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RESEARCH ARTICLE

Palm Oil Intensification and Expansion in Indonesia and Malaysia: Environmental and Socio-Political Factors Influencing Policy

1. Introduction

Intensification and expansion are two essential tenets of commercial agriculture. Intensification is defined as an increase in the productivity of land measured by the real value of agricultural output per hectare, or in other words, yield increase. Expansion can be simply defined as the increase in the area of land used for crops, often involving the conversion of forests or other land use types (Byerlee et al., 2014). At the plantation and grower level, intensification and expansion are often two-pronged, complementary strategies. This paper analyses trends of intensification and expansion in the interlinked oil palm sector in Indonesia and Malaysia. Indonesia and Malaysia today produce approximately 85% of global crude palm oil (CPO). Despite similar starting points and also comparable rates of increasing productivity and profit in this sector, both countries have developed almost opposite trajectories of land use. While both intensification and expansion has occurred in these countries, national indicators show that Malaysia has largely pursued intensification while Indonesia has overwhelmingly favoured expansion. Part of the explanation for this divergence is the nature of the "oil palm complex" identified by Cramb and McCarthy (2016), where capital mobility, i.e. the relative ease of access to Indonesian land and labour enjoyed by Malaysian companies, accounts for recent patterns of expansion.

Using the framework of the Jevons paradox, this paper contributes to the existing literature by arguing how and why political and social factors, rather than technology and market incentives, can better account for the differences between yield and land use efficiency in Indonesia and Malaysia today. The research mapping method was adopted to assess the recent research literature, classify the types of intensification and expansionist measures in both states, and then map them against the economic assumptions that underpin the Jevons paradox. The paper firstly argues that expansion in Malaysia has been curtailed by the Malaysian government's pledge to maintain at least 50% forest cover in the late 1990s, coupled with a government supported corporate strategy of establishing plantations in Indonesia. Indonesia has made no such pledge, leading to expansionist policies focused on market creation and production goals with limited incentives for technology-driven intensification. It then goes on to note that in recent years, new socio-political developments in both countries may yet change this clear dichotomy of opposing land use strategies between these two countries, namely Sarawak's recent autonomous tendencies over land use and Indonesia's new leadership and international No Deforestation Peat and Exploitation (NDPE) commitments. It concludes that the key economic principles of the Jevons paradox largely still hold; and human manifestations of the paradox, driven by complex social and political factors, makes production more efficient and enables consumers to buy more palm oil. As transboundary haze and deforestation linked to this sector continues to be major concerns in the region, efforts must continue in both countries to decrease incentives for expansion and vice versa.

1.1. Conceptual Framework

In the late nineteenth century, the economist William Stanley Jevons analysed the use of coal, and he found that each increment of additional efficiency in coal extraction and utilization, enabled by technological advances, was met with an increment of additional coal extracted and consumed (Czech, 2006). The point of the paradox is that, as long as economic growth is the goal, technological progress will result in increased consumption rather than biodiversity conservation. The paradox seems to be reproduced in coal, mining, forestry, energy, and other sectors, and Nelson and Vucetich (2012) have studied the human tendency to manifest the Jevons paradox. Technology increases the efficiency of resource exploitation, but it does not determine how people should exercise that ability and efficiency. An example from the US in the 1970s shows that technology and economic incentives led to more efficient home heating and insulation, but rather than using less energy, people built larger houses because heating became more affordable (Nelson and Vucetich, 2012).

Byerlee et al. (2014; 2013) find that while intuitively we tend to think that intensification would be the best way to conserve natural ecosystems from agricultural encroachment, under certain circumstances intensification can drive expansion as well. They see intensification as either a technology-driven or market-driven process. Technology-driven intensification occurs when technical change in a crop allows more output on land per unit of input, and has been proven to be generally land saving. Market-driven intensification in turn results from a shift in product mix to higher value crops due to new market opportunities, like the high prices of certain commodities. Market-driven intensification raises economic productivity and profit on the land, and therefore provides incentives to expand the area of land available for cultivation or exploitation, giving rise to a form of the Jevons paradox (Alcott, 2005)**.**

Factors	**Definition/Details**	**Short-Term**	**Long-Term**
Technology-driven	Technical change and advancement in a crop	More output on land per unit of input	land saving/**intensification** (Alcott, 2005)
Market-driven	Shift in product mix to higher value crops due to new market opportunities, like the high prices of certain commodities	Raises economic productivity and profit on land, providing incentives to expand the area of land available for cultivation or exploitation	land **expansion** - Jevons paradox (Alcott, 2005)
Human-driven political and social incentives (Malaysia)	Forest cover pledge, intensification policies to work within pledge limitations	capital mobility to Indonesia (driving expansion there)	land saving/**intensification** in Malaysia
Human-driven political and social disincentives (Indonesia)	No forest commitments, expansionist policies focused on market creation and production goals	limited incentives for technology-driven intensification	land **expansion** in Indonesia

Table 1: Factors causing Intensification and Expansion

It has been argued that the increase of oil palm prices in the 1980s encouraged a shift from other crops to oil palm in Southeast Asia, and the resulting profits have been a major driver of

deforestation (Byerlee et al., 2014). This does not explain why the rate of deforestation related to oil palm after the 1980s increased more rapidly in Indonesia than in Malaysia. A previous study by Miyamoto et al. (2014) presented evidence that deforestation in Malaysia for oil palm expansion had slowed down in the mid-1980s, but notes that further research is necessary in order to understand the underlying causes for this. Thus, using the framework of the Jevons paradox, this paper contributes to the existing literature by focusing on the human tendency to manifest the Jevons paradox, arguing how and why political and social factors, rather than technology and market incentives, can better account for the differences between yield and land use efficiency in Indonesia and Malaysia today. The paper argues that expansion in Malaysia has been curtailed by the Malaysian government's pledge to maintain at least 50% forest cover in the late 1990s, coupled with capital mobility enabling Malaysian companies to exploit opportunities in neighbouring Indonesia, with the same overall result for land use and conservation. Indonesia has made no such pledge, leading to expansionist policies focused on market creation and production goals with limited incentives for technology-driven intensification.

