

Oil Palm Plantation Expansion and Population Problems: An Explanatory Factor for Deforestation in Indonesia

Ekspansi Perkebunan Kelapa Sawit dan Masalah Kependudukan: Faktor Penjelas untuk Deforestasi di Indonesia

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ABSTRACT

Deforestation in Indonesia remains a significant issue due to various factors. This article reveals the impact of demographic variables on deforestation, using oil palm plantation expansion as a case study. The study applies Hunter's model, considering population dynamics and intermediate variables, namely science and technology, institutions, policies, and culture. Through traditional literature review methods, demographic data and field research results from 2010 to 2020 were elaborated, focusing on Sumatra, Kalimantan, and Sulawesi. The findings underline that Indonesian rapid population growth drives high consumption rates. Additionally, the development of oil palm plantations is faced with high demand for CPO, policies that attach too much importance to investment, and agrarian deregulation. All these intermediate variables are visible through the agricultural expansion as a pattern of agricultural development. The massive expansion by private companies resulted in a change in the socio-ecological landscape. In addition, there are dilemmas in the villager's livelihood system, such as shifting traditional livelihood bases, livelihood dualism, the emergence of new vulnerabilities, and land grabs. In order to realize sustainable palm oil development, we suggest governance reforms at the global, national, and local levels.

Keywords: population dynamic; deforestation; agricultural expansion; oil palm plantation

ABSTRAK

Deforestasi di Indonesia tetap menjadi masalah yang signifikan karena berbagai faktor. Artikel ini mengungkapkan dampak variabel demografi terhadap deforestasi, dengan menggunakan ekspansi perkebunan kelapa sawit sebagai studi kasus. Studi ini menerapkan model Hunter, dengan mempertimbangkan dinamika kependudukan dan variabel perantara, yaitu ilmu pengetahuan dan teknologi, kelembagaan, kebijakan, dan budaya. Melalui metode tinjauan pustaka tradisional, artikel ini mengelaborasi data demografi dan hasil penelitian lapangan yang berfokus pada Sumatera, Kalimantan, dan Sulawesi dari tahun 2010 hingga 2020. Temuan ini menggarisbawahi bahwa pertumbuhan penduduk Indonesia yang cepat mendorong tingkat konsumsi yang tinggi. Selain itu, pengembangan perkebunan kelapa sawit dihadapkan pada tingginya permintaan Crude Palm Oil, kebijakan yang terlalu mementingkan investasi, dan deregulasi agraria. Semua variabel antara tersebut terlihat dalam praktik ekspansi pertanian sebagai pola utama dari pembangunan pertanian. Ekspansi besar-besaran oleh perusahaan perkebunan swasta menghasilkan perubahan lanskap sosio-ekologis. Selain itu, ekspansi juga menghasilkan dilema dalam sistem kehidupan warga desa, seperti pergeseran basis kehidupan tradisional, dualisme mata pencaharian, munculnya kerentanan baru,

dan perampasan lahan. Untuk mewujudkan pengembangan kelapa sawit berkelanjutan, kajian ini menyarankan reformasi tata kelola di tingkat global, nasional, dan lokal.

Kata kunci: dinamika penduduk; deforestasi; ekspansi pertanian; perkebunan kelapa sawit

INTRODUCTION

The condition of the world's forests remains a serious concern. Since 1990, a staggering 178 million ha have been lost, as reported by Food and Agriculture Organization (FAO, 2020). However, the net forest loss has substantially decreased over the years. This positive shift is attributed to reduced deforestation in certain nations, reforestation efforts and the natural expansion of forested areas in others. Specifically, the rate of net forest loss dwindled from 7.8 million ha per year in the 1990–2000 period to 5.2 million ha per year in 2000–2010, and further down to 4.7 million ha per year in 2010–2020. Despite this improvement, the decline in net forest loss has tapered in recent years due to a decrease in the rate of forest expansion, signifying that there are still challenges in forest management that need to be addressed.

In a press conference held by the Directorate General of Forestry Planning and Environmental Management of the Ministry of Environment and Forestry on March 3, 2021, the Indonesian government asserted a 75.03% reduction in deforestation rates for the 2019–2020 period (Ditjen PKTL KLHK, 2021). Specifically, the government reported deforestation figures of 462.46 thousand ha for 2018-2019, which dropped significantly to 115.46 thousand ha for 2019-2020. According to the monitoring of the Directorate General of PKTL of the Ministry of Environment and Forestry (MoEF), Indonesia's forested land covers 95.6 million ha, constituting 50.9% of the total land area. Within this, a significant 88.4 million ha, or 92.5% of the total forest area, lies within designated forested zones. While deforestation rate data exhibits volatility over extended periods, the trend is encouragingly downward (See Figure 1). The peak period was recorded in 1996–2000, when deforestation rates reached 3.51 million ha. Since then, there has been a consistent and commendable decrease, plummeting to 480 thousand ha by 2016–2017.

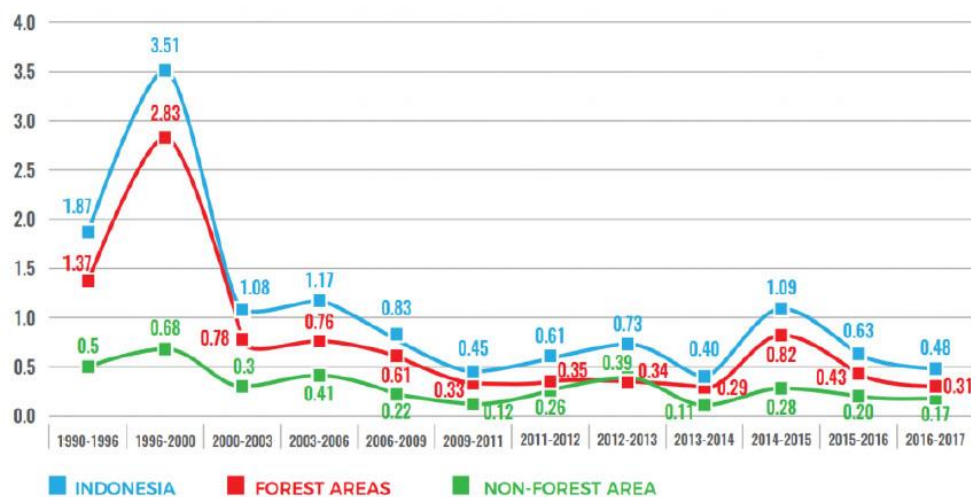


Figure 1. Deforestation Development According to MoEF Data
Source: (Forest Watch Indonesia, 2020)

