



Development narratives, notions of forest crisis, and boom of oil palm plantations in Indonesia



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ABSTRACT

Indonesia experienced massive deforestation in the last decades where rapid oil palm expansion has been considered as one of the main drivers. This article shows that the process of deforestation and the rapid oil palm expansion cannot be viewed in isolation from broader development contexts. Various actors at local, national, and global levels have used development narratives and poverty alleviation through various policies and institutional setting to create spaces and opportunities for oil palm development. These actors also deliberately created the notion of forest crisis by omitting the values of forest environmental services to justify forest conversion into oil palm plantations. These multiple factors shaped the speed and the direction of oil palm expansion in Indonesia. This rapid oil palm expansion in Indonesia has resulted in massive LUCC and serious environmental problems. Given these complexities, a single policy will not be sufficient when it comes to managing the consequences of rapid oil palm expansion in Indonesia.

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1. Introduction

Indonesia's forests and forestland have been exploited for various purposes, leading to severe deforestation. Over the past few decades, large tracts of forestland have been converted into oil palm plantations. In fact, rapid establishment of oil palm plantations has been touted as one of the main drivers of deforestation in Indonesia (Koh and Ghazoul, 2010; Kongsager and Reenberg, 2012; Setiawan et al., 2016; Wicke et al., 2011), with environmental consequences, such as biodiversity losses (Danielsen et al., 2009; Fitzherbert et al., 2008; Koh and Wilcove, 2008), carbon emissions (Fargione et al., 2008; Ravindranath et al., 2009; Uryu et al., 2008) and other adverse environment impacts (Comte et al., 2012; Lee et al., 2014a). The process of oil palm expansion and its outcomes is often presented as an example of conflicting interests in lands and natural resource utilizations (Sargeant, 2001; Susanti and Burgers, 2012; Susanti and Burgers, 2013). Because of its speed of expansion, oil palm expansion is often portrayed as a commodity boom (Casson, 2000; Fischer, 2010; Hall, 2011; WB Office Jakarta, 2010) which were facilitated by government policies (Badrun, 2010; Basiron, 2002; McCarthy, 2010; McCarthy and Cramb, 2009; Susanti and Budidarsono, 2014).

This article intends to analyze the expansion of oil palm plantations that has been at the expense of forests in Indonesia. This is done to disentangle the complex process of rapid oil palm expansion by analysing

those different factors which simultaneously occurred at multiple levels and pushed the rapid forest conversion into oil palm plantations in the country. This article particularly looks at the development discourses and narratives in land use planning, how oil palm plantations are prioritized over forests by analysing multiple factors that have simultaneously driven the expansion of oil palm in the country. This article uses a policy analysis approach, i.e. policy processes and formulation of programs, from the lenses of development narratives and discourses. In general, oil palm plantations and industries are increasingly seen as alternative sources of land-based income to replace the forest sector, whose contribution to the national economy declines significantly.

2. Concepts and theoretical underpinnings

2.1. Forests and development contexts

Policies over forests are strongly linked with development activities (De Camino, 2005; Sandker et al., 2012). Thus decisions about forests need to be understood within the broader development priorities of a country (De Camino, 2005). That could be conservation, sustainable forest management or economic development. Countries with high forest area per capita and low income per capita tend to prioritize economic growths using the resources (Maini, 2003). There have been extensive studies that link national wealth and deforestation (Barbier and Burgess, 2001; Koop and Tole, 2001; Meyer et al., 2003; Rudel et al., 2005). Over the past decades, management of forests in many countries across the world has been centred on how to use the resources to accelerate economic development (Arts et al., 2010). This explains excessive

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extractions of valuable timber between 1960s and 1980s. It is related to how to obtain the optimum financial return from the forests. Krott (2005) argues that the low productive values of forests often lead to considerations of other methods of utilization which result in higher financial yields. The economic motives explain the land use change from forests to non-forests. Forests are cleared and converted into agricultural lands or plantations to meet growing demands for food, fuel and fibre for human populations (Rudel et al., 2005).

2.2. Formulation of development priorities

There are always conflicting interests and goals in the use and allocation of forest resources. The diverging interests may not be fulfilled at the same time under resource scarcity (Hubo and Krott, 2010). Thus, a central focus of forest policy is to regulate the conflicting interests (Krott, 2005), and to settle the priorities (Van Maaren, 1984). Byron (2006) argues that the core issue of forest policy is who will manage the forests and for what purpose. Forest policy should therefore be understood in the context of actors, interests and how to achieve it (William, 1978). The actors compete for priorities to get policy supports (Aurenhammer, 2012; Aurenhammer, 2016; Schusser et al., 2015; Schusser et al., 2016). Thus, they attempt to influence the formulation and implementation of a policy (Giessen et al., 2016; Krott et al., 2014; Maryudi, 2016; Prabowo et al., 2016; Sahide et al., 2015). According to the model of the policy cycle, the initiation of a policy first requires information and political discourses about an unacceptable societal problem (Krott, 2005). A policy program is formulated to solve the problem (Ellefson, 1992; Howlett and Ramesh, 1993; Krott, 2005). A forest program is therefore the logical consequence of problem(s) related to forests.