1.2. Methods

This paper uses a research mapping method, as the most appropriate method to assess the existing intellectual terrain, as well as to specify research questions that contribute to the existing body of knowledge on forestry and plantations in tropical Southeast Asia (Tranfield et al., 2003). Since this study is interpretive and qualitative, research mapping is found to be more appropriate than systematic review methods, as this study does not involve numerical aggregation or meta-analysis (Tranfield et al., 2003).[1] We assess a sample of recently published studies on the political economy of palm oil and land use policy based on general database searches using keywords such as "palm oil", "intensification" and "expansion". We found that some key studies related to Indonesia and Malaysia were not retrieved in this way, and so we manually browsed recent issues of influential journals such as *The Journal of Peasant Studies*, *Land Use Policy* and *Forest Policy and Economics*. National media, government and corporate sources from Indonesia and Malaysia were used to fill some of the informational and data gaps that we identified in the literature. Similar to the approach used by Jorgensen and Gobster (2010), we assess the recent research literature and classify the types of intensification and expansionist measures that are found in Indonesia and Malaysia, mapping them against the economic assumptions that underpin the Jevons paradox.[2] This method revealed significant political and social factors that impact on decision-making processes and land use policies in the two comparative case studies we focus on, as illustrated in Table 1.

2. Land Use Efficiency and Palm Oil Production

While Indonesia is the larger producer in terms of volume, in terms of efficiency, Malaysia has consistently outperformed its neighbouring competitor. Production efficiency in the oil

[1] Systematic reviews are typically applied in fields and disciplines favouring positivist and quantitative approaches.

[2] Jorgensen and Gobster (2010, 341) developed a three-step strategy to identify their study sample. We did not replicate precisely this semi-systematic approach, but we used aspects of their method to build our own sample of literature pertaining to comparative processes of palm oil intensification and expansion.

palm industry is measured by yield per hectare and extraction rate and generally, Malaysia has been more efficient (see Table 1). Relative inefficiency leads to concerns about unnecessary land pressure in Indonesia for the production of CPO. The situation is particularly concerning given that most of the land use change in Indonesia has been in natural primary rainforest and peatlands (Wicke et al., 2011). Adding to this complexity is the fact that about 18% (Aidenvironment, 2014) to 30% (Brockhaus et al., 2012) of Indonesia's oil palm area is being controlled by Malaysian capital owners.

Parameters	**Malaysia**	**Indonesia**
Planted area	5.2 mil hectares (See Chart 1)	12.3 mil hectares (See Chart 2)
National Annual Yield	21 tonnes per hectare of fresh fruit bunches (FFB)	17 tonnes per hectare of FFB
Oil Extraction Rate	20%	
Mature/Immature	86%/14%	75%/25%
Share of World Market	41%	46%
Types of Production	61.2% on private estates, 22.5% on organised smallholder land (including FELDA[3], FELCRA[4], RISDA[5] and state agencies), 16.3% on independent smallholder land	53% of on private estates, 6% on state-owned company land, 8.6% on plasma smallholder land, 32.4% on independent smallholder land

Table 2: Efficiency Comparisons between Malaysia and Indonesia – most recent available figures (Arulandoo, 2016; Hoffmann et al., 2015; indexMundi, 2018; Ministry of Agriculture, 2017; MPOB, 2017; Rachmat, 2017; Saieed and Adnan, 2017; Stevenson, 2014)

This pattern of land use change gives rise to concerns of forest encroachment, loss of carbon sequestration and biodiversity loss (Byerlee et al., 2014). Deforestation has also contributed to a sharp rise in the annual greenhouse gas (GHG) emissions in Indonesia. For example, in 2013, Indonesia ranked as the fourth highest greenhouse gas emitter (including land-use change and forestry) in the world after China, the United States and India (World Resources Institute, 2017). In Malaysia, by contrast, oil palm expansion has largely occurred in logged-over secondary forests and on former plantations (Wicke et al., 2011), although this does not prevent opposition to expansion and deforestation in Malaysia (Mukherjee and Sovacool, 2014).

2.1. Malaysia's Pledge, Intensification and Regionalization

In the 1930s, Malaysia was the world's largest rubber producer, producing about 50% of the world's rubber. At its peak, Malaysia had as much as 1.4 million hectares of planted rubber (Hays, 2013). However, the invention of synthetic rubber gradually reduced the demand for natural rubber, resulting in lower rubber prices on the international commodities markets. Market forces drove intensification in the form of a shift in product mix: from rubber that

[3] Federal Land Development Authority
[4] Federal Land Consolidation and Rehabilitation Authority.
[5] Rubber Industry Smallholders Development Authority.

produced the low-price latex product, to oil palm that produced the in-demand palm oil. Between 1999 and 2004, about 300,000 hectares of former rubber plantations were converted into oil palm plantations (Hays, 2013). This market-driven intensification increased the economic returns from the land, resulting in the Jevons paradox. Even more rubber plantations were converted to oil palm, and lands that were planted with other less lucrative crops like coconut and cocoa followed suit (Wicke et al., 2011).

While this paradox has triggered substantial agricultural expansion in the late 1900s and early 2000s, this has largely been in former plantations, and also logged-over secondary forests (Wicke et al., 2011). This has meant that market-driven intensification in Malaysia did not result in as much deforestation of natural pristine rainforests. This is because, first, Malaysia was already at quite an advanced stage of natural resource exploitation before the shift to palm oil, so this was not a significant direct cause of land use change from pristine forest to cropland. Related to this were significant amounts of deagrarianization of land around Malaysia that were previously cultivated by smallholders, increasing the availability of land that could be converted into large-scale commercial palm oil cropland. Cramb (2009) explains that this was related to the rural-urban migration in the mid-1980s where many rural communities lost their population, and hence farm labour, to non-agrarian pursuits such as education.