These data confirm that deforestation is a pressing global concern that persists due to complex factors. It extends its reach even into forested areas, as illustrated by the ominous red curve. 2010 marked Indonesia's inclusion in the disheartening roster of the top 10 countries with the highest deforestation rates. The loss of 2 million ha, equivalent to 4.1% of its forest cover, between 2000 and 2010 positioned it fourth in this alarming lineup, trailing only behind Brazil, Papua New Guinea, and Gabon (FAO, 2010). This grim reality presents a dual threat, as deforestation catalyzes the loss of biodiversity, a fact substantiated by studies conducted by Azevedo et al. (2014) and Bhagwat et al. (2012). The exponential surge in global population figures further exacerbates this ecological crisis. One of the chief instigators

of this dire situation is the relentless expansion of agricultural frontiers, particularly pronounced in developing nations, as underscored by Barraclough & Ghimire (2000).

FAO's report for the year 2020 paints an equally disconcerting picture, revealing a 3% surge in global agricultural land coverage over the past quarter-century, now enveloping almost 40% of the Earth's surface (FAO, 2020). Contrastingly, forested regions account for a mere 31%, or approximately 4.06 billion ha, with 45% of these precious ecosystems concentrated in tropical climates. It is worth noting that a staggering 54% of the world's remaining forests are concentrated within the borders of just five countries: Russia, Brazil, Canada, the United States, and China, a statistic that further underscores the global dimension of this crisis, as elucidated by the FAO in 2020. In light of this data, the need for immediate and sustained action to implement and promote sustainable practices is undeniable, lest we continue down this perilous path of deforestation and its far-reaching repercussions.

One astounding fact is that economic development and growth are pursued in ways that result in the decline of biodiversity and tropical forests, the destruction of peatlands, the development of massive oil palm plantations, and dependence on mineral extraction, logging, and plantations. Sustainable development failed to be achieved because of it (Lopez & Suryomenggolo, 2018). We need one description that explains why deforestation continues to occur. How do demographic variables work to influence deforestation in Indonesia? This article raises the case of oil palm plantation expansion to explore the phenomenon of deforestation in Indonesia.

METHOD

This article applies a traditional literature review (Petticrew & Roberts, 2006) combined with secondary data analysis. Here, we examine the literature and secondary data relevant to the purpose of writing. The literature resulted from field research on the expansion of oil palm plantations, especially on the islands of Sumatra, Kalimantan, and Sulawesi. All articles studied are in the form of articles published between 2010–2020 in scientific journals and proceedings of scientific conferences indexed by Scopus and Google Scholar. Meanwhile, the secondary data used are population statistics and oil palm statistics.

Next, we use the theoretical framework modified from Hunter's model when explaining the relationship between population and environmental dynamics through several intermediate variables. The variables between those consist of science and technology, the context of institutions and policies, and cultural factors (Hunter, 2000). In the case of oil palm plantation expansion, the intermediate variables are modified into world CPO demand, economic policy, agrarian deregulation, and population consumption (Figure 2).

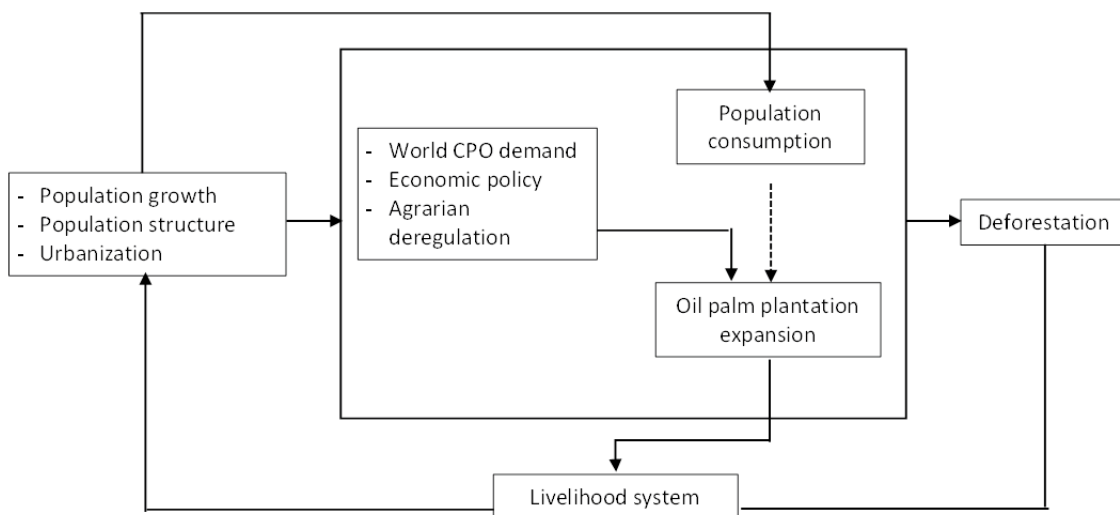


Figure 2. Theoretical Framework

RESULTS AND DISCUSSION

Population Problems and the Increasing Needs

Population and food issues have been of concern to experts since the Malthus era until now (Lucas & Meyer, 1994; Weeks, 2008). Technological developments can answer concerns about food scarcity. However, with declining environmental carrying capacity, this concern has again emerged (McMahon, 2013; Mellos, 1988; Seidl & Tisdell, 1999). McMahon (2013) stated that human footprints had exceeded the earth's capacity to provide sources of livelihood. The population variables remain significant when discussing food issues, where agricultural extensification becomes a logical consequence of population growth parallel to the high demand for food to achieve food security (Weeks, 2008). The fulfillment of these resource needs at its peak encouraged the conversion of land cover through forest clearing to support human numbers (Hunter, 2000).

