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[5] *Democracy and Electoral Empowerment Partnership (DEEP) Jakarta, Indonesia*
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Governing sustainability: land use change impact on the palm oil industry in Riau Province, Indonesia

Nina Yuslaini[1*)],Sri Maulidiah[2]
[1,2] *Departement of Government Sciences, Universitas Islam Riau, Indonesia*

Abstract

The aim of this research is to determine the social, economic, and ecological impacts of Land Use Change (LUC) of forest areas into Palm Oil industrial areas. The research method used was exploratory qualitative and analyzed using Nvivo 12 Plus. he findings of this study show that there are several challenges in the industrial land use of oil palm in forest areas in Riau, Indonesia, such as land conflicts between communities, government, private sector, forest destruction, and natural disasters. Therefore, we suggest that in order to expedite the removal of oil palm plantations from forest areas and to expedite the issuance of plantation licenses for community, private, and government entities wishing to enter such areas, both the federal government and local governments must adopt policies and impose sanctions. This study serves as a knowledge base to address the social, economic and ecological issues resulting from Land Use Change (LUC) in the province from forest areas to industrial areas producing oil palm. The conclusion of this research is that Land Use Change (LUC) from forest area to palm oil industry area in Riau Province, Indonesia has positive and negative impacts on social, economic, and ecological aspects in Riau Province, Indonesia. The government of the Indonesian province of Riau benefits from this research on land use change (LUC) in the palm oil sector.

Keywords: *palm oil industry, land use change, government, policy*

*)corresponding author
E-mail: ninayuslaini@soc.uir.ac.id

Introduction

The palm oil industry plays a significant role in the agriculture of tropical Asian nations like Malaysia, Indonesia, and Thailand as well as Latin American nations like Brazil (Harun et al., 2021). There are multiple clarifications from the palm oil industry regarding food, cosmetics, soap, and biodiesel (Perera et al., 2022). The palm oil sector aims to meet the needs of society in the long run. The influence of the palm oil industry in the labor sector can absorb 4.5 million workers, or if it is represented, it can increase employment by 4.5 percent of the export value at the national level. Indonesia is one of the nations that contributes significantly to the global crude palm oil export market (Veza et al., 2021).

The demand for fundamental materials for alternative energy sources and the availability of labor, land, and CPO goods encourage this. Given the abundance of palm oil industries in Indonesia, it is conceivable that land use change (LUC) will have numerous repercussions on society. (Yana et al., 2022). The ecosystem and any potential issues with the land are affected by the negative effects of land use change, or what is most commonly known as a type of land conversion (Hurtt et al., 2020).

A change in population, a rise in the demand for micro-quality, and the conversion of forest functions and customs that the community or other parties can implement can all result in changes to land use (Noviyanti & Sutrisno, 2021). Indonesia

is the biggest contributor to the export of palm oil commodities compared to other countries in the world (Rifin et al., 2020). The large value of Indonesia's palm oil exports to the world is influenced by the area of palm oil in Indonesia (Kinseng et al., 2023). The Ministry of Environment and Forestry estimates that in 2021, 3.3 million hectares of Indonesia's oil palm plantations will be in forested areas (Purwanto et al., 2020).

With 1.8 million hectares, the oil palm plantation area in Indonesia's Riau Province is the largest. There are also 2.6 million hectares of unreleased forest areas. 155,119 hectares of oil palm land in protected forests and 91,074 hectares of oil palm land in conservation forests were included in the data gathered in 2019 (Nurrochmat et al., 2020). In addition, the 3,372,572 palm oil industries are located in production forest areas (KHP). Of the 501,572 hectares of oil palm plantations, 1,497,421 hectares are in Limited Production Forest Areas, and 1,127,428 hectares are in Convertible Production Forest Areas. Of these, more than 761,615 hectares are still undergoing the release process (Malahayati & Masui, 2019). The growth of oil palm in Indonesia continues to be debated as it is considered a major cause of social conflict, forest destruction, biodiversity loss, and forest fires (Naylor et al., 2019). Nonetheless, more than 50 percent of Indonesia's oil palm plantations are in Riau Province, increasing national income and routine land ownership incomes, both small and large, created by converting farmland, forest, or agricultural land. As a result, relocation of resources and land, settlement in local areas, significant transformations in local flora and ecosystems, and exploitative labor relations (Rew et al., 2020).

