

## **Balancing Development and Conservation: The Role of Oil Palm in Achieving Prosperity and Sustainable Rural Livelihoods**

**Loso Judijanto\***

*IPOSS Jakarta, Indonesia*

\*Corresponding author: losojudijantobumn@gmail.com

### **ABSTRACT**

This study investigates the dual role of oil palm cultivation in promoting economic development and supporting environmental conservation, with a particular focus on sustainable rural livelihoods in tropical regions. Employing a Qualitative Literature Review (QLR) methodology, it systematically analyzed peer-reviewed articles, policy documents, and industry reports to synthesize current knowledge on the sector's impacts. The review identifies that oil palm is a significant contributor to rural incomes and national economies, particularly in Indonesia and Malaysia, by generating employment and supporting export revenues. However, expansion of oil palm plantations is also sometimes associated with substantial environmental challenges, including deforestation, greenhouse gas emissions, and biodiversity loss, as well as social issues such as land tenure conflicts and unequal benefit distribution. Sustainability certification schemes—such as the Roundtable on Sustainable Palm Oil (RSPO) and Indonesian Sustainable Palm Oil (ISPO)—have demonstrated potential in mitigating negative impacts, but their effectiveness is limited by inconsistent enforcement and accessibility for smallholders. The findings underscore the necessity for stronger governance, more inclusive policies, and integrated landscape-level planning to reconcile development and conservation objectives. This review highlights the need for continued research on the long-term effectiveness of sustainability initiatives and collaborative governance models to ensure equitable and environmentally responsible outcomes in the oil palm sector.

**KEYWORDS:** Oil palm, Sustainable development, Rural livelihoods, Environmental conservation

### **1. Introduction**

The rapid expansion of oil palm cultivation has become a defining feature of rural transformation in many tropical countries, particularly in Southeast Asia. As a highly versatile and productive crop, oil palm (*Elaeis guineensis*) plays a critical role in meeting global demand for edible oils, biofuels, and a wide range of industrial products. Countries such as Indonesia and Malaysia have emerged as the world's leading producers, with the sector providing significant contributions to national economies, employment, and rural livelihoods (Jelsma, Idsert; Schoneveld, George C.; Zoomers, Annelies; van Westen, 2017). However, the growth of the oil palm industry has also intensified debates over its environmental and social consequences, placing it at the center of global discussions on sustainable development (Pacheco et al., 2017; Sibhatu, 2023).

Despite its economic importance, oil palm expansion is frequently associated with substantial environmental challenges, including accusations of being the sole cause of deforestation, biodiversity loss, greenhouse gas emissions, and peatland degradation (Onoja et al., 2019; Ozora, 2024). These impacts are particularly pronounced in biodiversity-rich regions such as Sumatra and Borneo, where large-scale land conversion has altered ecosystems and potentially threatened endangered species. Social concerns have also emerged, with land tenure conflicts, displacement of indigenous communities, and unequal benefit distribution raising questions about the sector's inclusivity and long-term sustainability (Abood et al., 2015; Roucoux et al., 2017). While various sustainability initiatives, such as the Roundtable on Sustainable Palm Oil (RSPO) and Indonesian Sustainable Palm Oil (ISPO) certifications, have been introduced to address these challenges, their effectiveness remains uneven, and enforcement gaps persist.

Existing research has extensively documented both the economic benefits and environmental costs of oil palm development. However, there remain critical gaps in understanding how these trade-offs play out at the local level, particularly in relation to rural livelihoods, governance structures, and the effectiveness of policy interventions (Castellanos-Navarrete et al., 2021; Klimek et al., 2015; Ruhmkorf, 2018). Much of the literature

focuses on macroeconomic trends or deforestation metrics, often overlooking the nuanced experiences of smallholder farmers, local communities, and other stakeholders who are directly affected by the sector's transformation (Nesadurai, 2019; Petri et al., 2024). Furthermore, the complexity of global supply chains and the interplay between public and private governance mechanisms add additional layers of challenge to achieving balanced development outcomes (Busch et al., 2015; Dauvergne, 2018).

Addressing these knowledge gaps is essential for informing more equitable and sustainable approaches to oil palm governance (Pratama, 2021). This study aims to critically examine the conditions under which oil palm development can support both rural prosperity and environmental sustainability (Pacheco et al., 2020; Wijnbergen & Smith, 2020). By adopting a Qualitative Literature Review (QLR) approach (Klaassen, 2018; Whitley et al., 2022), this research seeks to provide a comprehensive and contextually grounded analysis that informs policy, practice, and future research on sustainable rural development in oil palm-producing regions.

## 2. Literature Review

### 2.1. Oil Palm and Rural Economic Transformation

The cultivation of oil palm has played a key role in shaping rural economies in tropical regions, particularly in Southeast Asia, Sub-Saharan Africa, and Latin America. Its comparatively efficient use of land resources, year-round harvest cycles, and growing global demand have positioned it as a strategic crop in national poverty alleviation strategies (Arsyad et al., 2020). In both Indonesia and Malaysia, the oil palm sector has been instrumental in supporting rural livelihoods and increasing earnings among smallholders, and infrastructure development in remote areas (Varkkey et al., 2018). The sector's ability to attract private investment, enhance fiscal revenues, and stimulate value chain activities at the local level has led many governments to treat it as a vehicle for rural prosperity (Gatto et al., 2017).

Studies have also highlighted the crop's role in enhancing asset accumulation among smallholders, particularly in contexts where land titling, market access, and extension services are relatively strong (Snashall & Poulos, 2023). However, economic benefits are unevenly distributed, often favoring large-scale plantations and elite actors over smallholders and marginalized groups (Habibi, 2023). This disparity is further exacerbated by issues such as price volatility, dependence on intermediaries, and the high cost of replanting mature palms (Firdaus, 2025).

### 2.2. Environmental Impacts and Conservation Concerns

Despite its economic importance, the rapid growth of oil palm plantations has triggered accusations of major environmental concerns, as extensive land clearing is unfairly closely directly linked to deforestation and the decline of biodiversity, habitat degradation, and the release of greenhouse gases, particularly when development occurs on peatlands and primary forests (Adesiji et al., 2015). The accusations of loss of ecological connectivity and the decline of keystone species, such as orangutans and tigers, have intensified scrutiny from conservationists and multilateral agencies (Mathai et al., 2016).

