,** including: Blue-crowned hanging parrot (*Loriculus galgulus*), Natuna Island surili (*Presbytis natunae*), humphead wrasse (*Cheilinus undulatus*), etc.
Wildlife Sanctuary		
Balai Raja Wildlife Sanctuary	18,000	**Flora,** including: Meranti (*Shorea sp.*), bintangur (*Calophyllum spp.*), gutta-percha (*Palaquium gutta*), kempas (*Koompassia malaccensis Maing*), giam (*Cotylelobium flavum dipterocarpaceae*), tropical pitcher plant (*Nepenthes*), etc. **Fauna,** including: Sumatran elephant (*Elephas maximus sumatranus*), Sumatran tiger (*Panthera tigris sumatrae*), sunbear (*Helarctos malayanus*), etc.
Bukit Batu	21,500	**Flora,** including: Ramin (*Gonystylus bancanus*), agarwood (*Aquilaria malaccensis*), light red meranti (*Shorea leprosula*), etc. **Fauna,** including: Sumatran elephant (*Elephas maximus sumatranus*), Sumatran tiger (*Panthera tigris sumatrae*), wrinkled hornbill (*Aceros corrugatus*), etc.
Tasik Belat	2,529	**Flora,** including: Ramin (*Gonystylus bancanus*), meranti (*Shorea sp.*), punah (*Tetramerista glabra*), kempas (*Koompassia malaccensis Maing*), bintangur (*Calophyllum spp.*), etc. **Fauna,** including: Sun bear (*Helarctos malayanus*), Sumatran tiger (*Panthera tigris sumatrae*), etc.
Danau Pulau Besar–Bawah	28,238	**Flora,** including: Ramin (*Gonystylus bancanus*), meranti (*Shorea sp.*), kempas (*Koompassia malaccensis Maing*), punah (*Tetramerista glabra*), terentang *(Campnosperma auriculatum),* bintangur (*Calophyllum spp.*), blackboard tree (*Alstonia scholaris*), rengas (*Gluta renghas*), etc. **Fauna,** including: Lesser adjutant (*Leptoptilos javanicus*), Wallace's hawk-eagle (*Nisaetus nanus*), Sumatran elephant (*Elephas maximus sumatranus*), Sumatran tiger (*Panthera tigris sumatrae*), Malayan

Source: Ministry of the Environment and Forestry

Table 6.16. In-Situ Biodiversity Conservation in Riau (Continued)

Name	Area (hectares)	Biodiversity
Tasik Besar–Metas	3,200	**Flora,** including: Ramin (*Gonystylus bancanus*), meranti (*Shorea sp.*), suntai (*Palaquium walsurifolium*), punah (*Tetramerista glabra*), etc. **Fauna,** including: Sun bear (*Helarctos malayanus*), Sumatran tiger (*Panthera tigris sumatrae*), long-tailed macaque (*Macaca fascicularis*), Sunda pig-tailed macaque (*Macaca nemestrina*), whistling duck (*Dendrocygninae*), etc.
Kerumutan	120,000	**Flora,** including: Meranti (*Shorea sp.*), punah (*Tetramerista glabra*), nipa palm (*Nypa fruticans*), rengas (*Gluta renghas*), etc. **Fauna,** including: Sumatran tiger (*Panthera tigris sumatrae*), clouded leopard (*Neofelis nebulosa*), sun bear (Helarctos malayanus), Javan gibbon (Hylobates moloch), etc.
Tasik Tanjung Padang	4,925	**Flora,** including: Meranti (*Shorea sp.*), geronggang (*Cratoxylum arborescens*), suntai (*Palaquium walsurifolium*), punah (*Tetramerista glabra*), etc. **Fauna,** including: Sunda pangolin (*Manis javanica*), musang (*Paradoxurus hermaphroditus*), rhinoceros hornbill (*Buceros rhinoceros*), green pigeon (*Treron*), lutung (*Trachypithecus*), saltwater crocodile- (*Crocodylus porosus*), lesser adjutant (*Leptoptilos javanicus*), etc.
Bukit Rimbang-Baling	136,000	**Fauna,** including: Sumatran tiger (*Panthera tigris sumatrae*), clouded leopard (*Neofelis nebulosa*), Malayan tapir (*Tapirus indicus*), deer (*Cervidae*), siamang (*Symphalangus syndactylus*), napu (*Tragulus napu*), sun bear (*Helarctos malayanus*), etc.
Tasik Serkap-Sarang Burung	6,900	**Flora,** including: Ramin (*Gonystylus bancanus*), suntai (*Palaquium walsurifolium*), kempas (*Koompassia malaccensis Maing*), etc. **Fauna,** including: Sun bear (*Helarctos malayanus*), Sunda pangolin (*Manis javanica*), long-tailed macaque (*Macaca fascicularis*), hornbill (*Bucerotidae*), whistling duck (*Dendrocygninae*), etc.

Source: Ministry of the Environment and Forestry

The description above shows that oil palm plantations establishment in Sumatra only uses around 17 percent of the total land area of Sumatra. Meanwhile, the forest area is still around 48 percent of the total land area of Sumatra. Therefore, there is still adequate opportunity for in-situ or ex-situ biodiversity conservation as well as other forms of resource conservation.

MYTH 6-35

Oil palm plantations dominate space use and cause biodiversity loss in Kalimantan

FACTS

Kalimantan Island, also known as Borneo, is blessed with the largest tropical rainforest in Southeast Asia. Its tropical forests are the world's lungs and habitat to various flora and fauna. Biodiversity richness in Kalimantan's tropical forests even compares to the Amazon forests (Central Kalimantan Provincial Government, 2015).

Oil palm plantations are also established on this island. Oil palm plantations' establishment here is relatively recent compared to Sumatra. Still, the four provinces on this island (West Kalimantan, Central Kalimantan, East Kalimantan, and South Kalimantan) are among the top-10 oil palm center provinces in Indonesia. With its rapid development, oil palm plantations in Kalimantan are often the target of rumors spread by anti-palm oil NGOs regarding the loss of habitat for biodiversity.

To counter this accusation, looking at the distribution of land use in Kalimantan is necessary. Its land area is 53 million hectares, of which 36.5 million hectares or 77.4 percent is used for forest areas (forested and non-forested) (Table 6.17).

Table 6.17. Land Use in Kalimantan

Land Use	Thousand Hectares	Percent
Protected Area		
Conservation Forest[a]	4,956.30	10.50
Protected Forest[a]	7,031.60	14.90
Cultivation Area		
Limited Production Forest[a]	10,621.70	22.51
Production Forest[a]	10,793.70	22.87
Convertible Production Forest[a]	3,104.50	6.58
Forest Sub-total	36,507.80	77.36
Oil Palm Plantation[b]	5,820.41	12.33
Other Sectors	10,729.49	22.74
Land Total	53,057.70	112.43

Source: [a]Ministry of the Environment and Forestry (2021); [b]Ministry of Agriculture (2021)

Meanwhile, the oil palm plantations area in Kalimantan is 5.82 million hectares or only about 12.3 percent of the island's area. In other words, the largest land use in Kalimantan is for forest areas and not for oil palm plantations.

A national policy stated that 12 million hectares of land in Kalimantan have been designated as a "home" for biodiversity in the form of protected and conservation forests. The area is used for in-situ and ex-situ native biodiversity conservation across West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, and North Kalimantan. In-situ biodiversity conservation takes the form of National Parks in Kalimantan (Table 6.18).

Table 6.18. List of National Parks and Biodiversity Priorities in Kalimantan

Name	**Area (km²)**	**Priority Plant/Animal**
Betung Kerihun	8,000	*Musa lawitiensis, Neouvaria acuminatissima, Castanopsis inermis,* clouded leopard, flat-headed cat, sun bear, sambar, Bornean orangutan, helmeted hornbill
Bukit Baka Bukit Raya	1,811	Rafflesia, orchid, sun bear, Bornean orangutan, sambar, Asiatic linsang, mouse-deer
Danau Sentarum	1,320	Light red meranti, jelutong, ulin, proboscis monkey, Bornean orangutan, crocodile, arowana
Gunung Palung	900	Jelutong, ramin, ulin, black orchid, proboscis monkey, Bornean orangutan, sun bear, rhinoceros hornbill
Kayan Mentarang	13,605	Blackboard tree, jelutong, ramin, ulin, agarwood, clouded leopard, sun bear, proboscis monkey, tarsius, Hose's langur, hornbill
Kutai	1,986	Rafflesia, orchid, sun bear, sambar, slow loris, proboscis monkey, Bornean orangutan, white-bellied sea eagle
Sebangau	5,687	Ramin, jelutong, proboscis monkey, Bornean orangutan, sun bear, clouded leopard, tarsius, hornbill
Tanjung Puting	4,150	Orchid, tropical pitcher plant, meranti, agarwood, ramin, Bornean orangutan, proboscis monkey, clouded leopard, dugong, arowana

Source: Suharto et al., 2019

For example, East Kalimantan still serves as a home for its native biodiversity (Table 6.19) consisting of: (a) 2 National Parks covering an area of 1.5 million hectares; (b) 2 Strict Nature Reserves covering an area of 178.5 thousand hectares; and (c) 1 Wildlife Sanctuary with an area of 103 thousand hectares.

Table 6.19. In-Situ Biodiversity Conservation in East Kalimantan

Name	Area (hectares)	Biodiversity
National Park		
Kayan Mentarang	1,306,500	**Flora,** including: Orchid (*Orchidaceae*), rattan (*Calamus ciliaris*), etc. **Fauna,** including: Hornbill (*Bucerotidae*), great argus-(*Argusianus argus*), Bulwer's pheasant (*Lophura bulweri*), banteng (*Bos javanicus*), sun bear (*Helarctos malayanus*), etc.
Kayan Mentarang Kutai	198,629	**Flora,** including: Ulin (*Eusideroxylon zwageri*), longjack (*Eurycoma longifolia*), mangrove (*Rhizophora*), orchid (*Orchidaceae*), tropical pitcher plant (*Nepenthes*), etc. **Fauna,** including: Orangutan (*Pongo*), Sunda pig-tailed macaque (*Macaca nemestrina*), sambar (*Rusa unicolor)*, Jave mouse-deer (*Tragulus javanicus*), etc.
Strict Nature Reserve		
Teluk Adang	59,761	**Flora,** including: Rattan (*Calamus ciliaris*), sugar palm (*Arenga pinnata*), etc. **Fauna,** including: Silvery lutung (*Trachypithecus cristatus*), sambar (*Rusa unicolor*), etc.
Bukit Sapat Hawung	1,385	**Flora,** including: Balau (*Shorea laevis*), keruing (*Dipterocarpus*), mahang (*Macaranga*), ulin (*Eusideroxylon zwageri*), etc. **Fauna,** including: Hornbill (*Bucerotidae*), orangutan (*Pongo*), Müller's gibbon (*Hylobates muelleri*), white-rumped shama (*Copsychus malabaricus*), Burung peafowl (*Pavo*), etc.
Muara Kaman Sedulang	65,497	**Flora,** including: Meranti (*Shorea sp.*), ulin (*Eusideroxylon zwageri*), rattan (*Calamus ciliaris*), etc. **Fauna,** including: Wild boar (*Sus scrofa*), proboscis monkey (*Nasalis larvatus*), lutung (*Trachypithecus*), long-tailed macaque (*Macaca fascicularis*), otter (*Lutrinae*), etc.
Padang Luwai	4,787	**Flora,** including: Black orchid (*Coelogyne pandurata*), true cardamom (*Elettaria cardamomum*), longjack (*Eurycoma longifolia*), etc. **Fauna,** including: Wild boar (*Sus scrofa*), deer (*Cervidae*), muntjac (*Muntiacini*), monitor (*Varanus*), hornbill (*Bucerotidae*), green pigeon (*Treron*), Carolina parakeet (*Conuropsis carolinensis*), crow (*Corvus*), etc.
Teluk Apar	47,048	**Flora,** including: Grey mangrove (Avicennia marina), perepat (Sonneratia alba), etc. **Fauna, including:** Long-tailed macaque (Macaca fascicularis), lutung (Trachypithecus), kingfisher (Alcedines), straw-headed bulbul (Pycnonotus zeylanicus), etc.
Wildlife Sanctuary		
Pulau Semama	103.05	**Flora,** including: Mangrove (*Rhizophora*), perepat (*Sonneratia alba*), etc. **Fauna,** including: Sea cucumber (*Holothuroidea*), large saltwater clam (*Tridacna*), coconut crab (*Birgus latro*), etc.

