Chapter 6

Oil Palm Plantations in Indonesia: The Implications for Migration, Settlement/Resettlement and Local Economic Development

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Additional information is available at the end of the chapter

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1. Introduction

Palm oil is the world's most traded vegetable oil: in August 2012, the share of palm oil (including kernel oil) in world supply was 37.6% [1]. Palm oil is extracted from the fruit of the oil palm tree (*Elaeisguineensis*); the main products are crude palm oil (CPO) and palm kernel oil (PKO). In terms of land use, the oil palm tree is more efficient than any other oil crop [2], and in economic terms palm oil is highly competitive. The value chain of palm oil and its derivatives has a strong degree of vertical integration [3], and its production costs are relatively low compared to other vegetable oils. It is therefore seen as one of the cheapest and most attractive vegetable oils traded on the world market [4, 5].

The palm oil sector provides income and employment for a significant number of individuals in developing countries [6]. A study of the Indonesian palm oil industry carried out as part of a global study under the coordination of the Australian National University, concluded that palm oil developments have had a positive impact on the incomes and living standards of all involved [7]. According to an assessment carried out in Sumatra, oil palm plantations have high labour requirements and show high return to labour [8].

Palm oil, being a multi-purpose vegetable oil, offers good prospects for further expansion. There is a growing demand from the commercial food and oleo-chemical industries that use oil palm in processed foods, cosmetics, soaps, pharmaceuticals, industrial and agro-chemical products, and as a feedstock for bio-diesel. The growing worldwide interest in bio-diesel as an alternative to fossil fuel is expected to lead to the further expansion oil palm plantation [9,10,11]. Tilman and colleagues [12] assert that this might lead to a food–energy–environ-

ment 'trilemma'. Even though oil palm trees are not a problem (they are 'green'), the rapid expansion of oil palm plantations across Southeast Asia, and particularly Indonesia and Malaysia, could cause the destruction of rainforests, as well as a lot of social problems, including food security challenges [13]. There are concerns that oil palm expansion will lead to the loss of biodiversity and the conversion of forest area [14 - 16] and the aggravation of social conflicts. According to Colchester and colleagues [17], who analysed the situation on and around six oil palm plantations, local communities face serious problems with the companies and there are many land conflicts. There is a widespread feeling in the communities of being cheated by the companies, and of being pushed into agreements through false promises without having a voice in decision-making. To the extent that people are employed, labour conditions are often not favourable. According to Marti [18], who conducted research on the labour conditions of plantation workers, much will depend on 'whether Indonesia's policy-makers intend to keep a large labouring class in low-paid, low-skill jobs as the rest of the country develops, or whether the country anticipates inviting millions of workers from even less fortunate countries to work on their plantations in future.'

With these controversies in mind, this chapter provides an overview of the pros and cons of oil palm development in Indonesia, paying attention to changing government policies and focusing on the implications of increasing oil palm investments for migration, settlement/resettlement and local economic development.

Since the 1970s, the Indonesian government has stimulated oil palm expansion in various ways, initially in the form of plantations. For a considerable time, the government played a direct role in stimulating investments in oil palm plantations through state agencies (with direct interventions in service provision, institutional support, agricultural extension, access to land and capital, etc.). Plantation development policies were carried out in close relation with other policy objectives, namely population redistribution through resettlement schemes or transmigration to stimulate the development of the outer islands (Sumatra, Kalimantan and Papua) and revitalizing the by then huge transmigration settlements that had often failed to produce more than rice and subsistence crops [19] and enhancing regional development (i.e., the increase in agricultural production, employment generation etc.); and the political objective of promoting national integrity and increasing national security [20].

This chapter is based on empirical data collected in Riau province (one of the booming oil palm producing areas that has undergone rapid expansion in the last 10 years) as well as on desk research. The field data collection focused on the economic activities related to oil palm development. The desk study included an analysis of legal and technical documents related to historical records of oil palm development in Indonesia in general and in Riau province in particular. These documents were collected in libraries and government offices, and from companies and online sources.

After providing some background information on palm oil investments, we give a historical overview of how oil palm expansion took place in Indonesia in close relation to changing policies. This is followed by an assessment of the implications of rapid oil palm expansion for migration, settlement/resettlement and local economic development.

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2. Investment in palm oil production, settlement development and rural economy

Investments in palm oil production require large-scale plantations to be economical and the establishment of palm oil processing units (mills) close to the plantations, as the oil palm fruits have to be processed within 48 hours after harvesting. Once investments in palm oil production have been made, the plantations are made to last as long as possible, or at least for one production cycle (25 years). A large-scale oil palm plantation requires a significant amount of labour to establish the plantation, maintain the palm trees and harvest the fruits. A detailed study on palm oil production in Indonesia noted that the labour requirements of a plantation during one production cycle (25 years) vary between 59 and 144 person-days (pds) per ha per year, which is an average of 91 pds per year[21]. Although a mill requires less labour, managers, technical staff and labourers have to be on hand. However, in many (if not all) cases, large-scale plantations are established in scarcely populated areas, and even in 'empty' frontier areas. Large-scale plantations are therefore always accompanied by settlement/resettlement, for which staff and labour facilities must be established [22]. For example, a block of 1000 ha of oil palm trees needs 91,000 pds/year. Assuming that the optimum working time for one person is 250 pds per year, 364 employees and labourers will be needed. As most of them will live with their families, significant provisions have to be made.