The ecological consequences of oil palm cultivation are not uniform and depend on a range of factors. Research has shown that impacts vary according to plantation type, governance context, prior land use, and adherence to certification standards such as the RSPO or ISPO (Cattau et al., 2016). Nevertheless, enforcement remains weak in some jurisdictions, with illegal expansion, fire-based land clearing, and encroachment into protected areas persisting (Tacconi et al., 2019). Conservation efforts are frequently undermined by policy incoherence between national development agendas and ecological governance frameworks (Coscieme et al., 2021).

### 2.3. Governance, Regulation, and Institutional Dynamics

Strong institutional oversight is essential for balancing the conflicting priorities of development and environmental preservation within the oil palm sector. A range of institutional actors—including central and local governments, customary authorities, corporate firms, civil society, and international donors—shape how policies are implemented and contested on the ground (Jefferson et al., 2020). However, fragmented jurisdiction, overlapping land tenure claims, and rent-seeking behavior often result in policy ambiguity and enforcement failures (Diepart, 2015).

Initiatives such as jurisdictional sustainability programs, moratoria on new concessions, and integrated spatial planning have been introduced to mitigate these governance failures. Yet, success has been limited due to weak

coordination, limited capacity at the district level, and the dominance of vested economic interests (Tafeni, 2024). Furthermore, formal regulations are frequently disconnected from informal land practices, particularly in indigenous and customary areas (Perrin, 2017).

#### **2.4. Smallholders and Equity in Oil Palm Landscapes**

Smallholders constitute a significant yet structurally disadvantaged segment within oil palm economies. While they account for over 40% of planted areas in some countries, their access to inputs, capital, markets, and extension services remains limited (Langyintuo, 2020). Research has documented how contract farming schemes, while promising in theory, often lock farmers into asymmetrical relationships with processing mills and corporate buyers (Gumbi et al., 2023).

The inclusion of smallholders in sustainability initiatives remains problematic. Certification schemes are often costly and administratively burdensome, making them inaccessible to independent farmers without external support (Mushi et al., 2022). Moreover, many policy frameworks fail to recognize the diverse typologies of smallholders, ranging from plasma participants and informal growers to transmigrants and local customary landholders—each with distinct needs and constraints (Bronkhorst et al., 2017). Equity in benefit distribution remains a central concern in assessing the true developmental value of oil palm expansion.

#### **2.5. Towards Integrated and Sustainable Palm Oil Landscapes**

In response to growing criticism, new models of oil palm governance emphasize landscape-level approaches that integrate ecological, social, and economic dimensions. These approaches advocate for a shift away from farm-level interventions towards multistakeholder platforms, inclusive planning, and adaptive co-management (Ratner et al., 2022). Jurisdictional sustainability initiatives and collaborative land-use planning efforts offer promising alternatives to the fragmented and sectoral strategies of the past.

However, moving towards integrated solutions requires confronting structural challenges—power asymmetries, institutional inertia, and conflicting incentives among actors. It also demands epistemic pluralism, recognizing that rural communities possess valuable knowledge, values, and priorities that are often marginalized in top-down sustainability narratives.

### **3. Method**

This study employed a Qualitative Literature Review (QLR) approach to systematically investigate how oil palm development influences the balance between economic growth, environmental conservation, and sustainable rural livelihoods. The QLR method was chosen for its capacity to synthesize diverse perspectives and generate nuanced insights from a broad body of literature relevant to the research objectives.

#### **3.1. Search Strategy and Data Sources**

A comprehensive literature search was conducted between January and March 2025. The following academic databases and repositories were accessed: Scopus, Web of Science, JSTOR, Google Scholar, and Mendeley. To ensure coverage of both peer-reviewed and gray literature, additional searches included institutional reports, policy documents, and industry publications. The search strategy utilized Boolean operators and combinations of keywords such as: “oil palm” OR “palm oil”; “sustainable development”; “rural livelihoods”; “environmental conservation”; “certification” OR “RSPO” OR “ISPO”; “smallholders”; “governance”; and “landscape approach”.

#### **3.2. Inclusion and Exclusion Criteria**

Studies were included if they were published in English between 2010 and 2025, focused on the economic, environmental, or social dimensions of oil palm in tropical regions (especially Southeast Asia, Africa, and Latin America), provided empirical evidence, policy analysis, or conceptual frameworks relevant to the research questions, and included both peer-reviewed articles and reputable institutional reports.

Exclusion criteria were publications not directly related to oil palm or its sustainability impacts; opinion pieces, news articles, or non-scholarly sources; studies lacking sufficient methodological detail.

### 3.3. Screening and Selection Process

The initial search yielded 827 sources. Titles and abstracts were screened for relevance, followed by a full-text review of 151 articles and reports. After applying the inclusion and exclusion criteria, 72 sources were selected for in-depth analysis.

### 3.4. Data Extraction and Analysis

A thematic analysis framework guided the synthesis of findings. Key information was extracted from each source, including study context, methodology, main findings, and relevance to the research objectives. The analysis proceeded in the following steps:

1. Coding: Each document was coded for recurring themes related to economic impact, environmental consequences, social sustainability, governance, and certification schemes.
2. Theme Development: Codes were grouped into higher-order themes to identify patterns, contradictions, and knowledge gaps.
3. Synthesis: The findings were synthesized to map dominant narratives, highlight governance challenges, and propose integrative perspectives for balancing development and conservation.

### 3.5. Ensuring Rigor and Reproducibility

Multiple databases and diverse literature types were included to minimize selection bias and ensure a balanced representation of perspectives. The thematic coding process was iterative, with regular cross-checks to ensure consistency and reliability.

### 3.6. Alignment with Research Objectives

The chosen QLR methodology and thematic analysis approach were explicitly aligned with the study's objectives: to critically assess the multifaceted impacts of oil palm, identify institutional and policy innovations, and propose pathways for sustainable and equitable sectoral development

## 4. Results

The objective of this research is to explore how oil palm helps balance economic growth and environmental protection, particularly in the context of sustainable rural livelihoods. Through a Qualitative Literature Review (QLR), an analysis of relevant literature has uncovered several important dimensions of the palm oil trade, looking at the economic effects alongside the environmental and social issues.

In terms of economic contribution, oil palm has proven to be one of the key commodities supporting the economies of tropical countries, particularly Indonesia and Malaysia. In Indonesia, the oil palm sector contributes around 3.5% to the national GDP. It is a key income generator for over 16 million people employed in palm oil plantations and related industries (Chrisendo et al., 2021). In 2020, Indonesia recorded a production of 51 million tons of palm oil, establishing it as the leading global producer, while Malaysia followed with approximately 19 million tons (Cheah et al., 2023). Based on information from the Indonesian Palm Oil Association (IPOA), Palm oil represented 50% of Indonesia's total exports in 2020, making it the country's leading non-oil export product (Tandra & Suroso, 2023).