Source: Ministry of the Environment and Forestry

The description above shows that oil palm plantation establishments in Kalimantan still allow for biodiversity conservation. Such conservation takes the form of in-situ or ex-situ biodiversity conservation as well as other forms of conservation to maintain the native flora and fauna richness of the island.

MYTH 6-36

Forest and land fires only occur in oil palm center provinces

FACTS

The phenomenon of forest and land fires in various parts of the world (Myth 6-22), including in Indonesia, is part of the impacts of global climate change (Myth 6-02). Such fires are a humanity and ecological tragedy that harms all, regardless of where they occur, in oil palm center or non-oil palm center provinces, and whatever the cause is.

Table 6.20. Average Areas of Forest and Land Fires in Indonesia from 2010-2022

Province	2010-2022	Province	2010-2022
South Sumatra	93,374	North Kalimantan	3,660
Central Kalimantan	81,038	South Sulawesi*	2,504
Papua*	80,730	Riau Islands*	2,423
East Nusa Tenggara*	48,455	West Java*	2,260
South Kalimantan	41,560	Central Java*	2,099
Riau	33,671	West Sumatra*	2,041
West Kalimantan	33,469	West Papua*	1,984
West Nusa Tenggara*	22,317	West Sulawesi*	1,865
East Kalimantan	19,853	Aceh	1,745
Maluku*	14,499	North Maluku*	1,645
Jambi	14,430	Gorontalo*	1,196
Lampung*	12,792	North Sulawesi*	1,195
East Java*	7,481	Bengkulu*	262
Central Sulawesi*	6,067	Bali*	229
Southeast Sulawesi*	5,380	Banten*	44
Bangka Belitung*	4,600	Yogyakarta*	31
North Sumatra	4,567	Total	471,709

Source: Ministry of the Environment and Forestry (data as of July 2022)
Note: *) Non-oil palm center provinces

According to the Ministry of the Environment and Forestry data (2022), forest and land fires occur in almost all provinces in Indonesia (Table 6.20). Several oil palm center provinces in Indonesia, such as South Sumatra, Central Kalimantan, South Kalimantan, Riau, and West Kalimantan, have been hit by relatively large land and forest fires. However, provinces without oil palm plantations, such as East Nusa Tenggara, West Nusa Tenggara, East Java, Central Java, and West Java, also experience large land and forest fires.

The forest and land fires occurring in provinces with oil palm plantations, such as Bengkulu, Aceh, and West Sumatra were relatively smaller than those in Central Java and East Java, which do not have such plantations. This shows no strong evidence of a link between forest and land fires and oil palm plantations.

Forest and land fires do not occur systematically or specifically on peatlands. East Java, West Nusa Tenggara, and West Java do not have peatlands, but they were also hit by relatively large forests and land fires. The Global Forest Watch report (2019) also confirms that only 39 percent of the total forest and land fires in 2019 occurred on peatlands, and the remaining 61 percent occurred outside peatlands.

Examining the forest and land fire locations resulted in an interesting discovery. Indonesia's largest forest and land fires in the past ten years occurred in 2015 and 2019.

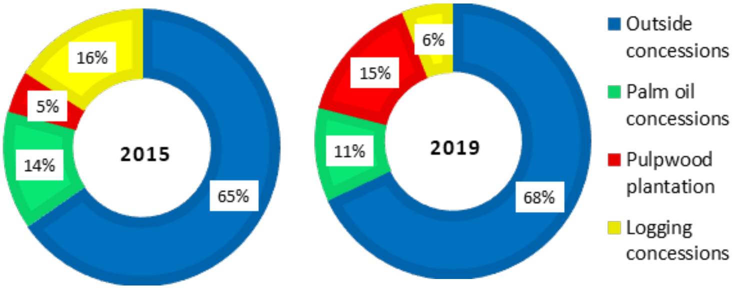


Figure 6.31. Distribution of Forest and Land Fires in Indonesia by Concession Location in 2015 and 2019 (Source: Global Forest Watch Fires, 2019; PASPI Monitor, 2020[j]; Darmawan, 2020)

Global Forest Watch data (2019) shows that around 86 percent of the hotspots for forest and land fires in Indonesia in 2015 (Figure 6.31) were outside oil palm plantation concession areas, namely in state forests (65 percent), logging concession areas (16 percent), and pulpwood concession areas (5 percent). Meanwhile, in the 2019 forest and land fires, around 89 percent of the hotspots are outside oil palm plantation concession areas, namely in state forests (68 percent), pulpwood concession areas (15 percent), and logging concession areas (6 percent).

In other words, attributing forest and land fires to oil palm plantations is not based on valid empirical facts. In fact, most of Indonesia's forest and land fires occurred in state forests. The phenomenon of state forest fires may reflect a "tragedy of the common property right" (Hardin, 1968; Brown & Harris, 1992; Markov et al., 2010), considering that such forests are public goods and open access resources that anyone, including irresponsible individuals, can access.

Therefore, similar to forest and land fires in other countries, those in Indonesia do not occur systematically or specifically related to oil palm center provinces. Forest and land fires occur regardless of location, in oil palm center or non-oil palm center provinces. Satellite imagery shows that most forest and land fires occurred outside oil palm plantations. Oil palm plantations were also victims of fires.

MYTH 6-37

Forest and land fires are caused by oil palm plantations

FACTS

Forest and land fires damage the ecosystem and benefit nobody, neither those who work in oil palm plantations and their families nor the public. In addition, forest and land fires are typically followed by a smoke haze polluting the air, which is harmful to plants and crops, including oil palm trees, as it causes stress in plants and disrupts photosynthesis. Therefore, the efforts to prevent forest and land fires inside and outside the plantations are part of the oil palm plantations management.

Oil palm plantation companies have mitigation efforts by implementing Standard Operating Procedures (SOP) concerning guidelines for preparedness, preventive measures, and early detection of forest and land fires. The companies establish task force/Fire Alert Team and provide firefighting technology and equipment. To prevent forest and land fires outside their plantations, the companies collaborate with local communities by establishing *Masyarakat Peduli Api* (Fire Prevention Community). They also coordinate with other stakeholders such as the local government, the

Indonesian National Armed Forces (TNI), Indonesian National Police (POLRI), National/Regional Agency for Disaster Management (BNPB/BPBD), Fire Department, and taskforces of other oil palm plantation companies.

It is unreasonable to accuse oil palm plantations as the perpetrators since forest and land fires put them and their companies at a disadvantage. First, the perpetrators (individuals and corporations) risk a severe imprisonment sentence and a hefty fine. Article 78, paragraphs 3 and 4 of Law Number 41 of 1999 on Forestry stipulates that this crime is punishable by imprisonment for a term between 5 and 15 years or a fine of up to IDR 5 billion, while Article 187 of the Indonesia Criminal Code stipulates a 12-year imprisonment. Both Article 48, paragraph 1 of Law Number 18-year 2004 on Plantation and Article 108 of Law Number 32 of 2009 on Environmental Protection and Management stipulates that this crime is punishable by imprisonment for a maximum term of 10 years or a fine of up to IDR 10 billion.

Government Regulation Number 150 of 2000 on Soil Degradation Prevention in Biomass Production states that those who degrade/pollute the soils will receive punishments, by referring to Law Number 32 of 2009 on Environmental Protection and Management, stating that those committing environmental crimes are liable to the following disciplinary measures: (1) confiscation of benefits derived from the crimes; and/or (2) total or partial closure of the company; and/or (3) reparation of environmental damages caused by the crimes; and/or (4) obligation to work on the neglected matter without any rights; and/or (5) nullifying the neglected matter without any rights; and/or (6) placement of the company under supervision for three years at a maximum.

Second, forest and land fires decrease the productivity of oil palm plantations. A study conducted by Indonesian Oil Palm Research Institute (IOPRI) finds that droughts alone can decrease (Table 6.21) productivity by 28-41 percent and yields by 0.6-2.5 percent. Smoke haze affects the formation and growth of oil palm fruit, reducing productivity by about 0.2-5.5 percent. Thus, the potential loss per hectare due to declining productivity caused by forest and land fires in the surrounding areas could amount to IDR 12-15 million per hectare.

Table 6.21. Losses Suffered by Oil Palm Plantations due to Drought and Haze

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

Source: IOPRI
Note: *only haze **only drought

Third, oil palm smallholders and companies experience a decline in profit. In addition to the declining productivity of palm oil, profit can also fall due to the dropping demand for palm oil. The attribution of forest and land fires in Indonesia to the palm oil industry will damage the reputation of palm oil among global consumers and hinder companies' efforts to meet sustainability standards (RSPO/ISPO). This will affect the acceptability of palm oil products in developed regions and countries, such as Europe and the United States.

With such potential loss, it makes no sense that oil palm planters, either as an individual or a company, burn the forests and put themselves at a disadvantage. It is unreasonable for oil palm plantation companies to deliberately leave forest fires unextinguished in their surrounding areas and allow the fires to harm their plantations, their employees' families, and the public. Oil palm plantations are also a victim of forest and land fires.

MYTH 6-38

Floods only occur in oil palm center provinces

FACTS

Flooding is worsening due to climate change (Myth 6-02). Flooding occurs in almost every country, regardless of the oil palm plantations' presence. Worldwide, flooding occurs in Europe, North America, China, Australia, and other countries without oil palm plantations. Flooding also occurs in Indonesia, Malaysia, Thailand, and other palm oil-producing countries.

In Indonesia, all provinces are hit by floods every year. The National Agency for Disaster Management (2022) data shows that 11,194 flood events occurred from 2010 to 2021 in Indonesia (Table 6.22). The three provinces most frequently hit by a flood in that period were Central Java, West Java, and East Java. There are 4,308 flood incidents in these three non-oil palm center provinces, representing 38 percent of the total number of flood incidents nationwide from 2010 to 2021.

Like any other province, flooding also occurred in the five major oil palm center provinces are Riau, West Kalimantan, Central Kalimantan, North Sumatra, and East Kalimantan. Of all flood incidents in Indonesia in 2010-2021, only 13 percent occurred in these five provinces.

The data above clearly shows that flooding occurs due to climate change experienced by all countries and provinces. Flood is not related to oil palm plantations. Instead, provinces without oil palm plantations are the ones more frequently hit by the flood.