The palm oil industry can potentially improve the socioeconomic status of the Riau region of Indonesia by creating jobs (Afrino et al., 2023). Tenure conflicts, limited benefits for landowners, and a large number of oil palm plantations still exist in forest areas are some of the adverse social and environmental effects (Andrianto et al., 2019). The palm oil market is huge in Indonesia, a massive and growing industry (Sudarmaji & Hasan, 2017). Palm oil production reached its highest level in the last five years, reaching 48,297079 tonnes. The value of palm oil exports reached 22.97 billion dollars per year (Rifin et al., 2020), while Indonesia's trade balance was a surplus of 21 billion dollars. However, the reality on the ground in the palm oil industry is not accompanied by good practices. Sustainable principles are often inferred to fulfill market demands (Wahab, 2019). Sustainability certifications like Indonesia Sustainable Palm Oil (ISPO), established by the government in the Roundtable on Sustainable Palm Oil (RSPO), are based on the same sustainability principles (Abdul Majid et al., 2021). PT Tunggal Perkasa Plantations must adhere to the sustainable principles and standards set by the RSPO, but the problem lies in the CPO present on the premises. In this situation, this CPO falls under the category of unsustainable industrial practices (Anyaoha & Zhang, 2023).

A forest area is a specific area the government has declared to be kept as a permanent forest, as stated in Article 1 Point 3 of Law No. 41/1999 on forestry (Gunawan et al., 2022). A forest area is a territory that is no longer covered by diverse forestry vegetation but is still classified as a forest (Yayat Hidayat et al., 2022). There are three main functions of forests: conversion function, protection function, and production function(Walker et al., 2020). There are three types of conversion woods: hunting parks, nature conservation forests, and nature reserve forests. Limited production forests, conversion production forests, and conversion production forests are the three other categories into which production forests are separated (Nurda et al., 2020). The forest lands in Riau Province are referred to as conservation forests,

protected forests, limited production forests, permanent production forests, and convertible production forests according to the Forest Use Agreement Number SK.903/MENLHK/SETJEN/PLA.2/12/2016 (Mizuno et al., 2021). Before Government Regulation (PP) No. 23/2021 is out, PP 104/2015 regulates the conversion of forest land (Lowder et al., 2021). Methods for changing forest areas and their functions, as well as (PP) 105/2015 on the use of forest areas. Two processes, forest land release and forest land use loan license, regulate the process of forest land conversion. The Forestry Law's Article 38, Paragraph 1, states that only productive forest areas and protected forest areas may be utilized for development projects unrelated to forestry.

There are four criteria for assessing the potential of land for exchange. The first is that the location is within a convertible production forest area. It has to meet four requirements: first, it must be on mineral soil; second, it must not be utilized for anything other than forest or non-forest purposes; third, it must be closed off and used for plantations, settlements, agriculture, mining, and non-primary forest land. In line with Republic of Indonesia Government Regulation Number 23 of 2021, the Special Utilization Forest is a forest area permitted for non-forestry activities. Transmigration, settlements, plantations, agriculture, industry, infrastructure, national strategy, national economic recovery, and the food and energy sectors are among the permitted activities (Rustiadi et al., 2023; Yeny et al., 2022). The findings of studies on land policy reforms that mandate plantation corporations to share producing land with farmers who select the land are presented (Azhar et al., 2021). Land can be allocated for food crops and livestock farming on a global, country, and plantation scale (Nigussie et al., 2021), in addition to reducing further deforestation in the tropics. Crop and livestock strategies can lead to food security and reduce the use of chemical herbicides in palm oil-producing countries (Azhar et al., 2021).

The literature review, as is depicted in Figure 1, uses the keywords to distinguish this study topic from others by identifying and analyzing prior research difficulties "Palm oil industry and Land Use Change (LUC)," obtained from 11 documents in the Scopus database from 2017-2023, the identification results show that the issue of land Use Change and palm oil industry is still rarely researched and is a new research topic. Some topics related to these keywords are (1) Economy, (2) Bio-Industry, (3) Biochemical, (4) Oxygen demand, (5) Aquatic ecosystem (6) African Oil Palm.

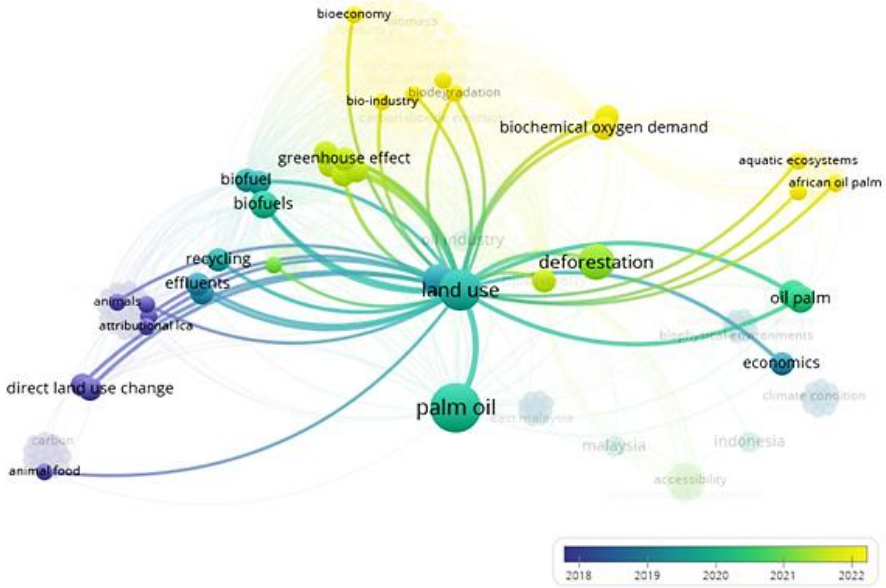

Figure 1. Identification and VOSviwer analysis of connected research
Source: VOSviwer analysis, 2024