Population size, growth, and distribution are the most critical demographic forces in land use change, where food demand is an intermediate variable. In addition to the number of inhabitants and their distribution, the composition of the population by age also determines the total food demand of a country. Human calorie needs increase with age and decrease if the aging population ages. If we bring up the causes of population migration again, then the need for food is one of the drivers for people to move places. This means that the population density contingent on the population's high pressure on land determines the distribution of the population.

The population of Indonesia continues to increase (Figure 3) with a fairly high population growth rate. Based on the 2020 Population Census, the population reached 270.203.900 million people (BPS-Statistics Indonesia, 2021). The population growth rate was 1.25% from 2010–2020, decreasing from 1.49% in 2000–2010. The population structure is male 136.661.900 and females 133.542.000 (Sex Ratio = 102.3). Indonesia's population remains heavily concentrated on the island of Java, accounting for 56.11%. After Java, Sumatra Island is ranked second, which is 20.33%. It means another quarter of it is scattered on other large and small islands. However, the average population density of Indonesia continues to increase, from 124 people/km² in 2010 to 141 people/km² in 2020.

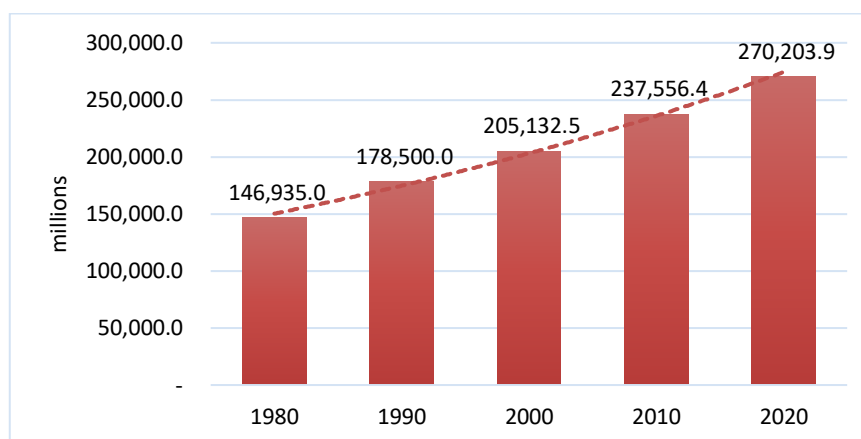


Figure 3. Total Population of Indonesia 1980–2020
Source: (BPS-Statistics Indonesia, 2000, 2010, 2021)

The increase in food needs can be predicted through the population's growth rate, structure, and distribution. These three parameters determine how much material the needs of human life should be provided. The following indicators have been calculated based on the 2010 and 2020 Population Censuses. During the ten years from 2010–2020, a population increase of 32.57 million people or around 3.26 million people yearly. The median age in 2010 was 27.2 years, increasing to 30.3 years in 2020. Most are of productive age (14–64 years), which was 66% in 2010 and increased to 77.5% in 2020. The high addition and the increasing number of people in the productive age demand a greater quantity of living needs. Those aged 14–64 years are not only productive but also consumptive.

Indonesia is experiencing a considerable increase in its urban population (Figure 4). The 2010 Population Census showed that the number of urban and rural populations was approximately the same,

with 49.79% of the population living in urban areas and 50.21% in rural areas. This population figure increased from 14.8% in 1961, 17.4% in 1971, 22.3% in 1980, and 30.9% in 1990. It is quite surprising because, according to the 2020 Population Census, that the urban population has become 56.4%. It means that more residents now live in urban areas, or many areas have turned into urban ones.

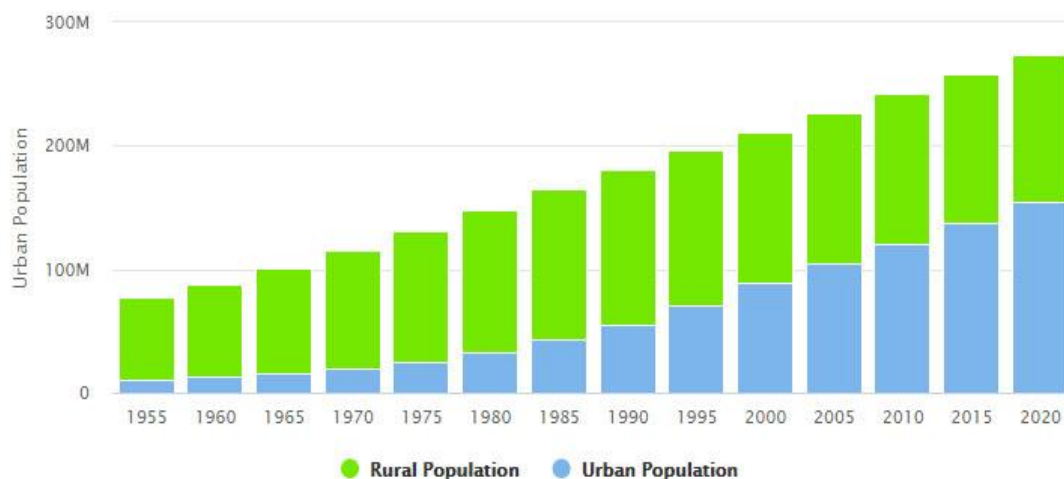


Figure 4. The Development of Urban and Rural Population in Indonesia
Source: (Worldometer, 2020)

The increase in the number of urban residents is both due to natural growth and migration from rural areas. In Indonesia, regional expansion since the enactment of regional autonomy is considered a significant factor driving urbanization. With the change in the status of an area to a district, many regions changed their status to cities – in the administrative units of the sub-district.

The average expenditure value of the population can explain the picture of population consumption. Based on the March 2020 National Social Economy Survey (BPS-Statistics Indonesia, 2021), the average expenditure for the food category was IDR 603.206,00 per capita per month, an increase from 2019 of IDR 572.551,00 per capita per month. Similarly, the expenditure for the non-food category also increased by Rp622.449,00 per capita per month (2020) from Rp592.690,00 per month (2010). The consumption level of urban residents is higher than rural, where in 2020, it was recorded at IDR 1.455.637,00 per capita per month while the rural population was IDR 933.695,00.

