ENVIRONMENTAL LAW FOR SUSTAINABLE PALM OIL DEVELOPMENT TO COMBAT DEFORESTATION AND CLIMATE CHANGE IMPACT

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ABSTRACT

Purpose: The aim of this study is to examine how environmental law to mitigate the impact of climate change caused by deforestation in Indonesia due to the high demand for palm oil.

Theoretical framework: Theoretical framework incorporate principles from international agreements such as the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), aligned with environmental law with Indonesia’s national policies and strategies, such as the National Action Plan for Greenhouse Gas Reduction and Indonesia Sustainable Palm Oil (ISPO).

Design/methodology/approach: The research method used a qualitative approach with data collected through library research. Various sources, including articles, journals, books, reports, and documents, were utilized to gather comprehensive and reliable information on the Indonesian palm oil problem and its environmental and societal impact.

Findings: The result of the study concluded that addressing deforestation and the environmental impact of palm oil production requires several measures. These include reducing global demand for palm oil, promoting sustainable palm oil production, and adopting best practices in the palm oil industry. Implementing environmentally friendly approaches, protecting critical conservation areas, respecting the rights of local communities, and reducing greenhouse gas emissions are essential steps to mitigate the issue

Research, Practical & Social implications: The study outline the role of engage all stakeholders, including producers, companies, governments, civil society, and global consumers, in these efforts. Striking a balance between economic interests and environmental concerns is vital. By promoting sustainable agricultural practices, negative impacts on the environment and society can be minimized, and progress can be made towards achieving climate change mitigation and sustainable development goals.

Originality/value: The value of the study lies in its holistic approach to addressing multiple interconnected issues. It not only focuses on environmental conservation but also considers the socioeconomic aspects of small-scale farmers in Indonesia. This integrated perspective is vital for finding sustainable solutions that benefit both the environment and local communities.

Keywords: environmental law, deforestation, palm oil targets, climate change, sustainable development.

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LEI AMBIENTAL PARA O DESENVOLVIMENTO SUSTENTÁVEL DO ÓLEO DE PALMA PARA COMBATER O DESMATAMENTO E O IMPACTO DAS MUDANÇAS CLIMÁTICAS

RESUMO

Objetivo: O objetivo deste estudo é examinar como a legislação ambiental pode mitigar o impacto das mudanças climáticas causadas pelo desmatamento na Indonésia devido à alta demanda de óleo de palma.

Quadro teórico: O quadro teórico incorpora princípios de acordos internacionais como o Acordo de Paris e a Convenção-Quadro das Nações Unidas sobre Mudanças Climáticas (UNFCCC), alinhados com a legislação ambiental com as políticas e estratégias nacionais da Indonésia, como o Plano Nacional de Ação para a Redução de Gases de Efeito Estufa e o Óleo de Palma Sustentável da Indonésia (ISPO).

Design/metodologia/abordagem: O método de pesquisa utilizou uma abordagem qualitativa com dados coletados por meio de pesquisa bibliográfica. Várias fontes, incluindo artigos, revistas, livros, relatórios e documentos, foram utilizados para reunir informações abrangentes e confiáveis sobre o problema indonésio do óleo de palma e seu impacto ambiental e social.

Constatações: O resultado do estudo concluiu que enfrentar o desmatamento e o impacto ambiental da produção de óleo de palma requer várias medidas. Isso inclui reduzir a demanda global por óleo de palma, promover a produção sustentável de óleo de palma e adotar as melhores práticas na indústria de óleo de palma. Implementar abordagens ambientalmente amigáveis, proteger áreas críticas de conservação, respeitar os direitos das comunidades locais e reduzir as emissões de gases de efeito estufa são passos essenciais para mitigar a questão.

Pesquisa, implicações práticas e sociais: O estudo delineia o papel de envolver todas as partes interessadas, incluindo produtores, empresas, governos, sociedade civil e consumidores globais, nesses esforços. É fundamental encontrar um equilíbrio entre os interesses econômicos e as preocupações ambientais. Ao promover práticas agrícolas sustentáveis, os impactos negativos sobre o ambiente e a sociedade podem ser minimizados e podem ser feitos progressos no sentido de alcançar os objetivos de atenuação das alterações climáticas e de desenvolvimento sustentável.