A second and related point is the Malaysian government's voluntary pledge to keep 50% of its forest cover intact (Nossal and Stubbs, 1997). Logging was a major export industry for Malaysia following its independence in 1957, as Malaysia's lush rainforest contained much high-quality, in-demand hardwoods (Jomo, 2003). As a result of these logging practises, Malaysia faced serious criticism from environmentalists in the 1980s (Nossal and Stubbs, 1997). Several European governments announced boycotts of Malaysian timber due to unsustainable rates of deforestation (Mohamed, 1999). Mahathir Mohamed, Malaysia's Prime Minister at the time, fervently defended Malaysia's position, arguing that "we are not exploiting the forests for no good reason. We need money. We have to export wood because we need the foreign exchange without which we cannot buy what we want" (Sustainable Development News, 1992). As a sort of peace offering to the international community, and in an attempt to prove that Malaysia could indeed develop sustainably, Malaysia pledged at the United Nations Conference on Environment and Development in 1992 that it would keep 50% of its land area forested (Nossal and Stubbs, 1997).

This international pressure, and the need for Malaysia to silence its critics, proved overwhelming enough to drown out the immediate expansionist tendencies of the local palm oil sector. During this time, prominent individuals from within the sector such as Dr Yusof Basiron, CEO of the Malaysian Palm Oil Council, lobbied hard for the Malaysian government to push for palm oil plantations to be classified as 'plantation forest', so that any forest conversion into palm oil plantations would not be considered deforestation.[6] While this expansionist lobby continues today (Basiron, 2014), at the governmental level the argument for reclassification has not gained traction. Instead, the government of Malaysia has encouraged and supported corporate strategy to expand into Indonesia to avoid profit losses resulting from land restrictions in Malaysia.

[6] The Malaysian government has in the past successfully lobbied for rubber plantations to be classified as "forest" by the UN Food and Agriculture Organization (FAO).

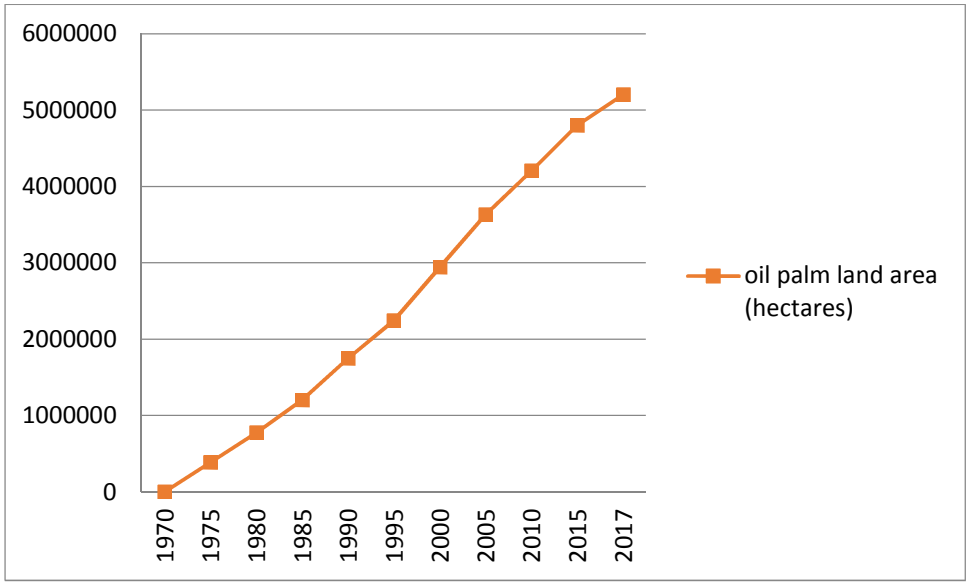

Chart 1: Oil palm land area in Malaysia (indexMundi, 2018)

Malaysia's pledge came at a time when land conversion was still occurring at a significant rate, and this pledge continues to influence Malaysia's approach to agricultural expansion. Rapid deforestation was witnessed in Malaysia until the 1980s, but since the land pledge it has slowed down substantially. Some years even registered a manageable deforestation rate of 1% per annum, while in other years deforestation was as low as 0.1% (Wicke et al., 2011). A recent speech by Malaysia's Minister for Environment and Natural Resources, Dr Wan Junaidi Tuanku Jaafar, at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP) 22 in Marrakech, announced that Malaysia currently has 54.5% forest cover (Tuanku Jaafar, 2016).[7] This means that Malaysia has less than 5% of forest left into which expansion can occur.[8] The area covered by oil palm plantations doubled from the 1990s to the 2000s, although the forest cover pledge has meant that Malaysia's expansion over the past decade has been relatively slow. For example, for a ten-year period from 2003 to 2013, Malaysia's land expansion for palm oil has been at an average of only 130,000 hectares per year (Ling, 2014). The limited available land area is projected to limit future expansion to only about 100,000 hectares per year (Ling, 2014), with an upper limit of 5.6 million hectares (EU Delegation to Malaysia, 2012; Ling, 2014).

[7] This figure excludes palm oil plantations but includes all rubber plantation land in both West and East Malaysia, including those managed by smallholders.

[8] Forest area is defined as land "spanning more than 0.5 hectares with trees higher than five meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ" (FAO). A remaining concern is the fact that the 54.5% of forest cover declared by Malaysia includes areas planted with forest tree species such as pines, acacia mangium, gmelina arborea, and rubber. These are known as forest plantations and fall under the classification of forest since their end products feed the timber industry. Hence, while forest cover remains, the quality of these forests may be reduced as these forest plantations are (selectively) logged. While this is an important point that questions the 'quality' of Malaysia's forest cover pledge, it is less so in the context of this paper on the palm oil industry. The conversion of forests to palm oil does not merely involve a deterioration of forest quality, but a total conversion of forest cover areas to non-forest cover areas. Hence, any palm oil expansion would involve a reduction in total forest cover percentage, and not merely reduction of (less-countable) forest quality.