Another study of the palm oil industry, as discussed by Lim, explains that sustainable production presents a profound channel to achieve sustainable development (Tan & Lim, 2019; Wardhani & Rahadian, 2021). According to the United Nations (UN), sustainable products are an approach that minimizes the environmental depletion of production systems and meets all needs (Zahoor et al., 2022). Driven by various factors, many industries favor sustainable production (Machado et al., 2020). Previous studies have revealed that sustainable production increases sales, competitive advantage, operational efficiency, and profit margins (Baah et al., 2021). This study shows that sustainability improves company performance. In the change of forest area into oil palm industrial area, a policy is needed from the government to accelerate validation and leave the matter of land change to each regional policy so that no one party benefits, such as the government, companies, and the people of Riau Province, Indonesia. This work adds to the body of knowledge on the present and potential land use transformation of forest regions into oil palm industrial areas theoretically (Papilo et al., 2022; Raharja et al., 2020). Based on this, this study is important to determine the changes in land conversion of forest areas into oil palm industrial areas in government policy, socio-economic and sustainability (economic feasibility, environmental feasibility, community acceptance, and technology utilization) in Riau Province, Indonesia (Ekawati et al., 2019).

This study aims to examine the consequences of land use change (LUC) in the Indonesian province of Riau as forest space is transformed into an oil palm industrial region. Land Use Change (LUC) is defined in the research as a theoretical framework to empirically examine the consequences of land conversion from forest region to oil palm industrial area to comprehend this problem. This research is divided into three stages: the state of land use change (LUC) today, the opportunities and problems associated with LUC, and the effects of LUC from the forest region to the oil palm industrial area.

Research Methods

Utilized is an exploratory qualitative case study approach to research (Creswell & Poth, 2018). To ascertain the effects of land use change (LUC) from forest regions into industrial areas producing palm oil on the economy, society, and environment in the Indonesian province of Riau. The adoption of this research methodology is justified by the intricacy of the situation involving converting a land use change (LUC) into an oil palm industrial region in Indonesia's Riau Province. This study uses secondary data from various online media sources, including social media and mainstream media, field notes, research observations, and government document data from the province of Riau. A comprehensive literature study is also used to support this research (Kitchenham et al., 2009) to explore previous studies on land use change (LUC). It is a relatively new and evolving way of understanding, testing, and exploring phenomena and research cases. This kind of research can yield fresh conclusions with various data that regular research has not addressed. This approach is based on the growth of social media, online news and information, the intricacy of the internet, and new prospects. The community may benefit from this research's fresh perspectives and knowledge, which is expected to include information on issues currently gaining traction. The province of Riau in Indonesia is home to this research object.

The selection of Riau Province as the study's location was motivated by the fact that, according to data on Indonesia's national economic growth, Riau Province has the country's highest concentration of palm oil plantations (GRDP) (Apresian et al., 2020). Data collection is done through field observation; government documents are collected

by browsing all digital data related to the land conversion of forest areas into oil palm industrial areas in Riau Province, Indonesia.

Table 1. Table 1. Source of Data Research using data collection techniques.

Topic	Source/ Coverage
Riau Provincial Government Website	1. https://www.riau.go.id/home/ 2. https://ppid.riau.go.id/informasi-publik/329/rpjmd-provinsi-riau-tahun-2019-2024 3. https://riau.bps.go.id/
Mainstream Media Websites	4. https://betahita.id/news/detail/8095/nasib-hutan-riau-di-tengah-serbuan-korporasi-sawit.html?v=1667877838 5. https:/./mediaperkebunan.id/56-persen-perkebunan-sawit-rakyat-di-riau-ada-di-kawasan-hutan/
Digital Research Documents	6. http://repository.pertanian.go.id:8080/server/api/core/bitstreams/6f65f345-55c9-484c-a11e-bdae03875b1d/content 7. https://www.researchgate.net/profile/Afifah-Khairunnisa/publication/325312235_Dampak_Industri_Perkebunan_Kelapa_Sawit_di_Riau_Terhadap_Ekosistem_Lingkungan/links/5b04f8214585154aeb080127/Dampak-Industri-Perkebunan-Kelapa-Sawit-di-Riau-Terhadap-Ekosistem-Lingkungan.pdf 8. https://databoks.katadata.co.id/datapublish/2022/01/12/bps-kontribusi-produksi-sentra-kelapa-sawit-riau-terbesar-nasional-pada-2020.