Table 6.22. Total Number of Flood Incidents in Indonesia in 2010–2021

Province	2010-2021	Province	2010-2021
Central Java*	1,515	Southeast Sulawesi*	229
West Java*	1,449	Riau	198
East Java*	1,344	Lampung*	191
Aceh	679	East Nusa Tenggara*	191
North Sumatra	464	Gorontalo*	175
South Sulawesi*	443	Bengkulu*	123
West Sumatra*	434	North Sulawesi*	116
South Sumatra	395	Bali*	96
Central Sulawesi*	322	Maluku*	96
West Nusa Tenggara*	318	North Maluku*	95
South Kalimantan	305	Papua*	94
Banten*	282	West Sulawesi*	89
East Kalimantan	277	Bangka Belitung*	68
Central Kalimantan	271	Yogyakarta*	65
DKI Jakarta*	257	Riau Islands*	45
West Kalimantan	244	North Kalimantan	42
Jambi	241	West Papua*	41

Source: National Agency for Disaster Management (2022)
Note: *) Non-oil palm center provinces

MYTH 6-39

Landslides only occur in oil palm center provinces

FACTS

In addition to floods, landslides are also commonly associated with oil palm plantations. In reality, landslides frequently occur in many countries, including Indonesia, and are unrelated to oil palm plantations.

National Agency for Disaster Management data (2022) shows that 3,952 landslide incidents occurred from 2010 to 2021 in Indonesia (Table 6.23). Two provinces most frequently hit by landslides in that period were Central Java with 2,655 incidents (63 percent) and Bali with 219 incidents (5 percent). The next three provinces were East Kalimantan (177 incidents or 4 percent), South Sulawesi (156 incidents or 4 percent), and Yogyakarta (132 incidents or 3 percent).

Table 6.23. Total Number of Landslide Incidents in Indonesia in 2010–2021

Province	2010-2021	Province	2010-2021
Central Java*	2,655	West Nusa Tenggara*	43
Bali*	219	Southeast Sulawesi*	41
East Kalimantan	177	West Kalimantan	29
South Sulawesi*	156	Lampung*	24
Yogyakarta*	132	Papua*	23
North Sumatra	99	DKI Jakarta*	22
South Sumatra	91	Central Sulawesi*	18
Banten*	84	Gorontalo*	17
East Nusa Tenggara*	82	West Sulawesi*	13
North Kalimantan	56	Bangka Belitung*	13
Maluku*	55	Riau Islands*	13
Bengkulu*	50	North Maluku*	11
North Sulawesi*	49	West Papua*	8
South Kalimantan	47	Total	3,952

Source: National Agency for Disaster Management (2022)
Note: *) Non-oil palm center provinces

Four of these five provinces with the most landslide incidents were non-oil palm center provinces: Central Java, Bali, South Sulawesi, and Yogyakarta. This data proves that oil palm plantations are unrelated to the rising number of landslide incidents.

MYTH 6-40

Droughts only occur in oil palm center provinces

FACTS

Droughts are also worsening due to climate change (Myth 6-02). Droughts occur in many countries, including Indonesia. Based on National Agency for Disaster Management data (2022), the provinces most frequently hit by droughts from 2010 to 2021 (Figure 6.32) were Central Java (19 percent), East Java (17 percent), West Java (15 percent), South Sulawesi (7 percent), and West Nusa Tenggara (6 percent). These five provinces are not oil palm centers.

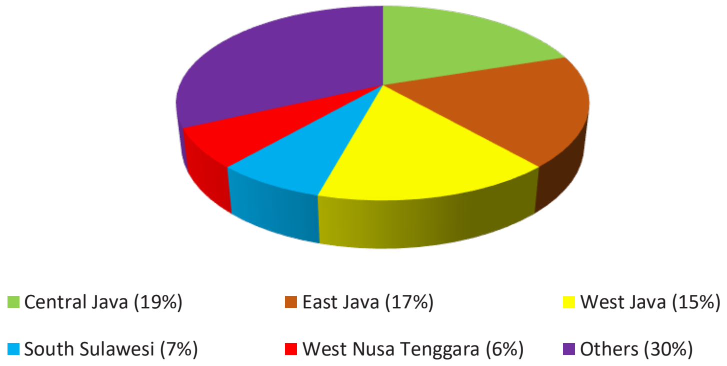


Figure 6.32. Top Five Indonesian Provinces Hit by Drought in 2010–2021 (Source: National Agency for Disaster Management, 2022)

Based on the data above, it can be concluded that the droughts occurring in many provinces of Indonesia are not related to oil palm plantations. Droughts are one of the effects of climate change. They occur in all countries or regions and cannot be attributed to oil palm plantations.

MYTH 6-41

The development of palm oil biodiesel undermines the emission-reducing efforts in Indonesia

FACTS

Developing palm oil biodiesel in Indonesia is environmentally beneficial. Palm oil biodiesel is a substitute for fossil diesel fuel, one of the largest contributors to GHG emissions in every country, including Indonesia. Palm oil biodiesel is superior to petrodiesel in terms of clean-burning properties, non-toxicity, renewability, sustainability, and acceptability (Zahan et al., 2018). Substituting palm oil biodiesel for fossil diesel fuel will reduce GHG emissions.

Emissions have been significantly reduced since the mandatory biodiesel policy was implemented in Indonesia (Figure 6.33). GHG emissions reduction improved from 592.3 thousand tons CO_2 eq in 2010 to 22.3 million tons CO_2 eq in 2020, or 400 times higher at the end of the period.

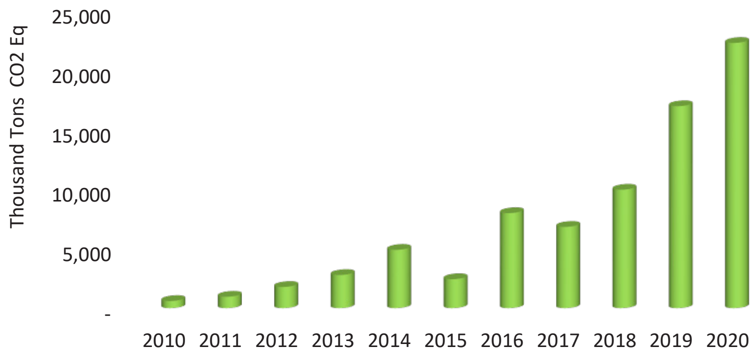


Figure 6.33. Reduction of GHG Emissions as a Result of Mandatory Biodiesel Policy in 2010–2020 (Source: Ministry of Energy and Mineral Resources in PASPI Monitor, 2020[i])

The reduction of GHG emissions resulting from the mandatory biodiesel policy is an important step to achieving Paris Agreement goals. In its Nationally Determined Contribution (NDC), Indonesia is committed to reducing GHG emissions by 29 percent (conditional) and 41 percent (unconditional) by 2030.

To help achieve the NDC target, the energy and transportation sectors targeted a 0.038 Gt CO_2 eq reduction of GHG emissions in 2020. With the mandatory B30 biodiesel in 2020, the energy and transportation sectors managed to reduce emissions by around 59 percent of the target reduction. Therefore, palm oil biodiesel contributed to Indonesia's efforts to achieve the NDC target.

The description above shows that the palm oil industry is part of the solution that helps Indonesia fulfill its commitment to reducing GHG emissions. The palm oil industry reduces GHG emissions by substituting low-emission palm oil biodiesel for high-emission fossil diesel fuel. The palm oil industry has a bigger potential to reduce GHG emissions, especially in the energy and transportation sectors, in the future. This can be done by developing palm oil-based green fuel (green diesel, green gasoline, and green avtur) as a substitute for fossil diesel fuel, fossil gasoline, fossil avtur that humans have increasingly relied on. In addition, oil palm bioenergy such as second generation (biomass-based) and third generation (POME-based) can be used as more sustainable energy sources.

Chapter 7
Myths Versus Facts: Palm Oil Industry in Governance and Policy Issues

One of the accusations against Indonesia's palm oil industry is that oil palm plantations are not managed with sustainability principles. The country is accused of having weak national sustainable development policies and poor governance for oil palm plantations.

Indonesia adopts a sustainable development paradigm in which economic development (the profit/prosperity), social development (the people), and environmental conservation (the planet) are well-balanced, inclusive, and harmonious. Economic development that disregards environmental sustainability cannot be considered sustainable development. Likewise, economic development that only focuses on the environment cannot be considered sustainable. Sustainable development can be achieved through economic, social, and environmental sustainability.

This chapter will dialectically discuss myths, opinions, and issues around the sustainability governance for and policies on Indonesia's palm oil industry.

MYTH 7-01

Indonesia has no national policy on sustainable development

FACTS

Indonesia is still in the early stage of its development pathways toward the future. Nonetheless, since the beginning, the government has laid the foundations for policies on national development management across sectors and regions/spaces. These national policies take the form of laws and regulations, ranging from law, ministerial regulations, to implementing regulations.

Table 7.1. National Sustainable Development Governance and Policy in Indonesia

Regulation/policy	**On**
Laws and Regulations	
The 1945 Constitution of the Republic of Indonesia and the Preamble thereto	
Law Number 12 of 1992	Crop Cultivation System
Law Number 5 of 1960	Basic Agrarian Principles
Law Number 13 of 2003	Manpower
Law Number 39 of 2014	Plantation
Law Number 32 of 2009	Environmental Protection and Management
Law Number 26 of 2007	Spatial Planning
Law Number 5 of 1990	Conservation of Biological Resources and Their Ecosystems
Law Number 41 of 1999	Forestry
Law Number 17 of 2004	Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change
Law Number 29 of 2000	Plant Variety Protection
Law Number 18 of 2012	Food
Law Number 8 of 1999	Consumer Protection
Law Number 36 of 2009	Health
Law Number 1 of 1970	Occupational Safety
Law Number 40 of 2007	Limited Liability Companies
Law Number 20 of 2014	Standardization and Conformity Assessment
Law Number 3 of 2014	Industrial Affairs
Law Number 7 of 2014	Trade
Law Number 21 of 2004	Ratification of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity
Law Number 5 of 1994	Ratification of the United Nations Convention on Biological Diversity
Law Number 23 of 2002	Child Protection
Law Number 25 of 2007	Investment
Law Number 18 of 2013	Prevention and Eradication of Forest Destruction
Law Number 19 of 2013	Farmer Protection and Empowerment
Law Number 25 of 1992	Cooperatives
Law Number 11 of 2020	Job Creation

Laws regulating national development management (Table 7.1) include laws and government regulations on spatial planning, land use, technology, management, natural resources and environment, human resources, products, etc. All these laws converge on the sustainable development paradigm. Indonesia adopts a sustainable development paradigm in which economic and social development and environmental conservation are well-balanced, inclusive, and harmonious.

Indonesia's conformity with sustainable development became increasingly evident when the country adopted the Sustainable Development Goals (SDGs) 2015-2030 as the new platform for global development. The Government of Indonesia is committed to contributing to the achievement of SDGs as set forth in Presidential Regulation Number 59 of 2017 and Presidential Regulation Number 111 of 2022 on Implementation of the Achievement of Sustainable Development Goals (SDGs). As an implementing regulation to support the SDGs implementation in Indonesia, the Ministry of National Development Planning/Development Planning Agency issued Regulation of the Ministry of National Development Planning Number 7 of 2018 on Coordination for Planning, Monitoring, Evaluating, and Reporting the Sustainable Development Goals Implementation.

SDGs mainstreaming into Indonesia's development planning (Minister of National Development Planning, 2020) is also evident from the National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah/RPJMN*) for 2020-2024, Strategic Plans of Ministries/Agencies for 2020-2024, Annual Government Work Plans (*Rencana Kerja Pemerintah/RKP*), and National Action Plan (*Rencana Aksi Nasional/RAN*). SDGs mainstreaming also occurs in the development at the local level, as outlined in the Regional Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah Daerah/RPJMD*) and Regional Action Plan (*Rencana Aksi Daerah/ RAD*).