The actors who articulate and define policy problems do not act in isolation. They instead articulate the problem based on their interests (Hubo and Krott, 2013). Information and discourses about forests, including its importance to the society, is often used as a social bargaining in the formulation of a specific program (Krott, 1990). By means of information, the actors can make themselves a picture of real situation. They can determine which methods appropriate of utilizing the forests and the information is used to promote practical solutions (Krott, 2005). Information represents a strategy of accumulating power (Krott et al., 2014). The information can comprise factual and evaluative statements about forests and forestry (Krott, 2005). The acceptance of the strategy can be based on empty formulas, short and long-term impacts, partial facts, falsehoods, dogma, ideology and symbols (ibid.). Scientific knowledge is also used as the rationalization in making policies (Giessen et al., 2009). Ekayani et al. (2016) further argue that asymmetric information may have impacts on policy processes.

3. Methods

This study combines a number of approaches to ensure high validity and reliability. It first used content analysis, as well as a literature review of official documents and news (Hsieh and Shannon, 2005; Neuman, 2005). This study used the most relevant official documents, as well as text from trusted magazines. Those approaches were then combined with primary data and information gathered through formal and informal in-depth interviews with key informants (see 1). The interviews were of a semi-structured nature (Neuman, 2005), also comprising narrative elements on individual experiences with the development of oil palm plantations.

4. Framing the importance of oil palm plantations and industries

4.1. Crisis in the forestry sector and the need for alternative income

More than two-thirds of Indonesia's terrestrial areas are designated as forest area. In the early 1970s, Forestry sector was designed to become an important engine for economic development in Indonesia.

This industrial forestry discourse has put priority on the production function and economic profits of the forests based on the sustainable yield of the resource. This was especially stimulated by the increasing demand for forest products, particularly timber (Arts et al., 2010).

In the first five-year the national development phase (Repelita I, 1969–1974) the Government of Indonesia (GoI) formulated policies through exploitation of forests in the outer islands. Logs were directly exported. The GoI then stimulated investments and developments of timber industries to further increase contribution to national income, to generate employments, and to maintain the sustainability of forest yields in order to ensure the supply of raw materials for the industries. The important roles of the timber sector to the economic development were narrated in “the second most important sector after oil and gas” (FAO, 2000). The superlative narratives such as “the world's largest exporter of tropical hardwood logs” and “dominating the global markets of tropical plywood” (Maryudi, 2011) were also used as a social bargaining and the masks of rampant forest exploitation.

The acceptance on the forest exploitation was based on the fact that the sector contributed approximately a fifth to the total gross domestic products (GDP), creating around 2.35 million direct jobs and around 1.5 million indirect jobs in 2001 (Sastrosumarto et al., 2007). There was an enormous and ever-increasing demand for forest products which resulted in a booming wood processing industry, followed by increasing timber prices (Banerjee, 1997). It is estimated that, during this timber boom, the national wood processing industry consumed 60–80 million m³ of wood per year (Barr et al., 2001). However, the log consumption was well above the Indonesian average timber harvest of 25 million m³ per year (MoF, 2002).

An official document of the national development phase clearly discounted the role of forestry sector that was said to enter a crisis period, i.e. the natural forests cannot sustain the national timber industries. This was supported by the increasing concern on forest loss and degradation. In fact, between 1990 and 2012, Indonesia lost around 25 million ha of forest areas (FAO, 2015). The over-exploitation of natural forest resources had resulted in a decrease in the capacity of timber supply from natural forests. The global discourse of ecological crisis (Arts et al., 2010) has also started to erode the development priorities based on timber industries. Although policies on enhancing the control over logging operation and forest rehabilitation had been formulated, its implementation was virtually ineffective. Forest resources degradation had continued and increasingly had become serious concern in the third five-year national development plan (Repelita III, 1979–1984). The GoI once introduced industrial forest plantations to ensure the supply of raw materials for forestry industries. However, the progress of plantation development was slow the forestry industry had still highly depended on the supply of natural forest. Deforestation and forest degradation continued.

The massive forest fires in 1997/1998 added the size of degraded forest areas. Logging operation became less attractive as the timber production decreased. Low production of timber has led to higher cost of the logging operation for the same size of forest and limited profit of logging operation (Interview 2). As the amount of timber harvested from natural forests decreased, the contribution of the forestry sector to national income also decreased from 3.5% in 1993 (Ulya and Yunardy, 2006) to only 0.6% in 2013 (MoF, 2014). These five-year development plans clearly state that the national economic growth has become the main priority of national development. Therefore, the economic variables became the main indicators in setting the priority. Most of the decisions are merely based on their direct economic and financial contributions.

National mass media has also raised the declining contribution of forestry sector to GDP to less than 1% in 2009 (Kontan.co.id, 2011). Although forests have important ecological functions, these roles were hardly recognized as important contributions by the forestry sector to maintaining the multi-functionality of the landscapes and ecosystem sustainability. The situation became more problematic as forest areas also encountered encroachment, illegal logging, forest fire and land

conflict which were rooted from weak spatial plan, inconsistent forest maps, unclear forest boundaries in the field, and weak forest law enforcement (Interview 1, 3, 4, 9, 10, 12, 13, 14, 15, 17, and 18).

As the financial contribution from forestry sector decreased, its role in national economic also slowly disappeared. The crisis in the forestry sector strengthened the need to look for alternative land and natural resource-based incomes. This is especially after the implementation of decentralized government where new autonomous regions have to generate income from their own jurisdiction areas (Interview 14). This development opened up opportunities for new (agricultural) commodities to expand. With a growing demand for biofuels, vegetable oil and processed foods, oil palm plantation development was easily able to fill this gap.