The importance of understanding urbanization as an explanatory factor for the increase in consumption levels that drives the production of many raw materials through agricultural and industrial activities was confirmed through research (DeFries et al., 2010; Underhill, 2018; Li et al., 2019; Pandey et al., 2020; Ali, 2021) that found that urban population growth was positively correlated with increased consumption. On the other hand, it shows the importance of urban-based demand for agricultural and industrial products in predicting deforestation. Although the effect of urbanization on consumption depends on the region, the level of development, and the structure of the economy (Ali, 2021), a strong tendency in the movement of people to the city, is most likely related to tremendous pressure to open up tropical forests and in turn contribute significantly to the increase in carbon emissions (Yuan et al., 2015; Wang et al., 2019).

In addition to urbanization, the increase in consumption levels is also a result of successful economic development of increasing the per capita income of the population. According to some research (J. Li dkk., 2019; Schneider dkk., 2011; Yuan dkk., 2015), changes in per capita income have the highest positive impact on the level of food consumption per capita and exceed the individual impact of technical changes. Population growth without increased income and technical changes led to a decrease in per capita food consumption.

Agricultural expansion came to be a consequence of population consumption. We cannot avoid producing and extracting natural resources into more valuable materials through the food industry, manufacturing, automotive, energy, weapons, etc. As we know, processed products made from palm

oil have covered many industries, including food, cosmetics, pharmaceuticals, and energy. These types of materials are familiar to humans who consume various finished products.

Oil Palm Plantation Expansion: The Aspect of Policy and New Deforestation

One of Indonesia's great forces driving rural economic change is the expansion of oil palm plantations. The increase in acreage and palm oil production parallels the high demand for CPO (Sayer et al., 2012; Santika et al., 2019; Dharmawan et al., 2020; Chrisendo et al., 2022). By citing various literature, Sayer et al. (2012) tried to convince the increasingly inseparable tendency of oil palm from human life. Demand for vegetable oil is expected to reach about 240 million tons per year by 2050, double the value of 2009; palm oil is preferred for its low production costs. In 2011 global palm oil production was 50.2 Mt or about 28% of total vegetable oil production. The demand for palm oil as a biofuel feedstock has increased from zero in 2000 to about 10% of crude palm oil in 2011. Most of the interest in using palm oil as a biofuel was generated in 2005–2006 when the price of crude mineral oil surpassed the price of CPO.

Oil palm plantations in Indonesia are driven by three actors: Government Estates, Private Estates, and Smallholders. The vast area of oil palm plantations places Indonesia as the world's largest oil palm producer. According to the Coordinating Minister for Economic Affairs at the World Economic Forum (WEF) Davos on January 23, 2020, "Indonesia is the world's leading palm oil producer. This commodity contributes 3.5 percent of the national GDP. By utilizing no more than 10 percent of the total global land bank for vegetable oil, Indonesia can produce 40 percent of the world's total vegetable oil" (Timorria, 2020).

Palm Oil Statistics data shows that the land area of the three plantation actors and CPO production continues to increase (Figures 5 and 6). The total area of oil palm plantations in 2000 was 4.2 million ha, with CPO production of 7 million tons increasing in 2019 to 14.6 million ha and CPO production to 48.42 million tons. In other words, within 19 years, there was an almost four-fold increase in the area and CPO production by almost seven times. At the on-farm level in 2019, the three actors achieved oil palm plantations, State Estates 4.23%, Private Estates 54.42%, and Smallholders 41.35%, respectively. These plantations spread across many provinces, the six most prominent being Riau Province (2.82 million ha), West Kalimantan (1.89 million ha), Central Kalimantan (1.77 million ha), North Sumatra (1.66 million ha), East Kalimantan (1.29 million ha), and South Sumatra (1.22 million ha).

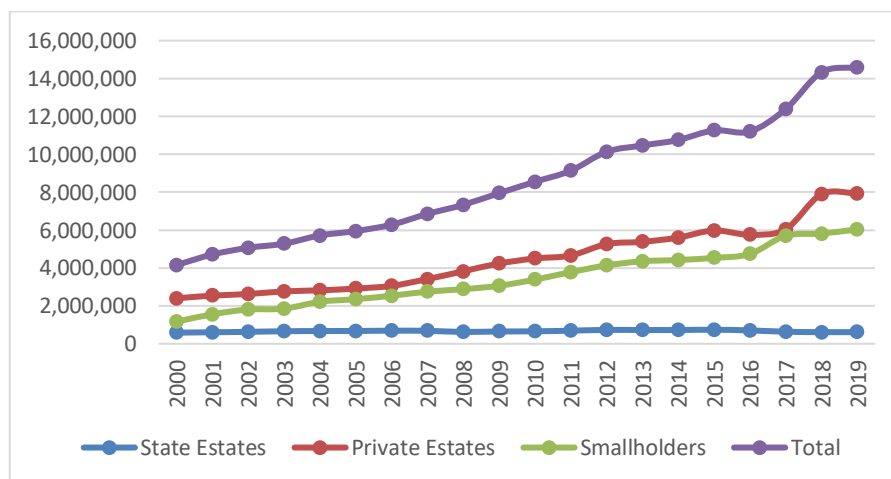


Figure 5. Development of Oil Palm Plantation Area (ha), 2000–2019
Source: (BPS-Statistics Indonesia, 2020)