Source: processed by researchers, 2024.

Qualitative interactive analysis approaches are employed in this data analysis technique (Miles et al., 2014). This analysis technique involves collecting, identifying, reducing, presenting, verifying, and drawing research conclusions to provide optimal interpretation and results. Next, Nvivo 12 Plus's qualitative analysis tools helped with the data analysis for this study (Mortelmans, 2019). The goal is to delve further into the case studied to obtain new research findings. Figure 2 below illustrates the steps in the research method:

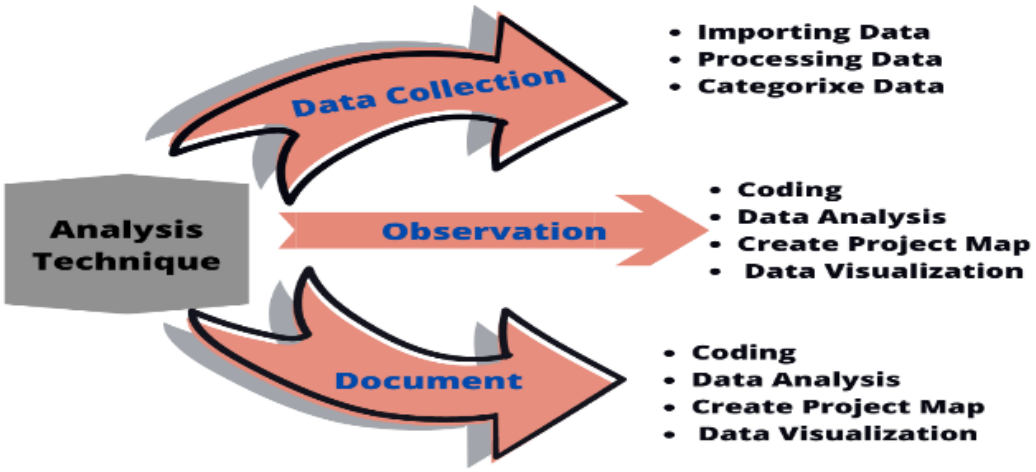

Figure 2. Method for analysis with the Nvivo 12 Plus.
Source: processed using a variety of source, 2024

Three steps make up the data analysis technique. The first is data gathering, which entails importing, processing, and classifying the data. In the second step, observation results are studied, encompassing data analysis, coding, project map building, and data visualization. The third stage involves data coding, data analysis, project map creation, and data visualization to assess the collected documents' results. This study's foundation was identifying, tracking, collecting, and mapping digital data from field notes made by researchers, official records, and digital media, including several well-known media on land use change (LUC). It also included a systematic literature review to trace earlier research studies on the topic of land use change. Then, I assisted with analysis through Nvivo 12 Plus (Fatmawati et al., 2022).

Results and Discussion

The current condition of land conversion of forest areas into oil palm industrial areas in Riau Province, Indonesia

This study is supported by a map that the Ministry of Environment and Forestry released in 2020, which displays the locations of industrial oil palm farms within forested areas in 12 districts of Indonesia's Riau Province. Oil palm plantations fall into three categories, one of which is forest area status. This indicates that forest area status was governed by several distinct legal frameworks before Riau's Regional Regulation on forest areas was issued. Furthermore, a lack of knowledge about the borders of forest areas and inadequate supervision in the face of growing human habitation have a negative impact on numerous oil palm companies situated in forested areas.

Due to dwindling life demands and a growing scarcity of land, land functions are changing from forest areas to oil palm industrial zones. In contrast to other plantations, oil palm plantations yield higher profits. In Indonesia's Riau Province, the palm oil industry has invaded 1.8 million hectares of forest. Here is information about the palm oil industry.