Sustainable development is also interconnected and indivisible. Sustainable development can be achieved when there is more than one sustainable sector or industry. Sustainable development must be viewed across sectors, regions/spaces, and generations.

MYTH 7-02

Indonesia has no development policy on biodiversity conservation

FACTS

Countries worldwide should learn about zoning from Indonesia. By implementing Law Number 41 of 1999 on Forestry and Law Number 26 of 2007 on Spatial Planning, Indonesia has stipulated that a minimum of 30 percent of the total land area must be forests. Indonesia's land area is divided into conservation and cultivation zones. Thus, Indonesia adopts a harmonious coexistence between cultivation zones (for urban areas/settlement, industry, agriculture/plantation, etc.) and conservation zones (for protected and conserved forests) (Figure 7.1).

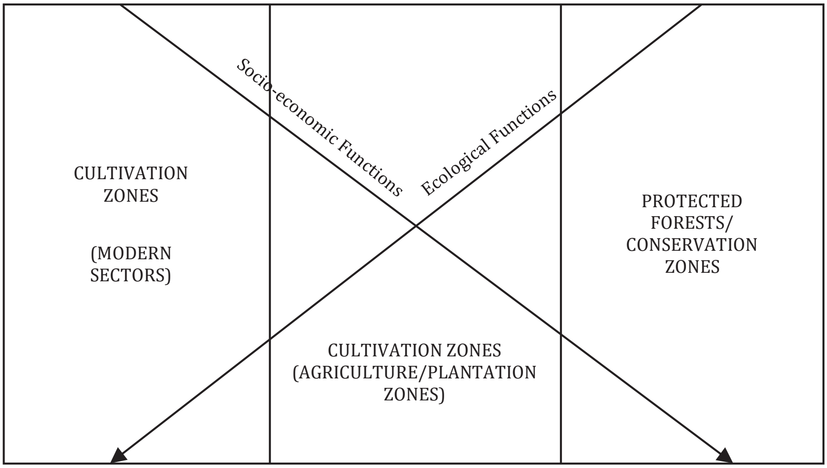


Figure 7.1. Harmony of Spaces for the Modern, Agriculture/Plantation, and Protected Forest/Conservation Sectors in Indonesia

A minimum 30 percent of Indonesia's land is allocated for forests to serve as a "home" to biodiversity (native plants, native animals, and indigenous microorganisms), natural fortifications, and nature conservation. The remaining land area of a maximum 70 percent is used for all development sectors such as agriculture, plantations, animal husbandry, urban areas, residential areas, etc.

Based on the Forestry Statistics data (Ministry of the Environment and Forestry, 2021), forests make up 88 million hectares of about 187 million hectares of Indonesia's land area in 2020. It indicates that about 47 percent of the total land area was forested areas, well above the minimum requirements stipulated by the laws. More than half of these forested areas are primary forests serving as the natural habitats in all of mainland Indonesia for the biodiversity of animals (such as elephants, tigers, orangutans, rhinoceros, lions, bears, many species of birds, etc.) and wild plants (Myths 6-34 and 6-35).

The agricultural-rural areas make up about 55 million hectares or 29 percent of the total land area, whereas the urban areas (including residential areas, office zones, business centers, etc.) reached 43 million hectares or around 23 percent of the total land area. Oil palm plantations as part of the agricultural-rural areas make up 14.9 million hectares (Ministry of Agriculture, 2021), or about 8 percent of Indonesia's land area.

Urban areas, agriculture/plantation zones, and forests coexist in Indonesia's land spaces. Each forested area as home to biodiversity, urban areas as the center of human activities, and agriculture/plantation zones as food, energy, and biomaterial producers occupy its own spaces and have unique functions within the ecosystem that cannot be replaced by each other. Thus, they must harmoniously coexist within their designated spaces.

In other words, "shopping malls, oil palm trees, and orangutans" coexist and thrive in harmony within their own spaces. Indonesia's policies on spatial planning for a sustainable ecosystem are all about this.

MYTH 7-03

Indonesia has no biodiversity conservation system

FACTS

Flora and fauna biodiversity is the essence of an ecosystem in which a complex food web exists. Therefore, biodiversity conservation should not use a sectoral approach but an ecosystem approach. Biodiversity is an invaluable asset in an ecosystem that should be conserved for the next generation.

Under Law Number 26 of 2007 on Spatial Planning, Indonesia's land area is divided into conservation and cultivation zones. Data in Table 7.2 shows that 88.41 million hectares of forested areas are used for biodiversity conservation, consisting of 41.65 million hectares of conservation zones and 46.77 million hectares of cultivation zones.

Conservation zones mainly function as a "home" to protect plants and animals, both in-situ (inside the natural habitat) and ex-situ (inside an environment similar to the natural habitat and within the care of humans). Cultivation zones are also used for biodiversity conservation through plantation forestry.

Table 7.2. Biodiversity Conservation System in Indonesia

Description	Thousand Hectares	%
Ex-Situ and In-Situ Biodiversity Conservation in Conservation/Protected Zones		
Strict Nature Reserves, Wildlife Sanctuaries, National Parks, Nature Parks, Community Forests, Game Reserves, etc.	41,648	22.18
Biodiversity Conservation in the form of Plantation Forestry in Cultivation Zones		
Limited Plantation Forests, Plantation Forests, Convertible Plantation Forests, Industrial Forests	46,765	24.90
Total Forested Area	88,413	47.08
Plantation (Oil Palm, Rubber, Coconut, Cocoa, Coffee, Tea, Sugar Cane, etc.)	26,956	14.36
Total Land Cover	115,369	61.44
Food Crop Agriculture, Vegetable Horticulture, Fruit Farms, Ornamental Plants/Biopharmaceuticals, Animal Husbandries, Freshwater Fisheries	32,901	17.52
Other Sectors	39,504	21.04
Total Land Area	187,774	100.00

Source: Ministry of Environment and Forestry (2021), Ministry of Agriculture (2021), data processed by PASPI

Cultivation zones mainly center on human activities, such as farms, plantations, plantation forests, urban areas, residential areas, industry, etc. Oil palm plantations expansion occurs within the cultivation zones. Unlike protected/conservation zones, cross-sectoral land-use conversion in cultivation zones is possible. Croplands can be converted into non-croplands, plantation forests can be converted into non-plantation forests, oil palm plantations can be converted into non-oil palm plantations, and vice versa.

The third method of biodiversity conservation is related to the socio-economic functions of cultivation zones by farming plants/livestock/fish for the next generation. In the course of human history, plant/livestock farming effectively conserves biodiversity and satisfies human needs at the same time. Agriculture, plantations, industrial forests, animal husbandry, and aquaculture have been the methods to conserve biodiversity throughout human history.

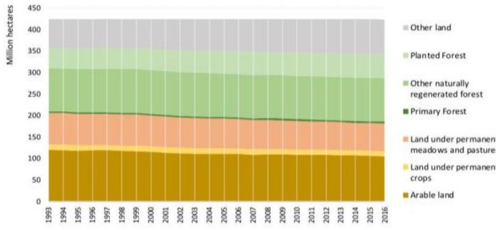
The description above shows that since the initial period of national development, the Government of Indonesia has specifically set the proportion of land area that must be preserved as forested areas (non-deforestable) for biodiversity conservation, i.e., the conservation zones. Biodiversity for the future generation is also conserved with a plantation forestry system in cultivation zones.

MYTH 7-04

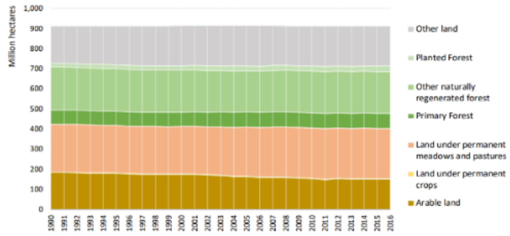
Indonesia's virgin forests, as the "home" to biodiversity, are in a worse state than those of other countries

FACTS

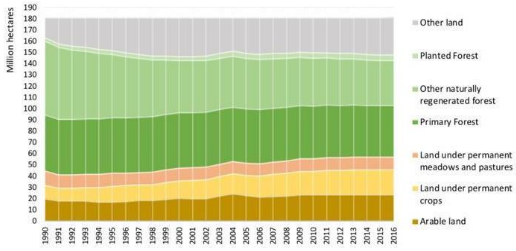
Indonesia is not like Europe and North America. Both regions had depleted their virgin forests at the start of their economic development, including protected and conserved forests as well as their inhabitants (the biodiversity). The study by LCAworks (2018) clearly shows the stark difference between the current state of forests in both regions compared to those in Indonesia (Figure 7.2). Virgin forests in Indonesia are proportionally more abundant than those in the European Union countries and the United States.



EU-28



The United States



Indonesia

Figure 7.2. Comparison of Forest Land Uses among EU-28, USA, and Indonesia (Source: LCAworks, 2018)

The large-scale deforestation in both regions (Myth 6-13) has depleted their virgin forests, and only a few remains today. The studies by Sabatini et al. (2018) and Barredo et al. (2021) reveal that Europe's last primary forests only cover 1.4 million hectares in Finland, Ukraine, Bulgaria, and Romania. Likewise, the United States' remaining virgin forests can only be found in Alaska (Sumarwoto, 1992). The loss of virgin forests in Europe and the United States leads to the loss of forest cover and eliminates the native biodiversity of plants and animals. Where is the biodiversity native to Europe and the United States today?

In contrast, Indonesia's virgin forests are still quite vast, allowing them to remain "home" to tropical biodiversity. This is also confirmed by native tropical rainforest plants and animals, such as Sumatran tigers, Sumatran elephants, two-horned rhinoceros, orangutans, monkeys, birds, butterflies, etc., still exist.

MYTH 7-05

Oil palm plantations encroach forests at their will to obtain lands

FACTS

As a country with a legal system, Indonesia regulates how development should be carried out, including oil palm plantations development. The land acquisition process and procedures for plantations are regulated by laws and regulations (Figure 7.3). In general, the land for plantations (including land for other sectors) is taken from cultivation zones and forested areas.