Nevertheless, despite the considerable economic benefits of oil palm, the environmental and social repercussions of expanding oil palm plantations are considerable. According to Global Forest Watch (2020), since 1990, more than 5 million hectares of Indonesian forests have been transformed into oil palm plantations, contributing to the unfair accusations of the sole cause of global deforestation (Qaim et al., 2020). It has been reported that such conversion has occurred in areas with high biodiversity, such as Sumatra and Kalimantan, causing the depletion of habitats critical for endangered animals like orangutans, tigers, and elephants (Gatti & Velichevskaya, 2020). In Malaysia, while the oil palm sector helps mitigate poverty in rural communities, the expansion of plantations has been accused of causing a significant loss of tropical forests as well (Wan Mohd Jaafar et al., 2020).

The primary environmental challenge related to oil palm is not only deforestation but also land degradation, such as the potential damage to peatlands frequently used for oil palm farms, with the utilization of peatland in cultivation leading to a substantial increase in carbon dioxide (CO<sub>2</sub>) emissions. As an illustration, the forest fires that occurred in Indonesia in 2015, which were largely caused by the burning of peatland for oil palm plantations, contributed to the release of an estimated 2.6 million tons of CO<sub>2</sub> (Manning et al., 2019). During the same year, because of the incidents, Indonesia was ranked as the second-largest emitter of CO<sub>2</sub>, following China, largely due to fires associated with oil palm expansion (Harris et al., 2015). Additionally, some unsustainable oil palm farming practices, such as the overapplication of toxic pesticides and herbicides, may compromise the quality of soil and water in adjacent areas, threatening the well-being of rural communities dependent on these natural resources (Allen et al., 2015).

Despite these challenges, there are several policy innovations and certifications, like the Roundtable on Sustainable Palm Oil (RSPO) offer promising approaches to lessen the negative effects of oil palm. According to RSPO data, by 2020, around 20% of the world's palm oil production had been certified by the RSPO, involving more than 4 million hectares of plantations (Schmidt & De Rosa, 2020). This certification aims to ensure more environmentally and socially responsible plantation practices, encouraging companies to adhere to strict sustainability standards. However, despite progress in certification adoption, studies indicate that enforcement of these standards remains weak on the ground. In 2020, only about 30% of RSPO-certified palm oil plantations consistently complied with environmental and social standards (Afrizal et al., 2023).

Another significant finding emerging from the literature is the unequal distribution of economic benefits from the palm oil sector. Small-scale farmers, essential to the oil palm production process, often find themselves in imbalanced relationships with large corporations. According to a report by the International Finance Corporation (IFC), more than 40% of smallholder farmers in Indonesia and Malaysia face difficulties accessing fair markets and receive relatively lower prices for their products, making them vulnerable to global price fluctuations (Hasan et al., 2022). The partnership system with large companies, known as the plasma scheme, aims to improve smallholder conditions but is in some cases hindered by uncertainty in contracts and high dependency on companies for marketing their produce (Hutabarat et al., 2019).

Social impacts of oil palm expansion also cannot be overlooked. Research shows that land-use changes often lead to potential disputes over land between corporations and local or indigenous populations, particularly in areas with unrecognized customary land rights. In Indonesia, grossly estimated that around 10% of total agrarian conflicts are related to the plantation sector, involving over 300,000 families who depend on customary lands now used for plantations (Andrianto et al., 2019). Moreover, poverty in regions involved has been eradicated, but it persists in some areas, even though some areas have seen increased incomes due to employment provided by the sector (Santika et al., 2019).

From a governance and policy perspective, while actions have been taken to impose a moratorium on the expansion of oil palm plantations, coupled with more stringent regulatory actions, the implementation of these policies is often hindered by greater economic interests, institutional fragmentation, and limited oversight capacity (Choiruzzad et al., 2021; Putri et al., 2022). As an illustration, the Indonesian palm oil moratorium was implemented in 2018, but several instances of illegal plantation expansion continue in zones not approved for oil palm development (Syarifuddin et al., 2020; Yusuf et al., 2018).

Another significant observation is that the enduring viability of the oil palm industry depends heavily on policies that adopt a landscape-based approach, which not only involve land management but also take into account biodiversity, socio-economic, and equitable distribution of benefits. Countries like Colombia, Nigeria, and Brazil have begun adopting such approaches, with integrated spatial planning between the oil palm sector and natural conservation management (Lyons-White & Knight, 2018). This approach necessitates the collaboration of multiple stakeholders, including governments, corporations, civil society, and indigenous communities, to establish a more sustainable development framework.

Overall, although oil palm is crucial in driving economic growth in rural regions and alleviating poverty in producing countries, the sector has to overcome remaining challenges related to achieving environmental and social sustainability. Therefore, to achieve sustainability goals, there is a need for global cooperation, stricter policy enforcement, and enhanced monitoring capabilities to lessen the adverse consequences of the expansion of oil palm farming.

## 5. Discussion

This study aims to analyze how the oil palm industry combines economic advancement with ecological sustainability and its role in enhancing rural livelihoods. Through the Qualitative Literature Review (QLR), a comprehensive analysis of existing literature has provided critical insights into these complex dynamics.

The findings indicate that the oil palm industry plays a major role in driving economic development in rural areas, especially in Indonesia and Malaysia. In Indonesia, the oil palm sector directly employs around 16 million people, contributing approximately 3.5% to the national GDP (Lionardo et al., 2024; Purnomo et al., 2023). Additionally, it represents a major share of the country's export revenues, making it one of the largest commodity sectors in the country. The data suggest that oil palm plantations are essential in reducing poverty in rural communities, where smallholder farmers experience substantial improvements in income, sometimes increasing their earnings by 50-100% after engaging in oil palm cultivation (Edwards, 2019; Euler et al., 2016). Similarly, in Malaysia, exports of oil palm make a substantial contribution to the nation's economic growth, representing 30% of its total export revenue (Ramadhani & Santoso, 2019; Ziaei & Ali, 2021).