4.2. The rise of oil palm

The notions of crisis in the forestry sector and the need of alternative national income triggered and opened the opportunity for oil palm plantation to rapidly expand in Indonesia. However, other factors also played important roles in changing oil palm from an unfamiliar exotic plant into the most rapidly expanding crop in the tropics (Fitzherbert et al., 2008) which significantly contributed to national income. The implementation of decentralized government in 2001 has spurred the expansion of oil palm plantations (Setiawan et al., 2016). Licensing lands for new oil palm plantation has been seen as instant income for the new autonomous regions (Obidzinski and Barr, 2003; Palmer and Engel, 2007). With greater responsibility in land and natural resource management, local government rapidly issued land and natural resources licensing under various community plantation partnership (Maryudi, 2015; Potter and Badcock, 2001). Following the decentralization, the demand for “*pemekaran*”¹ increased as a result of local elites generating income and maintaining their existence in the new autonomous region (Saad, 2001).

Between 1969 and 1993 the area of oil palm plantation expanded from only 120,000 ha to around 1.84 million ha. After the crisis in forestry sector in early 1990s, the expansion of oil palm plantation have accelerated. Between 1993 and 2013 the area of oil palm plantation increased from 1.84 million ha to 10.47 million ha. With this expansion, the contribution of oil palm export values to the total national export value increased from around 2% in 1991 to 10% in 2012 (CBS, 2015a; FAO, 2015). The increasing area of oil palm plantations is illustrated in Fig. 1. In the following sections, we elaborate the factors and their interplays which determine the rapid expansion of oil palm plantation in Indonesia.

4.2.1. National development narratives supporting oil palm development

Oil palm has been produced in Indonesia since long before the national independence in 1945 (Henderson and Osborne, 2000). The potency oil palm production as an export commodity has become increasingly important when the era of national development began. However, this potency could not directly be exploited due to lack of knowledge, infrastructures, and investments as stated in the first five-year national development phase (Repelita I, 1969–1974) since the focus of Repelita I was to generate quick income for development. Meanwhile, the rich forest resource was under-utilized and was ready to be exploited for quick income. Therefore, Repelita I targeted forest exploitation, instead of establishing large palm plantations, to increase export values. Section 4.1 has discussed the importance of the forestry sector to the national income until 1990s.

Oil palm expansion quickly became one of the government programmes which was implemented mainly through Nucleus Estate

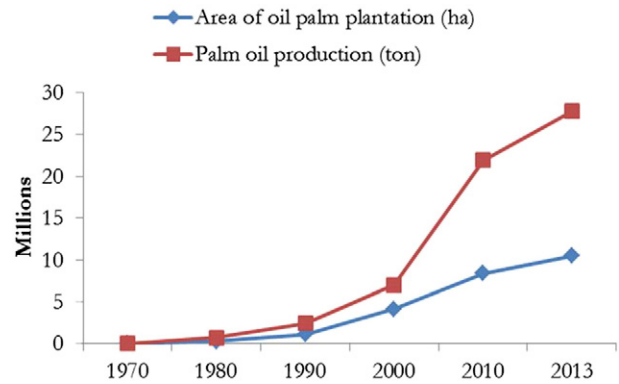


Fig. 1. Area of oil palm plantation and palm oil production in Indonesia between 1970 and 2013 (Mo, 2015)

Smallholder (NES) scheme and transmigration programme. Land was also made available through government land allocation programme throughout the *Repelitas*. Forest regulations have been amended accordingly to facilitate conversion of forests into oil palm (Setiawan et al., 2016). The National Planning Agency indicated that forest land conversion should become the sources for the establishment of new oil palm plantations. Wicke et al. (2011) estimated that from 1975 to 2005 around 40 million ha of forests in Indonesia have been converted into oil palm plantations. It is equal to 30% reduction of total forested land. Land also became available for the establishment of oil palm plantations after many logging companies closed down. Many of ex-logging concessions were granted land licenses for oil palm plantations (Interview 7 and 8). In the oil palm producing region such as Riau province of Indonesia, existing agricultural lands such as rice fields have been increasingly converted into oil palm plantations (see Section 4.3).

Besides, the GoI also formulated policies that are intended to improve the productivity of oil palm plantations and to commercialize palm oil production. The ultimate objective of this policy was to increase the contribution of palm oil sector to national income (MoPC, 1968). Adding values and improving the quality of agricultural products such as palm oil became the focus of agricultural development in the fourth five-year national development phase (Repelita IV, 1984–1989). These were done to increase the competitiveness of the products in the global market (see Section 4.3.3). As previously mentioned, during Repelita V forestry sector was hampered by the declining of log production from natural forests, deforestation and forest degradation. For these reasons, in 1991, the GoI liberalised the palm oil market by limiting the state involvement and allowing market mechanisms to regulate the palm oil market. This policy also allowed private companies to export crude palm oil or CPO (Larson, 1996). This policy had eradicated the role of the state as price or market regulator (McCarthy, 2010).

To give greater opportunities to rural landowner to participate in oil palm development, to attract more direct private-community partnership and foreign direct investments, and to reduce direct government subsidies in connection with the establishment of oil palm plantations, the GoI introduced a new credit scheme for Primary Cooperative Members or KKPA (*Kredit untuk Koperasi Primer Anggota*). In the KKPA scheme a private company needed to partner with a primary cooperative formed by a group of smallholders (Larson, 1996). The GoI also facilitated the transformation of non-oil palm transmigration areas into oil palm production areas. This has to be done subject to agreement by the KKPA and the participating households.

