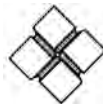


OIL PALM EXPANSION IN RIAU PROVINCE, INDONESIA :

serving people, planet and profit?

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1

INTRODUCTION



1.1 Background and motivation

Indonesia has been called the emerald of the equator, due to its huge tropical forest area. The Indonesian forest accounts for 23 percent of global forest cover, or around 32 percent of total forest in South East Asia (FAO, 2010c). It is the third largest area of humid tropical forest in the world (FAO, 2006) and rich in biodiversity, both flora and fauna. Myers et al. (2000) define the Indonesian archipelago as one of the biodiversity hot spots with around 35 thousand plant species and almost 3 thousand vertebrate species. These include 16.5 thousand endemic plant species and 1,230 endemic vertebrate species. The forest ecosystems in particular are home to around 80 percent of all terrestrial species (Carnus et al., 2006) and hold 70–90 percent of terrestrial aboveground and belowground biomass (Houghton et al., 2009). This includes several endangered species such as the Sumatran tiger (*Panthera tigris* ssp. *Sumatrae*), elephant (*Elephas maximus*), and orangutan (*Pongo abelii*) (IUCN, 2014).

Nowadays, however, Indonesia is mostly seen as a tropical forest destroyer and one of the largest emitters of greenhouse gas (GHG). Large numbers of studies on deforestation (Angelsen, 1995; Contreras-Hermosilla, 2000; Geist & Lambin, 2002; Geist & Lambin, 2001; Kaimowitz & Angelsen, 1998; Lambin et al., 2003; Lambin et al., 2000; Lambin, 2001; Lambin & Meyfroidt, 2010; Laurance et al., 2009; Meyfroidt & Lambin, 2011; Meyfroidt et al., 2010; Rudel et al., 2005; Sunderlin et al., 2005) have concluded that deforestation involves a complex process in which the drivers for deforestation, and therefore the solution to managing and reducing future deforestation, are to be found outside the forestry sector.

Oil palm (*Elaeis guineensis*) expansion has become the most notable driver of deforestation in Indonesia in recent years, mainly in order to serve the global demand for palm oil products for oils and biofuels (Fitzherbert et al., 2008). Wicke et al (2011) estimated that, between 1975 and 2005, around 40 million ha of forests in Indonesia were converted into oil palm plantations. This is equivalent to a 30 percent reduction in total forested land. The widespread impacts of oil palm expansion are easily visible 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 being replaced by monoculture oil palm plantations. This landscape transformation has led to significant biodiversity loss.

This seems to point to the fact that oil palm has an over-arching attractiveness, not only for large scale companies but also smallholders. These smallholder households have experienced the benefits of oil palm production from the oil palm development and transmigration programmes. Within the framework of this programme many rural poor from Java and Madura moved to less densely populated Outer Islands¹ to join

¹ The outer islands refer to the islands of Indonesia archipelago outside Java and Madura.

the oil palm development (Hoshour, 1997). The programme also led to transmigrants becoming supported smallholders who were able to improve their living conditions and accumulate capital in a relatively short period (Budidarsono et al., 2012a). Given these benefits of oil palm production, an increasing number of smallholder households have voluntarily adopted oil palm into their existing farming system (Brandi et al., 2013). This rapid expansion of oil palm plantations has turned Indonesia into the world's main producer of palm oil. Around 85 percent of palm production is exported and it has become one of the largest agricultural export products (Fischer, 2010).

This rapid expansion of oil palm plantations was triggered partly by continuously increasing global fossil fuel consumption, especially in the transport sector, and the depleted supply of fossil fuels which are easily extractible at an affordable price. This development and the urgency of the need to reduce global greenhouse gas (GHG) emissions, especially in the transport sector, has triggered demand for alternative fuels, most notably biofuels. Tropical oil palm has been viewed as one of the most promising biofuel crops as it produces the highest yields of all suitable biofuel crops, although palm oil has been commonly used as a food ingredient and has become an affordable vegetable oil.

Given the growing global demand for palm oil for both food and fuel, the availability of lands for conversion into oil palm plantations may pose a significant challenge to the growth of the Indonesian palm oil industry (World Growth, 2011). This especially applies considering the effects of oil palm expansion on forest in particular and landscape in general. The effects of this growing pressure on lands are being increasingly analysed. Nevertheless, there are wider and less visible effects of oil palm expansion at regional and local levels which are little understood.