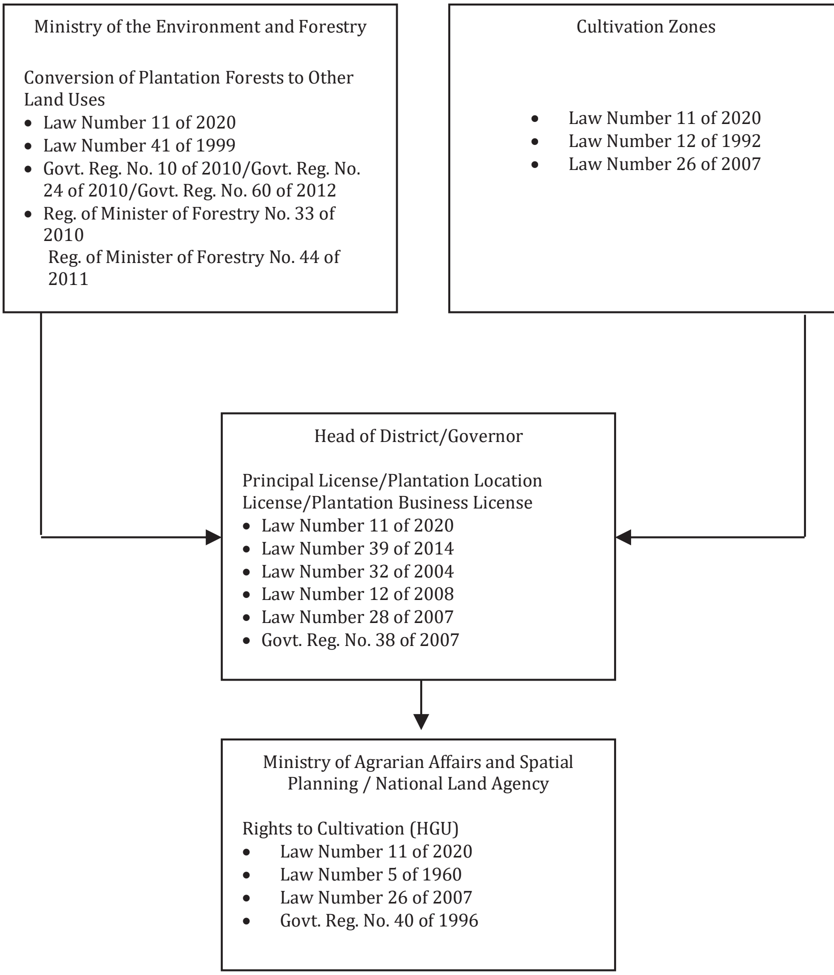


Figure 7.3. Procedure and Stages of Land Acquisition for Oil Palm Plantations in Indonesia

Under Law Number 11 of 2020 on Job Creation and Law Number 41 of 1999 on Forestry, converting forested lands to other non-forest land uses, including plantations, can only involve convertible plantation forests. Conversion of protected forests and conservation zones, on the other hand, is prohibited.

Through the Minister of the Environment and Forestry, the government is the only authority to grant and issue a license for relinquishing convertible plantation forest zones for conversion to non-forest land uses. Likewise, heads of districts or governors are authorized to issue Plantation Location

License (after the issuance of Decision on Relinquishment of Forest Zone) and Plantation Business License (*Ijin Usaha Perkebunan/IUP*, after the issuance of Location License) in accordance with Law on Plantation and Law on Regional Government. Only after obtaining an IUP can someone apply for the Rights to Cultivation (*Hak Guna Usaha/HGU*) in oil palm plantations to the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency.

It should be noted that regulations for land acquisition and plantation license have long been outlined in a series of Decisions of the Minister of Agriculture, beginning with the Decision of the Minister of Agriculture Number 325/Kpts/Um/5/1982 on Licensing Procedures for the Plantation Sub-sector. This Decision had several amendments, the latest of which is the Regulation of the Minister of Agriculture Number 21 of 2017 on Licensing Guidance for Plantation Business. With such procedures, stages, and mechanisms for acquiring land for plantations, it is clear that only the government is authorized to allocate land for plantations.

Even with common sense, there is no possibility, nor is there capacity, for oil palm planters to grab or take over forested areas carelessly. These procedures, stages, and mechanisms for land acquisition involving institutions at various levels are created exactly to prevent lands from being haphazardly used.

The description above shows that Indonesia has rules and regulations that oil palm planters must obey to acquire land for their plantations. If an individual does not obey them, he/she commits an unlawful act and must be punished according to the applicable laws and regulations.

MYTH 7-06

Indonesia has no governance for oil palm plantations on peatlands

FACTS

Indonesia pays close attention to the conservation of protected and cultivated peatlands. The coordination of policies on and management of peatlands in Indonesia is regulated by Presidential Regulation Number 1 of 2016 on Peatland Restoration Agency, which is subsequently expanded to include mangrove forests by Presidential Regulation Number 120 of 2020 on Peatland and Mangrove Restoration Agency.

In Indonesia, peatlands have long been used for agricultural purposes, including for oil palm plantations. In fact, in 1911, during the Dutch colonial period, some of the earliest oil palm plantations in Indonesia were developed on peatlands, located in Itam Ulu, Pulo Raja, and Sei Liput on the east coast of North Sumatra and Aceh. This means that peatland management and technology for oil palm plantations have long been known and applied in Indonesia.

To facilitate the development of plantations on peatlands, Indonesia has national policies in place. They are Law Number 39 of 2014 on Plantations and Law Number 32 of 2009 on Environmental Protection and Management, which is subsequently construed in Government Regulation Number 57 of 2016 on Amendments to Government Regulation Number 71 of 2014 on Protection and Management of Peatland Ecosystem. Specific regulation for oil palm plantations is outlined in the Decision of the Minister of Agriculture Number 14 of 2009 on Guidelines on Peatland Uses for Cultivating Oil Palms. In addition to these regulations, companies that cultivate oil palms on peatlands have internal guidelines on the cultivation techniques and management of oil palm plantations on peatlands.

The description above shows that Indonesia has long had rules and regulations to govern oil palm plantations on peatlands. The implementation of the rules and regulations should be continuously improved to ensure more sustainable oil palm plantations on peatlands.

MYTH 7-07

Indonesia has no oil palm industrialization strategy

FACTS

Anti-palm oil groups often assume that the palm oil industry is extractive and not part of the modern economic sector because it only takes or harvests natural resources from the earth. The palm oil industry is also accused of having unsustainable production as it only improves due to the extensification of oil palm plantations.

The accusation by the anti-palm oil groups is untrue. For example, logging and mining are extractive industries that remove raw materials from the earth (hunting economy). On the contrary, oil palm plantations are within the non-extractive economic sector since palm oil is produced by cultivating and further processing fresh fruit bunches (FFB) using modern management and science/technology.

As the world's leading palm oil producer, Indonesia has developed palm oil industrialization strategies. The palm oil industrialization strategies use modern resources (technological innovation, investment capital, and creative and innovative human resources) to achieve a more sustainable palm oil industry.

The industrialization strategies for oil palm plantations (upstream) are built on the changes in how palm oil production improves. Early in the development of oil palm plantations in Indonesia, palm oil production could still be improved by expanding the plantations. At that time, lands were still abundant, and the workforce of oil palm plantations was unskilled (factor-driven). Improving palm oil production is driven by capital (capital-driven) and especially innovation (innovation-driven) (Figure 1.3 in Chapter 1). Capital-driven and innovation-driven methods achieve better economic, social, and ecological sustainability (PASPI, 2017; Saragih, 2017; Wulansari et al., 2021).

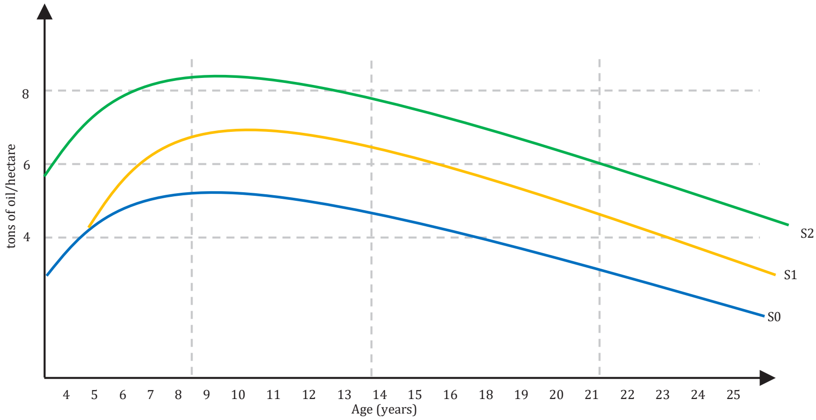


Figure 7.4. Productivity Improvement Strategy of Oil Palm Plantation

Two kinds (Figure 7.4) of strategy can be applied to improve the productivity of oil palm plantations (Sipayung, 2018), which involve improving the partial productivity (S0 to S1) and improving the total factor productivity (S0/S1 to S2). The partial productivity can be improved by fixing cultivation techniques (Good Agricultural Practices/GAP) or managerial competencies in existing plantations (Rist et al., 2010; Samosir et al., 2013, 2015; INOBU, 2016; Winrock International, 2017; Nurfatriani et al., 2019; Bakhtary et al., 2021). The total factor productivity strategy is applied by replanting oil palm trees with different varieties and improving cultivation techniques or managerial competencies in oil palm plantations with older trees.

In addition to developing oil palm plantations industrialization, Indonesia also implements policies on downstreaming palm oil industrialization. Today, Indonesia's palm oil downstreaming is significantly growing in three ways (Figure 1.4 in Chapter 1), i.e., oleofood complex, oleochemical complex, and bioenergy/biofuel complex. Two strategies are applied to expand and intensify palm oil downstreaming in the country are export promotion and import substitution.

The export promotion strategy is by supporting the domestic palm oil downstreaming (in the three ways of oleofood, oleochemical, and bioenergy/biofuel complex) to produce and export high-value-added palm oil products, i.e., intermediate and finished products. Meanwhile, the import substitution strategy is by supporting the domestic palm oil downstreaming (in the three ways of oleofood, oleochemical, and bioenergy/biofuel complex) to produce substitutes for products (oleofood, oleochemical, bioenergy/biofuel) still imported by Indonesia. These products include intermediate and finished products.

The import substitution strategy through biodiesel development facilitated by the mandatory biodiesel policy has successfully reduced Indonesia's dependence on imported fossil diesel fuel (Myth 3-15); thus, saving the foreign exchange of imports (Myth 3-16). In the oleofood and oleochemical complexes, the beta-carotene contained in palm oil (Myth 5-03) can be converted into vitamin A, which is expected to reduce Indonesia's dependence on imported vitamins (PASPI Monitor, 2021[k]). Likewise, using oleochemicals derived from palm oil to produce biosurfactants is expected to reduce the use of fossil oil-based surfactants widely used in toiletries.

The export promotion strategy for intensifying palm oil downstreaming in Indonesia is supported by several policies, such as policies on export tax, tax allowance, tax holiday, development of Special Economic Zones, international diplomacy, etc. Likewise, the import substitution strategy for intensifying palm oil downstreaming is also supported by several policies, such as the mandatory biodiesel policy.

The description above shows that Indonesia has policies on and governances for the palm oil industry concerning productivity improvement, efficiency, downstreaming, and sustainability. The strategy to improve palm oil production was initially factor-driven but has changed to be innovation-driven. The growth of palm oil downstreaming follows the palm oil production improvement through the implementation of export promotion and import substitution strategies.

MYTH 7-08

Indonesia has no policy and governance for a sustainable palm oil industry

FACTS

Indonesia has governed oil palm plantations for a long time by implementing environmental policies for business in the form of national and sectoral laws and regulations, as well as issuing sustainable palm oil certification. Regarding policies, the government has adopted regulations that promote sustainable palm oil, as outlined in Law Number 18 of 2004, which is subsequently amended by Law Number 39 of 2014 on Plantations. To achieve sustainability, the Regulation of the Minister of Agriculture Number 19 of 2011 on Indonesian Sustainable Palm Oil (ISPO) stipulates that sustainability is mandatory. The Regulation is amended by the Regulation of the Minister of Agriculture Number 11 of 2015 on Indonesian Sustainable Palm Oil (ISPO) Certification System. Previously, oil palm plantations in Indonesia had voluntarily adopted the principles of sustainable oil palm plantations through the Roundtable on Sustainable Palm Oil (RSPO) since 2004.

To strengthen and integrate various sectors related to the development of sustainable oil palm plantations, Presidential Regulation Number 44 of 2020 on the Indonesian Sustainable Palm Oil Plantation Certification System is issued. As a follow-up of the Presidential Regulation, Regulation of Minister of Agriculture Number 38 of 2020 on the Implementation of Sustainable Palm Oil Plantation Certification System is issued.