The establishment of large-scale oil palm plantations and processing units is an important economic activity that strongly influences the rate of land development in a region. It speeds up the development of infrastructure (e.g. the construction of roads to open up less accessible areas, and the provision of health and educational facilities) and stimulates the growth of the local economy through income spending by the plantation workers and the expenses of the company. Economic diversification will take place in the surrounding area, for example from subsistence agriculture to market-oriented cash production. The most fundamental effect of cash-cropping is that it increases the separation between the consumption and the production activities of the household. This in turn tends to change the pattern of family and communal dependencies and to strengthen the role of the nucleus family as a productive enterprise [23]. Another effect is the emergence of non-agricultural activities (trade, home industry and services). Urban employment opportunities subsequently increase.

Empirical research carried out in Riau province assessing the development impact of large-scale oil palm plantations on the local economy [24] revealed that the investment in palm oil production strongly induced local economic growth. The study found that marginal propensity to consume locally (MPCL) of the community living from oil palm plantation was 0.8415. This means that about 84% of additional income was spent locally. The percentage of money spent locally that becomes local income (PSY) was 71%; nearly three quarters of the necessary inputs needed could be provided locally. Based on these figures, the calculated income multiplier effect was 2.48 (1/(1 – (MPCL x PSY)). This means that an autonomous IDR 1 million change in income (or investment expenditures) in the area results in a change of IDR 2.48 million. The multiplier effect refers to the increase in final income arising from any new injection of spending.

3. Oil palm plantation development in Indonesia: A brief review

3.1. The early stage of palm oil development

The oil palm (*Elaeis guineensis*) originates from the tropical rainforest of West Africa, and was originally cultivated mostly by independent small farmers with landholdings of up to 7.5 ha. Palm oil has been commercially traded to Europe since 1811 [25, 26]. In Indonesia, oil palms have been cultivated commercially since 1911, when they were first developed in the east coast area of Sumatra under Dutch administration [2]. While the tree was cultivated successfully in this area in large plantations, the native population did not replace their coconut palms with this new palm species. They planted it only for decorative purposes.

In the east coast region of Sumatra, palm oil production (CPO) grew dramatically, from 181 tons in 1919 to 190,627 tons of CPO and 39,630 tons of kernel oil in 1937 [27]. This was in line with the oil palm plantation development in the area. The size of the first estate, which was established in 1910–14, was 2,620 ha. The plantation area increased to 6,920 ha in 1919, and steadily increased until 1936, when the total area planted amounted to 75,000 ha, of which 63,234 ha were in a productive stage. In this regard, Deasy [28] wrote that:

… the oil palm industry in Sumatra during the last two decades has bordered on the phenomenal. Production of palm oil in that island has increased from a few thousand metric tons in the early twenties of this century to almost two hundred thousand metric tons in 1937. In 1920, Sumatra accounted for less than one-half of one per cent of the world's annual export of palm oil; by 1937 over 40 per cent of the total export of that commodity was originating in the island. From an insignificant crop with an output far below that of most other Sumatran estate crops in 1920, the oil palm by 1937 had risen to a position of joint supremacy with rubber in the agricultural economy of the island.

The east coast of Sumatra became the site of one of the most intensive and successful pursuits of foreign agricultural enterprise or plantation [29]. Bio-physically, the area is quite suitable for oil palm growing, with high rainfall (minimum 1600 mm/year) and a tropical climate within 10° of the equator. Land and labour, the most important inputs, were available. The land was made available by getting long-term land leases from the local indigenous rulers through the colonial government [29, 30]. In the 1870s, the Dutch government started to withdraw from direct involvement in economic production, and increasingly concentrated on creating incentives that would stimulate the private initiative. As Breman [30] wrote:

The 1870 Agrarian Act, which officially put an end to the forced cultivation system in Java and started transition to an era of unbridled liberalism, indicated the orientation of the new policy: the archipelago's natural resources were henceforth to be made accessible to capitalist interests in the mother country.

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The establishment of the palm oil industry in Sumatra started at the right time. The demand for palm oil was growing enormously worldwide, due to the increasing uses of palm oil products. Palm oil had already been traded to Europe and the United States since the early nineteenth century. Industrial development in Great Britain stimulated the demand for oil, a demand that was partly satisfied through trade with the West African coast. However, the increased mechanization of industry created a much larger need for lubricants, and palm oil proved useful in the manufacture of grease. Of equal importance, though, was the value of palm oil in the making of soap, candles and medicinal ointments, the increased use of which was also a result of the Industrial Revolution [26]. Scientific research supported the production of oil palm by modern, well-equipped estates and mills [25]. As a result, oil palm plantations in the Sumatra region became five times more productive than in Africa. The plantation development culture acquired from the cultivation and processing of latex rubber was a good foundation on which to introduce the large-scale cultivation of palm oil. The emergence of corporate capitalism since the 1850s, especially during the 'Tobacco Deli era' in the east coast of Sumatra, provided an ideal environment for large-scale plantation investments [29]. The capital market, labour market and remuneration systems had already developed. There was a banking system created by the tobacco planters association. Plantations that found themselves short of labour could easily acquire more through labour suppliers in Malaysia and Singapore.