4.2.2. Increasing global and domestic demands for palm oil

The increasing global and domestic demands for palm oil contribute to rise of commodity in the national policy. It is estimated that the global demand for palm oil grows at 5% per year (CMEA, 2011). The traditional demand for palm oil has been derived from the demand for food which

¹ *Pemekaran* refers to the formation of new regencies in the era of decentralized government

follows the growth of the global population and the progress of welfare (Kates and Parris, 2003). FAO (FAO, 2011) estimated that the world's poorest countries and regions will double their populations between 2000 and 2050. To feed those people, food production needs to increase by 70% in 2050 (FAO, 2010). The global population growth will spur the further expansion of oil palm plantation to fulfil the demand for vegetable oil as palm oil accounts for the greatest share (34%) in global vegetable oil (FAO, 2015) despite the negative campaign by the American Soybean Association (ASA), which claimed it is an unhealthy vegetable oil (Othman et al., 1993). The government of Indonesia sees this as a "should not be missed" opportunity. A press release of the Ministry of Industry stated that Palm oil industry has been increasingly important to become the engine for economic growth and employment generation.

The introduction of palm oil biofuel as an alternative renewable low carbon fuel has further created a new market for palm oil. This demand added to the increasing demand for palm oil as food ingredients and triggered the increase in food prices (Cakraborty, 2008; Zilberman et al., 2012). The spiking food price in 2006–2007 caused global concerns on food security and agriculture to return to the global agenda (Grain, 2008). This was mainly because the introduction of biofuels as alternative low carbon fuels diverted the use of grains from food into fuel, known as flex crop (Borras et al., 2014). The use of palm oil globally is illustrated in Fig. 2.

On the domestic markets, palm oil became the most common cooking oil (FAO, 2015) and is listed as one of the staple foods (CBS, 2015b). Because it is a staple food, the demand for palm oil as cooking oil has been increasing in line with the population. With a population growth of around 1.4% (UN, 2013), the consumption of palm oil increased from 0.17 kg per capita per year in 1961 to 4.8 kg per capita per year in 2013.

The rise of oil palm is also triggered by the GoI also committed to reducing national GHG emissions by 26% in 2020 from the business as usual scenario (Forest Climate Center, 2009) and securing national energy supplies. This was done by setting up a target of energy diversification both for electrification and transport sector (MoEMR, 2006). In this regard palm oil as a biofuel has been identified as the primary energy resource to diversify transport fuels and to reduce GHG emissions (Wirawan, 2010). The recognition of palm oil as a main alternative source to diversify transport fuels, created another demand for palm oil in the domestic market. In 2013 the government boosted the mandated amount of palm blending in diesel from 7.5% to 10%. In 2014 the government ordered power plants to mix in 20%. In 2015, the government raised the blending rate to 15% and subsequently to 20% to cut costs of importing fossil fuel and shore up prices of the world's most-used vegetable oil (Bloomberg, 2015).

4.2.3. The narratives of rural development

Besides the export values, the discourse about oil palm production has highlighted the contribution of oil palm production to poverty alleviation

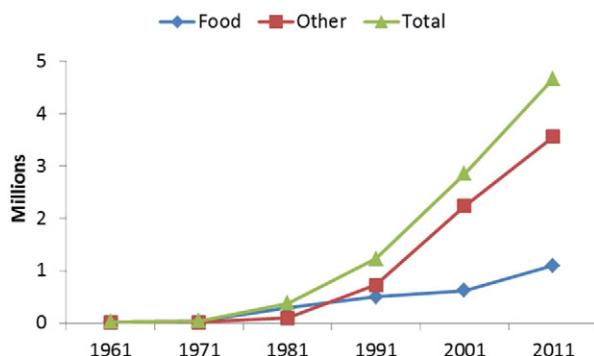


Fig. 2. The use of palm oil globally between 1971 and 2011 (FAO, 2015).

and generates significant employment, especially in rural areas (World Growth, 2011). The number of people working in the oil palm sector increased from around 2 million in 2000 to 5.5 million people in 2013 (GAPKI, 2014). In Riau Province for instance, oil palm production has been significantly contributing to job creation, especially in the rural areas (Interview 11). Van Noordwijk et al. (2001) asserted that oil palm production has generated the highest employment per km². To put this into perspective, forest-related labour (logging, non-timber forest product collection) can support up to 5 labourers/km², while a small-scale oil palm plantation is able to absorb 40–60 labourers/km². The area of oil palm plantations which are managed by smallholders also increased from 1.8 million ha in 2002 to 3.4 million ha in 2010. In 2012 smallholder households managed around 40% of total oil palm plantation in Indonesia (CBS, 2012).

4.3. Case study of Riau province: forest doom, oil palm boom

By way of an illustration, we take Riau province which has experienced transformation in relatively short period from forestry dominated economy into the largest oil palm producing region in Indonesia. For this development, the landscape of Riau province has been experiencing transformation from biodiversity rich natural forest into monoculture oil palm plantation. The forestry sector has a long history in Riau Province. More than 2 million ha of natural forest had been allocated to forest concessionaires and harvested for commercial purposes, mostly for timber, since as early as the nineteenth century (Sumardjani, 2005). Between 1996 and 2000 almost 14 million m³ of timber were harvested from Riau forest. Riau was listed in the top 5 of national timber producers (MoF, 2002).