In addition, Presidential Instruction Number 6 of 2019 on National Action Plan on Sustainable Palm Oil for 2019-2024 is issued as part of the governance for oil palm plantations. This action plan aims to improve the capacity and capability of oil palm smallholders, solve issues related to the legal land status, utilize oil palms as a source of renewable energy, improve palm oil diplomacy, and accelerate the achievement of sustainable oil palm plantations in Indonesia.

The governance for Indonesian Sustainable Palm Oil (ISPO) begins with creating policies, which are subsequently implemented in the industry and every plantation. ISPO certification consists of seven principles, as shown in Figure 7.5.

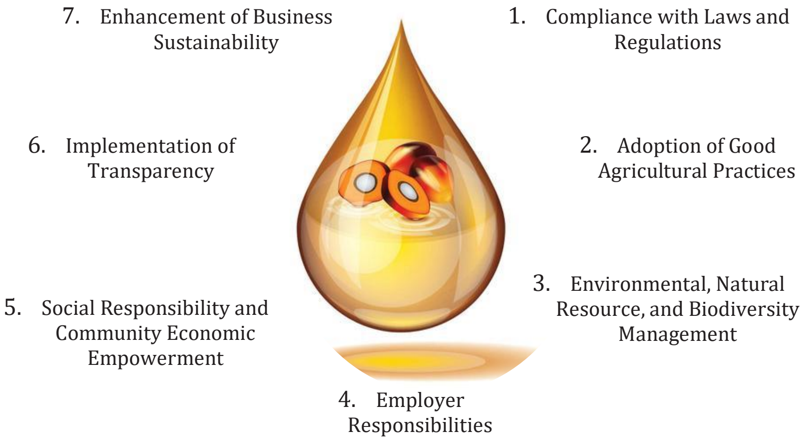


Figure 7.5. Principles Indonesian Sustainable Palm Oil (ISPO)

The objectives of the seven principles in Presidential Regulation Number 44 of 2020 are to ensure and improve the management and development of sustainable oil palm plantations, introduce ISPO certification to the entire palm oil supply chain, improve acceptance and competitiveness of Indonesian palm oil products in national and international markets, and contribute to GHG emissions reduction. The principles and objectives of ISPO certification are developed by accommodating and referring to the global commitment to sustainable development, such as the SDGs and the Paris Agreement, including Nationally Determined Contributions (NDCs).

MYTH 7-09

Indonesia has no policy on and governance for sustainable smallholder oil palm plantations

FACTS

The people are key actors in Indonesian oil palm plantations. Smallholder oil palm plantations expanded rapidly, growing from around 2 percent of total planted areas nationwide in 1980 to 40 percent in 2021 (Figure 1.2 in Chapter 1).

The governance for sustainable smallholder oil palm plantations is full of issues, such as legal land status, cultivation techniques (GAP), productivity improvement, smallholder associations and organizations, and sustainability certifications. The governance for sustainable smallholder oil palm plantations has been set forth in a series of Decision of the Minister of Agriculture, beginning with Decision of the Minister of Agriculture Number 325/Kpts/Um/5/1982 on Licensing Procedures for the Plantation Sub-sector, which had several amendments, the latest of which is Regulation of the Minister of Agriculture Number 21 of 2017 on Licensing Guidance for Plantation Business.

Oil palm smallholders expand their plantations using the land owned and held by themselves (Manurung et al., 2022). Some smallholders plant oil palms in forested areas near their villages (Apriyanto et al., 2021). Oil palm smallholders are generally too powerless to fix these issues independently. Hence public services are very much needed.

As is often the case with farmers (smallholders, peasants) in developing countries, they have been recognized by society in the socio-historical context. However, in the legal and formal context, many of them have not obtained a legal status for the land they cultivate, such as the Certificates of Title (*Surat Hak Milik/SHM*), Certificate of Compensation (*Surat Keterangan Ganti Rugi/SKGR*), and Certificate of Land (*Surat Keterangan Tanah/SKT*) or *girik* (certificate of customary land) (Aikantahan et al., 2011; Brandi et al., 2013; Jelsma et al., 2017; Manurung et al., 2022). Issues related to legal land status have made it difficult for oil palm smallholders to obtain a Certificate of Cultivation Registration (*Surat Tanda Daftar Budidaya/STDB*) as legal proof of their smallholder oil palm agribusiness.

Issues related to legal land status also prevent smallholders from participating in industrialization programs for smallholder oil palm plantations, such as the Replanting of Smallholder Oil Palm Plantations (*Peremajaan Sawit Rakyat/PSR*) program and the Indonesian Sustainable Palm Oil (ISPO) certification. It is not easy for smallholders to meet the legal land status requirement, which affects their ability to apply for ISPO certification (Darmawan et al., 2019; Tropenbos Indonesia, 2020).

To solve the issues related to the legal land status, the government has improved the governance for oil palm plantations through Presidential

Instruction Number 8 of 2018 and Presidential Instruction Number 6 of 2019. In addition, Law Number 11 of 2020 on Job Creation and the regulations derived from it, such as Government Regulation Number 23 of 2021 on Forestry Administration; Government Regulation Number 24 of 2021 on Procedures for Imposing Administrative Sanctions and Procedures for Non-Tax State Revenue Generated from Administrative Sanctions in the Forestry Sector; and Government Regulation Number 43 of 2021 on Settlement of Incompatibilities Related to Spatial Planning, Forested Areas, Licenses, and/or Land Rights are enacted as the legal basis for resolving issues in oil palm plantations related to legal land status and overlapping permits.

To improve the governance for sustainable smallholder oil palm plantations, Indonesia has issued policies on the replanting of smallholder oil palm plantations (Regulation of the Minister of Agriculture Number 18 of 2016, Regulation of the Minister of Agriculture Number 15 of 2020), built partnerships (Regulation of the Minister of Agriculture Number 18 of 2021), provided facilities and infrastructure, as well as developed associations and human resources (Regulation of the Minister of Agriculture Number 15 of 2020, Regulation of the Minister of Agriculture Number 3 of 2022). With several policies intended to improve the governance for smallholder oil palm plantations expected to solve the many issues they are facing.

The governance for sustainable smallholder oil palm plantations, as described above, will help they obtain ISPO certification more easily. Unlike corporate plantations that must comply with 7 ISPO principles, smallholder oil palm plantations only need to comply with 5 of them. The five ISPO principles are: (1) compliance with laws and regulations; (2) adoption of Good Agricultural Practices/GAP; (3) environmental, natural resource, and biodiversity management; (4) implementation of transparency; and (5) enhancement of business sustainability.

MYTH 7-10

Indonesia has no policy and program to improve the productivity of smallholder oil palm plantations

FACTS

In Indonesia, smallholder oil palm plantations are one of the most important elements in the palm oil industry. They cover 40 percent of the total areas of oil palm plantations in Indonesia. However, they only produce around 36 percent of Indonesia's total palm oil production because they still have lower productivity than private and state-owned oil palm plantations. Such lower productivity is caused by, among others, low-quality seeds, and poor cultivation techniques.

In response, the government has issued policies and programs to improve the productivity of smallholder oil palm plantations (Regulation of the Minister of Agriculture Number 18 of 2016), which provides guidelines on replanting smallholder plantations. The Government of Indonesia is highly committed to replanting smallholder oil palm plantations program (*Peremajaan Sawit Rakyat/PSR*). This commitment is demonstrated by the launch of its program by President Joko Widodo in three oil palm center regions in Indonesia, i.e., South Sumatra, North Sumatra, and Riau.

Replanting oil palm trees is not only about replacing old trees with new ones. It is a crucial phase to ensure the continuous cycle of palm oil production. Replanting also serves as an entry point for technological improvement by introducing high-yielding varieties and adopting GAP. This shows that replanting is a more sustainable way to improve productivity (Sipayung, 2018; Bronkhorst et al., 2017; Varkkey et al., 2018). In the sustainability context, replanting of oil palm plantations is also a way to expand and enhance multifunctionality, i.e., the economic, social, and ecological functions of oil palm plantations (PASPI Monitor, 2021[y]).

Unlike state-owned and private plantation enterprises that incorporate replanting in their regular program, smallholders face many stumbling blocks to replanting their oil palm plantations. The land size owned, income/capital level, source of income, and legal land status are some factors influencing smallholders' decision to replant (Safitri and Rosyani, 2014; Anggraeny et al., 2016).

Financing assistance to replanting smallholder oil palm plantations is necessary, considering that most smallholders do not have ample savings to finance replanting on their own. A study by Mariyah et al. (2018) reveals that only 46 percent of smallholders have savings while the remaining 54 percent do not, and only around 10.8 percent of smallholders can afford replanting investments. If funds for replanting are available, smallholders will be more willing and the replanting will be more successful (Andriati, 2011; Safitri and Rosyani, 2014; Ruf and Burger, 2015; Anggraeny et al., 2016). Smallholders with no funds generally do not replant their oil palm plantations or are late to do so (Thang, 2011; Hutasoit et al., 2015).

Oil palm replanting requires an investment that can be too costly for smallholders. Therefore, the government must enact a policy to provide below-market financing through the replanting of smallholder oil palm plantations funds. The policy on replanting program's financing is outlined in the Regulation of the Minister of Finance Number 84 of 2017 that regulates the use of funds for replanting oil palm plantations.

Financing assistance for replanting of smallholder oil palm plantations from the Oil Palm Plantation Fund Management Agency was initially set at IDR 25 million per hectare (maximum 2 hectares per smallholder allowed) before being increased to IDR 30 million per hectare. In addition, replating program can also be financed using the People's Business Credit (*Kredit Usaha Rakyat/KUR*) financing scheme.

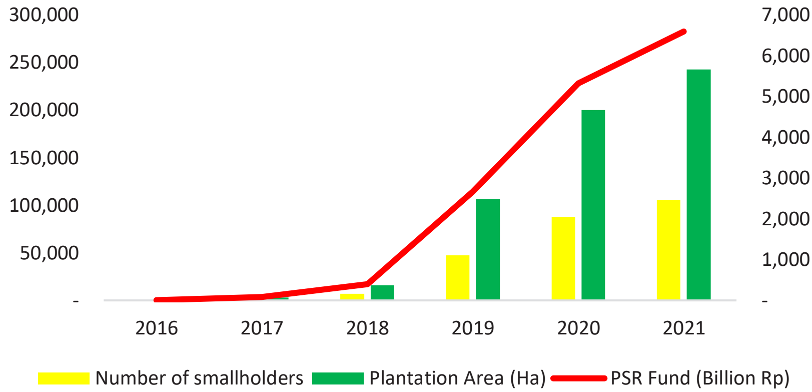


Figure 7.6. Performance of Oil Palm Replanting Programs in 2016–2021
(Source: Oil Palm Plantation Fund Management Agency, 2022)

The replanting of smallholder oil palm plantations fund distribution increased (Figure 7.6) from IDR 6.35 billion in 2015 to IDR 1.26 trillion in 2021. Oil Palm Plantation Fund Management Agency distributed palm oil funds worth IDR 6.6 trillion to this program in the same period.

In its implementation, replanting of smallholder oil palm plantations program is regulated by public policies and procedures as outlined in the Regulation of the Minister of Agriculture Number 18 of 2016 on Guidelines on Oil Palm Replanting and Regulation of the Minister of Agriculture Number 3 of 2022 on Human Resource Development, Research and Development, Replanting, and Facilities and Infrastructure of Oil Palm Plantations. To accelerate implementation, under the Regulation of the Minister of Agriculture Number 18 of 2021 on Assistance to Local Community

Plantation Development, the government integrates the replanting of smallholder oil palm plantations program with partnerships between corporate and local smallholder plantations.