This was a striking finding for me as an Indonesian forester and I started following the global debate on oil palm expansion and its consequences in relation to LUCC in general and deforestation in particular. With support from the Agriculture beyond Food (AbF) programme I started my PhD research on the consequences of oil palm expansion into remaining forest areas and the people who depend on them in 2010. AbF is a multidisciplinary programme set up to contribute to an informed debate about the future of agriculture in a bio-based economy in Indonesia, funded by the Netherlands Organization for Scientific Research (NWO/WOTRO) in collaboration with the Royal Dutch Academy of Sciences (KNAW).

This dissertation is therefore intended to enable a better understanding of the broad-based effects of oil palm expansion on land-use change and deforestation, local economic development and people's livelihoods. In the context of the debates on sustainable development, it is important to take a look at the underlying institutional factors that enable the rapid expansion of oil palm plantations and the drivers which influence the decision to adopt oil palm cultivation, and that accelerate the expansion of oil palm plantations and the impacts of oil palm on the environment and people's livelihoods in the oil palm producing region. This study focuses particularly on oil palm

expansion in the forest frontier areas of Riau province, one of the regions where oil palm has become the dominant agricultural commodity in the region as previously adopted on a wider scale by large-scale estates and recently by smallholders.

1.2 Debates on deforestation and oil palm expansion

The relationship between oil palm production and deforestation has increasingly become a topic of discussion between scientists, policymakers and practitioners from all over the world. In past decades many studies have focused on the magnitude of deforestation and particularly tropical deforestation induced by agricultural expansion and then most notably oil palm expansion (Fischer, 2010; Fitzherbert et al., 2008; Wicke et al., 2011). This deforestation, which is induced by rapid expansion of oil palm plantations in Indonesia, is a typical example of conflicting interests and goals in the use of allocation of forest and land resources. These diverging interests cannot be fulfilled simultaneously under resource scarcity (Hubo & Krott, 2010) and there has been a constant tug of war among different actors (Phelps et al., 2010). This is especially because actors apply a different interpretation to the institutions (Folmer & van Kooten, 2007; Van & Azomahou, 2007) and consequently access to land and forest resources (Contreras-Hermosilla & Fay, 2005). In addition, the pattern of deforestation for agricultural expansion has shifted in the last fifty years from mostly state-supported deforestation to more enterprise-driven deforestation (Rudel et al., 2009). This implies that the deforestation process has increasingly included more complex processes because more actors are involved in governing the processes.

In the 1970s oil palm was introduced as a commodity for development and poverty alleviation in Indonesia (Badrun, 2010). Oil palm constitutes around one-tenth of foreign exchange receipts (Fischer, 2010) and contributes significantly to regional incomes in the oil palm producing regions. For this reason the development of oil palm plantations and industry had been supported by government programmes relating, for example, to transmigration, infrastructures and processing industry developments (Badrun, 2010). As most plantations are in rural areas, oil palm production also generates employment for the rural population. In 2010, for instance, over 40 percent of oil palm plantations were cultivated by 3.5 million smallholders (World Growth, 2011). The involvement of smallholder households, especially the rural poor, in oil palm production, has been regarded as an inclusive development and one that contributes to poverty alleviation in the rural areas (Hoshour, 1997). However, this perception has changed as the result of the social and environmental movements. Globally, this rapid oil palm expansion has been increasingly contested by development paradoxes which question the sustainability of oil palm production in Indonesia (Lee, Abood et al., 2014; Sheil et al., 2009; Susanti & Burgers, 2012).