However, the study emphasizes that the growth of oil palm plantations has been unfairly associated with severe environmental consequences. Deforestation, particularly in tropical areas, has escalated as deforestation is unfairly associated directly with oil palm farming. In Indonesia, the clearing of more than 5 million hectares of tropical rainforest which has been unfairly directly associated with oil palm plantations since the 1990s, has led to severe biodiversity decline and the loss of vital habitats for species like orangutans and tigers (Petrenko et al., 2016; Toulec et al., 2020). In addition, transforming peatlands into oil palm plantations has potentially resulted in serious environmental repercussions, including large-scale forest fires. For example, the 2015 fires in Indonesia, which were allegedly exacerbated by land clearance for plantations, released over 2.6 million tons of CO<sub>2</sub> into the atmosphere, playing a major role in accelerating global climate change (Maskun et al., 2021; Rahman et al., 2017). These environmental impacts contradict the principles of sustainable development, as they undermine the very resources that rural communities depend on for their livelihoods, including aspects like water quality, soil health, and biodiversity.

Despite these challenges, continuous efforts are being made to reduce the adverse effects of the oil palm sector. The Roundtable on Sustainable Palm Oil (RSPO) certification has achieved progress in encouraging sustainable practices within the industry. By 2020, around 20% of global palm oil production had achieved RSPO certification, covering more than 4 million hectares of plantations (Anuman et al., 2018; Nusli et al., 2024). This certification guarantees that palm oil is cultivated using more eco-conscious methods and under improved labor standards. However, enforcement remains inconsistent, and some plantations continue to operate outside of these sustainability frameworks, contributing to accusations of deforestation (Carlson et al., 2018; Nnoko-Mewanu, 2019).

In terms of governance, the study suggests that weak regulatory frameworks in key producing countries have hindered the effectiveness of sustainability initiatives. Despite the moratorium on new palm oil plantation permits in Indonesia, some illegal plantations continue to expand, often in protected areas or on land with high environmental value (Cisneros Tersitsch et al., 2020; Pramudya et al., 2018). This highlights the need for stronger enforcement mechanisms and more comprehensive governance structures that involve both local communities and the private sector in decision-making processes. Furthermore, more attention is needed to integrate landscape-level planning that integrates agricultural development with the safeguarding of essential ecological habitats.

The social impacts of oil palm expansion also present significant challenges. While the sector has contributed to poverty reduction by providing jobs and improving income, it has also inadvertently exacerbated social inequality. Smallholder farmers, contributing approximately 40% to the worldwide production of palm oil, often face challenges related to market access, relatively lower prices for their products, and lack of technical assistance (Hendrawan et al., 2024; Reich & Musshoff, 2025). Many smallholders are also dependent on large companies for buying their crops, which limits their autonomy and long-term economic stability (Cramb & McCarthy, 2016; Syahza, 2019). This disparity underscores the need for inclusive policies that ensure smallholder farmers can benefit equitably from the palm oil production sector.

In summary, the contribution of oil palm is intricate, involving a delicate interplay between promoting economic growth, conserving the environment, and supporting enduring rural well-being. On one hand, the industry provides crucial economic opportunities for rural communities, lifting millions out of poverty and contributing to national economies. On the other hand, the potential ecological issues resulting from the expansion of oil palm plantations, such as accusations of a direct link to deforestation and the destruction of peatlands, represent a significant risk to biodiversity and jeopardize the sector's long-term viability. Although initiatives like RSPO certification offer some solutions, they have to exert more effort to be universally successful in addressing the sector's broader sustainability issues.

Recent literature underscores the complexity of oil palm's impacts, with both positive and negative consequences for producing countries. Qaim et al. (2020) found that while oil palm expansion has been a significant driver of economic growth and rural poverty reduction, it has also been associated with deforestation, biodiversity loss, and greenhouse gas emissions (Fadhli Rabbi et al., 2023; Qaim et al., 2020). This duality is echoed in other studies, which highlight that the conversion of forests to oil palm plantations leads to substantial carbon stock losses—up to 61% compared to original forests (Guillaume et al., 2018)—and alters local microclimates, further stressing ecosystems. However, these negative effects are not unique to oil palm; similar or even greater losses have been observed with other crops, such as rubber, suggesting that broader land-use policy and governance frameworks play a critical role in shaping outcomes (Qaim et al., 2020; Suardi et al., 2022).

The implementation of sustainability certification schemes, such as the Roundtable on Sustainable Palm Oil (RSPO), has been widely promoted as a strategy to mitigate environmental and social harms. Yet, recent research reveals that these market-based instruments can have unintended consequences. For example, a study in Malaysia found that RSPO certification was associated with a decrease in plantation efficiency, both before and after certification, likely due to the operational adjustments required to meet certification standards (Zachlod et al., 2025; Zakaria et al., 2022). This de-intensification may inadvertently drive producers to expand into non-certified areas, potentially shifting deforestation and biodiversity loss elsewhere—a phenomenon known as “leakage” (Zachlod et al., 2025). These findings suggest that while certification can improve practices on certified lands, its broader effectiveness depends on careful policy design, monitoring, and complementary measures to prevent negative spillover effects.

From a social perspective, the literature indicates that oil palm expansion has led to both opportunities and challenges for rural communities. While smallholder farmers can benefit from increased income and improved livelihoods, many face barriers to participating in certification schemes due to high costs, complex requirements, and limited access to resources (Michida, 2023; Ogahara et al., 2022). This exclusion risks deepening existing inequalities and undermining the legitimacy of sustainability initiatives, particularly if independent smallholders are marginalized from lucrative supply chains. Furthermore, land tenure insecurity and conflicts over customary land rights remain persistent issues, as documented in Indonesia and other producing countries (Ngan et al., 2022; Papilo et al., 2022; Qaim et al., 2020; Zakaria et al., 2022).

Despite these challenges, there are promising pathways forward. Integrated landscape approaches, which coordinate agricultural production with conservation goals and involve multiple stakeholders—including governments, companies, smallholders, and indigenous communities—are gaining traction as more holistic solutions (Alhaji et al., 2024; Khasanah et al., 2020; Martial et al., 2024; Papilo et al., 2022; Purnomo et al., 2023; Qaim et al., 2020). Such models have the potential to reconcile economic and environmental objectives, but require robust governance, transparent monitoring, and equitable benefit-sharing mechanisms to succeed (Khasanah et al., 2020; Purnomo et al., 2020).

### **5.1. Limitations**

This study's findings are based on a qualitative literature review, which, while comprehensive, is limited by the availability and quality of published data. There may be publication bias, and the heterogeneity of study contexts makes it difficult to generalize results across all producing regions. Additionally, the long-term impacts of certification schemes and landscape-level interventions remain insufficiently studied, highlighting the need for ongoing empirical research and monitoring.