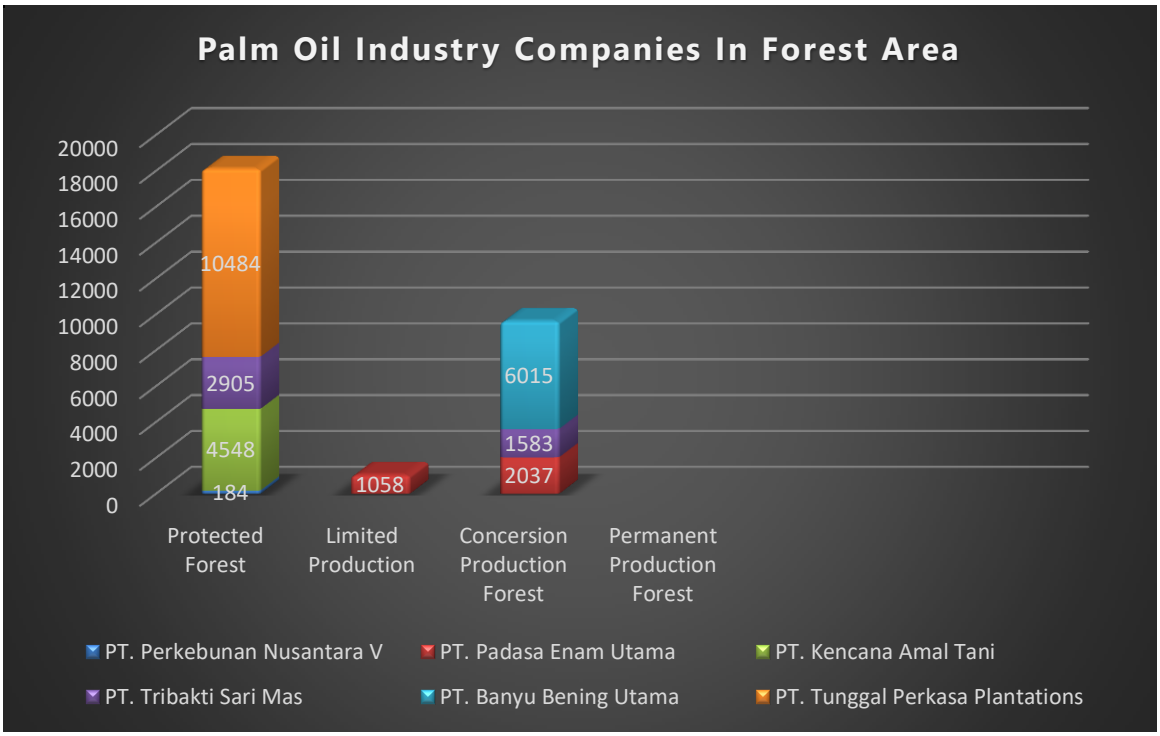

Figure 3. Companies encroaching on forest areas in Riau Province, Indonesia.
Source: Processed from Ridwan (Ridwan & Aulia, 2022), 2024.

From Figure 3 above, it can be seen that Seven companies are entering the forest area. However, all the aforementioned businesses have certificates for Indonesia Sustainable Palm Oil (ISPO). For example, PT Tunggal Perkasa Plantations is the largest oil palm plantation in the forest of Riau Province, Indonesia. PT Tri Bakti Sarimas and PT Banyu Bening Utama, which hold plantations in forested areas totaling 4,687 hectares and 6,015 hectares in Riau Province, Indonesia, came in second place. The report also mentions state-owned companies such as PTPN V. It was reported that Oil Palm Plantations, owned by state-owned companies (BUMN), colonized 184 hectares of protected forest areas. Ministry of Agriculture Regulation No. 38 of 2020 regulates ISPO certification. For example, PT Banyu Bening Utama is ISPO certified through SGS Indonesia as a certificate body with certificate number SGS-ID-ISPO-0028, valid from 5 December 2018 to 4 December 2023.

To ensure the long-term viability of the palm oil sector and effectively mitigate greenhouse gas emissions, the Indonesian government took a significant step by implementing the ISPO standard. This strategic move not only prioritizes sustainable management practices within the industry but also aligns with broader environmental goals, fostering a more eco-conscious approach to palm oil production (Agusti et al., 2020; Choiruzzad et al., 2021). The business is also a member of the Roundtable on Sustainable Palm Oil (RSPO), a global consortium that establishes guidelines for environmentally responsible palm oil development (Tey et al., 2020). In addition to large companies entering the forest, community plantations still exist in the forests of Riau Province, Indonesia. In Riau Province, Indonesia, farmers only have a land certificate (SKT). They have difficulty converting the SKT into a Certificate of Ownership (SHM) (Schoneveld et al.; Prianto et al., 2021) because the farmers' plantations are included in forestry areas according to the Regional Spatial Plan (RTRW).

Challenges and opportunities in transforming forest land use change to palm oil industrial estate in Riau Province, Indonesia.

Converting land for the palm oil business is proving to be problematic for the local administration of IRiau Province, Indonesia. (Berenschot et al., 2022; Helmi et al., 2021). Many government, private, and community interests cause land conflicts, not just because people do not know who controls and wants to control the land (Rulli et al., 2019). Provides an explanation of the elements that cause conflict in forest areas, namely: (a) inconsistent perceptions of forest area boundaries between communities, corporations, and the government; (b) forest areas are still borderless, without boundary demarcation; and (d) there is an element of deliberation by utilizing the weaknesses of the government, corporations, and communities in forest areas to control (Stokely & Betts, 2020). It is challenging for policymakers, especially the Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan, KLHK), Ministry of Agrarian Affairs and Spatial Planning, Ministry of Agriculture, and local governments. This oil palm plantation is located in a forested area in Riau Province, Indonesia.