Originalidade/valor: o valor do estudo está em sua abordagem holística para lidar com várias questões interconectadas. Não se concentra apenas na conservação ambiental, mas também considera os aspectos socioeconômicos dos pequenos agricultores na Indonésia. Essa perspectiva integrada é vital para encontrar soluções sustentáveis que beneficiem tanto o meio ambiente quanto as comunidades locais.

Palavras-chave: legislação ambiental, desmatamento, metas de óleo de palma, mudanças climáticas, desenvolvimento sustentável.

1 INTRODUCTION

The high demand for palm oil is caused by the global market need for cheap and efficient vegetable oil. Palm oil, which is obtained from the fruit of the oil palm, has
several advantages that make it a popular choice in the global market (Mekhilef et al., 2011). First, palm oil is relatively cheap and efficient in production. Palm oil production can achieve high yields in one hectare of plantation area, compared to other vegetable oils such as soybean oil or olive oil. Second, palm oil has a variety of uses in a variety of industries, including food and beverage, cosmetics, soaps, and biodiesel fuel. The demand for these products continues to increase in the global market (Jardim, 2009; Childerhouse et al., 2002). However, high demand for palm oil can also have negative impacts on the environment and society. Sustainable palm oil production requires large areas of land, and is often done at the expense of natural forests (Basiron, 2007). Deforestation to make way for oil palm plantations has resulted in the loss of natural habitats for wildlife and endangered plant species, as well as destroying the quality of soil and water resources. In addition, deforestation also contributes to climate change, because healthy forests can absorb carbon from the atmosphere and reduce greenhouse gas emissions, while deforestation releases carbon into the atmosphere (Houghton & Woodwell, 1989).

This deforestation can cause climate change and harm small farmers (Ruf et al., 2015). Deforestation reduces the capacity of forests to absorb carbon from the atmosphere, thereby releasing carbon into the atmosphere and accelerating global warming. In addition, deforestation can also exacerbate droughts, floods and soil erosion. The impact of deforestation on climate change can impact smallholder agricultural output (Laurance, 1998). Climate change can lead to unstable temperature and rainfall patterns, thereby reducing the productivity and quality of crops grown by smallholders (Vasilakakis et al., 2023; Ratnasari et al., 2023). In addition, climate change can also increase the risk of attack by pests and plant diseases, thereby reducing crop yields and income of small farmers (Ubisi et al., 2017).

In addition, deforestation can harm local communities and small farmers who depend on forests for natural resources, such as firewood, water, and natural medicinal resources (Chirwa et al., 2008). Deforestation can change forest ecosystems and reduce biodiversity, thereby affecting the welfare and survival of local communities (Mataruse et al., 2022). Therefore, it is important to promote sustainable forest management and strengthen the rights of local communities in managing natural resources. This can help reduce the negative impacts of deforestation on climate change and local communities, as well as ensure the sustainability of smallholder agricultural production. Departing from the problems mentioned above, this study aims to analyze how to mitigate the impact of
climate change caused by deforestation in Indonesia which is caused by the high demand for palm oil.