While the 50% forest cover pledge is non-binding and thus can be considered largely symbolic, the Malaysian government has consistently reiterated its commitment to the 50% pledge at the domestic and international level, including the 2009 Copenhagen Climate Conference and the 2012 United Nations Conference on Sustainable Development (Embas, 2012). The industry keeps a close eye on deforestation limit figures in all major industry gatherings, like the annual Palm Oil Trade Fair and Seminar (Basiron, 2012a). Despite these apparent restrictions, palm oil continues to be a major productive crop and export commodity for Malaysia. It is the fourth largest contributor to the national economy and employs as many as 3 million people in various capacities (Ferdous Alam et al., 2015). As such, the government has put into place several policies to ensure that the oil palm sector can continue to prosper despite the 50% forest cover pledge, mainly by focusing on intensification locally, and expansion in neighbouring Indonesia. These policies are discussed in detail below.

Firstly, while most plantation companies carry out their own research and development, the Malaysian government has historically influenced the direction of agricultural research and development (R&D). The government set up the Palm Oil Research Institute of Malaysia (PORIM) in 1974, which was then merged with the Palm Oil Licensing Authority (PORLA) in 1998 to create the Malaysian Palm Oil Board (MPOB). As a R&D agency with major companies on its advisory board, MPOB's focus has overwhelmingly been technical-based intensification, with the goal of closing the yield gap between the current average yield (21 tonnes FFB per hectare in Malaysia) and the potential yield (35 tonnes) (Fairhurst et al., 2010). MPOB has been particularly successful in developing high-yielding seed varieties and tissue cultures, and also ascertaining ideal levels of nutrients and fertilisers for plants to improve productivity (Wahid et al., 2004).

Importantly, the MPOB shares its technical findings with smallholders, who make up about 38.8% of all oil palm growers in Malaysia (MPOB, 2017). There are some 205,000 independent oil palm smallholders in Malaysia, from a total of about 680,000 smallholders (Kailany, 2011), with a total planted area as per 2014 of 807,000 hectares (about 15% of planted oil palm area) (Chandramohan et al., 2015). Yields produced by independent smallholders are significantly lower than those in commercial plantations, and so the MPOB tries to ensure that high-yielding seed varieties are made available at an affordable price to smallholders. In addition, the MPOB has Oil Palm Teaching and Advisory (Tunjuk Ajar dan Nasihat Sawit, TUNAS) officers at all major growing cities that offer regulatory, training and advisory services to smallholders (Basiron, 2012b). As an incentive for intensification, all growers who achieve yields of 30 tonnes FFB per hectare are eligible to join MPOB's 30 Tonnes Club, enjoying benefits like subsidised workshops and first priority technical advice from MPOB officers (Leong, 2014).

Secondly, the Malaysian government has established several organised land collectives, with complementary political and economic objectives. The oldest and best-known of these is the Federal Land Development Authority (FELDA). FELDA was established in 1956, and was promoted as a "catch up" vehicle for the poorer Malay and *bumiputera*[9] communities (Cooke, 2006), with the ultimate goal of eradicating rural poverty (Sloane-White and Beaulieu, 2010). FELDA started out by channelling federal funds to state governments to develop land.

[9] Literally translatable to "sons of the soil", which excludes the Chinese and Indian communities which were considered *pendatang*, or immigrants.

However, the states had other priorities and lacked the expertise for managing land settlement schemes. In 1960, FELDA was reimagined as a federal-level developer of land resettlement programmes (O'Donnell et al., 2017). To this end, the Malaysian government granted vast areas of agricultural land to FELDA all over Malaysia. Through a stringent but also politicised selection process[10] (Benjamin and Gasper, 2001; Pletcher, 1991), *bumiputera* smallholder families were selected and settled in these FELDA designated areas. Each family was given title deeds to about 4 hectares of land, where they cultivated under an "organised smallholder" system.

From the 1990s, FELDA reinvented itself as a developer of commercial plantations and settler development projects, essentially overseeing Malaysia's largest group of organised oil palm smallholders. FELDA smallholders now make up about 710,000 hectares of palm oil land, or about 12.3% of all palm oil cultivated land in the country (MPOB, 2017). These smallholder farmers benefited from the highly organised FELDA schemes, which are run very similarly to a commercial plantation. Each FELDA scheme has a manager, plantation officer and agronomist to encourage best management practises. Because of this, a significant amount of FELDA smallholders have been able to join MPOB's "30 Tonnes Club". Furthermore, as an important strategy in retaining the support of the rural Malays (Sloane-White and Beaulieu, 2010), the government maintained interest in encouraging and enabling high productivity in these settlements, to keep the settlers happy and supportive of BN. In terms of land use, since each smallholder is assigned their land size at the beginning of their settlement, expansion within FELDA schemes have been at a relatively controlled rate.

FELDA has since developed a commercial arm called FELDA Global Ventures (FGV), which has interests in China, Indonesia, Pakistan, and Thailand. It is now the third largest palm oil operator in the world. The entity has recently been embroiled in property fraud allegations at home and abroad (O'Donnell et al., 2017), however the controversy has managed to remain separate from FELDA's core business of organised smallholder collectives. Other similar land collectives have since been established in Malaysia generally following the FELDA model, with varied levels of success. These include FELCRA, RISDA (originally for rubber but now increasingly for oil palm), and the Sarawak Land Consolidation Agency (SALCRA), which is discussed in detail in section 3.1.

Thirdly, oil palm intensification is a focus of the Malaysian government's Economic Transformation Program (ETP) launched in 2010. The broad objective is to bring the industry closer to the national FFB yield target of 26.2 tonnes per hectare by 2020 by focusing on technology-driven intensification at the plantation level as well as downstream activities (ETP, 2014). The basic idea is to encourage replanting, improve FFB yield, and improve worker productivity through mechanization. Replanting is a challenge because of the 3 year lag before a new plant begins to produce FFB, and many smallholders are reluctant to replant, even though better materials are available. This has resulted in old trees that are harder to harvest, bringing smallholder yields down and resulting in stagnating national average yields.