Export-oriented plantation culture in Sumatra East Coast provided local employment that also attracted immigrants, which brought about more economic activity in the region. However, there are some criticisms regarding the development of large-scale plantations during the colonial era. The plantations did not lead to balanced economic growth and regional development [31]. The large-scale monocultures of capital-intensive enterprises created little wealth for unskilled workers (migrants) or local farmers, since wage levels were low. Many local farmers (especially shifting cultivators) suffered from land grabbing by the estate companies and the local economy suffered from the siphoning off of the locally produced surpluses (profits, dividends, staff salaries) to the head offices in urban centres and abroad. Moreover, the highly specialized plantations often suffered from instabilities on the world market, while having high fixed costs (for machinery, buildings, staff and maintenance). Together with the low purchasing power of the local population, this caused a low demand for urban goods and services and, as a result, a weak development of local market centres. There were consequently few opportunities for the local diversification of production and employment. Historical studies by Stoler [29] and Breman [30] to some degree provide a similar nuance from the labour perspectives.

However, those observations do not negate the fact that during the early stage of oil palm plantation, the east coast of Sumatra underwent a high population growth. As shown in Table 1, the annual population growth rate in the area in 1900–30 was 10.4%. Chinese and Javanese workers were the largest groups among the plantation workers (54% and 34%, respectively in 1902; [30]). It seems that the region was quite attractive for people to move to. The share of local people was assumed to be 56%, with an immigrant population of 44% in 1930.

According to Stoler [29] and Breman [30] investments in the plantation agriculture on the east coast of Sumatra (and the emergence of a plantation society) induced local development. The large number of people coming to and residing in the region created a market for consumer goods. To some degree, agglomeration economies evolved in the region. It is also noted that plantation support services, such as banking systems, capital and labour markets, were introduced, established and worked well. Within about five decades, the east coast of Sumatra region had been transformed from a frontier area into a well-developed and integrated plantation area. However, no study has looked at how the investments in such large-scale and modern plantation activities led to settlement development in the surrounding area, how the rural service centres developed and grew into urban centres, or, more in general, what kind of transformation took place in the region because of the new technology and the increase in population caused by the inflow of different ethnic groups.

Year	European 1)	Inlanders 2)	Chinese	Other 3)	Total
Population					
1900	2,079	306,035	103,768	9,208	421,090
1905	2,667	450,941	99,236	15,573	568,417
1915	5,200	681,000	132,000	14,320	832,520
1920	7,882	1,042,930	134,750	11,992	1,197,554
1930	11,079	1,470,395	192,822	18,904	1,693,200
			Proportion (%)		
1900	0.5%	72.7%	24.6%	2.2%	
1905	17.1%	79.3%	17.5%	2.7%	
1920	0.7%	81.8%	15.9%	1.7%	
1930	0.7%	87.1%	11.3%	1.0%	
Annual growth rate 1900–30	14.9%	13.1%	3.0%	3.6%	10.4%
Annual growth rate 1900–20	14.7%	12.7%	1.6%	1.6%	9.7%
Annual growth rate 1920–30	4.5%	4.6%	4.8%	6.4%	4.6%

Sources: Adapted from Het Oostkust van Sumatra Instituut, 1938.

Note: referring to Breman [30]

1. Includes Dutch, Belgian, German, Swiss, French, British and Austrian

2. Consists of local community and immigrants: Javanese, Banjarese, Baweanese, Bataks, Malay, Gayo, Mandailing

3. Consists of Thai, Indians

Table 1. Population of the east coast of Sumatra, 1900–30: population, proportion by ethnic group and annual growth rate

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3.2. Palm oil production after independence and recent development

Not much has been written about plantation development - or more specifically oil palm plantations – in the period from World War II until the independence of Indonesia, or during the transitional phase after independence. In general terms, Benjamin Higgins, a financial advisor for the Indonesian government in the early 1950s under the UN Technical Assistance Programme, wrote that the plantation industry was facing serious problems, which was shown by the fact that the area under plantation crops was still only two thirds of the pre-war level [32]. Figures showed that palm oil exports amounted to only 109,000 tons in 1960 [33], compared to 240,000 tons of CPO and kernel oil in 1937 [27]. However, since the earliest national reconstruction plan the Indonesian government has included plantation agriculture in its development policy. In 1955, the Ministry of Transmigration submitted a 5-year plan to the National Planning Bureau to resettle 400,000 families from overpopulated Java to unsettled areas in the outer islands (mainly associated with traditional export commodities from plantation agriculture, such as rubber, coffee, tea, etc.). According to Higgins, the objectives of the transmigration programme were not achieved, mainly due to a lack of assured financing, inadequate manpower and a lack of technical education [32].

Looking at time series data of oil palm plantation in Indonesia (Figure 1), it appears that Indonesian oil palm plantation increased significantly only after the 1970s. This is related to the New Order government policy for the agricultural sectors, which included plantation development.