2 LITERATURE REVIEW

Deforestation is a pressing global environmental issue with far-reaching consequences for biodiversity, climate change, and local communities. The relationship between oil palm plantations and deforestation is a topic of significant concern in regions where oil palm cultivation is prevalent. Oil palm plantations are a major driver of deforestation in tropical countries, and this review aims to provide an overview of key findings, trends, and debates in the academic literature regarding this issue. Oil palm (*Elaeis guineensis*) is native to West Africa but has become a major global crop due to its high oil yield. The expansion of oil palm cultivation has led to deforestation in several tropical regions, particularly in Southeast Asia and parts of Africa and Latin America. The historical context of this phenomenon is essential to understand the current state of affairs. Numerous studies have documented the devastating impact of oil palm expansion on tropical biodiversity, including the loss of habitat for endangered species such as orangutans, tigers, and rhinoceros. Oil palm plantations contribute to deforestation and loss of forest cover, as well as contributing to increased greenhouse gas emissions from forest conversion to plantation land (Carlson et al., 2013). Research indicates that fragmented landscapes created by oil palm plantations often lead to decreased biodiversity and increased vulnerability to invasive species. Deforestation to open land for oil palm plantations can damage soil quality and water resources and reduce biodiversity and natural habitats for wildlife and endangered plant species (Donald, 2004).

In addition, oil palm plantations can also generate greenhouse gas emissions from practices such as land clearing by burning forest or peat, the use of fertilizers and pesticides, and the use of fossil fuels in transportation and processing. Deforestation can cause climate change because forests are an important natural resource in absorbing carbon dioxide from the atmosphere and converting it into oxygen through the process of photosynthesis (Houghton & Woodwell, 1989). Deforestation associated with oil palm expansion contributes to greenhouse gas emissions, exacerbating climate change. Carbon released from forest degradation and loss contributes significantly to global emissions.
Studies have estimated the carbon emissions resulting from deforestation for oil palm plantations, highlighting the environmental cost of this industry.

In socioeconomic factors, the expansion of oil palm plantations has often led to land conflicts and displacement of indigenous communities, who depend on forests for their livelihoods. Researchers have explored the social impacts of oil palm plantations on indigenous and local communities, shedding light on issues of land tenure and human rights. The economic benefits of the palm oil industry are often cited, including job creation and economic growth in producing regions. However, these benefits may come at the expense of the environment and local communities. Research has examined the trade-offs between economic gains and environmental losses, highlighting the need for sustainable practices. Therefore, when forests are cut down or burned, the amount of carbon dioxide absorbed by forests will decrease and vice versa carbon dioxide will be released into the atmosphere. In addition, forests also function as natural climate regulators that can absorb greenhouse gases from the atmosphere. These greenhouse gases will absorb and reflect heat from the sun, which can increase global temperatures and cause climate change. With deforestation, the function of forest climate regulation is reduced and these greenhouse gases will continue to accumulate in the atmosphere (Corbera et al., 2010). Climate change resulting from deforestation can have very harmful impacts on the environment, including erratic weather patterns, floods, droughts, storms, and rising sea levels. In the long term, climate change can affect agricultural production, cause water shortages, and reduce biodiversity (Laurance, 1989).

3 METHOD

The research method was carried out using a qualitative approach. The data collection technique used in the study was library research or library research. This can provide an advantage in collecting data effectively and efficiently. Data taken from various sources such as articles, journals, books, reports and other documents can provide complete and reliable information regarding the Indonesian palm oil problem and its impact on the environment and society. In addition, the qualitative approach used can provide a deep and complex understanding of the problem under study. In this case, the research was conducted by analyzing statements related to the Indonesian palm oil problem to gain a broader and deeper understanding of this issue. The use of data in explaining phenomena that occur due to deforestation caused by oil palm plantations can
strengthen the description and analysis of the study. By using relevant and up-to-date data, the study can provide a more comprehensive understanding of the impacts of deforestation and oil palm plantations on the environment and society.