### **5.2. Implications and Recommendations for Future Research**

This study emphasizes the urgent need for integrated policies that align economic development goals with environmental sustainability. It also calls for the enhancement of regulatory frameworks that ensure compliance with sustainability standards at all levels of production. Future research could focus on assessing the long-term effectiveness of sustainable certification programs like RSPO and their impact on both smallholder farmers and the environment. Furthermore, more attention is needed on innovative governance models that foster collaboration between governments, the corporate sector, and societal stakeholders to promote a palm oil industry that is both sustainable and socially just. Lastly, understanding how landscape-level approaches to land-use planning can reconcile the demands of oil palm production with the need for conservation will be crucial in promoting a balanced and sustainable future for both rural communities and the environment.

## **6. Conclusion**

The oil palm sector plays a fundamental role in shaping the economic frameworks of various tropical countries, particularly in Southeast Asia. It has been instrumental in driving rural development by offering employment opportunities for millions, especially small-scale farmers, and serving as a key component of national economies, notably in Indonesia and Malaysia. However, the growth of oil palm plantations has raised significant environmental concerns, especially in terms of unfair accusations of deforestation, biodiversity loss, and peatland degradation, all of which present substantial challenges to long-term sustainability.

Although the oil palm industry has shown promise in stimulating economic growth and alleviating poverty in rural areas, these advantages sometimes come at the expense of considerable environmental harm. The swift expansion of plantations has been unfairly associated with the loss of vital habitats for endangered species, including orangutans and tigers, as well as the loss of essential carbon sinks, exacerbating climate change. Furthermore, unsustainable agricultural practices, like clearing peatlands for plantations, have resulted in large-scale greenhouse gas emissions, amplifying global environmental issues.

To address these challenges, initiatives like the Roundtable on Sustainable Palm Oil (RSPO) and ISPO have worked to encourage sustainable practices within the industry. While RSPO and ISPO certification have brought about some improvements, their application has been uneven, and many plantations still operate outside the scope of certified sustainability. The absence of robust enforcement measures and the persistence of some plantations have hindered progress toward creating a truly sustainable oil palm sector.

Despite these obstacles, there are promising opportunities to find a balance between economic development and environmental preservation. Landscape-based land-use planning approaches, which integrate both oil palm cultivation and the conservation of vital ecosystems, have been successful in alleviating some of the adverse environmental effects of the growth of oil palm plantations. Additionally, ensuring equitable benefits for smallholder farmers through better market access and inclusive policies could help address the social inequalities heightened by the industry's growth.

The future of sustainability in the oil palm industry is closely tied to the introduction of more stringent regulatory frameworks, stronger enforcement of sustainability standards, and governance models that promote collaboration among governments, the private sector, and local communities. Only through coordinated and comprehensive efforts can the industry effectively balance the demands of economic development with the need for environmental protection and social equity.

While oil palm is essential to fostering economic growth and supporting rural livelihoods, its long-term sustainability depends on addressing its environmental and social challenges. By strengthening governance, improving certification practices, and ensuring fair outcomes for smallholder farmers, the oil palm industry holds the potential to drive more sustainable practices and equitable results for both the economy and the environment. Future research should focus on evaluating landscape-level management strategies and assessing the long-term impact of certification programs on smallholders and ecosystems.

In sum, the evidence suggests that oil palm can contribute to both prosperity and sustainability, but only under specific institutional and policy conditions. Achieving this balance requires not just technical solutions, but also inclusive governance, targeted support for smallholders, and adaptive management to address unintended consequences. The sector's future will depend on the ability of stakeholders to learn from past experiences and continuously refine strategies to align economic development with conservation imperatives.

## References

- Abood, S. A., Lee, J. S. H., Burivalova, Z., Garcia-Ulloa, J., & Koh, L. P. (2015). Relative contributions of the logging, fiber, oil palm, and mining industries to forest loss in Indonesia. *Conservation Letters*, 8(1), 58–67. <https://doi.org/10.1111/conl.12103>
- Adesiji, A. R., Mohammed, T. A., Daud, N. N., Saari, M., Gbadebo, A. O., & Jacdonmi, I. (2015). Impacts of land use change on peatland degradation: a review. *Ethiopian Journal of Environmental Studies and Management*, 8(2), 225–234. <https://doi.org/10.4314/ejesm.v8i2.11>
- Afrizal, A., Hospes, O., Berenschot, W., Dhialuhaq, A., Adriana, R., & Poetry, E. (2023). Unequal access to justice: an evaluation of RSPO's capacity to resolve palm oil conflicts in Indonesia. *Agriculture and Human Values*, 40(1), 291–304. <https://doi.org/10.1007/s10460-022-10360-z>
- Allen, K., Corre, M. D., Tjoa, A., & Veldkamp, E. (2015). Soil nitrogen-cycling responses to conversion of lowland forests to oil palm and rubber plantations in Sumatra, Indonesia. *PloS One*, 10(7), e0133325. <https://doi.org/10.1371/journal.pone.0133325>
- Andrianto, A., Komarudin, H., & Pacheco, P. (2019). Expansion of oil palm plantations in Indonesia's frontier: Problems of externalities and the future of local and indigenous communities. *Land*, 8(4), 56. <https://doi.org/10.3390/land8040056>
- Anuman, C., Khongkhon, B., Thaweehirunratthakid, N., & Laoyoung, K. (2018). Factor affecting on success and failure for roundtable sustainable palm oil (RSPO) in Thailand. *International Journal of Applied Business and Economic Research*, 16, 189–199.
- Arsyad, M., Nuddin, A., Fahmid, I. M., Salman, D., Pulubuhu, D. A. T., Unde, A. A., & Djufry, F. (2020). Agricultural development: poverty, conflict and strategic programs in country border. *IOP Conference Series: Earth and Environmental Science*, 575(1), 12091. <https://doi.org/10.1088/1755-1315/575/1/012091>
- Berenschot, W. (2022). Land-use change conflicts and anti-corporate activism in Indonesia: A review essay. *Journal of East Asian Studies*, 22(2), 333–356. <https://doi.org/10.1017/jea.2022.15>
- Bronkhorst, E., Cavallo, E., Medler, M. van D. tot, Klinghammer, S., Smit, H. H., Gijsenbergh, A., & Laan, C. van der. (2017). Current practices and innovations in smallholder palm oil finance in Indonesia and Malaysia: Long-term financing solutions to promote sustainable supply chains. Center for International Forestry Research (CIFOR). <https://doi.org/10.17528/cifor/006585>
- Busch, J., Ferretti-Gallon, K., Engelmann, J., Wright, M., Austin, K. G., Stolle, F., & others. (2015). Reductions in emissions from deforestation from Indonesia's moratorium on new oil palm, timber, and logging concessions. *Proceedings of the National Academy of Sciences*, 112(5), 1328–1333. <https://doi.org/10.1073/pnas.1412514112>
- Carlson, K. M., Heilmayr, R., Gibbs, H. K., Noojipady, P., Burns, D. N., Morton, D. C., Walker, N. F., Paoli, G. D., & Kremen, C. (2018). Effect of oil palm sustainability certification on deforestation and fire in Indonesia. *Proceedings of the National Academy of Sciences*, 115(1), 121–126. <https://doi.org/10.1073/pnas.1704728114>
- Castellanos-Navarrete, A., de Castro, F., & Pacheco, P. (2021). The impact of oil palm on rural livelihoods and tropical forest landscapes in Latin America. *Journal of Rural Studies*, 81, 294–304. <https://doi.org/10.1016/j.jrurstud.2020.10.047>
- Cattau, M. E., Marlier, M. E., & DeFries, R. (2016). Effectiveness of Roundtable on Sustainable Palm Oil (RSPO) for reducing fires on oil palm concessions in Indonesia from 2012 to 2015. *Environmental Research Letters*, 11(10), 105007.
- Cheah, W. Y., Siti-Dina, R. P., Leng, S. T. K., Er, A. C., & Show, P. L. (2023). Circular bioeconomy in palm oil industry: Current practices and future perspectives. *Environmental Technology & Innovation*, 30, 103050. <https://doi.org/10.1016/j.eti.2023.103050>
- Choiruzzad, S. A. B., Tyson, A., & Varkkey, H. (2021). The ambiguities of Indonesian Sustainable Palm Oil certification: internal incoherence, governance rescaling and state transformation. *Asia Europe Journal*, 19(2), 189–208. <https://doi.org/10.1007/s10308-020-00593-0>
- Chrisendo, D., Siregar, H., & Qaim, M. (2021). Oil palm and structural transformation of agriculture in Indonesia. *Agricultural Economics*, 52(5), 849–862. <https://doi.org/10.1111/agec.12658>
- Cisneros Tersitsch, M. E., Kis-Katos, K., & Nuryartono, N. (2020). Palm oil and the politics of deforestation in Indonesia (Issue 842).