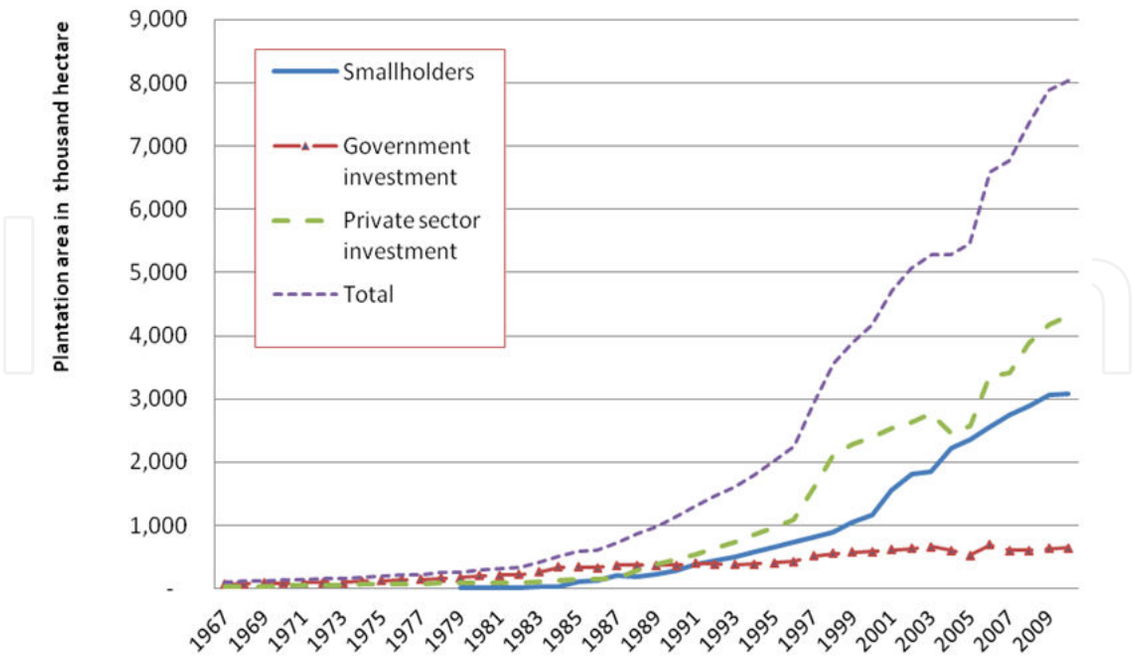

Figure 1. The development of oil palm plantation area in Indonesia, by actors. Source: Series of Statistik Perkebunan Indonesia (estate statistics)

Much has been published about the post-1970s development of the palm oil industry in Indonesia, focusing on topics such as germ palm development [34], competitiveness [7], socio-economic improvement [19], agrarian issues and social transformation [5, 17], and even human rights [18].

As mentioned, the Indonesian government began to put sustained effort into promoting tree plantation crops in the late 1970s. It established a scheme called Nucleus Estate Scheme (NES) (*Perkebunan Inti Rakyat*; PIR), whereby state-owned plantation companies (the 'nucleus') helped farmers (namely plasma farmers) to grow oil palm. The plantation companies provided seedlings, technical assistance and financing to small holders. Their crops would be purchased by companies' mills [35]. The policy was not implemented for solely plantation development; it was linked and integrated with other policy objectives: population redistribution through resettlement schemes or transmigration (i.e. by moving people from densely populated regions to scarcely populated areas), socio-economic progress (regional development, increased agricultural production, employment generation) and political consolidation (promotion of national integrity and security) [36]. Thus, the initial programme consisted basically of direct state investments through state-owned companies (PTPN) and was integrated with government-sponsored transmigration programmes to provide a labour force for the new plantations [22]. This integration was embryonic for smallholder engagement in state-led agribusiness; the emergence of smallholder oil palm planters constituted a spread effect of plantation development led by the government, and, most importantly, it was the time when settlement development was started in the surrounding of large-scale oil palm plantation.

Analysing the evolution of oil palm plantation development since the 1970s, McCarthy [5] differentiates into three phases of development: (1) the New Order state developmental period (the late 1970s to 1994), which was characterized by direct state intervention; (2) the transitional period towards private initiative through the KKPA model (1994–98); and (3) the 'laissez-faire' period (the term used by McCarthy to name the *Reformasi* era) since 1998.

First phase: During the New Order period, the government pursued a developmental agenda that combined the aim of ensuring political and macro-economic stability by financing infrastructure and providing subsidies derived from oil revenues [5]. There were direct interventions by the state that enabled state-owned companies to have more access to land and capital; institutional support was also provided [37]. The introduction of the Nucleus Estate Scheme (the PIR) in combination with the transmigration programme (the PIR-Trans) took place in this period. In general, in terms of area, the ratio between the nucleus estate and the smallholder plasma was 20:80; the nucleus estate held 20% of the total area and the remaining 80% was owned by smallholders – plasma farmers with technical assistance from the nucleus estate. Under the PIR-Trans scheme, trans-migrants played significant roles as labour for the plantation (crop care and harvesting) and constitute an important component during the establishment years. The government provided financial support to smallholders to establish their plantations and to finance their living and housing expenses, while the nucleus estate (the company or investors) was responsible for extension services and for collecting and processing the fruit bunches. The government also facilitated access to land (mostly

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state forest land and village lands), developed some infrastructure and granted credit at concessionary rates for plantation development. The PIR-Trans schemes, which existed between 1986 and 1994, benefited smallholders, as 'plasma' farmers. The state provided access to 'free land' and concessionary credit in exchange for submission to a particular agribusiness model, namely the inclusion of smallholders in peripheral areas. The farmers would obtain fully private rights over their holdings upon settlement of the oil palm development loan. By incorporating trans-migrants, new settlements were established in the area surrounding the plantation, besides those of the local people.