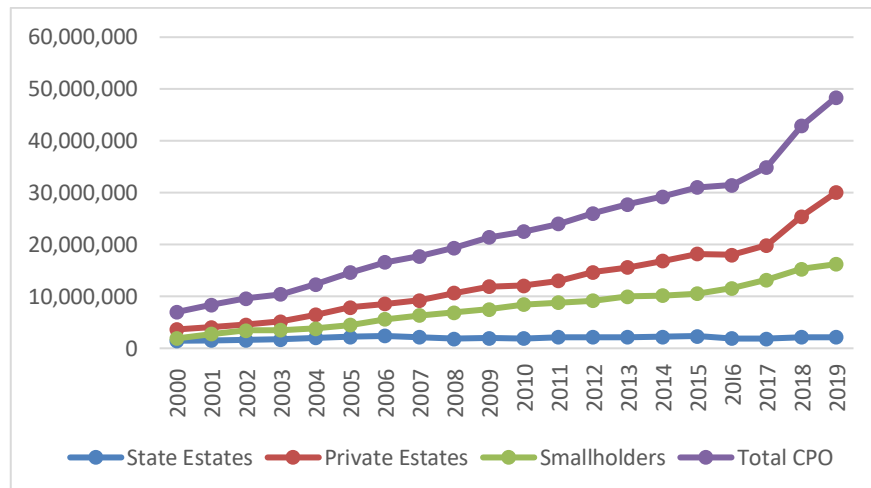


Figure 6. Development of CPO Production (ton), 2000–2019
 Source: (BPS-Statistics Indonesia, 2020)

Oil palm plantations significantly contribute to the national economy, primarily through export activities. Palm Oil Statistics 2019 noted that Indonesia's palm oil production is mainly exported to foreign countries, and the rest is marketed domestically. Indonesia's palm oil exports reach five continents, namely Asia, Africa, Australia, America, and Europe, with a significant share in Asia. In 2019, India, Malaysia, Spain, Singapore, and the Netherlands were the top five countries importing Indonesian CPO which total CPO imports reached 94.08% of Indonesia's total CPO exports. The largest CPO export destination country is India, with an export volume of 3.99 million tons or 53.88% of Indonesia's total CPO export volume with a value of US\$2.175 million. Furthermore, most CPO is exported to Malaysia and Spain with an export contribution of 12.56% and 12.54% of total CPO exports.

The development of large-scale oil palm plantations, in line with the Foreign Direct Investment (FDI) policy in the non-oil and gas sector in the new order era and post-reform economic restructuring, has always been highlighted as the main driver of economic change for people in rural areas. The presence of plantation companies is also alleged to have significantly contributed to opening up inland areas that are difficult to reach. The company has a hand in building roads and bridges that connect one area to the causeway. Even after the development of an area held by an oil palm company, the potential for Regional Native Income will increase and become a reason for regional expansion.

The massive oil palm development, especially by private companies, has started since the new order era but has gained momentum after the 1998 reforms. The presence of the reform era also marks two problems (Rahmadian et al., 2020). First, the end of the heyday of logging through Forest Concession Rights (*Hak Pengusahaan Hutan* or HPH) resulted in many land ownership changes. Ex-HPH land that was not reforestation, plus the business network between HPH and private estates entrepreneurs that has been established since the New Order accelerated and facilitated the transition process. Second, the implementation of regional autonomy in 1999 was immediately responded to by the Regional Government with a development work program that emphasized the development of the plantation and mining sector. The private players are still dominated by the capitalist actors who controlled the plantation business in the past. On the other side, this is accelerated through the ease with which the authorities in the area issue Location Permits, Plantation Business Permits, and the Right to Cultivate (*Hak Guna Usaha*-HGU) (Yulian et al., 2017). Even in many cases, although the National Land Agency has not issued HGU, companies are already operating to do land clearing (Rahmadian et al., 2020).

The massive oil palm production poses socio-ecological problems at the site level as long as associated with the agricultural development model that adheres to the pattern of agricultural expansion (Barraclough & Ghimire, 2000), namely an extensive expansion by cutting down forests and burning them. Changes in the ecological landscape that occur due to the expansion of oil palm plantations include changes in land cover, land use, deforestation, decreased land area of food crops, increased CO₂ in the atmosphere, decreased biodiversity, and decreased water reserves that can trigger drought (Fatmasari et al., 2018). The uncontrolled development of large-scale oil palm plantations adds to the

complexity of socio-ecological issues, ecological landscapes, production organizations, and household livelihood systems (Dharmawan et al., 2020).

Deforestation results from agricultural expansion by developing large-scale plantations and logging activities (Miettinen et al., 2012) to produce food and industrial raw materials involving the global political economy. Developing countries are positioned in the WTO scheme as producers of foodstuffs and industrial raw materials for developed countries (McMichael, 2013). This global structural pressure 'forces' developing countries to adopt forest conversion policies while the presence of power at the local level causes communities to be involved in converting customary forests into other functions.

We called this new deforestation the change in forest land cover in Indonesia, which has returned to be massive since the end of the heyday of HPH in the new order period, then replaced by plantation expansion (oil palm). Policies that result in significant foreign investment in this sector, as well as export-oriented production of raw materials, act as a driving force for changes in the ecological landscape. The emergence of policies to control the rate of deforestation through a moratorium since 2018 has not stopped the opening of new areas of oil palm plantations. Some problems in palm oil governance before and after the moratorium still face structural and technical constraints. The phenomenon of forest fires that accompany the opening of plantation areas is one of the strategic issues in Kalimantan and Sumatra. In addition, there is also the problem of agrarian conflicts that until now have not found a fundamental solution, spatial problems, overlapping with mining concessions, and the practice of opening illegal plantations.

Oil Palm Expansion and the Dilemma of the Livelihood System

The dilemma of oil palm expansion concerning the rural community's livelihoods is experienced because it concerns their original livelihood base. Traditional livelihoods generally have subsistence with various activities, such as food crops in wetlands, freshwater fisheries, cultivation, dependence on forest resources, horticulture, and animal husbandry. The local people slowly imitated private companies' expansion of oil palm plantations (Yulian dkk., 2017), resulting in a shift in the traditional livelihood base (Santika dkk., 2019). They tried to adopt oil palm cultivation techniques by converting their cultivated land until completely turned into oil palm farmers. Cultivating oil palms as the main occupation was considered more profitable than subsistence farming.

In addition to the problem of overlapping areas and land grabs, expansion turned out to be a factor attracting the migration of workers from outside the region to be employed in plantations and CPO factories on the grounds of efficiency (Kelley et al., 2020). This demographic problem changed the composition of the labor force in the village. The large influx of migrants around plantation areas encourages a plurality of demographics and sources of livelihood. There is one big question, whether the presence of plantation companies and migrants will threaten the livelihood sustainability of local people or not. Local communities are threatened if they cannot adapt to the changes in the ecological landscape and the emergence of intense competition for new sources of livelihood in an increasingly plural society.