Environmental activists criticize the rapid oil palm expansion as having induced deforestation which, in turn, has led to biodiversity loss. By way of an illustration, between 1990 and 2000, Indonesia scored the second highest rate of deforestation in the world, at around 1.75 percent (FAO, 2010c). This deforestation rate translated into 1.9 million ha of annual forest loss, equal to clearing four soccer fields per minute. Between 2000 and 2010 the deforestation rate was 0.5 percent or around 0.5 million ha of annual forest loss (FAO, 2010c). Although this deforestation rate decreased, the size of annual forest loss is still alarming. Given this deforestation rate Indonesia, and particularly Sumatra Island, is projected to 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 lost more than 70 percent of its natural habitat for its unique endemic species between 1800 and 2000, leading to around 80 percent of bird species loss (Myers et al., 2000). Other studies estimated that around 387 species of vascular plants, 91 species of fishes, 28 species of reptiles, 116 birds and 147 mammals are threatened with extinction (Sodhi et al., 2004). Brook et al (2006) projected that around 26 percent of endemic species will be extinct by 2030 due to the deforestation rate staying at the level of year 1990 – 2000.

In addition, the introduction of palm oil as biofuel has increased the demand for palm oil as a food ingredient. This additional demand for palm oil biofuel has threatened local food production because existing agricultural lands for food production have been converted into oil palm plantations. What is more, this additional demand for palm oil biofuels has increased food price, diverted the flow of investment in land in the global South and increased the competition for the remaining lands (Borras et al., 2014; Kaag & Zoomers, 2014).

Recent studies have also revealed that, if the LUCC effects through forest conversion are taken into account, the production of palm oil biofuels may even increase GHG emissions compared to the use of fossil fuels (Koh, 2007a; Koh & Wilcove, 2008). This is mainly because the increasing expansion of oil palm plantations also takes place on peatland areas. By 1990 around 18 thousand ha of oil palm plantations in Indonesia were situated on peatlands while, by 2010, around 1.3 million ha of peatland in Indonesia were occupied by oil palm plantations. It is projected that the trend will continue and that, by 2030, around 3.7 million ha of peatland in Indonesia will be occupied by oil palm plantations (Miettinen et al., 2012). This trend has been increasingly identified by

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

studies on land use/cover change (Koh et al., 2011; Margono et al., 2014b; Ramdani & Hino, 2013). This also became a dramatic reality in late 2015 when extensive peat forest fires caused a haze for over 4 months in Indonesia and contributed around 1.75 billion metric tons of CO₂ equivalents (GFED, 2015). Many plantation companies in Sumatra and Kalimantan were under investigation due to being suspected of deliberately starting fires in order to clear land (DW, 2015). This strengthens the argument that palm oil biofuel is, in many cases, not a low carbon alternative fuel solution to GHG emissions from fossil fuels. Instead, palm oil biofuel has created new problems in relation to GHG emissions from LUCC and peat fires.

Many smallholder households have been participating in palm oil production and palm oil production has therefore been regarded as an inclusive development. Nevertheless, oil palm development has been increasingly contested by social activists because it reduces the access of native forest dependent communities to lands and forest resources (Colchester, 2001). By way of an illustration, more than 40 percent of the Indonesian population depend on the forest for their livelihood (Chao, 2012). There is also more and more evidence that oil palm plantation development has led to land-related conflicts (Colchester, 2001). For instance, in 2015 around 50 percent (127 cases) of land-related conflicts occurred in the estate crop sector and especially oil palm plantations (KPA, 2015).

Although oil palm development has created many dilemmas, a lot of international organisations still recognize the important contribution it makes to rural development, poverty alleviation and to providing the growing global population with affordable food and alternative fuels (Kojima & Ryan, 2010; Sheil et al., 2009; World Growth, 2011). The main concern is how palm oil production should meet sustainability standards and how the economic, environmental and social impacts for the entire supply chain of palm oil products should be monitored and evaluated (RSPO, 2016).

To achieve this goal many multi-stakeholder platforms initiated efforts designed to achieve sustainable palm oil production in the early 2000s based on standards for global sustainable palm oil production. The Roundtable Sustainable Palm Oil (RSPO) certification system promotes sustainability criteria related to social, environmental and economic good practices within industry or product (Green Palm, 2015). The International Sustainability and Carbon Certification (ISCC) system promotes the sustainability and traceability of feedstock in the food, feed and chemical industries. The Sustainable Agriculture Network (SAN) promotes the social and environmental sustainability of agricultural activities and the Roundtable on Sustainable Biofuels (RSB) which is intended to ensure the sustainability of biofuels.