Figure 4. Palm Oil Plantations in Riau Province, Indonesia, in 2022.
Source: Processed from PTPN V, 2024

Figure 4 above illustrates how government-owned oil palm farms are still situated in forested regions today in Riau Province, Indonesia. In addition to the detrimental effects of Land Use Change (LUC), Riau Province, Indonesia's conversion of forest areas into industrial regions for oil palm also has favorable socio-economic effects, such as a decrease in poverty levels. Although this is not the case throughout Riau Province, palm oil-centric Indonesia has a lower poverty rate than non-palm oil-centric areas (Wahyono et al., 2022). While oil palm farmers make more money than non-palm oil farmers, this encourages people to try palm oil as a livelihood (Abideen et al., 2023). In line with palm research, oil palm results in very low application of agronomic aspects (Jelsma et al., 2019).

The investigation results indicate to Syahza and Asmit (2020) that The agribusiness surrounding palm oil has created economic multiplier effects in rural areas. The Indonesian province of Riau is seeing a rise in the palm oil sector. This shows that, with a contribution of 28.08 percent in 2021, the economy of Riau Province, Indonesia, still depends on processing. The development of the palm oil sector has led to the development of the Riau Province in Indonesia as an economic hub. Furthermore, commercial operations should be conducted in areas with oil palm plantations (outermost, underdeveloped, and deepest) (Ministry of Industry RI, 2023).

According to the Gross Regional Domestic Product (GRDP) of Riau Province, Indonesia, based on business fields at current prices for 2016–2022, the plantation industry contributes more to the GRDP of the province each year. Figure 5 below shows

the trend that illustrates the plantation sector's contribution to the GRDP of the Indonesian province of Riau:

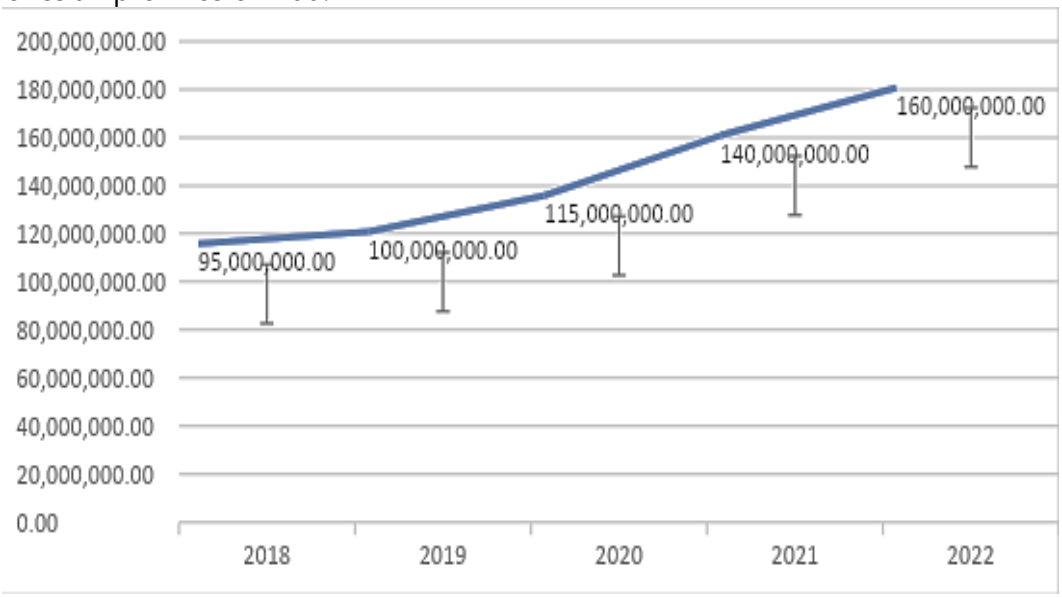

Figure 5. Contribution of Palm Oil to GRDP

Source: processed from the Riau Province 2024 Central Bureau of Statistics (BPS)

The industrial sector that produces palm oil substantially contributes to the GRDP, as seen in Figure 5 above. Three main factors that determine the sustainability of the palm oil business are the economic, social, and ecological dimensions. From an economic perspective, the inhabitants of Indonesia's Riau Province stand to gain economically from investments in the palm oil sector. However, reducing the negative impacts of the palm oil industry is done with RSPO and ISPO certificates. One of the requirements for RSPO and ISPO certificates is that there are high conservation value areas (HCV) (Ningsih et al., 2020). This HCV aims to protect plantations against adverse effects and maintain their sustainability.