[10] FELDA performs a very important political function. Loyalty to the ruling party coalition, Barisan Nasional (BN), was among the key criterion used to select the settlers. FELDA settler areas were seen as vote banks for BN, and victory was very likely in FELDA areas during both state and general elections. In return, funds are often officially set aside for FELDA settlers as their 'reward' during festive seasons, and BN often reiterates that the support of more than 100,000 FELDA settler families nationwide was key in maintaining political stability in the country.

To counter this, the Malaysian government is providing financial grants to smallholders to cover the cost of replanting, as well as a monthly allowance of US$157 until the young trees are productive (Ferdous Alam et al., 2015). To improve FFB yield, smallholders are encouraged to join cooperatives that enable them to enjoy bulk discounts on agricultural inputs and better pricing for their produce (ETP, 2014). Such technology-driven intensification is especially appreciated among smallholders with limited resources. If smallholders are able to achieve more output per unit it is logical that they will prefer to concentrate on intensification rather than more expensive forms of expansion.

Finally, despite these mainly self-imposed limits to growth at home, the Malaysian government did not see this as a barrier to continue being a major player in the international palm oil sector. The neighbouring land expanses of Indonesia, together with other smaller areas in Papua and Brazil (Koh and Wilcove, 2008) were identified as the potential avenues for market expansion. Indonesia, with its large market, plentiful labour and land, and comparatively lower operation costs (Haji Mat Zin, 1999), was especially ideal. Hence, from the 1990s onwards, the Malaysian government was instrumental in facilitating the mobility of capital from well-established Government-Linked Companies (GLCs) and well-connected private conglomerates into Indonesia. Beyond this, the Malaysian government was also active in establishing and funding industry promotional groups and lobby groups[11] to further support the ongoing operations of these firms once established in Indonesia (Varkkey, 2016). Malaysia is currently the biggest foreign investor in the Indonesian palm oil plantation sector (Lipsey and Sjoholm, 2011). It is estimated that there are 162 plantations in Indonesia that have linkages to Malaysian companies (Adnan, 2013; Maruli, 2011; WALHI et al., 2009).

Hence, somewhat ironically, while limited land availability has helped control the pace of expansion in Malaysia, market-driven intensification has encouraged expansion by Malaysian plantation companies, not so much at home, but abroad (Rajenthran, 2002). As such, the Jevons paradox of intensification fuelling expansion has taken on a transnational dimension. With the support of the Malaysian government, major Malaysian commercial plantations are continuing to look and expand to greenfields abroad, especially in Indonesia (Basiron, 2012b). However, this has not meant that expansion in Malaysia can stop completely. While capital mobility from Malaysia to Indonesia in this sector is currently active, the political relationship between the two countries can be volatile and may affect these investments (Varkkey, 2016). [12] As such, even while Malaysian capital is driving expansion in Indonesia, Malaysian plantation companies must still focus on intensification and some strategic expansion in Malaysia for the long term.

The oil palm industry is among the most regulated industries in Malaysia. As a result, land transactions, especially among the large commercial growers, have been generally above board. New plantings have been formally limited to logged-over lands or old agricultural lands (MPOC, 2006). While there have been cases of plantations encroaching into forest lands and NCR lands (especially in Sarawak, discussed in section 3.1), this has been the exception rather than the norm. Furthermore, the limits to growth due to the 50% forest

[11] Most notable being the Association of Oil palm Plantation Investors of Malaysia in Indonesia (APIMI), which enjoys direct access to both Malaysian and Indonesian political leadership.
[12] For example, in 1997, Indonesia abruptly closed off its palm oil sector to foreign investors following demands by Indonesian nationalists. And more recently in 2014, there was a call in the Indonesian parliament to limit foreign (particularly Malaysian) ownership of plantations in Indonesia

pledge have been at the forefront of commercial growers' strategies in Malaysia. At the same time, the booming palm oil market serves as a great incentive for expansion among commercial plantations.

2.2. Land Use Governance and Expansion in Indonesia

Palm oil was revived as a major agricultural industry with the help of the Indonesian state in late 1960s, for instance with the establishment of state-owned plantation estates (Perseroan Terbatas Perkebunan, PTP) (Larson, 1996). The policy successfully expanded the area devoted to oil palm cultivation on government estates, which grew from 84,000 hectares in 1969 to 176,000 hectares in 1979 to 343,000 hectares in 1987. As the international demand for palm oil drove commodity prices higher, Indonesian growers were encouraged to change their product mix. For example, planting oil palm in Indonesia can yield estimated net present values of between $3,835 and $9,630 per hectare per year (Lee, 2011), compared to the average of between $1,283 and $1,416 per hectare per year for other crops (Prasetyo et al., 2009). Hence, more growers chose to grow palm oil, and those that did so saw the profits that they could reap from their land increase dramatically.

The Jevons paradox states that such increase in productivity can serve as an incentive to expand land area, and indeed this is what happened in Indonesia. Being about six times larger than Malaysia in terms of land area, the Indonesian oil palm industry was able to grow swiftly (Basiron, 2007; Nature, 2007). Furthermore, unlike Malaysia, Indonesia has never made any clearly defined forest cover pledges to the international community. Hence, the profits emanating for the sector provided a strong incentive for expansion.