The RSPO, which was established in 2004, has become the most prominent certification system at global level which uses multi-stakeholder platforms and involves oil palm producers, processors or traders, consumer goods manufacturers, retailers, banks/investors and environmental and social non-governmental organizations (NGOs). It is a voluntary initiative and the eight RSPO criteria³ were developed especially to meet the markets in the EU and USA (Schouten & Glasbergen, 2011). The concerns about sustainable palm oil production were shared by the national government of Indonesia which drew up a mandatory certification policy system for sustainable palm oil production to ensure that all Indonesian oil palm growers conform to higher standards of agricultural practices. The Indonesian Sustainable Palm Oil (ISPO) certification system⁴ was intended to improve the sustainability and competitiveness of the Indonesian palm oil industry and contribute to the Indonesian government's objectives to reduce greenhouse gas emissions and draw attention to environmental issues. Although both the RSPO and ISPO have similar goals as regards sustainable palm oil production, they differ because of the different institutional framework which the standards refer to. The ISPO system refers to Indonesian policies, while the RSPO refers to global institutional frameworks.

It is clear that considerable attention has been paid to the social and environmental effects of oil palm expansion. However, there has been less of a focus on the broad-based effects of oil palm production at the regional and local levels. This oil palm expansion influences the way in which regional development has taken place in the oil palm producing regions. For these reasons, it is important to understand the broad-based effects of oil palm expansion on land-use change and deforestation, local economic development and people's livelihoods in the oil palm producing regions.

1.3 Research question

This research aims to create a better understanding of the broad-based effects of oil palm expansion on land-use change and deforestation, local economic development and people's livelihoods. This research addresses the following central question: *Under what conditions has oil palm expansion taken place and how can it contribute to sustainable development?*

3 There are eight RSPO criteria: (i) commitment to transparency; (ii) compliance with applicable laws and regulations; (iii) commitment to long-term economic and financial viability; (iv) use of appropriate best practices by growers or millers; (v) environmental responsibility and conservation of natural resources and biodiversity; (vi) responsible consideration of employees, individuals and communities affected by growers or mills; (vii) responsible development of new plantings; and (viii) commitment to continuous improvement in key areas of activity.

4 There are seven ISPO principles : (i) licence and farm management; (ii) the implementation of technical guidelines on oil palm farming and processing; (iii) environmental management and monitoring; (iv) responsible care of employees; (v) responsible care of the community; (vi) commitment to community economic empowerment; and (vii) commitment to continuous improvements.

To address the central question, four sub-questions have been formulated as follows:

- (i). *What are the characteristics and the drivers of oil palm expansion in Indonesia? How do these drivers interplay to accelerate oil palm expansion?*
- (ii). *What is the role of policies and institutions in the process of land use/cover change and/or deforestation induced by oil palm expansion?*
- (iii). *What are the impacts of oil palm production on regional development in the oil palm producing region such as Riau province?*
- (iv). *What are the roles of smallholders in oil palm production and in shaping the landscape?*

1.4 Some concepts

This study is about the rapid expansion of oil palm plantations as an attempt to fulfil the needs for food, fuels and fibres, to create employment and to boost economic growth which affects the global land use/cover change, especially deforestation and global environmental change. The influences of human activities on the global environmental changes have intensified and accelerated in the past centuries (Turner, 1990) and this marked the beginning of the Anthropocene era (Costanza et al, 2007). Land use/cover change (LUCC), especially deforestation, is a typical and the most ancient anthropogenic impact with global magnitude and profound local and regional consequences (Kates & Parris, 2003) which often relates to the rise and fall of civilization (G. Harris, 2007). This deforestation has transgressed the limits of ecological resilience and anthropogenic disturbances that earth can absorb and has resulted in environmental and social problems and vulnerabilities which influence human well-being (Palsson, 2012).

The notion of sustainable development is geared to the increasing awareness of, and responsibility for, our vulnerable earth and its consequences for human well-being. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland & World Commission on Environment and Development, 1987). This definition comprises two fundamental concepts: (a) the concept of needs, especially the basic needs of the world's poor and the priority that should be given to them and (b) the idea of limitations as consequences of the technological advancement, social structures and the carrying capacity of the environment. This definition is anthropocentric, meaning that the focus of the sustainable development is on human needs, rather than the needs of the ecosystem. Consequently there is no absolute limitation to development and, instead, it is constrained by the existing technologies and the capabilities of social structures and environment in absorbing the effects of human activity (Ciegis et al., 2009).