The palm oil industry has improved the local ecology. The palm oil industry's socioeconomic benefits, as reported by (Dharmawan et al., 2020), among others, are 1) increasing commercial and job possibilities, 2) enhancing social welfare, and 3) promoting regional development. The economic aspect of meeting human requirements is the primary goal of environmental utilization; however, the environmental aspect is not satisfied, leading to unsustainable environmental (land) utilization activities. In addition to maintaining land productivity and capability, sustainable land use raises per capita income, preserves or even enhances environmental quality, satisfies present demands without sacrificing potential for the future, and guards against environmental harm.

Land use change (LUC) in oil palm industrial estates poses economic, social, and ecological challenges, including land conflicts between private and government parties and specific government policies of Riau province, Indonesia. In addition, many companies that do not have RSPO and ISPO certificates raise the issue of land use change (LUC). Related to land use change (LUC) to economic, social, and environmental sectors, including increasing employment, improving social welfare, contributing to the region, and sustainable land utilization in the long term.

What can be learned from the land use conversion (LUC) of forest areas into oil palm industrial areas during the transformation of land change?

The socio-economic effects of Riau Province, Indonesia, include land use change (LUC) from forest areas to palm oil production (Susanti & Burgers, 2013). To improve community welfare and create jobs, land use change (LUC) from a forest region to a palm oil industry area is desired. The adverse effects of land use change are known as negative impacts (LUC). The ecological shift of land use change (LUC) from forest areas to oil palm industrial areas affects the community's socioeconomic standing, such as PT Tunggal Perkasa Plantations. Three components can be used to measure the impact of socioeconomic conditions in this study: education, economic activity, and income. However, in this study, the impact of Land Use Change (LUC) from forest areas to the palm oil industry on education conditions is not positive. Instead, LUC impacts socio-economic aspects, such as labor absorption and community road access. With Land Use Change (LUC) in forest areas in the palm oil industry, the community's economic activities increased, including improving people's livelihoods in Riau Province, Indonesia. In addition to positive impacts, there are also negative impacts for the people of Riau Province, Indonesia, such as floods and landslides. The following is the amount of oil palm plantation land and the number of flood and landslide events in Riau Province, Indonesia, in Figure 6 below.

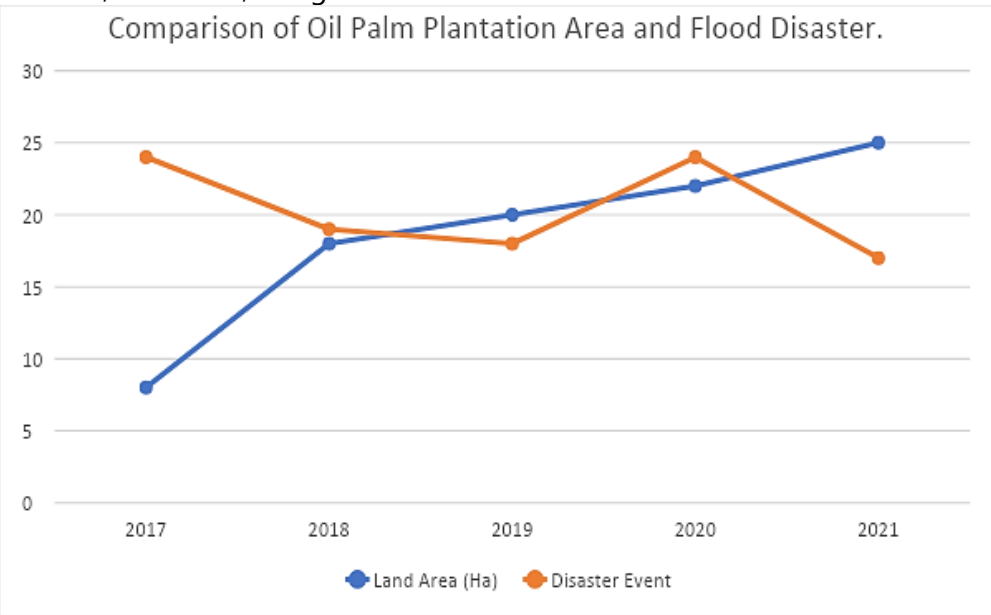

Figure 6. Comparison of the number of oil palm plantations and flood disaster events. Source: processed from Ridwan, Auliya (2022)

From Figure 6 above, the floods and landslides in Riau Province, Indonesia, are examples of the ecological impacts of Land Use Change (LUC) of forest areas into oil palm industrial areas. Floods are caused by natural situations that damage the environment. Palm oil companies that overhang forests will eliminate the existence of forests. As oil palm cultivation in forest areas causes land drainage and damages the hydrological cycle, especially in the forest areas of Riau Province, Indonesia, which are dominated by peatlands, changes in land use change (LUC) significantly impact increasing flood disasters. This study shows that Land Use Change (LUC), which converts forest areas into oil palm industrial areas in Riau Province, Indonesia, increases flood and landslide disaster rates.