The expanding of oil palm plantations in Kalimantan, especially in areas with forest landscapes that depend on the life of inland communities, brings significant economic benefits to rural communities (Santika et al., 2019). However, this is limited to villages where most of the population has prior knowledge of plantation management and past exposure to the market economy, such as polyculture plantation villages. In contrast to villages where most people rely heavily on subsistence-based traditional livelihoods, economic benefits last only a few years after the transition period because after six or seven year, they have to pay the credits to the corporation –nucleus estate and smallholder scheme. As new adopters, farmers have not yet fully mastered oil palm farming. Meanwhile, the socio-ecological capital on which these village communities depend and invest mainly deteriorated. In the long run, it is necessary to pay attention to maintaining socio-ecological well-being for local communities. The basis socio-economic and socio-cultural characteristics of rural communities in the oil palm development portfolio must be considered, as this largely determines the success of the palm oil sector in bringing economic benefits and improving the community's overall welfare in the long term.

There was a phenomenon called livelihood dualism in rural Bengkulu, as a description of the diversification and disparity in livelihoods at the level of village communities due to the conversion of rice fields into oil palm plantations (Widiono et al., 2015). A dilemma was synthesized from dependence on palm oil production, income diversification versus single-based income, and the interdependent relationship between farmers and *taukes* –wholesaler who buy the farmer palm oil. It is not easy to generalize these dilemmas into one formulation. The results of the study in West Kalimantan, for example, concluded that farmers' responses to oil palm plantation expansion varied depending on ecological arrangements, the economic presence of established plantations in the region, the capacity of farmers to diversify oil palm-based economic activities, and exposure to external economic activities (Dharmawan et al., 2020).

Based on ethnographic research in oil palm plantation zones in West Kalimantan, T. M. Li (2018) pointed out the processes accompanying oil palm expansion as the dispossession of customary land. The period after that was thick with violent nuances embedded in the material, social and political infrastructure. The promise to reform plantations through regulations and certifications, including Corporate Social Responsibility (CSR) and the logic of plantation-based local livelihood systems, is a trajectory that deteriorates over time as plantation zones expand and become saturated, and everyone is locked into them. The occurrence of land grabs by the private sector is intertwined with economic and political affairs at the regional level. Rahmadian et al. (2020) found that the licensing of plantation company concessions after the enactment of regional autonomy was characterized by extra-legal and illegal licensing practices that had become a pragmatic culture and tendency between people in business and the regional ruling elite.

In line with Yulian et al. (2017), those criticizing the massive oil palm expansion in East Kalimantan since 1993 through legal and illegal deforestation, resulting in farmers' dependence on companies and at the same time being a marker of increasing socio-economic vulnerability to the global palm oil politics economy. The same phenomenon was also found in Riau (Hidayah et al., 2016), Bengkulu (Sukiyono et al., 2017), West Sulawesi (Fatmasari et al., 2018), and Gorontalo (Both et al., 2020) where oil palm expansion causes symptoms of farmers relying on a single source of livelihood and company control over farmers through development mechanisms and price control. When palm oil prices declined, people became vulnerable. For Fatmasari et al. (2018), this dilemma for farmers was described as a monoculture of vegetation and a monostructuring of household livelihoods. The high consumption of people's food that depends on external supplies will make it difficult for people when income decreases. In other words, vulnerability increases due to the deterioration of environmental quality and the presence of market vulnerability.

CONCLUSION

This article concludes that population variables correlate with deforestation through the work of some intermediate variables that are aggregations of the functioning of some structural aspects at the macro level. Combining with the increase in the level of population consumption, it has also perpetuated the expansion of oil palm plantations. Furthermore, expansion and deforestation determine people's livelihood systems.

The variables between those of a macro nature boil down to market failures and policy failures at the global and national levels (Barraclough & Ghimire, 2000). Departing from here, they can be grouped into three levels of governance in terms of overcoming the problem of deforestation within the framework of sustainable development: global, national, and local.

At the global level, it is necessary to reform the system of international relations between the North and the South. The neoliberal agenda often forces developing countries into structural adjustments that should respect socially and ecologically acceptable development efforts. International financing for the development of acreage and the palm oil industry should include protection criteria for communities and forests. Even international donor agencies, it is time to get involved in reforestation financing and prevention from sporadic expansions by the private sector and the community through ecology-based community empowerment programs by building networks across levels and sectors. Compensation for forest conservation through carbon trading should benefit local communities because, based on simulations, the opportunity cost is greater than the carbon market price; besides, the carbon market is

not available at this time (Gunawan, 2018).

At the national level, the palm oil moratorium policy (Varkkey et al., 2018) must be followed up by resolving agrarian disputes for indigenous communities in forest areas so that the moratorium is not just a "truce" between the private sector and indigenous communities. At this level, an appropriate formulation is needed between the moratorium policy, increasing productivity, exchanging peatlands for mineral lands, and implementing agrarian (Purnomo et al., 2020) reforms. It is also urgent to implement Indonesia Sustainable Palm Oil (ISPO) at the local level by selecting independent certification bodies with integrity. An adequate financing scheme is needed to assist farmers in implementing ISPO because ISPO can potentially threaten oil palm farmers, as found by Dharmawan et al. (2019).

At the local level, the findings (Yulian et al., 2017) and (Rahmadian et al., 2020) confirm the importance of consistent enforcement of the rules by local governments under the close supervision of the central government. The granting of Location Permits and Plantation Business Permits should not be enough to legitimize the company to start its activities of the land clearing until the regional office of the local National Land Agency issues the HGU. The approach used to obtain social permits must be integrative and pay attention to various interests of groups in the community. Such as research Yuliani et al. (2020) found that the acceptance or rejection of community is not related to poverty but to how far members of society are integrated with communities, traditions, and nature. It is essential to pay attention to the community's long-term interests so that the goals of oil palm development and conservation can be bridged.