Since the 1980s, the state pursued deregulation policies and paved the way for the market to shape the industry (Susanti and Maryudi, 2016). This had led to rapid expansion during this time, especially in Sumatra and Kalimantan. Total plantation area rose significantly from 117,000 hectares in 1969 to 3.9 million hectares in 1999 (Palm Oil Agribusiness Strategic Policy Institute, 2014). This was further encouraged by a specific policy goal set by the Indonesian government during this time to surpass Malaysia as the world's largest CPO producer (Van Gelder, 2004). With the introduction of private sector driven partnership models since 1999,[13] expansions happened rapidly in existing estates (Casson, 2002; Daemeter, 2015; McCarthy, 2010). However, as these pre-existing croplands quickly dwindled, expansion began to occur in natural primary rainforests and peatlands, a trend which has continued to present times (Wicke et al., 2011).

After local Indonesian investors established themselves in the sector, the Indonesian government opened up the sector to foreign investors in the early 1990s, along with attractive incentives (Rifin, 2010). This followed Indonesia's commitment to the structural reforms outlined by International Monetary Fund (IMF), which required the government to ease restrictions for foreign investment in the palm oil sector. This marked the entry point of Malaysian plantation companies into Indonesia. The area harvested with oil palm in Indonesia increased dramatically from around 70,000 hectares in the 1960s to 1.6 million

[13] In 1999, the Pola Kemitraan scheme was enacted, introducing models in which the private sector became the main industry driver while reducing the autonomy of smallholders related to plantation management.

hectares by 1997. Expansion slowed down during the Asian Financial Crisis in 1997-1998, as many plantation companies faced financial difficulties (Casson, 2002). Another wave of foreign investment then occurred as the government invited investors to take over failing Indonesian plantation companies. In 1998 the total land area increased to about 2.01 million hectares (FAOSTAT, 2012; Wicke et al., 2011) and in 2006, Indonesian plantations achieved their tipping point and Indonesia overtook Malaysia as the largest producer of palm oil (Jarvis et al., 2010; McCarthy, 2010).

It is important to note, however, that Indonesia is able to surpass Malaysia thanks to Malaysian companies operating in it. In 1997, Indonesian nationalists successfully pushed for a moratorium for foreign investment, arguing provocatively that Malaysian companies already controlled 3 million hectares (Aidenvironment, 2014). The Asian Financial Crisis broke the moratorium and Malaysian companies again started to expand their operations in Indonesia. In 2013, it was reported that Malaysian company groups' aggregate oil palm land banks in the country reached 1.8 million hectares, contributing around 18% of oil palm land area in 2013 (Aidenvironment, 2014; Ministry of Agriculture, 2017). Other sources mentioned that 30% of palm oil land in Indonesia is controlled by Malaysian entities (Brockhaus et al., 2012). As in the 1990s, such statistics led to dissatisfaction amongst some Indonesians, who argue that the Indonesian palm oil industry is increasingly "being controlled by foreigners" (Handr, 2009). In Kalimantan, according to a GAPKI (Indonesian Palm Oil Association) official, 60% of the palm oil area is controlled by foreign capital owners, mainly Malaysian companies (Wibowo, 2013).

This nationalist sentiment adds complexity to the already complex policy environment of palm oil industry expansion in Indonesia. With the introduction of a more private sector-driven partnership scheme in 1999, Malaysian capital is among the most important sources of the growth of the palm oil industry in Indonesia. Hence, expansion in Indonesia is driven by a combination of local and foreign factors: local companies and smallholders, feeling threatened by the increasing presence of foreign entities, particularly Malaysian companies, are pressuring the government to provide them with more facilities, such as access for funding, land, and technical support.

It is estimated that oil palm land area in Indonesia currently stands at 12.3 million hectares (Ministry of Agriculture, 2017). It contributes around 7% to Indonesia's GDP annually (Bank Indonesia, 2014; Das, 2014), and employs about 20 million people, both directly and indirectly (Simamora, 2011). For example, in Riau, one of the major palm oil producing regions in Indonesia, 85% of all palm oil plantations were created on natural forest land. In between 1982 and 2007, large scale oil palm plantations were responsible for 29% of total forest cover loss, with an additional 7% contributed by smallholders. Furthermore, forest cover loss in Sumatra and Kalimantan (2.5% per year between 1985 and 1997), the major oil palm growing areas in Indonesia, is significantly higher than Indonesia's national level forest cover loss of 1.9% per year (Wicke et al., 2011).

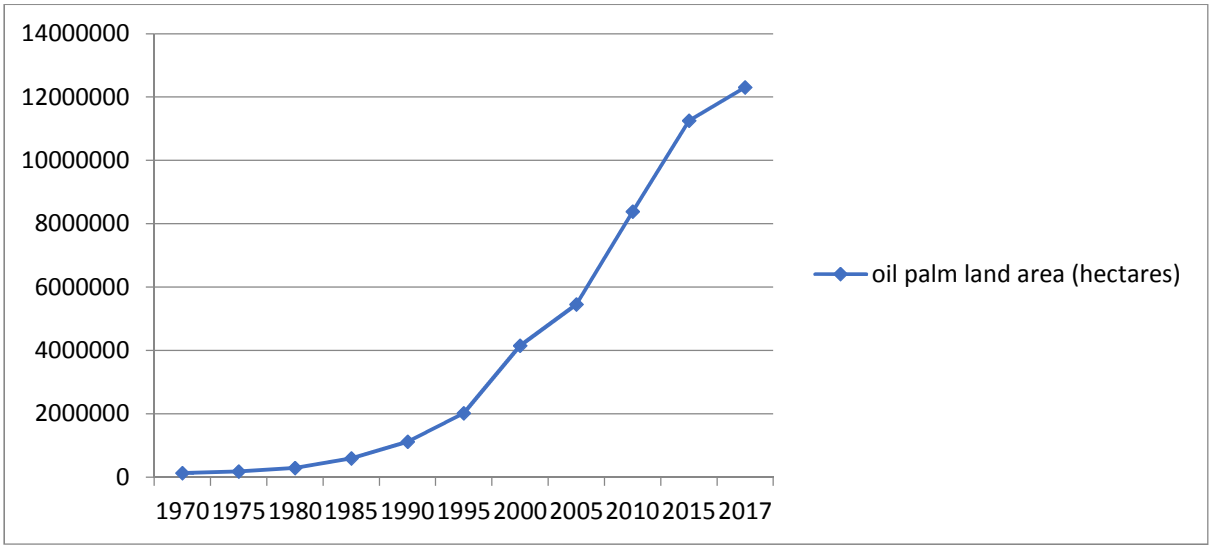

Chart 2: Oil palm land area in Indonesia (Ministry of Agriculture, 2017)