The sustainable development concept proposed by *Brundtland Commission* intends to ensure appropriate and secure wealth for all people with regards to the bio-physical limit of the environment. This idea of complementary interaction between development

and environment emphasizes the quality of economic growth and people's wellbeing. As a consequence, sustainability could be defined as the ethical ideal and normative ethical principle for the further development of society to guide it into the form it is supposed to be in (Parker, 1993). This ethical principle has led to sustainable development, bringing the problems of nature's preservation into wider social fields (Escobar, 1996).

The concept of sustainable development involves three dimensions of well-being, i.e. economic, ecological and social and their complex interrelations which are often presented as a triangle encompassing three concentric circles, three pillars supporting a roof, or three integrated circles covering three areas: economic, ecological and social (Ghosh, 2008). Economic sustainability seeks to maximize the flow of income and consumption that could be generated while maintaining the stock of assets or capitals (Maler, 1990) and safeguarding an optimal amount of general capital (or sum of different kinds of capital) for future generations (Ciegis et al., 2009). Ecological sustainability focuses on the stability of biological and physical systems to ensure balanced nature and an ability to adapt to changes in biosphere and future possibilities (Holling, 1986). Social sustainability seeks to reduce vulnerability and maintain the resilience of social and cultural systems and their ability to cope with shocks (Bohle et al., 1994) to solve social, economic and environmental problems, as well as actively develop the whole system (Berkes & Folke, 1994). This implies that sustainable development is inclusive and associated with the equity in distribution of possibilities for development (Ciegis et al., 2009). Disregarding one of the dimensions of sustainable development would threaten the whole sustainability (Kahuthu, 2006).

Due to the multidimensional and complex issues of the sustainable development concept, the realization of sustainable development is highly problematic, despite the concept of sustainable development having been widely accepted (Ciegis et al., 2009). In addition, efforts to achieve sustainable development have increasingly been challenged by (a) war, conflict, crime and corruption which threaten human lives, capital, infrastructures and environment, (b) population growth in developing countries and ageing in developed countries, migration and urbanization, (c) growing affluence and persistent poverty, increasing income inequality and new diseases, (d) greater consumption for food and energy, changing technologies and lifestyle, (e) globalization which influences governance, institution and values, and (f) global environmental change which influences the capacity of global life support system (Kates & Parris, 2003).

The notion of sustainable development discussed above has become important for an understanding of the anthropocene phenomenon such as oil palm expansion and its effects on the broader context of sustainable development, particularly in the producing regions. The process of oil palm expansion and its consequences for human well-being have been accelerated and intensified by the feedback loops of inter-relation between humans and their environment. This means, in particular, the effects of rapid oil palm expansion on land-use change and deforestation, local economic development and people's livelihoods.

1.5 Analytical framework

The analytical framework of this research consists of multiple levels of analysis, namely at global, national and local levels. Global population growth and technological advancement have been fundamentally changing the earth and the environment (Kates et al., 1990). The interaction between humans and their environment has led to resource degradation (Hardin, 1968; Malthus, 2007; Meyer & Turner, 1992; Turner, 1990) and more complex processes of commercialization and political-economic conditions (Angelsen, 1999; Contreras-Hermosilla, 2000; Kates & Parris, 2003; Meyer & Turner II, 2002). These human and environment interactions have mainly been aimed at fulfilling the needs of food, fuels, other human needs and economic development (Kates & Parris, 2003).

Finding and exploiting new frontiers of lands and natural resources became substantial factors of successful economic development (FAO, 2010c). The industrial revolution led to lower international transportation costs for people and goods and therefore the growing demand for food, minerals, construction materials and energy commodities could be fulfilled by the trades in the globalized world (Barbier, 2010). New frontiers of lands and natural resources have been globally exploited and have become part of the national and global economy (Barbier, 2005). Some present these land investments as an opportunity for new developments (Deininger & Byerlee, 2011). Others present them as a major problem due to social and environmental consequences in the global South (Grain, 2008).