As part of the replanting of smallholder oil palm plantations program, the policy and governance for smallholder oil palm plantations are also improved by providing replanting technology (such as recommendations for certified high-yielding varieties; land clearing, cultivation techniques, etc.); organizing oil palm farmer associations; and providing partnership supports through certified seeds, banking, agricultural services, and FFB marketing. All these policies are necessary to help smallholders replant and manage their plantations in general (Andriati, 2011; Zen et al., 2016).

MYTH 7-11

Partnerships in oil palm plantations in Indonesia are not performed well

FACTS

Partnerships in oil palm plantations are an implementation of the mandate of *Pancasila* (specifically the fifth precept, "Social Justice for All Indonesian People") and the 1945 Constitution (specifically Article 33). Article 33 states that natural resources are controlled by the state and utilized for the optimal welfare of the people. It also states that the national economy is conducted under the principles of togetherness, amicability, fair-based efficiency, sustainability, orientation to the environment, independency, and keeping the unity of the national economy. Through partnerships, corporations (state-owned and private) can help smallholders develop and manage oil palm plantations. Thus, it will create equal economic opportunities and improve welfare.

The current legal basis of the partnership obligation of oil palm plantations is Law Number 20 of 2008 on Micro, Small, and Medium Enterprises and Law Number 39 of 2014 on Plantations. Before both Laws were issued, the oil palm plantation partnership scheme had been regulated by the Decision of the Minister of Agriculture since 1977.

The basic concept of the partnership scheme is modeled after a biological cell, which contains a nucleus and plasma. The nucleus is the blueprint and engine for overall cell growth. In a biological cell structure, the nucleus will naturally enlarge the plasma membrane until the nucleus eventually divides into new biological cells.

In the Nucleus Estate and Smallholders (NES) partnership scheme, corporations (state-owned and private) act as the nucleus, whereas the local smallholders are the plasma. The duties and responsibilities of nuclear corporations are, among others, to develop the prospective plasma plantations, prepare and develop the capacity of the prospective plasma, guide the plasma on maintaining and managing plantations, and collect the yields of plasma plantations. The nucleus-plasma scheme is expected to be applied on a larger scale with this mechanism.

In Indonesia, oil palm plantation partnerships with the NES scheme have been developed since 1977. After the successful World Bank-financed pilot NES (I-IV) programs, various NES schemes were developed (Figure 1.1 in Chapter 1): (1) Special NES and Local NES (1980–1985) developed to improve the local economies; (2) Transmigration NES (1986–1995) to develop new economic regions; (3) Primary Credit Cooperatives for Members NES (1996) to develop rural cooperatives; and (4) NES Partnership Scheme for Plantation Revitalization (2006).

Starting in 2007, the government obligates corporations to develop at least 20 percent of the total land areas they cultivate for community plantations (Regulation of the Ministry of Agriculture Number 26 of 2007). The Regulation is mandatory for oil palm plantation corporations with Plantation Business License (*IUP or IUP-Budidaya*) issued after 2007. The corporations' obligation to assist in developing community plantations is also outlined in Law Number 39 of 2014 on Plantations, specifically Article 58.

The NES partnership schemes and their variants developed by the Government of Indonesia can be considered a successful policy. It has a significant trigger effect, creating a revolution in smallholder oil palm plantations (Sipayung, 2018; PASPI Monitor, 2021[ag]). The smallholder oil palm plantation areas increased from around 6 thousand hectares (1980) to 6.8 million hectares (2021). In the same period, the proportion of smallholder plantations also significantly increased from 2 percent to 40 percent of the total areas of oil palm plantations in Indonesia (Figure 1.2 in Chapter 1).

Limited land for new plantations and the enactment of Presidential Instruction Number 18 of 2018, concerning the moratorium on clearing new land for oil palm plantations, are among the factors preventing corporations from performing their partnership obligation by means of developing new oil palm plantations for local communities. In addition, clearing land for new oil palm plantations can potentially lead to environmental issues, such as the conversion of forests, peatlands, and other croplands, biodiversity loss, as well as social issues, such as agrarian conflicts and human rights violations. This situation challenges the corporations in performing their obligation to assist in developing community plantations. Therefore, a more sustainable and inclusive partnership scheme is needed as an alternative (PASPI Monitor, 2021[c]).

The alternative partnership scheme to address the challenge above is outlined in Law Number 11 of 2020 on Job Creation, which is followed up by technical regulations in Government Regulation Number 26 of 2021 on Administration of the Agriculture Sector, and Regulation of the Minister of Agriculture Number 18 of 2021 on Assistance to Local Community Plantation Development. The three regulations require plantation corporations to assist in developing community plantations with minimum areas of 20 percent of the areas listed on their Plantation Business License (*IUP*). However, the partnership obligation can also be converted to equivalent productive business activities, such as in the facilities for replanting, subsystems at upstream and downstream points, and subsystems for cultivation and support, etc.

The history of oil palm plantations in Indonesia above proves that partnerships are a pillar in supporting the growth of oil palm plantations in the country. Various arrangements in partnership schemes with several variants and updates remain the cornerstone of oil palm plantations in Indonesia for improving productivity, developing palm oil downstreaming, and achieving sustainability.

MYTH 7-12

Certification of sustainable oil palm plantations in Indonesia is not well-implemented

FACTS

There are two types of certification for sustainable oil palm plantations in Indonesia are ISPO and RSPO. Both certification bodies have the same principles. The difference is that ISPO is an initiative by Indonesia through the government as a palm oil producer (supply-side sustainability certification), and the certification is mandatory. Meanwhile, RSPO is an initiative by those representing palm oil consumers (demand-side sustainability certification), and the certification is optional.

ISPO certification awarded to the palm oil industry in Indonesia saw an increase from 2015-2022 (Figure 7.7). The total area of ISPO-certified oil palm plantations increased from around 1.17 million hectares to 5.19 million hectares. The production volume of ISPO-certified palm oil rose from 4.73 million tons to 21.9 million tons. Of around 5.19 million hectares of ISPO-certified oil palm plantations in Indonesia, most belong to corporate plantations. Contrarily, only a few smallholder oil palm plantations have received ISPO certification.

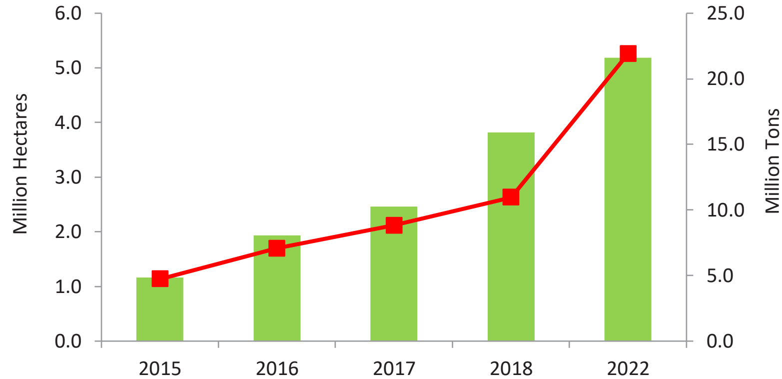


Figure 7.7 Progression of ISPO-certified Oil Palm Plantation Areas and Palm Oil Volume in 2015–2022* (Source: Ministry of Agriculture, 2022) *areas as of April 2022, production as of September 2022

In addition to ISPO, oil palm plantations in Indonesia have also adopted the RSPO certification system since 2008/2009. The total area of RSPO-certified oil palm plantations in Indonesia increased from 73.7 thousand hectares in 2009 to 1.76 million hectares in 2021. The volume of palm oil certified sustainable (CSPO & CSPKO) rose from 442 thousand tonnes to 13.9 million tonnes in the same period (Figure 7.8).

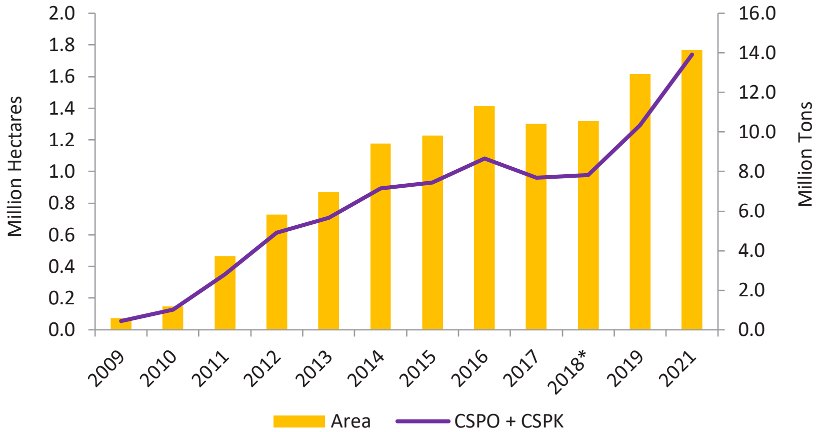


Figure 7.8. RSPO-certified Palm Oil Volume in Indonesia (Source: RSPO, 2022), *as of 30 June 2018

The description above shows that the certification of sustainable palm oil in Indonesia (ISPO and RSPO) has seen an increase in areas and production volume from year to year. The increase in sustainability certification indicates the commitment of the government and Indonesian oil palm plantation business actors to achieving sustainable development of oil palm plantations.

MYTH 7-13

Even though Indonesia is the largest producer of palm oil in the world, its production of certified sustainable palm oil is less than in other palm oil-producing countries

FACTS

The Roundtable on Sustainable Palm Oil (RSPO) was established to create a global standard for sustainable palm oil production to meet global consumer preferences for sustainable products. The total areas and palm oil production awarded RSPO certification have significantly increased (Figure 7.9).

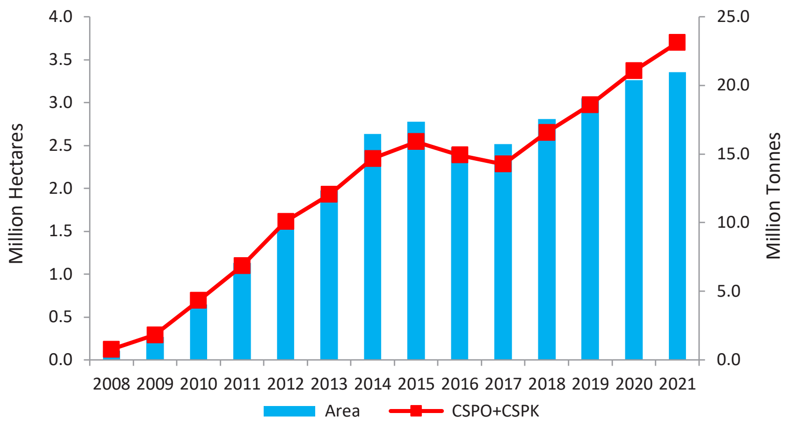


Figure 7.9. Progression of Total Areas and Production of Certified Sustainable Palm Oil in The World (Source: RSPO, 2022)

The total area of oil palm plantations with sustainability certification in the world increased from 0.1 million hectares in 2008 to around 3.35 million hectares in 2021. The global volume of palm oil production with sustainability certification also rose rapidly from 0.8 million tonnes to 23.1 million tons in the same period.