REFERENCES

- Ali, M. (2021). Urbanisation and energy consumption in Sub-Saharan Africa. *The Electricity Journal*, 34(10), 107045. <https://doi.org/10.1016/J.TEJ.2021.107045>
- Azevedo, J. C., Pinto, M. A., & Perera, A. H. (2014). Forest landscape ecology and global change: An introduction. *Forest landscapes and global change: Challenges for research and management*, 1–27. https://doi.org/10.1007/978-1-4939-0953-7_1/COVER
- Barracough, S., & Ghimire, K. B. (2000). *Agricultural expansion and tropical deforestation: Poverty, international trade and land use*. Earthscan. <https://www.routledge.com/Agricultural-Expansion-and-Tropical-Deforestation-International-Trade/Barracough-Ghimire/p/book/9781853836657>
- Bhagwat, S., Cole, L., & Willis, K. (2012). Biodiversity in oil palm plantations. In J. A. Simonetti, A. A. Grez, C. F. Estades, & J. Pérez (Ed.), *Biodiversity conservation in agroforestry landscapes: Challenges and opportunities* (pp. 117–130). Universidad de Chile Press.
- BPS-Statistics Indonesia. (2000). *Statistical yearbook of Indonesia 2000* (Catalog: 1101001). BPS-Statistics Indonesia.
- BPS-Statistics Indonesia. (2010). *Statistical yearbook of Indonesia 2010* (Catalog: 1101001). BPS-Statistics Indonesia.
- BPS-Statistics Indonesia. (2020). *Indonesian oil palm statistics 2019* (Catalog: 5504003). BPS-Statistics Indonesia.
- BPS-Statistics Indonesia. (2021). *Statistical yearbook of Indonesia 2021* (Catalog: 1101001). BPS-Statistics Indonesia.
- Chrisendo, D., Siregar, H., & Qaim, M. (2022). Oil palm cultivation improves living standards and human capital formation in smallholder farm households. *World Development*, 159, 106034. <https://doi.org/10.1016/J.WORLDDEV.2022.106034>
- DeFries, R. S., Rudel, T., Uriarte, M., & Hansen, M. (2010). Deforestation driven by urban population growth and agricultural trade in the twenty-first century. *Nature Geoscience*, 3(3), 178–181. <https://doi.org/10.1038/ngeo756>
- Dharmawan, A. H., Mardiyansih, D. I., Komarudin, H., Ghazoul, J., Pacheco, P., & Rahmadian, F. (2020). Dynamics of rural economy: A socio-economic understanding of oil palm expansion and

- landscape changes in East Kalimantan, Indonesia. *Land*, 9(7), 213. <https://doi.org/10.3390/land9070213>
- Dharmawan, A. H., Nasdian, F. T., Barus, B., Kinseng, R. A., Indaryanti, Y., Indriana, H., Mardianingsih, D. I., Rahmadian, F., Hidayati, H. N., & Roslinawati, A. M. (2019). Kesiapan petani kelapa sawit swadaya dalam implementasi ISPO: Persoalan lingkungan hidup, legalitas dan keberlanjutan. *Jurnal Ilmu Lingkungan*, 17(2), 304–315. <https://doi.org/10.14710/JIL.17.2.304-315>
- Ditjen PKTL KLHK. (2021, Maret 3). *Siaran Pers Nomor: SP. 062/HUMAS/PP/HMS.3/3/2021: Laju Deforestasi Indonesia Turun 75,03 %*. <http://ppid.menlhk.go.id/berita/siaran-pers/5848/laju-deforestasi-indonesia-turun-7503>
- FAO. (2010). Global Forest Resources Assessment 2010 - Main report. *FAO Forestry Paper 163*, 163, 350 pp.
- FAO. (2020). *Global Forest Resources Assessment 2020 Key findings*. <https://doi.org/10.4060/ca8753en>
- Fatmasari, R., Darma, R., Salman, D., & Musa, Y. (2018). Landscape ecological changes and livelihood dilemma of the rural household around the oil palm plantation. *International Journal on Advanced Science, Engineering and Information Technology*, 8(6), 2702–2708. <https://doi.org/10.18517/ijaseit.8.6.7257>
- Forest Watch Indonesia. (2020, Juni 5). *Menelisik angka deforestasi pemerintah*. <https://fwi.or.id/menelisik-angka-deforestasi-pemerintah>
- Gunawan, H. (2018). Indonesian peatland functions: Initiated peatland restoration and responsible management of peatland for the benefit of local community, Case study in Riau and West Kalimantan Provinces. In M. I. Lopez & J. Suryomenggolo (Ed.), *Environmental resources use and challenges in contemporary Southeast Asia: Tropical ecosystems in transition* (pp. 117–138). Springer.
- Hidayah, N., Dharmawan, A. H., & Barus, B. (2016). The expansion of palm oil plantation and changes of rural social ecology. *Sodality: Jurnal Sosiologi Pedesaan*, 4(3), 249–256. <https://doi.org/10.22500/SODALITY.V4I3.14434>
- Hunter, L. M. (2000). *The environmental implications of population dynamics, population matters: a RAND program of policy-relevant research communication*. RAND.
- Kelley, L. C., Peluso, N. L., Carlson, K. M., & Afiff, S. (2020). Circular labor migration and livelihood dynamics in Southeast Asia's concession landscapes. *Journal of Rural Studies*, 73, 21–33. <https://doi.org/10.1016/j.jrurstud.2019.11.019>
- Li, J., Cheong, T. S. E., Shen, J., & Fu, D. (2019). Urbanization and rural-urban consumption disparity: Evidence from China. *The Singapore Economic Review (SER)*, 64(4), 983–996. <https://doi.org/10.1142/S0217590817450102>
- Li, T. M. (2018). After the land grab: Infrastructural violence and the “Mafia System” in Indonesia's oil palm plantation zones. *Geoforum*, 96, 328–337. <https://doi.org/10.1016/j.geoforum.2017.10.012>
- Lopez, M. I., & Suryomenggolo, J. (2018). Introduction: Environmental resources use and challenges in contemporary Southeast Asia. In M. I. Lopez & J. Suryomenggolo (Ed.), *Environmental resources use and challenges in contemporary Southeast Asia tropical ecosystems in transition* (Vol. 7, pp. 1–18). Springer. https://doi.org/10.1007/978-981-10-8881-0_1
- Lucas, D., & Meyer, P. (1994). *Beginning population studies* (2nd ed.). National Center for Development Studies The Australian National University.
- McMahon, P. (2013). *Feeding frenzy: the new politics of food*. Profil Books.
- McMichael, P. (2013). *Food regimes and agrarian questions*. Fernwood Publishing.
- Mellos, K. (1988). Neo-Malthusian Theory. In *Perspectives on Ecology: A Critical Essay* (pp. 15–42). Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-19598-5_2