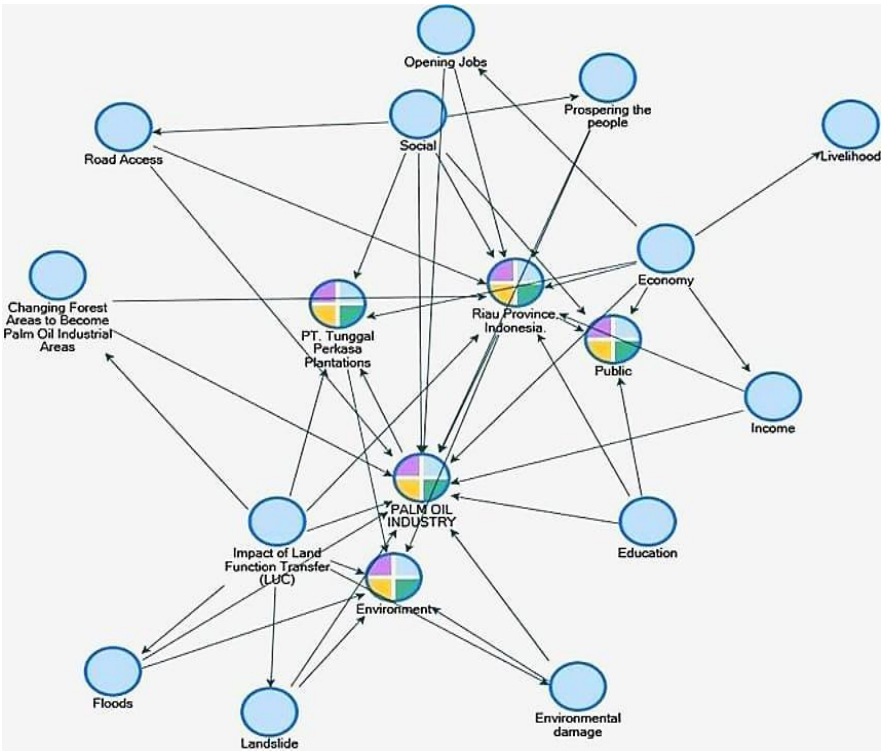

Figure 7. Informational network of research results about the effects of land use change (LUC) on the oil palm industrial estate in Indonesia's Riau Province.
Source: using Nvivo 12 Plus, 2024.

Based on figure 7 above explains that the use of Land Use Change (LUC) in forest areas for the palm oil industry in Riau Province, Indonesia, has both good and bad impacts on the communities there. Many businesses, such as PT Tunggal Perkasa Plantations, enter the forest. This palm oil industry has positive effects, such as the socio-economic improvement of the Riau Province, Indonesia community. However, the negative effects of these oil palm industrial areas cause flooding and landslides. Some of the activities that negatively impact include road construction, preparation of planting areas, and mill construction. Soil quality will decline, the strength of the soil to retain rain will be reduced, plant species will fade or become extinct, animals and microorganisms that maintain the balance of the ecosystem will be destroyed, the area used to maintain and preserve air and soil moisture will be reduced, and tall and large plants will be lost, which keep tropical temperatures stable.

Conclusion

Land Use Change (LUC) from forest area to palm oil industry area in Riau Province, Indonesia, has had positive and negative impacts on the social, economic, and ecological aspects of Riau Indonesia. Positive impacts include the improvement of the community's socio-economy, employment opportunities, and so on; however, Land Use Change (LUC) from forested to oil palm industrial areas has detrimental effects as well, like an increase in land disputes among the public, private, and governmental sectors. In addition, impacts include floods and landslides in Riau Province, Indonesia. The central government's policy regarding Land Use Change (LUC) is another finding that permits the palm oil business to continue operating within the forest area. For example, big oil palm businesses enter forest regions, including PT.Tunggal Perkasa Plantations and PTPN V, which are owned by the state. The efforts of the Riau Provincial Government, Indonesia, in curbing Land Use Change (LUC) of forest areas into oil palm industrial areas by making policies and strict sanctions on the public and private sectors

still in the forest area. These findings are useful for the community, companies, and the government of Riau Province, Indonesia.

This study's several intrinsic flaws include its narrow focus on Land Use Change (LUC) from forested to oil palm industrial areas and the lack of thorough information and regulations regarding the expansion of oil palm industrial areas in Riau Province by the Indonesian government. To ensure that the results are unbiased and capable of uncovering new facts, the research aims to gather relevant data and policies to assist this investigation.

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