4 RESULTS AND DISCUSSION

4.1 PALM OIL TARGETS AND DEFORESTATION IMPACT ON CLIMATE CHANGE

The climate change that occurs can cause losses for small farmers. One possible impact is a decrease in crop productivity due to changes in temperature and erratic rainfall patterns. Small farmers who depend on their agricultural output for survival, can experience economic difficulties if agricultural production decreases (Donald, 2004). In addition, climate change can also lead to rising sea levels and flooding, which can destroy farmland and farmer's homes. This can lead to significant losses for smallholder farmers, most of whom do not have access to insurance or emergency funds. Climate change can lead to the spread of pests and diseases that can destroy crops. Increasing temperatures and erratic rainfall patterns can create more favorable conditions for the spread of pests and diseases in plants (Altieri, 2015). This can result in large losses for smallholders, as they have to incur higher costs for pest and disease control, which can put a strain on their finances. Reducing deforestation and controlling palm oil production targets can help mitigate the impact of climate change on smallholders and the environment. Deforestation can increase greenhouse gas emissions and eliminate the natural habitats required by many species of plants and animals, including those that are important for agriculture and food production (Friel et al., 2009). Therefore, reducing deforestation can help reduce greenhouse gas emissions and maintain ecosystem balance. In addition, controlling palm oil production targets can also help reduce deforestation. High production targets could encourage the development of new oil palm plantations and displace natural forests, thereby reducing biodiversity and exacerbating climate change. By controlling production targets, we can reduce pressure on the environment and prioritize sustainable and environmentally friendly agricultural practices (Paterson & Lima, 2018; Pawson et al., 2013). However, it is also important to consider the social and economic implications of reducing palm oil production, especially for smallholders who depend on oil palm farming. Therefore, it is important to develop sustainable and inclusive solutions that can meet the needs of smallholders and maintain environmental balance.
Palm oil is one of the main commodities in the world which is used as a raw material in various products, such as cosmetics, food and bio-fuels (Hinkes, 2020). Oil palm has been shown to contribute to deforestation, loss of forest cover, and reduced biodiversity in Indonesia and other countries where oil palm is grown. High demand for palm oil has driven the expansion of the palm oil industry worldwide, especially in Southeast Asia, where forest lands and peatlands are being converted to oil palm plantations (Stichnothe & Schuchhardt, 2011). Throughout 2021 most of Indonesia's palm oil supplies will be used for export needs. According to data from the Association of Indonesian Palm Oil Producers (GAPKI), Indonesia's total palm oil production in 2021 will reach 51.3 million tonnes. Details of production consist of 46.88 million tons of crude palm oil (CPO) and 4.41 million tons of crude palm kernel oil (CPKO). Apart from production, supplies of Indonesian palm oil in 2021 will also be added by imports of 59 thousand tonnes, as well as an initial stock of 4.86 million tonnes. Of the total supply, 34.23 million tonnes of Indonesian palm oil in 2021 will be used for export, with details:

- Export of Processed CPO: 25.7 million tonnes
- Export of Oleochemicals: 4.14 million tons
- Export of CPO: 2.73 million tonnes
- Lauric (lauric acid) exports: 1.48 million tons
- Exports of Biodiesel: 0.16 million tonnes

Meanwhile, palm oil for local consumption in 2021 is only 18.42 million tons, with details:

- Local Food Consumption: 8.95 million tonnes
- Local Biodiesel Consumption: 7.34 million tonnes
- Consumption of Local Oleochemicals: 2.12 million tonnes

GAPKI noted that the total local consumption plus exports of Indonesian palm oil in 2021 will reach 52.65 million tons. Of this total figure, the proportion of palm oil for export consumption reaches 65%, while for local consumption it is only 35%. We present in more detail in Table 1 (Ahdiat, 2022).

<table>
<thead>
<tr>
<th>No.</th>
<th>Palm Oil Consumption</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Exports</td>
<td>34.23 Million Tonnes</td>
</tr>
<tr>
<td></td>
<td>Export of Processed CPO</td>
<td>25.7 Million Tonnes</td>
</tr>
<tr>
<td></td>
<td>Export of Oleochemicals</td>
<td>4.14 Million Tonnes</td>
</tr>
<tr>
<td></td>
<td>CPO export</td>
<td>7.73 Million Tonnes</td>
</tr>
<tr>
<td></td>
<td>Lauric Export</td>
<td>1.48 Million Tonnes</td>
</tr>
</tbody>
</table>
The expansion of the palm oil industry has led to deforestation in several areas important for conservation, including in Kalimantan and Sumatra, Indonesia. Deforestation to expand oil palm plantations not only removes natural habitats for wildlife, but also results in a significant loss of carbon stocks, causing high greenhouse gas emissions and adverse climate change (Shevade & Loboda, 2019).