For Indonesia, in accordance with the economic assumptions that underpin the Jevons paradox, intensification is closely tied to expansion. Earlier research has revealed that land productivity, in terms of palm oil yields, is an accurate predictor of where new estates will appear in Indonesia. If plantations on a particular area have been displaying high rates of productivity, adjacent lands are likely to be opened up for expansion as well (Lian and Ghazoul, 2010). Furthermore, smallholders who are able to achieve high yields through intensification are likely to expand their operations, using the additional profits obtained (Zen et al., 2005). Clearly, profitability drives expansion in Indonesia, where expansion seems to be politically and socially acceptable as economic growth and food production are higher priorities than conservation (Sayer et al., 2012).

Indonesia's average national yield has consistently been below Malaysia's. According to Donough et al. (2011), there are generally three main areas where yield gaps can be commonly observed among plantations in Indonesia, both large-scale and small. The first gap is due to management deficiencies during the development of a plantation until trees reach maturity. The second gap concerns poor nutrient management in the production phase. The third yield gap is caused by inefficiencies in the general management of the mature trees (excluding nutrients). It must be noted, though, that smallholders and local business investors are highly heterogeneous in Indonesia. Different typologies of smallholders, such as independent smallholders with individual partnerships, farmer cooperatives, or company-managed plasma model smallholders have different levels of productivity (CPI and PILAR, 2015). While the causes of the yield gap are well understood, the realities on the ground in Indonesia do not create incentives towards technology-driven intensification to overcome these gaps. Intensification requires high investment in R&D activity, and there is a significant lag time due to the learning process required for the application of intensification methods (Zen et al., 2005). There are more incentives for expansion to make up for the production shortfall. While Malaysian growers are indirectly forced to intensify due to limited land, this situation does not exist in Indonesia.

MPOB, FELDA and the ETP are among the institutions and incentives in Malaysia that have played important roles in encouraging intensification. While there are similar entities in Indonesia in all three aspects, these Indonesian efforts have been relatively less successful than their Malaysian counterparts. Firstly, Indonesia's equivalent to MPOB is the Indonesian

Oil Palm Research Institute (IOPRI). Formerly a generalised agriculture research institute inherited from the Dutch, the body changed its name to IOPRI and its specialisation to oil palm in 1992. While R&D into high-yielding palms commenced in the 1920s, the seed varieties produced have been unable to meet the productivity levels of Malaysian seeds. Furthermore, while MPOB in Malaysia has succeeded in disseminating high-quality seeds among their independent smallholders, IOPRI has been less successful in this aspect. For example, a promising joint initiative between IOPRI, local plantation agencies (*dinas perkebunan*), and local estate companies in the 2000s set up large nurseries selling improved seedlings at subsidised prices and an accompanying support program. However, decentralisation has shifted the control of plantation agencies to the district (*kabupaten*) level. Some districts cut off funding to their plantation agencies, which resulted in the uneven success of this joint program (Zen et al., 2005). This is particularly problematic when considering that independent smallholders are the largest group of smallholders in Indonesia. While independent smallholders in Malaysia make up only about 42%[14] of all smallholders, in Indonesia, about 79%[15] are independent (Rachmat, 2017).

FELDA's smallholder scheme is the model of choice for encouraging productivity among smallholders in Malaysia, whereas Indonesia's equivalent, the nucleus-plasma scheme, first introduced through Perkebunan Inti Rakyat program in 1980s, has had limited success in this aspect. While the formal partnership model changed to a more private sector-driven partnership model since early 2000s, the Indonesian government still requires all large private plantations ("nucleus") to prepare a minimum of 20% of its total concession area for surrounding smallholders. In 2013, the Ministry of Agriculture issued the Regulation No. 98/2013 that allows the obligatory 20% to be built outside the concession area as long as the size is equivalent. These smallholders would run their plots ("plasma") under formal partnership with the companies, which includes cooperation for the transportation of FFB, procurement of agricultural input, processing, and marketing (Ministry of Agriculture, 2013). About 500,000 smallholders are under such schemes in Indonesia, taking up about a third of all oil palm planted areas (Mukherjee and Sovacool, 2014). However, because the form of cooperation with smallholders differs from one plantation to another, rates of productivity among plasma smallholders have varied greatly. Rather than looking at the nucleus-plasma cooperation mechanism through the lens of intensification, the government sees it more in terms of reducing inequality and preventing social conflicts in plantation areas. With this perspective, the obligation for plantation companies to prepare a minimum of 20% of their total concession area for surrounding smallholders leads not to intensification but to expansion because many companies, such as Golden Agri Resources (Agus, 2017) prefer to give the smallholders plots outside the concession area.

Smallholders in Indonesia, including independent, cooperatives or company-managed, generaly suffer from limited assistance and varying degrees of disorganization. These factors, combined with limited technical knowledge on how to optimize production, has led to low rates of productivity (Zen et al., 2005) which also forces smallholders to expand in an

[14] Calculated by the author from this and other reliable sources. MPOB estimates that independent smallholders manage 933,948 hectares of land, while organised smallholders manage 1,268,365 hectares of land (MPOB, 2017).

[15] We use Rachmat's (2017) definition of an "independent smallholder", which is a smallholder who is not part of a plasma scheme. Rachmat's latest data indicate that smallholders make up about 41% of the total palm oil area, with 21% of this made up of plasma smallholders and 79% independent smallholders.

attempt to earn more. In tropical countries with large populations of rural dwellers living in or close to poverty, these populations will opt for more planted area rather than natural forests (Sayer et al., 2012). Hence, in Indonesia, both high and low productivity can encourage expansion, creating a seemingly zero-sum game for forest conservation.