Second phase: In the transitional period towards private–community initiatives (the KKPA model), the government changed its policy by seeking to encourage private sector initiatives, facilitate foreign direct investment and accelerate estate crop development. The new orientation was in response to the World Bank's criticism of the on-going state support of smallholder oil palm schemes. It advised the government to officially abandon its direct subsidizing role and leave oil palm development to the market. The government ignored this advice for some time, before changing its policy as a result of increasing pressure on the state budget, as well as donor advocacy for a more direct social–private partnership model. Accordingly, the next phase in the development of oil palm schemes marked a new milestone in an on-going trend towards state withdrawal.

The new scheme was known as the KKPA (*Koperasi Kredit Primer untuk Anggota*; Primary Cooperative Credit for Members) and covered the period 1995–98. It involved a more direct private–community 'partnership' model, with the plantation firm being responsible for nearly all of the project, working directly with the participating farmers to resolve land problems, and providing training and extension. During this period the door for foreign direct investment in large-scale plantations was opened. Local communities, including settlements of trans-migrants, which had often been unsuccessful to move beyond the production of rice and subsistence crops, could be transformed into oil palm plantations, depending on the agreement between both parties. More independent smallholder oil palm farmers emerged in that time, and led to more spontaneous migration into the oil palm area.

Third phase: McCarthy [5] asserts that in the 'laissez-faire' period (1998 onwards), the shift to decentralization, public–private partnerships between market actors and the government, and social–private partnerships between market actors and communities have affected Indonesian policy. The year 1998 was, in fact, a key moment in the transition from a developmental approach to a more neoliberal, market-driven model [5]. A series of policy changes provided for the development of 'community plantations' (*perkebunan rakyat*) under various partnership (*kemitraan*) models (see the two ministerial decrees: the Decree of Forestry and Estate Ministry No. 107/Kpts-II/1999 and the Decree of Agricultural Ministry No 26/2007). Existing estates entered into partnerships with large, capital-intensive companies willing to invest in labour-intensive oil palm projects [19]. During this period, farmers, who were initially in the PIR-Trans schemes, managed to gain access to oil palm technology and improve their incomes. They were eventually able to access investment capital, because, once they had paid off their credit, they obtained land certificates, which could be used as collateral for borrowing money from local banks to expand production. At a time of rising oil palm

prices, many of these new landowners used these accumulated assets to rapidly expand their holdings. During the later years of the oil palm boom (i.e. prior to 2008), these actors were joined by successful KKPA farmers, who were (to a limited degree) using incomes from productive oil palm holdings to invest in upgrading unproductive land into oil palm plantations. The result was spontaneous frontier development on the margins of already existing palm oil plantations. This means that the spread effect of oil palm plantation was more prevalent in this period.

Summarizing, the state agribusiness-driven policy has transformed rural areas, making Indonesia the world's largest oil palm producer. The area devoted to palm oil production had doubled to 5.5 million ha by the year 2000 [38], and by 2009 Indonesia was the world's leading oil (CPO and PKO) producer with 24.5 million tons as compared to Malaysia with 22.1 million tons [39]. The introduction of the oil palm was initially associated with direct state investments via state-owned companies. After implementing various types of schemes, the state introduced the estate-transmigration programme; both models of palm oil development led to frontier development. Settlements were officially established in newly opened areas, in the expectation that economic activities would slowly develop. During the second and the third period, both spontaneous migration and the number of independent oil palm smallholders increased in the area surrounding the existing oil palm plantations.

4. Oil palm plantation development in Riau province

Riau Province is located in the centre and on the eastern coast of Sumatra along the Strait of Malacca, the busy international shipping route connecting the Indian Ocean with the South Chinese Sea and the Pacific Ocean. Riau is also quite near Singapore, one of the biggest trading centres in Southeast Asia (see Figure 2).

Riau is rich in natural resources, particularly petroleum, natural gas, coal, forest, and rubber, oil palm and fibre plantations. There are huge deposits of oil and natural gas beneath the ground, making the province the country's largest producer of oil: 80% in the early 1970s [41] and 50% in 2006 [42, 43]. In 2010, there were 2.1 million ha of oil palm plantations [44] and also two giant pulp and paper companies. The economic potential attracts people from the surrounding areas and even from other islands (Java, Kalimantan) who hope to find a better life. Net migration to Riau has rapidly increased over time (Table 2).

Riau is divided into 10 regencies and 2 autonomous cities. Until 2004 the province included the Riau Islands, a large group of small islands located east of Sumatra and south of Singapore, but in July 2004 these islands were split off as a separate province.

According to the 2010 census, the population of Riau province was 5.54 million. Population growth was far above national average: the annual population growth rate was 4.35% in 1970-90, while the national average was only 1.49%. In 2000–10, the rate it was 3.9%, while the national figure was only 1.9%. This population growth reflects the economic potential of the province. Table 3 presents the detailed population growth by regency and city.