One of the forestry officer stated, "We know that the contribution of Riau forests to national income is large, but we do not know exactly how much as the most of the provision of forest resources were mainly managed by national government" (Interview 14). This forest exploitation has led to deforestation and forest degradation. The Ministry of Forestry reported that Riau was experiencing a deforestation rate of 158,000 ha per year between 2003 and 2006 (MoF, 2008) and 191,000 ha between 2006 and 2010 (MoF, 2011). The number, the area, and the potential timber of natural forests have been continuously decreased. In 2010, the natural forest concessionaires occupied approximately only 300,000 ha (MoF, 2011). With this situation, the contribution of forests to national and regional income has been continuously decreasing (Interview 15).

With this forest crisis, natural forest concessionaires were increasingly replaced by monoculture industrial plantation forest concessionaires which, by 2010, occupied approximately 1.6 million ha (MoF, 2011) and monoculture oil palm plantations, which, by 2010, occupied approximately 2.1 million ha (Estate Crop Agency of Riau Province, 2011). The Provincial Forestry Agency reported that around 1.6 million ha of forest area has been released for oil palm plantation (Forestry Agency of Riau Province, 2010). This area accounted around 80% of the total oil palm plantation in Riau province in 2010 (Estate Crop Agency of Riau Province, 2011) and 44% of the total forest loss in Riau province between 1982 and 2010 (MoF, 2011; WWF Indonesia, 2006).

The development of oil palm plantation in Riau province has a huge multiplier effects, especially oil palm has brought development in the rural areas (Interview 11). To support this development, road networks have been substantially intensified during the last few decades. Between 1984 and 2009 the road density in Riau increased from 13.60 km per 1000 km² to 267.56 km per 1000 km² in 2009 (CBS of Riau Province, 2011; Hill, 1991). In 2010 Riau was home to 146 oil palm mills with a total capacity of more than 6000 tons FFB per hour, the largest in Indonesia (Harris et al., 2011; Lee et al., 2014b).

The number of labourers working in the estate crop sub-sector increased from 1.15 million in 2009 to 1.22 million in 2010 or around 6%. Within these numbers the number of labourers working in oil palm

Table 1
List of actors, interests, and roles.

	Actor	Interest	Roles in oil palm development
Phase I	Ministry of Agriculture	<ul style="list-style-type: none"> Improve agricultural production to stimulate development in outer islands Enhance national integrity 	<ul style="list-style-type: none"> Introduce oil palm as commodity for development through NES scheme. Provide technical trainings related to oil palm production Provide subsidies on agricultural infrastructures Conduct research to improve oil palm production.
	Ministry of Transmigration and Manpower	<ul style="list-style-type: none"> Generate employment Alleviate poverty for rural poor groups 	<ul style="list-style-type: none"> Facilitate the mobility of labourers for oil palm development Establish settlements for the labourers within NES-transmigration programmes Provide living allowance in the first five years of oil palm development
	Ministry of Industry and Trade	<ul style="list-style-type: none"> Control the distribution of oil palm products Expand the palm oil industry and trade 	<ul style="list-style-type: none"> Create new domestic market for oil palm products by adding palm oil as a staple food.
	Ministry of Economic	<ul style="list-style-type: none"> Income from export values for development 	<ul style="list-style-type: none"> Provide cheap credit for the Nucleus companies within NES scheme.
Phase II	Ministry of Agriculture	<ul style="list-style-type: none"> Enhance agricultural production and promote rural development National food self-sufficiency 	<ul style="list-style-type: none"> Conduct research to improve oil palm production especially related to the high yielding planting materials.
	Ministry of Forestry	<ul style="list-style-type: none"> Income from forest land licensing for new oil palm plantations 	<ul style="list-style-type: none"> Provide and facilitate land acquisition for the establishment of oil palm plantations and industries
	Ministry of Industry and Trade	<ul style="list-style-type: none"> Expand the oil palm industries and trades 	<ul style="list-style-type: none"> Deregulation for the establishment of oil palm industries Market liberalization for oil palm products
	Ministry of Economic	<ul style="list-style-type: none"> Income from export values and export tax to replace income from forestry 	<ul style="list-style-type: none"> Credit scheme for independent smallholders through KKPA
	Private sector	<ul style="list-style-type: none"> Investments on lands and oil palm processing industries Cheap credit from government to establish oil palm plantations and industries Facilities and subsidies in gaining lands for oil palm developments 	<ul style="list-style-type: none"> Participate in oil palm development as Nucleus Estate.
	Global consumers	<ul style="list-style-type: none"> Affordable vegetable oil Alternative low carbon renewable fuels 	<ul style="list-style-type: none"> Supporting oil palm production by consuming cheap oil palm products and affordable palm oil biofuel.
	Environment and people NGOs	<ul style="list-style-type: none"> Sustainable and responsible oil palm production Reduce GHG emissions Benefits distribution of oil palm production 	<ul style="list-style-type: none"> Opposing oil palm expansion
	Ministry of Agriculture	<ul style="list-style-type: none"> Enhance agricultural production National food self-sufficiency Sustainable oil palm production 	<ul style="list-style-type: none"> Conduct research to improve oil palm production especially related to the high yielding planting materials.
Phase III	Ministry of Forestry and Environment	<ul style="list-style-type: none"> Income from forest land licensing for new oil palm plantations Reduce GHG emission from Land use/cover change 	<ul style="list-style-type: none"> Implementing compulsory palm oil certification, including smallholders Provide and facilitate land acquisition for the establishment of oil palm plantations and industries on mineral soil areas
	Ministry of Energy	<ul style="list-style-type: none"> Alternative renewable low carbon fuel National energy self-sufficiency 	<ul style="list-style-type: none"> Moratorium on land licensing for new oil palm plantations on peat lands Promote the use of palm oil as bio-fuel as an alternative affordable renewable fuel
	Ministry of Industry and Trade	<ul style="list-style-type: none"> Expand the oil palm industries and trades 	<ul style="list-style-type: none"> Establishment of oil palm industrial clusters Conduct research related to palm oil production.
	Ministry of Economic	<ul style="list-style-type: none"> Income from export values and export tax 	<ul style="list-style-type: none"> Facilitate foreign investment on palm oil industries
	Private sector	<ul style="list-style-type: none"> Investments on lands and oil palm processing industries Cheap credit from government to establish oil palm plantations and industries Facilities and subsidies in gaining lands for oil palm developments 	<ul style="list-style-type: none"> Participate in oil palm development as Nucleus Estate.
	Local government	<ul style="list-style-type: none"> Regional income from forest land licensing for new oil palm plantations Employments generated by oil palm production and palm oil industry Extension of roads and transportation infrastructures Extension of settlements, urban areas 	<ul style="list-style-type: none"> Facilitate land licensing in their jurisdiction areas
	Global consumers	<ul style="list-style-type: none"> Affordable vegetable oil Alternative low carbon renewable fuels 	<ul style="list-style-type: none"> Supporting oil palm production by consuming cheap oil palm products and affordable palm oil biofuel.
	Environment and people NGOs	<ul style="list-style-type: none"> Sustainable and responsible oil palm production Reduce GHG emissions Benefits distribution of oil palm production 	<ul style="list-style-type: none"> Implementing oil palm certification (RSPO) and a requirement to enter global market