In Indonesia the expansion of agricultural lands to serve global demands for agricultural products such as palm oil has been seen as an opportunity to stimulate economic growth through export value creation, infrastructures extension and employment generation. In addition, the national commitment to GHG emissions reduction has added to the demand for palm oil in the domestic market. This expansion of oil palm plantations has led to substantial LUCC, especially deforestation and landscape transformation from being dominated by natural forest into monoculture oil palm plantations, thereby creating environmental vulnerabilities. This was mainly because those investments in land to cultivate oil palm as a 'flex crop' (Borras et al., 2014) have targeted forest frontier areas (Anseeuw et al., 2012).

Oil palm producing regions such as Riau province have not just experienced economic growth, capital accumulation, infrastructures and urban areas extensions, but also massive deforestation. The capital accumulation could have been triggered by the increasing demand for agricultural products and stimulated by land-related laws and regulations which enable commercial production schemes to expand into remaining forest areas. This process is recursive and when conditions are favourable this process will be accelerated by the products of these dynamics. However, deforestation could also have been caused by the process of impoverishment due to accelerated land scarcity as most lands have already been used for agricultural production. This is mainly the case for household agricultural production which leads to lower agricultural production and a lower standard of living for households (Durham, 1995), resulting, in social vulnerabilities.

1.6 Research site and methods

The research was conducted in Riau province, on the island of Sumatra in Indonesia, one of the first provinces to adopt oil palm. Being the world's biggest oil palm producer (FAO, 2010b), Indonesia had around 10.5 million ha of oil palm plantations in 2013 (MoA, 2015), producing around 26.8 million metric tons of palm oil (FAO, 2015). Riau is situated between the Bukit Barisan Mountain range in the west and the Malacca strait in the east. This geographic position has enabled Riau to participate in global trading for centuries (Colombijn, 2002). Four large and important rivers run through Riau province, namely the Rokan River, Siak River, Kampar River and the Indragiri River (Figure 1.1). Those four rivers form the Riau delta in the eastern part of the province. This delta has extensive, deep peat soils which are regarded as being ecologically vulnerable and less suitable for agricultural purposes (Whitten et al., 1987), while the west part of Riau province is dominated by mineral soil (Sudiardjo et al., 1990).

During its early development, oil palm production mainly took place on large-scale plantations. The total area of oil palm plantations in Riau has been increasing continuously and then especially in the last few decades. In 2011, registered oil palm plantations (including state-owned, smallholder and private enterprises) took up about 2.1 million ha of land, or around 24% of the total area of Riau province. This increase is due to the growth in smallholder⁵ plantations, that have increasingly adopted oil palm cultivation. In 2011 around 412 thousand households in Riau province were involved in oil palm production. Riau province contributed around 24% to the overall national palm oil production (MoA, 2012). The harvested fresh fruit bunches (FFB) are processed in 144 palm oil mills in the province (Estate Crop Agency of Riau Province, 2011).

Eight villages in three regencies, located in the eastern part of Riau Province, were selected: (a) Dayun, (b) Banjar Semnai, (c) Temiyang, (d) Sepahat, (e) Tasik Serai, (f) Bukit Kerikil, (g) Labuhan Tangga Baru, (h) Labuhan Tangga Besar. The criteria for selecting the villages were that: (a) they were located in the forest frontier areas and (b) had experienced rapid expansion of smallholders' oil palm plantations. The study area and villages under study are depicted in Figure 1.1. In each selected village, a structured household survey was carried out between November 2010 and February 2011. The sample survey comprised 255 households. The criteria for selecting households within the selected villages were that they: (a) were smallholders and (b) produce oil palm. This household survey was intended to quantify the socio-economic variation of the households. The variables included in the survey were demographic variables, land variables and farming practice variables (see Annex 1).

Focus group discussions (FGDs) were carried out with key informants to gain an insight into the processes of oil palm expansions in the study area and to collect qualitative data to supplement household survey results. The key informants included

5 Based on Ministerial Decree No. 26/ Permentan/ OT.140/2/2007 small-scale oil palm plantation are farms of less than 25 hectares in total.

community or village leaders and elders, company representatives, government agency representatives (local, provincial, and national), experts (scientists) and NGO workers (local and international).