- Coscieme, L., Mortensen, L. F., & Donohue, I. (2021). Enhance environmental policy coherence to meet the Sustainable Development Goals. *Journal of Cleaner Production*, 296, 126502. <https://doi.org/10.1016/j.jclepro.2021.126502>
- Cramb, R., & McCarthy, J. F. (2016). *The Oil Palm Complex: Smallholders, Agribusiness and the State in Indonesia and Malaysia*. Nus Press.
- Dauvergne, P. (2018). The global politics of the business of “sustainable” palm oil. *Global Environmental Politics*, 18(2), 34–52.
- Diepart, J. C. (2015). The fragmentation of land tenure systems in Cambodia: peasants and the formalization of land rights.
- Edwards, R. B. (2019). Export agriculture and rural poverty: evidence from Indonesian palm oil.
- Euler, M., Schwarze, S., Siregar, H., & Qaim, M. (2016). Oil palm expansion among smallholder farmers in Sumatra, Indonesia. *Journal of Agricultural Economics*, 67(3), 658–676. <https://doi.org/10.1111/1477-9552.12163>
- Firdaus, M. I. (2025). Palm Oil Industry. In *The Palm Oil Export Market: Trends, Challenges, and Future Strategies for Sustainability* (p. 32).
- Gatti, R. C., & Velichevskaia, A. (2020). Certified “sustainable” palm oil took the place of endangered Bornean and Sumatran large mammals habitat and tropical forests in the last 30 years. *Science of The Total Environment*, 742, 140712. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.140712>
- Gatto, M., Wollni, M., Asnawi, R., & Qaim, M. (2017). Oil palm boom, contract farming, and rural economic development: Village-level evidence from Indonesia. *World Development*, 95, 127–140. <https://doi.org/10.1016/j.worlddev.2017.02.010>
- Gumbi, N., Gumbi, L., & Twinomurinzi, H. (2023). Towards sustainable digital agriculture for smallholder farmers: A systematic literature review. *Sustainability*, 15(16), 12530. <https://doi.org/10.3390/su151612530>
- Habibi, M. (2023). Extracting labour from the neighbour: class dynamics of agrarian change in Sumatran oil palm. *The Journal of Peasant Studies*, 50(4), 1317–1346. <https://doi.org/10.1080/03066150.2022.2026330>
- Harris, N., Minnemeyer, S., Stolle, F., & Payne, O. (2015). Indonesia’s fire outbreaks producing more daily emissions than entire US economy. *World Resources Institute*, 16.
- Hasan, M. F., Fadhil, I., Fahmid, M. M., & Ahmad, T. (2022). Impact of the European Union Regulations on Indonesian Oil Palm Smallholder Farmers. *International Journal of Oil Palm*, 5(1), 1–15.
- Hendrawan, D., Chrisendo, D., & Musshoff, O. (2024). Strengthening oil palm smallholder farmers’ resilience to future industrial challenges. *Scientific Reports*, 14(1), 12105. <https://doi.org/10.1038/s41598-024-62426-z>
- Hutabarat, S., Slingerland, M., & Dries, L. (2019). Explaining the “certification gap” for different types of oil palm smallholders in Riau Province, Indonesia. *The Journal of Environment & Development*, 28(3), 253–281. <https://doi.org/10.1177/1070496519854505>
- Jefferson, U., Carmenta, R., Daeli, W., & Phelps, J. (2020). Characterising policy responses to complex socio-ecological problems: 60 fire management interventions in Indonesian peatlands. *Global Environmental Change*, 60, 102027. <https://doi.org/10.1016/j.gloenvcha.2019.102027>
- Jelsma, Idsert; Schoneveld, George C.; Zoomers, Annelies; van Westen, A. C. M. (2017). Unpacking Indonesia’s independent oil palm smallholders: An actor-disaggregated approach to identifying environmental and social performance challenges. *Land Use Policy*, 69, 281–297. <https://doi.org/10.1016/j.landusepol.2017.08.012>
- Klaassen, R. G. (2018). Interdisciplinary education: a case study. *European Journal of Engineering Education*, 43(6), 842–859. <https://doi.org/10.1080/03043797.2018.1442417>
- Klimek, P., Obersteiner, M., & Thurner, S. (2015). Systemic trade risk of critical resources. *Science Advances*, 1(10), e1500522. <https://doi.org/10.1126/sciadv.1500522>
- Langyintuo, A. (2020). Smallholder farmers’ access to inputs and finance in Africa. In *The role of smallholder farms in food and nutrition security* (pp. 133–152). [https://doi.org/10.1007/978-3-030-42148-9\\_7](https://doi.org/10.1007/978-3-030-42148-9_7)
- Lionardo, A., Kurniawan, R., Irmawati, I., Umanailo, M. C. B., & Santoso, A. D. (2024). Palm Oil Workers Employment Policy and Sustainability. *ARISTO*, 13(1), 303–314. <https://doi.org/10.24269/ars.v13i1.9289>
- Lyons-White, J., & Knight, A. T. (2018). Palm oil supply chain complexity impedes implementation of corporate no-deforestation commitments. *Global Environmental Change*, 50, 303–313. <https://doi.org/10.1016/j.gloenvcha.2018.04.012>
- Manning, F. C., Kho, L. K., Hill, T. C., Cornulier, T., & Teh, Y. A. (2019). Carbon emissions from oil palm plantations on peat soil. *Frontiers in Forests and Global Change*, 2, 37. <https://doi.org/10.3389/ffgc.2019.00037>