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Figure 2. Topographical map of Riau. Source: ICRAF database

	1971	1980	1985	1990	1995	2000	2005
Riau	175,498 **(11%)**	269,732 **(11%)**	221,654 **(11%)**	561,364 **(22%)**	714,828 **(29%)**	1,370,491 **(72%)**	1,127,824 **(64%)**
Sumatra	1,547,401	2,384,232	2,095,077	2,552,764	2,457,843	1,903,777	1,762,728

Source: BPS 2011

Table 2. Net migration to Riau and Sumatra, 1971–2005

As shown in Table 3, the regency of Pelalawan – where timber plantations for the pulp and paper industry, and also oil palm plantations are located – had the highest population growth rate (6.8%). Siak, Kampar, Rokan Hulu and Rokan Hilir, which have significant areas of oil palm plantations, also experienced a high population growth (above 4%). Although there is no big difference in population between the districts, several districts (such as the city of Pekanbaru, Kampar Regency and Inderagiri Hilir Regency) have quite high concentrations compared to other districts. However, migrants are found almost every-

where. Many come from Java, and use the social networks that have been established through trans-migrants who settled before them [45].

Regency / city	Area (km²)	Population		
		Census 2000	Census 2010	Annual growth
Pekanbaru (city)	633	585,440	903,902	4.3%
Dumai (city)	2,039	173,188	254,337	3.8%
Kuantan Singingi Regency	5,235	216,732	291,044	2.9%
Indragiri Hulu Regency	7,611	247,306	362,961	3.8%
Indragiri Hilir Regency	13,633	555,701	662,305	1.8%
Pelalawan Regency	12,482	152,949	303,021	6.8%
Siak Regency	8,216	238,786	377,232	4.6%
Kampar Regency	10,814	447,157	686,030	4.3%
Bengkalis Regency	11,932	520,241	674,755	2.6%
Rokan Hulu Regency	7,225	265,686	475,011	5.8%
Rokan Hilir Regency	8,852	352,299	552,433	4.5%
Meranti Islands Regency*)	no data	no data	no data	–
RIAU PROVINCE	88,673	3,755,485	5,543,031	3.9%

*) Regency established in 2009; previously part of Bengkalis Regency. No data are available.

Source: BPS, 2011

Table 3. Area and population of Riau by regency and city, 2000 and 2010

Since the early 1980s, Riau Province has been the primary target for oil palm plantation development as part of Indonesia's agricultural development policy. The first large-scale oil palm plantation was established in Rokan Hulu Regency by PTPN (a state-owned plantation enterprise). The current Rokan Hulu Regency was part of Kampar Regency in the 1980s; like many other Indonesian provinces, Riau experienced the formation of new regencies in the era of post-Soeharto decentralization. This process, known as *pemekaran*, led to an increase in the number of regencies. Until 1999, Riau consisted of 5 regencies and 2 cities; it now has 10 regencies and 2 cities.

The establishment of oil palm plantations was initially realised through direct state investments. Then the private sector slowly took a more important role, especially after 1998. As mentioned, the establishment of oil palm plantations took place in the frontier area and in tandem with a resettlement programme to provide labour. Because the plantations provide higher wages and better profit, they attract people who seek to improve their livelihood and try their luck by engaging in oil palm growing. It is estimated that migrants comprise

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around 24% of the total population (about 67% of this group arrived in the context of the transmigration programmes [46]). This migration process stimulated oil palm to expand (occupying the surrounding area), and the decision of spontaneous independent farmers to cultivate oil palm has made the oil palm sector in the province boom (Table 4). Looking at the age distribution of the plantations, the table shows that the largest proportion of newest (still immature) oil palm plantations are under the smallholder system, followed by the private estates. It means that the recent development of oil palm plantation in Riau was done by private sector and smallholder farmers.

A study on livelihoods in Riau revealed that many of the migrants are well-off and are able to buy the land of local people and plant oil palms. However, it also involves the encroachment of state forest land. For example, small-scale farmers have entered the Tesso Nilo National Park to establish oil palm plantations [46, 47].

	Area (ha)			
	Immature	**Productive stage**	**Not-productive**	**Total area**
State-owned estates	1,000	78,546	-	79,546
Private estates	147,162	758,402	385	905,949
Smallholdings	318,969	780,959	17,625	1,117,553
	467,131	1,617,907	18,010	2,103,048

Sources: Dinas Perkebunan Provinsi Riau (2011) Statistik Perkebunan Provinsi Riau 2010. Pekanbaru

Table 4. Oil palm plantations by actors in Riau, 2010

In only two decades, Riau overtook North Sumatra as the leading province in palm oil production (Figure 3). The rapid expansion of oil palm plantations has been in line with the economic attractiveness and profitability of this perennial crop. Independent smallholders are becoming increasingly dominant. They benefit from a direct link with the plantation companies, which provide technical assistance, good planting material, fertilizers and delivery contracts to the mill.

The rapid expansion of oil palm plantations is clearly illustrated in Riau's economic performance. Table 5 presents the distribution of oil palm plantations and the economic performance of the various regencies.

As shown in Table 5, each regency in Riau has oil palm plantations, with the planted area ranging from 12% in the capital city of Pekanbaru to 58.5% in Rokan Hulu Regency. In 2000–10, Riau underwent relatively high population growth. Indragiri Hilir Regency (which is dominated by peat land) had the lowest population growth rate. Rokan Hulu Regency (which has mostly mineral soil and the largest oil palm plantation in the province) had the highest population growth (see also Table 3).