production increased by around 15%, while those of other crops decreased (Estate Crop Agency of Riau Province, 2011). While in its early development oil palm has been heavily subsidized by government funds, recently oil palm becomes an interesting investment. Oil palm production becomes financially viable for commercial credit for investment. Since 2004 BNI 1946 – a state-owned bank – has given commercial credits for investment on oil palm production, not only to large scale companies, but also to smallholders (Interview 19). Independent smallholders have been increasingly adopted oil palm production in their farming system. The lucrative financial benefits which are offered by oil palm production become the main reason to voluntarily adopt oil palm production (Interview 16, 20, 21, 22, 23, 24, 25, 26, and 27).

However, the rapid expansion of oil palm plantation in Riau province has also led to severe environmental problems. The removal of forest areas due to oil palm expansion led to the shrinking of forest areas which has resulted in a significant reduction in biodiversity (Sheil et al., 2009). Sumatran orang-utans (*Pongo albelii*) are facing extinction (Nantha and Tisdell, 2009; Tan et al., 2009). Elephants (*Elephas maximus sumatranus*) and tigers (*Panthera tigris sumatrae*) are critically threatened by oil palm expansion (Danielsen et al., 2009; WRI, 2002). This shrinking of the habitat of Sumatran elephants and tigers has triggered conflicts between humans and wildlife.

In addition, the competition for remaining lands has been increasing as most land is being occupied. Land-related conflicts are inevitable in

Table 2

Policies and regulations implemented in the phases of oil palm development.

		Policies and regulations	Pros	Cons
Phase I	Plantation	<ul style="list-style-type: none"> Ministry of Agriculture decree No. 850/1981 Ministry of Manpower and Transmigration decree No. 50/1982 Ministry of Agriculture decree No. 853/1984 Ministry of Agriculture decree No. 333/1986 Indonesia Central Bank circulation letter No. 19/1986 	<ul style="list-style-type: none"> The establishment of oil palm plantation within NES scheme is done in close collaboration with transmigration programme and support poverty alleviation for the rural poor group who joined the transmigration programme Stimulate the participation of smallholder in the NES scheme by determining the proportion of oil palm plantation manage by the Nucleus estate (20%) and smallholders (80%). Stimulate the participation of private sector to take roles as the Nucleus estate by providing cheap credit scheme to finance the establishment of the oil palm plantations. 	<ul style="list-style-type: none"> Participation of local people in the development of oil palm plantation is low The development of oil palm plantation is highly subsidized by central government through government programmes
	Industry	<ul style="list-style-type: none"> Ministry of Agriculture decree No. 850/1981 Presidential Instruction No. 1/1986 	<ul style="list-style-type: none"> Integrated oil palm plantation with the processing industries ensures the supply of raw material to the processing industries 	<ul style="list-style-type: none"> Barrier to entry for independent smallholders who do not have contract with the Nucleus estate and oil palm processing industry
	Trade	<ul style="list-style-type: none"> Ministry of Trade and Cooperative decree No. 275/1978 Ministry of Agriculture decree No. 264/1978. Ministry of Industry decree No. 275/1978 	<ul style="list-style-type: none"> Control the distribution of palm oil to ensure the supply of palm oil in the domestic market at affordable price 	<ul style="list-style-type: none"> Limit the export of palm oil with quota and export tax
Phase II	Plantation	<ul style="list-style-type: none"> Ministry of Agriculture decree No. 73/1998 Ministry of Cooperative and Small Scale Enterprises decree No. 01/1998 	<ul style="list-style-type: none"> Larger opportunity for local land lords and independent smallholders to participate in oil palm production through public-private partnership within KKPA scheme 	<ul style="list-style-type: none"> Increasing competition for lands to establish new oil palm plantations
	Industry	Government Regulation No. 13/1995	<ul style="list-style-type: none"> Investors are allowed to establish oil palm processing industry without managing oil palm plantation, so called independent mill. This creates a new market for oil palm fresh fruit produced by independent smallholders. Stimulate the expansion of oil palm plantation managed by independent smallholders 	<ul style="list-style-type: none"> Increasing competition for independent oil palm mills to secure their raw materials. Restriction on foreign investment in oil palm sector
	Trade	Deregulation policy package (1991 and 1992) on CPO distribution and export (Ministry of trade and cooperative, Ministry of Agriculture and Ministry of Industry)	<ul style="list-style-type: none"> Eliminate export quota, increase palm oil export Market liberalization becomes the avenue of smallholders to connect to the global market of palm oil Market liberalization increased the price of palm oil at domestic market and stimulate the expansion of oil palm plantations 	<ul style="list-style-type: none"> The role of state is withdrawn and palm oil market is completely controlled by global market mechanism, export tax becomes the tool to control the distribution of palm oil
Phase III	Plantation	<ul style="list-style-type: none"> Implementation of decentralization Law No. 18/2004 Implementation of RSPO certification Implementation of ISPO certification 	<ul style="list-style-type: none"> Local government became the licence issuing agency for oil palm plantation Smallholder plantations with size less than 25 ha should register and do not necessary to have Business license. This easiness further accelerates the expansion of smallholder oil palm plantations. Ceiling limit on the size of large scale oil palm plantations More responsible oil palm production 	<ul style="list-style-type: none"> Land licensing for oil palm plantations has been seen as the quick source for regional income Uncontrolled expansion of smallholder oil palm plantations Extra cost for certifications
	Industry	Ministry of Industry decree No. 357/2005	<ul style="list-style-type: none"> Oil palm processing industries (oil palm mill) should manage their own oil palm plantation to ensure the supply of raw material Withdraw restriction on foreign investment on oil palm sector 	<ul style="list-style-type: none"> Limit the market of oil palm fresh fruit produced by independent smallholders. Domestic investors should compete with foreign investors
	Trade	Ministry of Industry and Trade decree No. 17/M-Dag/Per/3/2006	<ul style="list-style-type: none"> Adjusted monthly export tax on oil palm products based on price. 	<ul style="list-style-type: none"> Increase uncertainty for palm oil exporters.