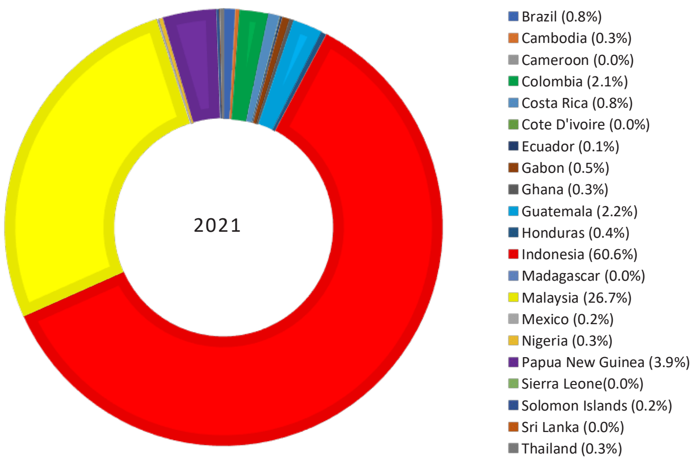


Figure 7.10 Distribution of Certified Sustainable Palm Oil-Producing Countries (Source: RSPO, 2022)

Not only Indonesia, but other palm oil-producing countries also have sustainability certification, such as Malaysia, Papua New Guinea, and countries in Africa and South America (Figure 7.10). Data on the distribution of certified sustainable palm oil worldwide shows that Indonesia is the world's largest producer, with a share of around 61 percent. The next largest certified sustainable palm oil producers are Malaysia (26.7 percent) and Papua New Guinea (3.9 percent).

The description above shows that Indonesia is the leading palm oil-producing country and the largest certified sustainable palm oil producer. The data does not include the plantation areas and palm oil production volume currently undergoing an assessment to receive sustainability certification.

MYTH 7-14

Sustainability certification of global palm oil is less than that of other vegetable oils

FACTS

Palm oil is the first vegetable oil in the world to have sustainability governance and certification systems. And the first countries to certify sustainable vegetable oil are Indonesia and Malaysia. Other vegetable oils, such as soybean, rapeseed, sunflower, etc., haven't had sustainability governance and certification systems by their producers.

Table 7.3 Sustainable Palm Oil Certification (CSPO & CSPK) in Global Vegetable Oils in 2021

Types of Vegetable Oils	Volume (million tons)		
	Not Certified as Sustainable	Certified as Sustainable	Sub-total
Palm Oil	56.6	18.9	75.5
Soybean Oil	61.3	0	61.3
Rapeseed Oil	27.9	0	27.9
Sunflower Oil	22.1	0	22.1
Palm Kernel Oil	4.5	4.2	8.7
Peanut Oil	6.5	0	6.5
Cottonseed Oil	5.2	0	5.2
Coconut oil	3.6	0	3.6
Olive Oil	2.8	0	2.8
Total	190.52	23.08	213.6

Source: RSPO, USDA (2022)

The global production volume of vegetable oils in 2021 was 213.6 million tons (Table 7.3), but only around 11 percent obtained sustainability certification. And all the vegetable oils certified as sustainable are palm oil (CSPO & CSPKO). This means that palm oil is the only vegetable oil globally that has had and performed sustainability certification. This should inspire vegetable oil-producing countries to follow in the footsteps of and learn from palm oil producers with sustainability certification in place.

The description above shows that global palm oil producers are committed to producing vegetable oils that meet sustainability principles. Palm oil is the first and only vegetable oil in the world to have sustainability governance and certification systems, unlike other vegetable oils.

MYTH 7-15

The palm oil industry makes no contribution to economic SDGs

FACTS

The United Nations (UN) has established a global development platform called the Sustainable Development Goals (SDGs) 2015–2030 to renew the expired Millennium Development Goals (MDGs) (2000–2015). The SDGs consist of 17 goals (Figure 7.11) categorized into three main pillars of development: economic, social, and environmental. Every stakeholder, country, and industry/sector are expected to contribute to achieving the SDGs.

Figure 7.11. Sustainable Development Goals (SDGs)

Indonesia is one of the countries that has ratified the SDGs. They are subsequently adopted into development policies and governance at the national and regional levels (Myth 7-01). As a strategic industry in Indonesia, the palm oil industry also proactively makes itself part of the solution in achieving the SDGs at the local/regional, national, and global levels.

In the economic aspect, the palm oil industry contributes to achieving the SDGs through SDG-7; SDG-8, SDG-9; SDG-10, and SDG-12. The contribution of the palm oil industry to SDG-7 (Affordable and Clean Energy) is demonstrated in its global supply of biofuels/bioenergy (Myth 3-02).

The palm oil industry has also shown its contribution to achieving SDG-8 (Decent Work and Economic Growth) by increasing smallholder's income (Myth 3-11), improving the welfare of oil palm plantation workers (Myth 4-14), acting as a 'locomotive' propelling the growth of new economic centers in rural areas (Myth 3-06), helping regional economic growth (Myth 3-08) and national economic growth (Myth 3-07), contributing to foreign exchange earning (Myth 3-19), improving Indonesia's trade balance (Myth 3-20), and boosting government revenues (Myth 3-21). In addition, the palm oil industry contributes to the revenues of palm oil importing countries (Myth 3-04) and the state revenues of palm oil importing countries (Myth 3-05).

The palm oil industry contributes to achieving SDG-9 (Industry, Innovation, and Infrastructure) through its role in constructing and providing road and bridge infrastructure (Myth 4-08) as well as developing the downstream industry and driving innovation (Myth 7-07).

The palm oil industry also plays a role in achieving SDG-10 (Reduced Inequalities) by reducing income inequality between communities living in palm oil village/palm oil center areas and communities living in non-palm oil village/non-palm oil center areas (Myth 4-05).

The palm oil industry also contributes to achieving SDG-12 (Responsible Production and Consumption) by supplying sustainable palm oil products through good governance (Myth 7-08) and sustainability certification systems, i.e., ISPO and RSPO (Myth 7-12, Myth 7-13, Myth 7-14).

MYTH 7-16

The palm oil industry makes no contribution to social SDGs

FACTS

The palm oil industry contributes to achieving social SDGs consisting of SDG-1; SDG-2, SDG-3; SDG-4; SDG-5; SDG-6; and SDG-11. To achieve SDG-1 (No Poverty), the palm oil industry plays a role in poverty reduction in Indonesia (Myth 4-04) and job creation at the rural (Myth 4-07), national (Myth 4-03), and global levels (Myth 4-01).

The palm oil industry is also part of the solution to achieving SDG-2 (Zero Hunger), which involves ending hunger and achieving food security inclusively at the local (Myth 3-13), national (Myth 3-12, Myth 5-15), and global levels (Myth 3-01). At the global level, the palm oil industry also improves the affordability and availability of edible vegetable oils for low-income households (Myth 4-02).

The palm oil industry contributes to achieving SDG-3 (Good Health and Well-being) as well. This is evident from the fact that palm oil has nutritional content of vitamin A (Myth 5-03) and vitamin E (Myth 5-04), as well as bioactive compounds (Myth 5-04) and essential fatty acids (Myth 5-05). Moreover, palm oil has a balanced composition of saturated and unsaturated fatty acids (Myth 5-02) beneficial for health. In addition, the palm oil industry also contributes to SDG-3 by increasing healthcare affordability and accessibility for oil palm plantation communities (Myth 4-11).

The palm oil industry also plays a role in achieving SDG-4 (Quality Education). This role is demonstrated by the increase in affordability and accessibility of quality education for oil palm plantation communities (Myth 4-10).

The palm oil industry's contribution to achieving SDG-5 (Gender Equality) is shown by how the industry is committed to achieving gender equality by fulfilling and protecting women workers' rights (Myth 4-16). This commitment is empirically evident from the fact that women workers in oil palm plantations have higher job satisfaction than their male counterparts.

Regarding the achievement of SDG-6 (Clean Water and Sanitation), the palm oil industry contributes by increasing the availability and access to good quality clean water for the community (Myth 4-12). Oil palm plantation companies also build good sanitation facilities in the work environment (Myth 4-16) and for the local rural communities through CSR programs (Myth 4-13). In addition to consuming less water, oil palm plantations are also involved in the hydrological cycle as well as soil and water conservation (Myth 6-25).

The construction of employee housing and other supporting facilities within corporate plantation areas (Myth 4-08) and the growth of new economic centers in rural areas (Myth 3-09) prove that the palm oil industry contributes to achieving SDG-11 (Sustainable Cities and Communities). Processing biomass and palm oil waste as a source of sustainable bioelectricity for local villages near the plantation (Myth 3-02) also proves the achievement of the SDGs.

MYTH 7-17

The palm oil industry makes no contribution to environmental SDGs

FACTS

The palm oil industry contributes to achieving the SDGs through SDG-13, SDG-14, and SDG-15. The palm oil industry plays a role in achieving SDG-13 (Climate Action) by acting as the 'lungs' of the ecosystem or carbon sink (Myth 6-09) and producing low-emission biofuel/bioenergy (Myth 3-02). Palm oil production naturally emits less than other vegetable oils (Myth 6-08). With GAP, methane capture technology, POME-based biogas and oil palm biomass, and productivity improvement, the palm oil industry becomes important in achieving the Net Carbon Sink target (Myth 6-11).

The palm oil industry also plays a role in achieving SDG-14 (Life below Water), as shown in how the industry contributes to soil and water conservation (Myth 6-25) by supporting natural biopores. The industry also helps conserve aquatic resources (including aquatic biota) because the palm oil production releases less water pollutants, coming from residues of fertilizers and pesticides, than those of other vegetable oils (Myth 6-23). The palm oil industry also produces biodegradable biosurfactants as a substitute for non-degradable surfactants (derived from fossil fuel) (Myth 5-17). In addition, biodegradable plastic granules made of palm oil, specifically empty fruit bunches, are currently under development to replace non-degradable petroleum-based plastics.

The palm oil industry also contributes to achieving the SDG-15 (Life on Land) by: (1) using oil palm biomass (empty fruit bunches, fiber, Palm Oil Mill Effluent-POME, fronds, etc.) as fertilizer to improve the soil ecosystem, thus, preserving the life of soil microorganisms; and (2) improving biodiversity conservation through the HCV/HCS approach, increasing natural biodiversity in oil palm plantations, and integrating oil palm with animal husbandry/agriculture/forestry (Myth 6-32, Myth 6-33). The Species Richness Loss (SRL) due to palm oil production is relatively less extensive than other vegetable oils (Myth 6-21).

Regarding the achievement of SDG-17 (Partnership for the Goals), the palm oil industry contributes at the local and global levels. The achievement of SDG-17 at the local level is evident from oil palm plantation partnerships between corporations (state-owned and private) and smallholders (Myth 7-11), and between oil palm smallholders. At the corporate level, the achievement is also seen in the partnerships between fellow workers in labor unions or workers' associations, and between corporations and labor unions (Myth 4-18). Global achievement manifests in the collaboration between Indonesia, Malaysia, and other palm oil producing countries in the Council of the Palm Oil Producing Countries (CPOPC).

The Government of Indonesia has also initiated various international forums to discuss palm oil contribution to achieve the SDGs. At the regional level, the Government of Indonesia actively participates in the Joint Working Group Meetings between the European Union and ASEAN member states. Likewise, at the multilateral level, Indonesia also makes the best of the international forum FAO Intergovernmental Group on Oilseeds, Oils and Fats, and Fats (IGG-OOF) and has begun preparing Voluntary Guidelines on Sustainable Vegetable Oils (VG-SVO).

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