The secondary data was collected from various sources including academic sources, international organizations, government (national, provincial, and local), research and consultancy institutions, NGOs (international and local), companies, media, and other related organizations. This was done in various ways, for example by visiting their website, by email and phone conversations, by visiting in person and by attending meetings or seminars. The secondary data includes scholarly articles, reports, proceedings, statistics data, metadata, legal documents, guidelines, maps and satellite images and other unpublished documents. Longitudinal satellite images (Landsat) were downloaded from USGS (<http://earthexplorer.usgs.gov/>).

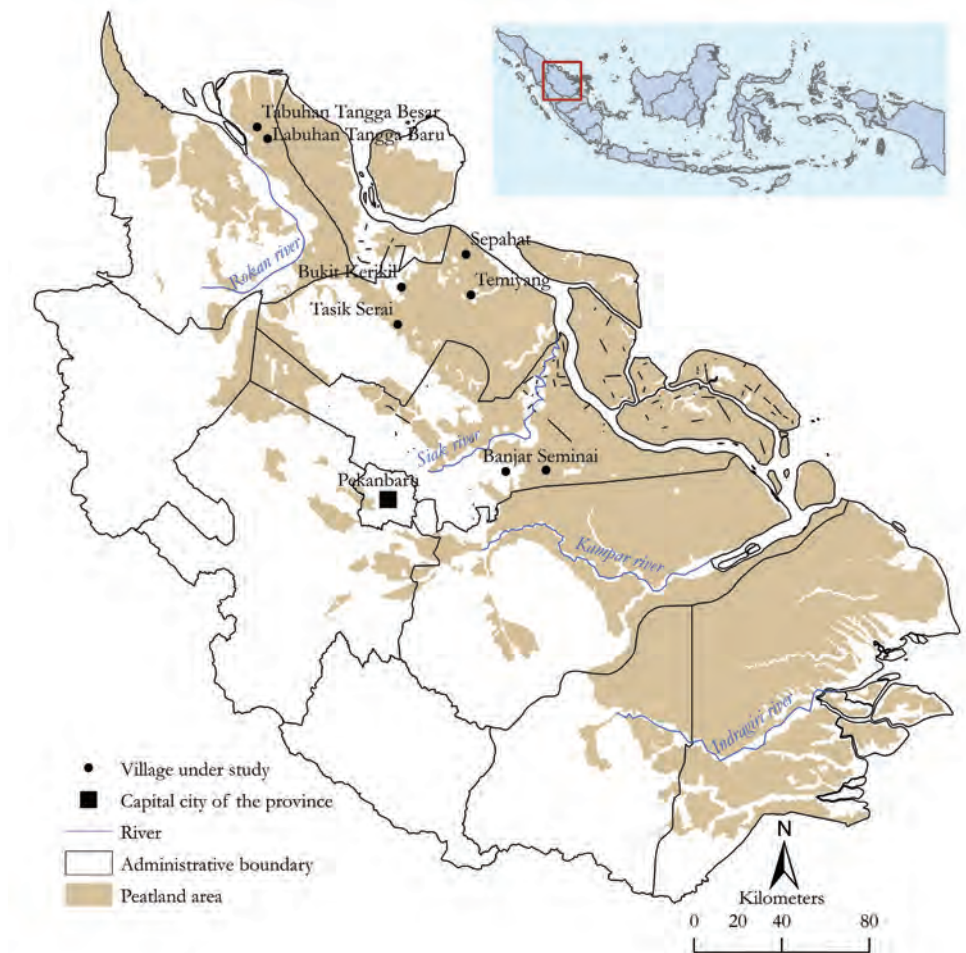


Figure 1.1 The administrative boundary, capital city of the province, main rivers (CBS, 2011a), peatland areas (Sudihardjo et al., 1990) and villages under study.

1.7 Structure of the book

This dissertation is organized into six chapters. The overview of each chapter is provided in the following section.

Chapter 1. Introduction

This chapter provides the background information to contextualize this research and describes the academic debates related to oil palm expansion in Indonesia. It also formulates the purpose and the research questions to be addressed by this research. What is more it provides the analytical framework which forms the basis of the research and introduces the research site, general methods and research activities.