many regions. The consortium for agrarian reformation (2015) reported that the number of agrarian conflicts has increased in the last five years. Thirty six land-related conflicts were recorded in Riau province, mainly due to the expansion of plantations. An NGO employee stated, “...incompatible and lack of transparency in land licensing became the root of this problem...” (Interview 4) as well as this, out-dated spatial planning by the province, inconsistency of reference maps and unfair compensation have created problematic land-related conflicts for new plantations (Kabar 24, 2013).

As the fertile mineral soils have been occupied by earlier plantations, peat lands have become new frontiers for land and natural resources exploitation in the last decade (Murdiyarso and Lebel, 2007). The use of peat lands for intensive agriculture such as oil palm plantations resulted in peat subsidence (Rieley, 2007) which destroyed the “sponge effect” reservoir function of peat swamp (Andriesse, 1988) and increasing GHG emissions from peat oxidation (Fargione et al., 2008).

5. Discussion and conclusion

This article shows that the rapid oil palm expansion in Indonesia in the last decades cannot be viewed in isolation from broader development contexts. Multiple factors have been working simultaneously at local, national and global levels and have shaped the speed and the direction of oil palm expansion in Indonesia. The national economic development, regional development and poverty alleviation narratives have been heavily used by various actors to justify the expansion of oil palm plantations. The lucrative financial benefits from oil palm have enticed various actors to participate in oil palm production. They used development and poverty alleviation narratives through various policies and institutional settings to create market and opportunities for oil palm development. In addition, these actors also deliberately omitted the values of environmental services of forest to create the notion of forestry crisis and to justify forest conversion into oil palm plantations.

We identify three phases of oil palm expansion in Indonesia. The first phase of oil palm expansion was driven by increasing global demand for palm oil as food ingredient to feed the increasing global population. The expansion of oil palm plantation was supported by government NES and transmigration programs. The second phase of oil palm expansion was driven by the urgency of finding alternative income source to replace income from forestry. The expansion of oil palm plantations was accelerated by the market liberalization policy, increasing participation of private sector and independent smallholders. To further support the expansion, the government made the massive post-fires degraded forest lands available for conversion into oil palm plantations to increase productivity. The third phase of oil palm expansion was accelerated by the implementation of decentralized government, increasing global concern on GHG emissions and the urgency to find alternative low carbon fuels. These recent rapid expansion of oil palm plantations has not merely been driven by structured development programs, but also driven by autonomous smallholders' decisions to participate in oil palm productions. The actors and their interest in oil palm development are listed in Table 1.

However, this rapid expansion of oil palm plantation has also resulted in massive land use/cover changes (LUCC) which is leading to serious environmental problems. The widespread impacts of oil palm expansion can be easily seen when travelling through Indonesia, especially on Sumatra and Kalimantan. Monoculture oil palm plantations are dominant in the landscape. Biodiversity-rich and heterogeneous landscapes consisting of tropical forests, mixed agroforestry systems, small scale farming areas, and rice fields in various configurations are increasingly replaced by monoculture oil palm plantations.