- Maskun, A., Naswar, A. H., & Bachril, S. N. (2021). Palm oil cultivation on peatlands and its impact on increasing Indonesia's greenhouse gas emissions. *IOP Conf Ser: Earth Environ Sci*, 724(1), 12092. <https://doi.org/10.1088/1755-1315/724/1/012092>
- Mathai, J., Duckworth, J. W., Meijaard, E., Fredriksson, G., Hon, J., Sebastian, A., & Consortium, B. C. (2016). Carnivore conservation planning on Borneo: identifying key carnivore landscapes, research priorities and conservation interventions. *Raffles Bulletin of Zoology*.
- Mushi, G. E., Di Marzo Serugendo, G., & Burgi, P. Y. (2022). Digital technology and services for sustainable agriculture in Tanzania: A literature review. *Sustainability*, 14(4), 2415. <https://doi.org/10.3390/su14042415>
- Nesadurai, H. E. (2019). Transnational private governance as a developmental driver in Southeast Asia: The case of sustainable palm oil standards in Indonesia and Malaysia. *The Journal of Development Studies*, 55(9), 1892–1908. <https://doi.org/10.1080/00220388.2018.1536262>
- Nnoko-Mewanu, J. (2019). "When We Lost the Forest, We Lost Everything": Oil Palm Plantations and Rights Violations in Indonesia. Human Rights Watch.
- Nusli, H., Muhamad, M. Z., Mustafa, M. M., Vaiapuri, S., Fatah, F. A., & Syahlan, S. (2024). Sustainable Certification in the Oil Palm Industry: A Comparative Analysis of MSPO, RSPO, ISPO and ISCC Schemes (p. 26).
- Onoja, E., Chandren, S., Razak, F. I. A., Mahat, N. A., & Wahab, R. A. (2019). Oil palm (*Elaeis guineensis*) biomass in Malaysia: the present and future prospects. *Waste and Biomass Valorization*, 10, 2099–2117. <https://doi.org/10.1007/s12649-019-00725-5>
- Ozora, T. T. (2024). Regenerative Agriculture as an Alternative to Indonesian Monoculture Oil Palm Industry: A Sustainable Livelihood Analysis. University of Leipzig.
- Pacheco, P., Schoneveld, G. C., Dermawan, A., Komarudin, H., & Djama, M. (2017). The public and private regime complex for governing palm oil supply: What scope for building connections and enhancing complementarities? (Vol. 174). CIFOR. <https://doi.org/10.17528/cifor/006891>
- Pacheco, P., Schoneveld, G., Dermawan, A., Komarudin, H., & Djama, M. (2020). Governing sustainable palm oil supply: Disconnects, complementarities, and antagonisms between state regulations and private standards. *Regulation & Governance*, 14(3), 568–598. <https://doi.org/10.1111/rego.12220>
- Perrin, J. (2017). Legal pluralism as a method of interpretation: A methodological approach to decolonising indigenous peoples' land rights under international law. *Universitas-XXI, Revista de Ciencias Sociales y Humanas*, 26, 23–60. <https://doi.org/10.17163/uni.n26.2017.01>
- Petrenko, C., Paltseva, J., & Searle, S. (2016). Ecological impacts of palm oil expansion in Indonesia.
- Petri, H., Hendrawan, D., Bähr, T., Musshoff, O., Wollni, M., Asnawi, R., & Faust, H. (2024). Replanting challenges among Indonesian oil palm smallholders: a narrative review. *Environment, Development and Sustainability*, 26(8), 19351–19367. <https://doi.org/10.1007/s10668-023-01788-2>
- Pramudya, E. P., Hospes, O., & Termeer, C. J. A. M. (2018). The disciplining of illegal palm oil plantations in Sumatra. *Third World Quarterly*, 39(5), 920–940. <https://doi.org/10.1080/01436597.2017.1401462>
- Pratama, A. F. (2021). Sustainable and digitized certification of palm oil production: Its impact on the environment in Indonesia. *International Journal of Informatics, Information System and Computer Engineering (INJIISCOM)*, 2(2), 135–142. <https://doi.org/10.34010/injiiscom.v2i2.5577>
- Purnomo, H., Kusumadewi, S. D., Ilham, Q. P., Kartikasara, H. N., Okarda, B., Dermawan, A., Puspitaloka, D., Kartodihardjo, H., Kharisma, R., & Brady, M. A. (2023). Green consumer behaviour influences Indonesian palm oil sustainability. *International Forestry Review*, 25(4), 449–472. <https://doi.org/10.1505/146554823838028210>
- Putri, E. I. K., Dharmawan, A. H., Hospes, O., Yulian, B. E., Amalia, R., Mardiyarningsih, D. I., & Suradiredja, D. Y. (2022). The oil palm governance: challenges of sustainability policy in Indonesia. *Sustainability*, 14(3), 1820. <https://doi.org/10.3390/su14031820>
- Qaim, M., Sibhatu, K. T., Siregar, H., & Grass, I. (2020). Environmental, economic, and social consequences of the oil palm boom. *Annual Review of Resource Economics*. <https://doi.org/10.1146/annurev-resource-110119-024922>
- Rahman, N., Bruun, T. B., Giller, K. E., Magid, J., van de Ven, G., & de Neergaard, A. (2017). Oil palm and the emission of greenhouse gasses-from field measurements in Indonesia. *EGU General Assembly Conference Abstracts*, 17581.