Regency / city	Area (km^2)	Population			Oil palm plantation (2010)		Economic performance		
		Population in 2010	Population density (per km^2)	Population growth rate 2000–10	Planted area (ha)	% to total area	GRDP per capita 2010 [2]	GRDP Growth [3]	Economic growth rate [4]
Kuantan Singingi	5,235	291,044	56	2.9%	121,709	23.4%	10,649.44	8.28	7.40
Indragiri Hulu	7,611	362,961	48	3.8%	118,538	15.4%	11,088.16	7.30	6.75
Indragiri Hilir	13,633	662,305	49	1.8%	213,541	15.5%	10,157.36	7.55	7.47
Pelalawan	12,482	303,021	24	6.8%	184,110	14.8%	10,321.78	7.21	7.10
Siak	8,216	377,232	46	4.6%	232,857	28.3%	10,123.38	7.45	7.37
Kampar	10,814	686,030	63	4.3%	353,792	32.4%	6,772,80	7,40	7,29
Rokan Hulu	7,225	475,011	66	5.8%	422,613	58.5%	5,395,28	7,06	6,02
Bengkalis	11,932	674,755	57	2.6%	177,130	21.0%	6,862,21	7,68	7,40
Rokan Hilir	8,852	552,433	62	4.5%	237,743	26.5%	7,439,10	7,69	7,57
Meranti Islands [1]	no data	no data	no data	no data	-	-	8,049,62	7,29	6,29
Pekanbaru (city)	633	903,902	1.428	4.3%	8,080	12.8%	10,078,26	9,72	8,90
Dumai (city)	2,039	254,337	125	3.8%	32,935	16.2%	8,221,24	8,60	8,56
RIAU	88,673	5,543,031	63	3.9%	2,103,048	23.6%	8,782,70	7,99	8,90

Sources: adapted from the respective [Regencies' statistics from 2011]

Notes:

1. Regency established in 2009; previously part of Bengkalis Regency. No data are available.

2. Gross regional domestic product in constant prices (hence 2000 price).

3. Annual average 2004–10.

4. Annual average 2008–10.

Table 5. Oil palm plantation and economic performance in Riau, by regency

Two economic indicators are used to assess the economic performance of all regencies in Riau in relation to oil palm plantation in the region, namely gross regional domestic product (GRDP) and economic growth. GRDP is used to measure the size of a region's economy. It is basically the aggregate of gross value added of all resident producer units in the region (using GRDP per capita as an approximation of the value of goods produced per person in a region); economic growth is measured on the basis of increase in the capacity of an economy to produce goods and services from one period of time to another.

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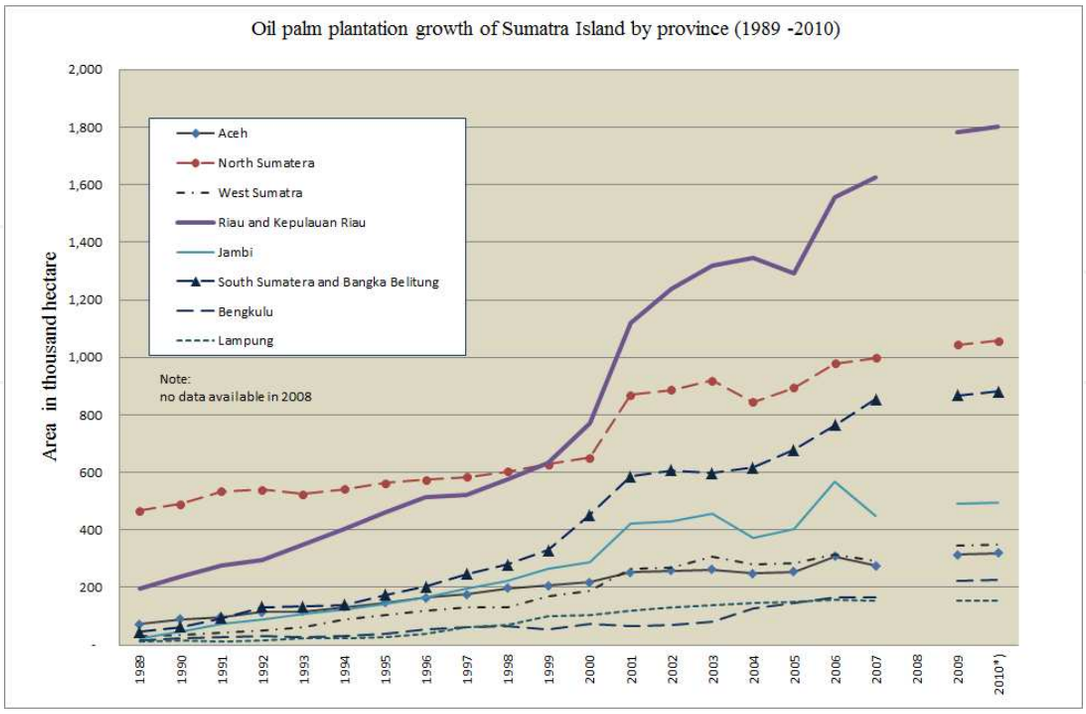

Figure 3. Oil palm plantation development in Sumatra Island by province (1989-2010)