Although deforestation due to the expansion of the palm oil industry does not always occur, high production targets and pressure to meet global demand have become factors that encourage practices that are detrimental to the environment and have negative impacts on conservation, local communities and the environment. For example, there are cases where oil palm plantation companies have cleared peatlands, which are environmentally sensitive and prone to fires, for oil palm plantations. Palm oil deforestation in Indonesia refers to the clearing of forest areas in Indonesia to make room for oil palm plantations (Carlson et al., 2018). Indonesia is the world's largest producer of palm oil, and palm oil production is an important source of income for the Indonesian government and smallholders. Can be seen in the picture below how the effect of deforestation from year to year. Most of the deforestation in Indonesia occurs in the forests and lands of Kalimantan and Sumatra. Riau had the largest area of deforestation during that period, namely 3.81 million hectares. Then, followed by three provinces in Kalimantan in the range of 3.3-3.4 million hectares. Furthermore, North Sumatra with 2.75 million hectares, Jambi 1.59 million hectares, and North Sumatra 1.33 million hectares. The data is presented in table form as follows (Lidwina, 2021):

<table>
<thead>
<tr>
<th>No.</th>
<th>Area</th>
<th>Area/Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Riau</td>
<td>3.810.000</td>
</tr>
<tr>
<td>2.</td>
<td>West Kalimantan</td>
<td>3.460.000</td>
</tr>
<tr>
<td>3.</td>
<td>Central Kalimantan</td>
<td>3.380.000</td>
</tr>
<tr>
<td>4.</td>
<td>East Kalimantan</td>
<td>3.340.000</td>
</tr>
<tr>
<td>5.</td>
<td>South Kalimantan</td>
<td>2.750.000</td>
</tr>
<tr>
<td>6.</td>
<td>Jambi</td>
<td>1.590.000</td>
</tr>
<tr>
<td>7.</td>
<td>North Sumatera</td>
<td>1.330.000</td>
</tr>
<tr>
<td>8.</td>
<td>South Sumatera</td>
<td>794.000</td>
</tr>
<tr>
<td>9.</td>
<td>Aceh</td>
<td>680.000</td>
</tr>
<tr>
<td>10.</td>
<td>Central Sulawesi</td>
<td>696.000</td>
</tr>
</tbody>
</table>

Source: Lidwina (2021)
In addition, forest conversion to oil palm plantations also contributes to an increase in greenhouse gas emissions, mainly due to the use of fire to clear forest land and conversion of peatland to agricultural land (Sihombing & Hamid, 2023; Lisdiyono, 2017). This causes an increase in carbon dioxide and methane into the atmosphere, which can lead to global climate change and serious impacts on the environment and human life (Rifa & Hossain, 2022; Chowdhury & Hossain, 2021; Rahi & Sagor, 2022).

4.2 IMPACT OF CLIMATE CHANGE FOR FARMERS

Deforestation or deforestation is one of the main causes of climate change in the world. Forests have an important role in maintaining global climate balance. Trees in the forest can absorb carbon dioxide from the atmosphere and convert it into oxygen through the process of photosynthesis (Mataruse et al., 2022). Therefore, forests are large carbon stores and play an important role in reducing greenhouse gas emissions. However, when forests are cut down, the carbon stored in the trees is released into the atmosphere as carbon dioxide gas. According to the IPCC report, deforestation and other land use changes are the cause of 10-15% of global greenhouse gas emissions.

Deforestation can affect water availability and regional temperatures. Forests have the ability to absorb rainwater and retain it in the soil. When forests are cut down, rainwater flows faster and is not stored properly in the soil, which can cause flooding and landslides in the rainy season and drought in the dry season. Deforestation can also affect regional temperatures because forests can help regulate temperatures and maintain a cool climate in densely populated areas (Ruf et al., 2015; Corbera et al., 2010).