- Ramadhani, T. N., & Santoso, R. P. (2019). Competitiveness analyses of Indonesian and Malaysian palm oil exports. *Economic Journal of Emerging Markets*, 46–58.
- Ratner, B. D., Larson, A. M., Barletti, J. P. S., ElDidi, H., Catacutan, D., Flintan, F., & Meinzen-Dick, R. (2022). Multistakeholder platforms for natural resource governance: lessons from eight landscape-level cases. *Ecology and Society*, 27(2).
- Reich, C., & Musshoff, O. (2025). Oil palm smallholders and the road to certification: Insights from Indonesia. *Journal of Environmental Management*, 375, 124303. <https://doi.org/10.1016/j.jenvman.2025.124303>
- Roucoux, K. H., Lawson, I. T., Baker, T. R., Torres, D. D. C., Draper, F. C., Lähteenoja, O., & others. (2017). Threats to intact tropical peatlands and opportunities for their conservation. *Conservation Biology*, 31(6), 1283–1292. <https://doi.org/10.1111/cobi.12925>
- Ruhmkorf, A. (2018). Global supply chain governance: The search for “what works.” *Deakin Law Review*, 23, 63–82. <https://doi.org/10.21153/dlr2018vol23no0art806>
- Santika, T., Wilson, K. A., Meijaard, E., Budiharta, S., Law, E. E., Sabri, M., & Poh, T. M. (2019). Changing landscapes, livelihoods and village welfare in the context of oil palm development. *Land Use Policy*, 87, 104073. <https://doi.org/10.1016/j.landusepol.2019.104073>
- Schmidt, J., & De Rosa, M. (2020). Certified palm oil reduces greenhouse gas emissions compared to non-certified. *Journal of Cleaner Production*, 277, 124045. <https://doi.org/10.1016/j.jclepro.2020.124045>
- Sibhatu, K. T. (2023). Oil palm boom: Its socioeconomic use and abuse. *Frontiers in Sustainable Food Systems*, 7, 1083022. <https://doi.org/10.3389/fsufs.2023.1083022>
- Snashall, G. B., & Poulos, H. M. (2023). ‘Smallholding for Whom?’: The effect of human capital appropriation on smallholder palm farmers. *Agriculture and Human Values*, 40(4), 1599–1619. <https://doi.org/10.1007/s10460-023-10457-9>
- Syahza, A. (2019). The potential of environmental impact as a result of the development of palm oil plantation. *Management of Environmental Quality: An International Journal*, 30(5), 1072–1094. <https://doi.org/10.1108/MEQ-02-2019-0089>
- Syarifuddin, E. A., Cangara, A. R., Rahman, I., Baharuddin, A., & Apriliani, A. (2020). The market campaign strategy of Greenpeace in decreasing rainforest deforestation in Indonesia: a case study of the usage of palm oil in Nestlé’s products. *IOP Conference Series: Earth and Environmental Science*, 575(1), 12071. <https://doi.org/10.1088/1755-1315/575/1/012071>
- Tacconi, L., Rodrigues, R. J., & Maryudi, A. (2019). Law enforcement and deforestation: Lessons for Indonesia from Brazil. *Forest Policy and Economics*, 108, 101943. <https://doi.org/10.1016/j.forpol.2019.101943>
- Tafeni, Z. (2024). Assessment of the District Development Model Implementation Impact Towards Improvement of Coordination and Integration of Support in the Local Government Environment, Eastern Cape Province South Africa. *Journal of Public Administration*, 59(1), 119–129. <https://doi.org/10.53973/jopa.2024.59.1.a10>
- Tandra, H., & Suroso, A. I. (2023). The determinant, efficiency, and potential of Indonesian palm oil downstream export to the global market. *Cogent Economics & Finance*, 11(1), 2189671. <https://doi.org/10.1080/23322039.2023.2189671>
- Toulec, T., Lhota, S., Soumarová, H., Putera, A. K. S., & Kustiawan, W. (2020). Shrimp farms, fire or palm oil? Changing causes of proboscis monkey habitat loss. *Global Ecology and Conservation*, 21, e00863. <https://doi.org/10.1016/j.gecco.2020.e00863>
- Varkkey, H., Tyson, A., & Choiruzzad, S. A. B. (2018). Palm oil intensification and expansion in Indonesia and Malaysia: Environmental and socio-political factors influencing policy. *Forest Policy and Economics*, 92, 148–159. <https://doi.org/10.1016/j.forpol.2018.05.002>
- Wan Mohd Jaafar, W. S., Said, N. F. S., Abdul Maulud, K. N., Uning, R., Latif, M. T., Muhmad Kamarulzaman, A. M., & Takriff, M. S. (2020). Carbon emissions from oil palm induced forest and peatland conversion in sabah and Sarawak, Malaysia. *Forests*, 11(12), 1285. <https://doi.org/10.3390/f11121285>
- Whitley, M. A., Collison-Randall, H., Wright, P. M., Darnell, S. C., Schülenkorf, N., Knee, E., & Richards, J. (2022). Moving beyond disciplinary silos: The potential for transdisciplinary research in Sport for Development. *Journal of Sport for Development*.
- Wijnbergen, M. V., & Smith, L. (2020). The Regenerative Palm Initiative: Palm Oil as a Keystone Crop for Regeneration in the Humid Tropics. *Solutions: For a Sustainable & Desirable Future*, 11(4). <https://doi.org/10.1142/S1793005720300216>

- Yusuf, A. A., Roos, E. L., & Horridge, J. M. (2018). Indonesia's Moratorium on Palm Oil Expansion from Natural Forests: Economy-Wide Impacts and the Role of International Transfers. *Asian Development Review*, 35(2), 85–112. [https://doi.org/10.1162/adev\\_a\\_00115](https://doi.org/10.1162/adev_a_00115)
- Ziaei, S. M., & Ali, I. (2021). Commodity exports and macroeconomic performance: The case of palm oil in Malaysia. *Cogent Economics & Finance*, 9(1), 1901388. <https://doi.org/10.1080/23322039.2021.1901388>