In general, Riau performed well economically. GRDP per capita ranged from IDR 5.4 million in Rokan Hulu to IDR 11.0 million in Indragiri Hulu. The growth rate of GRDP in 2004–10 was almost 8%. In addition to oil palm, other sectors (e.g., mining in Rokan Hilir; and industry in Pelalawan and Bengkalis) also contribute to GRDP. However, looking at oil palm plantations, a recent economic assessment of small-scale oil palm cultivation revealed that returns to land ranged from IDR 92 million to IDR 143 million per ha in a 25-year cycle, and returns to labour from IDR 122,000 to IDR 178,000 per person per day. Returns to land of smallholding oil palm plantations ranged from IDR 125 million to IDR 266 million; returns to labour ranged from IDR 67,000 to IDR 297,000 [48]. It is therefore not too surprising that net migration was high, especially in sparsely populated area (where the agricultural wage rate were relatively high). Especially here, land use conversion was accelerated by the attraction of more people.

For the development of settlements, we looked at the Village Potential Statistics (PODES / *PotensiDesa*), a village-level census that is carried out three times per decade. PODES is administered by BPS (Indonesia Statistical Body) and serves to collect socio-economic information from all 69,000 Indonesian rural villages and urban neighbourhoods. The survey is based on responses of the village heads and includes a wide range of indicators, from population characteristics to infrastructure, economic activities and social life. According to PODES, from 1996 (roughly 10 years after the introduction of large-scale oil palm plantations through direct government intervention), some 100 settlement units were being prepared to become definite village administrative units in Riau. These settlements were previously part of the resettlement scheme linked to the agricultural development programme, and some of

them were part of the oil palm development programme. In Kampar Regency, where large-scale oil palm plantation was first introduced, it was noted that there were 53 new settlements being prepared to become definite village administrative units. There were also 32 settlements (UPT; *Unit Permukiman Transmigrasi*) that still fall under the authority of the Transmigration Office. These settlements will also become definite village administrative unit in the near future.

Thus, the number of settlements in Riau also increased significantly. 'Settlements' in this context refers to *desa* (settlements in rural areas) and *kelurahan* (settlements in urban neighbourhoods), the *desa/kelurahan* being the lowest level of government administration in Indonesia. Using the PODES data from 1996, 2005 and 2010, the number of *desa* in ex-Kampar Regency (Rokan Hulu, Kampar and Pelalawan regencies) increased from 309 in 1996 to 492 in 2011. In the same period, the number of *kelurahan* increased from 8 to 24. The figures indicate that significant changes have taken place over a 15-year period. Even though other factors may also play a role, the multiplication and rapid growth of the *desa* and *kelurahan* cannot be explained without taking into account the rapid expansion of oil palm plantations and related activities.

Making an assessment of the socio-economic impact of oil palm adoption, we see that people living in the immediate surroundings of oil palm estates often have considerable benefits [49]. Village-level assessment showed that villages that adopt oil palm as a major source of income tend to perform well on indicators of physical, financial and human capital. At the household level, an assessment showed that more than 18% of the households had increased their income (in real terms) by 200–300 per cent after 5 years of practising oil palm cultivation. About 35% had increased their income between 400 and 1300 per cent after 5–10 years of engagement, and about 45% of the households that had practised oil palm cultivation for more than 10 years had increased their income by 2200 to over 25,000 per cent. Such positive income effects make oil palm expansion extremely difficult to stop.

In policy debates on and cost–benefit analyses of the effects of oil palm expansion, much attention is often paid to the direct effects, that is, the effects on potential incomes and/or environmental effects. However, little or no attention is paid to the indirect population effects, how to deal with the massive population inflow, and whether oil palm production will in the long run be able to sustain urban populations.

5. Concluding remarks

It is not difficult for policy makers to show that oil palms are an economically rentable crop with a huge potential for further economic growth. In addition to national demands, the growing worldwide interest in biofuels as an alternative to fossil fuels will increase demand for its feedstock and lead to the expansion of oil palm plantations in climatically suitable regions.

On the basis of a cost–benefit analysis of various crops, oil palm will probably continue to be seen as a highly profitable crop with interesting possibilities for being promoted as a source

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of 'green' development. The Indonesian population has increasingly been attracted by this crop, as it provides them with opportunities to benefit and multiply their incomes, which will in itself provide capital for improving consumption and having a good life.

At the same time, however, Riau shows us that there are environmental costs (deforestation, invasion into peat land areas etc.) and that oil palm expansion is accompanied by rapid immigration and urbanization. Even though policy attempts are made to control land conversion or to stop deforestation, much of what is happening today cannot easily be regulated. It is not the direct effects (i.e. the expansion of plantations and production) but the indirect effects and multipliers that bring into question the long-term sustainability of the development model. The establishment of new settlements, rapid urbanization and continuing immigration will require additional employment opportunities. And along with the growing population and the conversion of rice lands into oil palm fields, food security issues will increasingly become a problem. Rather than making quick money from oil palm production, the Indonesian government should make efforts to better control the indirect effects and especially to investigate the problem how to make oil palm-based economies more sustainable and equitable in the longer term. Without interventions – and with today's laissez-faire approach – further oil palm expansion will soon lead to the depletion of natural resources and an increase in social tensions as a result of unemployment and food insecurity.

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