Deforestation causes climate change to harm smallholder farmers in a number of ways (Altieri et al., 2015). One of the main impacts is the increased risk of natural disasters such as floods, landslides and droughts. Deforestation removes vegetation cover that can retain rainwater, thereby increasing the risk of flooding and landslides. On the other hand, deforestation also reduces rainfall and accelerates soil erosion, which can lead to drought and reduce the availability of water for agriculture. The impact of climate change resulting from deforestation is detrimental to smallholder farmers in a number of ways. One of the main impacts is the increased risk of natural disasters such as floods, landslides and droughts (Houghton & Woodwell, 1989; Mataruse et al., 2022). Deforestation removes vegetation cover that can retain rainwater, thereby increasing the risk of flooding and landslides. On the other hand, deforestation also reduces rainfall and
accelerates soil erosion, which can lead to drought and reduce the availability of water for agriculture. Deforestation also eliminates wildlife habitat which plays a role in maintaining the sustainability of ecological systems and maintaining environmental balance. Climate change caused by deforestation and loss of wildlife can also affect seasonal patterns and crop yields, to the detriment of smallholders (Paterson & Lima, 2018; Ubisi et al., 2017).

In addition, deforestation can also affect the availability and quality of soil, especially in areas that are already less fertile. Deforestation to make land for agriculture or plantations is often carried out without regard to aspects of conservation and sustainable soil management. This results in a decrease in soil quality and a decrease in crop yields, to the detriment of small farmers who rely on agricultural products as their main source of income (Chirwa et al., 2008). Overall, the climate change impacts from deforestation can be detrimental to smallholder farmers and local communities who depend on natural resources for their livelihoods. Therefore, efforts are needed to reduce deforestation and encourage sustainable agricultural practices to minimize negative impacts on the environment and society.

5 CONCLUSION AND SUGGESTIONS

Oil palm plantations are Indonesia's largest export commodity, and the country is the world's largest producer of palm oil. The export of crude palm oil, palm derivative products and other palm oil derivatives makes a significant contribution to the Indonesian economy and is a source of income for millions of farmers and workers in the oil palm plantation sector. However, oil palm plantations also have significant environmental impacts, including deforestation, loss of natural habitat for wildlife, and other environmental damage. Deforestation for oil palm plantations has resulted in the loss of forests that are important for conservation, reduces water availability, increases the risk of flooding and landslides, and contributes to climate change.

In addition, the palm oil industry is also often criticized for social problems, such as land conflicts and human rights issues. Practices such as illegal logging and eviction of indigenous peoples from their lands to make way for oil palm plantations are common. The Indonesian government itself has made efforts to reduce the negative impacts of palm oil deforestation, including by introducing sustainable palm oil certification and encouraging companies to adopt environmentally friendly production practices.
However, there are still many challenges in overcoming the problem of palm oil deforestation in Indonesia, including corruption, lack of supervision, and demands for high palm oil production.

To address the problem of deforestation and the environmental impact of palm oil production, it is necessary to reduce global demand for palm oil, increase sustainable palm oil production, and adopt best practices in the palm oil industry, such as minimizing environmental damage, protecting areas that are important to conservation, fulfilling the rights of local communities, and reducing greenhouse gas emissions. These efforts can involve all parties, including producers, companies, governments, civil society, and global consumers. It is important to strike a balance between economic and environmental interests, and promote sustainable agricultural practices to minimize negative impacts on the environment and society. This can be done by promoting sustainable forest management, strengthening the rights of local communities, and increasing agricultural productivity and efficiency to increase the welfare of farmers and strengthen a sustainable economy. Therefore, it is important to ensure that palm oil production is carried out in a responsible and sustainable manner, taking into account environmental, social and economic aspects. Sustainable palm oil certifications such as the Roundtable on Sustainable Palm Oil (RSPO) and Indonesian Sustainable Palm Oil (ISPO) can help ensure palm oil production is carried out in a way that is sustainable and takes into account environmental and social impacts.
REFERENCES