Between 1990 and 2000 with annual deforestation rate around 1.75% and became the second highest rate of deforestation in the world. Within Indonesia, Sumatra Island has experienced most rapid deforestation mainly to support the development of agro-industry (Casson, 2000) and will become one of the eleven deforestation fronts² which will contribute around 5 million ha to global deforestation between 2010 and 2030 (WWF Global, 2015). Due to this high rate of deforestation, Indonesia has lost more than 70% of its natural habitat for the unique endemic species between 1800 and 2000, leading to around 80% of bird species loss (Myers et al., 2000). In addition, many native and forest dependent communities lose access to forest resources (Chao, 2012). Evidence also shows that increasingly oil palm plantation development has led to land related conflicts (Colchester, 2001). For example, in 2015, around 50% (127 cases) of land related conflicts occurred in estate crop sector especially oil palm plantation (KPA, 2015).

Although efforts have been made to bring about sustainable oil palm production, progress is by no means living up to expectations. The environmental sustainability of palm oil production remains questionable. Given these complexities, a single policy will not be sufficient when it comes to managing the consequences of rapid oil palm expansion in Indonesia. The policies related to oil palm development are listed in Table 2.

This demand for palm oil as a biofuel was created by the assumption that palm oil is an alternative low carbon option to fossil. Countries including the European Union and Indonesia started stimulating the use of biofuels as one of instruments to reduce greenhouse gas (GHG) emissions (European Parliament and the EU Council, 2003; USDA Foreign Agriculture Service, 2015) as one of instruments for climate change adaptation and mitigation through emission reduction trajectory. However, recent studies reveal that as LUCC effects through forest conversion are taken into account, the production of biofuels may even increase

GHG emissions compared to the use of fossil fuels (Koh, 2007; Koh and Wilcove, 2008). In this regard, the production of palm oil as a biofuel is not a low carbon alternative fuel as a solution to GHG emissions from fossil fuels, especially when oil palm plantations have replaced peat lands (Fargione et al., 2008). These negative impacts of oil palm expansion increasing become global concern.

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Annex 1. List of interview

Interview 1, 2010	Ministry of Forestry (MoF), Forest Protection and Conservation Directorate General on 17 December 2010
Interview 2, 2010	Sinarماس Group staff on forestry business on 17 December 2010 (direct interview) and 17, 23, 24 December 2010 (electronic messages)
Interview 3, 2010	Gadjah Mada University (UGM) expert on social forestry on 17 December 2010
Interview 4, 2010	WWF staff (1) for forest crime on 20 December 2010
Interview 5, 2010	WWF staff (2) for oil palm certification on 23 December 2010
Interview 6, 2010	Staff of KALIPTRA which is an NGO in Riau province and acts as field facilitator for smallholder producing oil palm plantation at Rokan Hulu District on 20 December 2010
Interview 7, 2010	Riau University (UNRI) expert for regional development and spatial planning, who was also member of integrated team for provincial spatial plan of Riau province from 2008 to 2010 on 20 December 2010
Interview 8, 2010	Riau University (UNRI) expert oil palm production and agricultural economics on 22 December 2010 and 15 January 2011
Interview 9, 2010	Nature Conservation Agency (BKSDA) of the MoF at Riau province on 21 December 2010
Interview 10, 2010	JICA expert for forest fire management on 21 December 2010
Interview 11, 2010	Regional Planning Agency (BAPPEDA) of Riau province on 22 December 2010
Interview 12, 2010	PT. Arara Abadi (an industrial forest plantation company – HTI) staff (1) for forest conservation and social engagement on 29 December 2010
Interview 13, 2010	PT. Arara Abadi (an industrial forest plantation company – HTI) staff (2) for forest conservation and social engagement on 29 December 2010
Interview 14, 2010	Provincial Forestry Agency (Dinas Kehutanan Provinsi) of Riau province staff (1) on 30 December 2010
Interview 15, 2010	Provincial Forestry Agency (Dinas Kehutanan) of Riau province staff (2) on 30 December 2010
Interview 16, 2010	Estate crop Agency (Dinas Perkebunan) of Riau province on 30 December 2010
Interview 17, 2010	Tesso Nilo National Park (Taman Nasional Tesso Nilo) staff on 31 December 2010
Interview 18, 2011	PT. Diamond Raya Timber (a logging company which operates in Riau province) staff on 31 January 2011
Interview 19, 2011	PT. BNI 46 (a state owned bank) staff for credit specialist on 11 February 2011
Interview 20, 2011	Dayun village leader on 2 February 2011
Interview 21, 2011	Banjar Seminai village leader on 31 January 2011

² The deforestation fronts refer to places that will account for over 80% of the forest loss projected globally between 2010 and 2030. Ten of these fronts are in the tropics. The fronts are located in the Amazon, the Atlantic Forest and Gran Chaco, Borneo, the Cerrado, Chocodarién, the Congo Basin, East Africa, Eastern Australia, Greater Mekong, New Guinea and Sumatra. It is projected that globally around 170 million ha will be deforested in these deforestation fronts (WWF Global, 2015).

Annex 1 (continued)

Interview 1, 2010	Ministry of Forestry (MoF), Forest Protection and Conservation Directorate General on 17 December 2010
Interview 22, 2011	Sepahat village leader on 30 January 2011
Interview 23, 2011	Temiyang village leader on 7 February 2011
Interview 24, 2011	Tasik Serai village leader on 3 February 2011
Interview 25, 2011	Bukit Kerikil village leader on 5 February 2011
Interview 26, 2011	Labuhan Tangga Baru village leader on 6 February 2011
Interview 27, 2011	Labuhan Tangga Besar village leader on 8 February 2011

Annex 2. List of empirical material

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