Chapter 2. The six drivers and three phases of oil palm expansion in Indonesia

Chapter two addresses the first sub-question which concerns the causes of recent rapid oil palm expansion in Indonesia. The chapter analyses the drivers of oil palm expansion in Indonesia and especially the recent rapid expansion of oil palm expansions. The chapter shows that the expansion of oil palm plantations in Indonesia was driven by multiple factors at global, national and local levels and that these determine the speed and direction of oil palm expansion in Indonesia. Three phases of oil palm development were identified. While earlier development of oil palm expansion was state-driven, the financial benefits of oil palm have encouraged various other actors to participate in oil palm production. Investments have been made and markets have been created to enable the development and the expansion of oil palm plantations. However, this rapid expansion of oil palm plantations has also resulted in massive LUCC, which in turn has led to serious environmental problems.

Chapter 3. Oil palm expansion and deforestation in Indonesia: institutional context

Chapter three addresses the second sub-question on the roles of institutions in controlling oil palm expansion in Indonesia. This chapter focuses on the institutional context of oil palm expansion in relation to deforestation in Indonesia with the aim being to help achieve a better understanding of land governance issues as crucial factors when it comes to explaining the rapid expansion of oil palm plantations which replaced forest areas. This chapter shows that state policies played important roles in facilitating the rapid expansion of oil palm plantations in Indonesia. This is especially because of its lucrative financial benefits which stimulate regional development and alleviate poverty. In addition, the implementation of decentralized government has spurred the expansion of oil palm plantations because land licensing for new oil palm plantations has been perceived as a source of quick income for the new autonomous regions. However, the involvement of the state - and the fact that smallholder households also benefit from oil palm development - does not mean that oil palm development in Indonesia is unproblematic. Land governance institutions appear to have limited capacity to execute their responsibility and to enforce law. Forest lands, in particular, are under threat and have become the victim of the recent rapid oil palm expansion due to the lack of a clear institutional framework for forested areas and forestland.

Chapter 4. The impacts of oil palm expansion Riau province, Indonesia

Chapter four addresses the third sub-question on the impacts of oil palm expansion on the producing region such as Riau province of Indonesia. This chapter shows that oil palm expansion in Riau province has brought positive and negative impacts which, together with the interplays of these impacts, influence the feedback loops of accumulation and impoverishment processes. Oil palm has enabled Riau to integrate into the national and global economy and contribute to regional income, poverty alleviation and generate employment in the region. However, this natural resource-based development has resulted in a 'boom and bust' economic growth pattern and has led to low or stagnant and unsustainable economic growth in the long term. The expansion of oil palm plantations has directly and indirectly taken place at the expense of the forest. In a relatively short period, the landscape of Riau province has changed from highly forested areas into monoculture oil palm plantations. The shrinking of forest areas has led to biodiversity loss, erosion and water pollutions, forest and peat fires, air pollutions and haze, GHG emission, increasing human-wildlife conflicts, land-related conflicts and impoverishment.

Chapter 5. The roles of smallholders in oil palm production in Riau province, Indonesia

Chapter five addresses the fourth sub-question on the roles of smallholders in oil palm production and their contribution to shaping the landscapes in the forest frontier of Riau province. This chapter shows that the diversity in households' socio-economics variables could lead to a wide range of land acquisition and farming strategies. Understanding the diversity of smallholders could also lead to an understanding of the general differentiation of smallholder households in terms of pathways to oil palm adoption, land acquisition and farming strategies. This understanding could be used to formulate differentiated policies to manage future expansion of smallholder oil palm plantations in forest frontier areas and to create programmes to foster greater participation of smallholders in sustainable livelihoods and oil palm production. The future of forest frontier and peatland areas in Riau province is very likely to be dependent on whether the government will be able to acknowledge the increasing roles of smallholder households that are participating in oil palm production.

Chapter 6. Conclusion

Chapter six reflects on the findings of the previous chapters and discusses how these findings might contribute to a better understanding of the process of oil palm expansion in Indonesia in general and in Riau province in particular. This understanding could be used to formulate more differentiated and integrated policies which would provide a basis for managing future LUCC, and especially deforestation induced by oil palm expansion.