- Miettinen, J., Shi, C., & Liew, S. C. (2012). Two decades of destruction in Southeast Asia's peat swamp forests. *Frontiers in Ecology and the Environment*, 10(3), 124–128. <https://doi.org/10.1890/100236>
- Obie, M., Pakaya, M., Mustakimah, & Syilfi. (2020). Oil palm expansion and livelihood vulnerability on rural communities (A case in Pohuwato Regency-Indonesia). *Humanities & Social Sciences Reviews*, 8(1), 01–12. <https://doi.org/10.18510/hssr.2020.811>
- Pandey, B., Reba, M., Joshi, P. K., & Seto, K. C. (2020). Urbanization and food consumption in India. *Scientific Reports*, 10(17421). <https://doi.org/10.1038/s41598-020-73313-8>
- Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences: a practical guide*. Blackwell Publishing.
- Purnomo, H., Okarda, B., Dermawan, A., Ilham, Q. P., Pacheco, P., Nurfatriani, F., & Suhendang, E. (2020). Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. *Forest Policy and Economics*, 111, 102089. <https://doi.org/10.1016/J.FORPOL.2020.102089>
- Rahmadian, F., Dharmawan, A. H., & Kinseng, R. A. (2020). Diskursus perizinan ekspansi perkebunan kelapa sawit: Studi kasus Kabupaten Kutai Kartanegara. *Sosiohumaniora*, 22(1), 114–124. <https://doi.org/10.24198/SOSIOHUMANIORA.V22I1.21792>
- Santika, T., Wilson, K. A., Meijaard, E., Budiharta, S., Law, E. E., Sabri, M., Struebig, M., Ancrenaz, 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>
- Sayer, J., Ghazoul, J., Nelson, P., & Klintuni Boedhihartono, A. (2012). Oil palm expansion transforms tropical landscapes and livelihoods. *Global Food Security*, 1(2), 114–119. <https://doi.org/10.1016/J.GFS.2012.10.003>
- Schneider, U. A., Havlík, P., Schmid, E., Valin, H., Mosnier, A., Obersteiner, M., Böttcher, H., Skalský, R., Balkovič, J., Sauer, T., & Fritz, S. (2011). Impacts of population growth, economic development, and technical change on global food production and consumption. *Agricultural Systems*, 104(2), 204–215. <https://doi.org/10.1016/J.AGSY.2010.11.003>
- Seidl, I., & Tisdell, C. A. (1999). Carrying capacity reconsidered: from Malthus' population theory to cultural carrying capacity. *Ecological Economics*, 31(3), 395–408. [https://doi.org/10.1016/S0921-8009\(99\)00063-4](https://doi.org/10.1016/S0921-8009(99)00063-4)
- Sukiyono, K., Cahyadinata, I., Purwoko, A., Widiono, S., Sumartono, E., Asriani, N. N., & Mulyasari, G. (2017). *Assessing smallholder household vulnerability to price volatility of palm fresh fruit bunch in Bengkulu Province*. 1–15. https://scholar.google.co.id/citations?view_op=view_citation&hl=en&user=O-sm_4cAAAAAJ&cstart=20&pagesize=80&sortby=pubdate&citation_for_view=O-sm_4cAAAAAJ:r0BpntZqJG4C
- Timorria. (2020). *WEF Davos: Indonesia paparkan peran industri kelapa sawit*. <https://ekonomi.bisnis.com/read/20200125/99/1193762/wef-davos-indonesia-paparkan-peran-industri-kelapa-sawit>
- Underhill, A. P. (2018). Urbanization and new social contexts for consumption of food and drink in northern China. *Archaeological Research in Asia*, 14, 7–19. <https://doi.org/10.1016/J.ARA.2017.07.004>
- 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>

- Wang, Z., Cui, C., & Peng, S. (2019). How do urbanization and consumption patterns affect carbon emissions in China? A decomposition analysis. *Journal of Cleaner Production*, 211, 1201–1208. <https://doi.org/10.1016/J.JCLEPRO.2018.11.272>
- Weeks, J. R. (2008). *Population: An introduction to concepts and issues* (10th ed.). Thompson Wadsworth.
- Widiono, S., Kolopaking, L. M., & Rusli, S. (2015). Livelihood dualism: Case study of wetland conversion into estate impact in the villages based Javanese and Serawai ethnics in Regency of Seluma, Province of Bengkulu, Indonesia. *International Seminar on Promoting Local Resources for Food and Health (Iseprolocal)*, 347–352.
- Worldometer. (2020). *Indonesia demographics 2020 (population, age, sex, trends)*. <https://www.worldometers.info/demographics/indonesia-demographics/#urb>
- Yuan, B., Ren, S., & Chen, X. (2015). The effects of urbanization, consumption ratio and consumption structure on residential indirect CO₂ emissions in China: A regional comparative analysis. *Applied Energy*, 140, 94–106. <https://doi.org/10.1016/J.APENERGY.2014.11.047>
- Yulian, B. E., Dharmawan, A. H., Soetarto, E., & Pacheco, P. (2017). Livelihood Dilemma of The Rural Household Around The Oil Palm Plantation in East Kalimantan. *Sodality: Jurnal Sosiologi Pedesaan*, 5(3), 242–249. <https://doi.org/10.22500/SODALITY.V5I3.19398>
- Yuliani, E. L., de Groot, W. T., Knippenberg, L., & Bakara, D. O. (2020). Forest or oil palm plantation? Interpretation of local responses to the oil palm promises in Kalimantan, Indonesia. *Land Use Policy*, 96, 104616. <https://doi.org/10.1016/J.LANDUSEPOL.2020.104616>