In terms of national strategy, Malaysia's ETP has focused on intensifying current palm oil production to increase the efficient use of available land. Indonesia's national palm oil strategy over the years have been about achieving production goals, without an explicit focus on how to achieve those goals (either through intensification or expansion). This trend began in the 1980s when Indonesia declared its intention to become the world's largest palm oil producer (Van Gelder, 2004) and has continued to current times with goals to double production (Lian and Ghazoul, 2010). The Indonesian government has also focused on increasing national demand for palm oil with the implementation of an aggressive biofuel policy that sets mandatory targets for palm-biodiesel blends across various sectors like transportation, electricity and public service (Kharina et al., 2016). When such national strategies focus on production goals without setting limits for growth or clearly identifying strategies for achieving these goals, the sector understandably will take the path of least resistance to achieve these goals. In Indonesia, this path has generally been expansion.

Technological innovation for expansion is difficult and expensive. So why should a sector innovate when there is so much land available? Indeed, in Indonesia, well-connected business elites have always been able to obtain land concessions. Land has historically been used for patronage transactions in Indonesia. Patronage transactions are prevalent in the Indonesian business world, and are described in Scott's (Scott, 1972) classic study as a situation where a patron with a higher socio-economic position (normally from the government elite) exercises their influence and resources to provide for a client of lower status (business elite) in exchange for political support, assistance or services. With a sizeable monetary or in kind exchange, for example support during elections, business elites can secure rights to concessions. Such materialistic relationships are especially prevalent between oil palm interests and local government elites, as detailed in a recent case study in West Kalimantan by Prabowo et al (2017). These well-connected clients will find it easy to bypass the technical complexities of formal procedures for the conversion of forest to oil palm (Setiawan et al., 2016).

Mutually symbiotic patron-client relationships lead to situations of state capture at the national and regional level as well (Ascher, 1998), where major plantation players have had considerable influence in shaping Indonesia's land policy (Sayer et al., 2012). The Ministry of Forestry, the National Land Agency, and regional governments are especially vulnerable to state capture, as they are the core bureaucracies responsible in both forest area and title forest (Sahide and Giessen, 2015). As a result, for example, Reducing Emissions through Deforestation and Forest Degradation (REDD+) projects in Indonesia were often subject to an uncertain and highly contested forest management regime, undermining attempts to demonstrate the viability of operationalising market mechanisms at the local scale (Boer, 2018). The moratoriums that were part of the REDD+ projects were found to have been watered down considerably due to private interests (Varkkey, 2016). Companies generally have a preference for expansion into forest areas, because of the timber that can be harvested and sold for start-up funds before the commencement of planting (Sayer et al., 2012). This increases demand for forested land among business elites. Companies that expand into

community lands can expect the protection of their patrons in the face of community protest, and only a handful of land disputes between plantation companies and communities have concluded in favour of the communities.

Overall in Indonesia, incentives for expansion have been stronger than those for intensification. What little technology-based intensification that does happen is not disseminated effectively, especially to smallholders, to have the intended land saving effects. Furthermore, the market-driven productivity and profits achieved by large-scale commercial plantations serves as an incentive to expand the land area, since such lands are so easily obtainable, especially through patronage transactions enabled by ambiguous land tenures and the varying capacities of provincial authorities (Mukherjee and Sovacool, 2014). This is further enabled by the fragmented land-use administration and legal pluralism in Indonesia, both discussed in detail in a recent article by Kunz et al. (2017). Furthermore, as the international community increasingly puts pressure on the Indonesian government to halt deforestation and address land-related social conflicts, there has been a trend of "land banking" among plantation companies, where they try to gain the rights to as much land as possible in anticipation of possible future blocks to access in the form of government moratoriums or pledges (Sayer et al., 2012). Such land banking indeed accelerates deforestation, as often these lands are logged for profitable timber first, even though there is no immediate intention to plant oil palm (Mukherjee and Sovacool, 2014).

3. New Land Use Trends

Indonesia and Malaysia have historically experienced opposite trends of land use for oil palm due to prevailing socio-political incentives and disincentives for either intensification or expansion. We find however that recent socio-political developments are triggering some shifting land use trends in both countries. For Malaysia, the state of Sarawak is currently the most forested state in the country, and also has a significant amount of native customary rights (NCR) land. It is the country's final frontier for oil palm given the state's reserve of untouched peatlands and NCR lands. This is leading to conflicts with both the international scientific community and local indigenous communities. In Indonesia, the Joko Widodo (Jokowi) administration has called for strengthened moratoriums and meeting production goals without deforestation. Pledges from commercial buyers to use only "no deforestation, no peat, no exploitation" (NDPE) palm oil is further limiting the market for palm oil on newly developed lands (Rijk et al., 2017). The discussions in section 3.1 and 3.2 will evaluate these recent developments and consider if they will have a long-term effect on the land use trends of both Indonesia and Malaysia, and the regional palm oil sector as a whole.

3.1. Sarawak as the Final Frontier

With most of the agriculturally suitable lands in Peninsula Malaysia and Sabah are already developed for palm oil and other crops, Sarawak is the only remaining state with any significant arable land left. In 2011 it was identified that 75% or 1 million hectares of Malaysia's maximum expansion potential, keeping in mind the 50% forest cover pledge, was in Sarawak (Chin, 2011). Indeed, apart from going abroad, for example to Indonesia, many

Malaysian companies are also considering Sarawak as greenfield areas for palm oil (Chin, 2011; ETP, 2014).

Sarawak has been a latecomer in palm oil because of the challenging terrain there. With a huge land size of 12.4 million hectares, it is Malaysia's biggest state, though only 28% is suitable for agriculture, with the remaining areas being steep land (58%), peatland (13%) and infertile land (1%) (Lian, 2016). From a relatively small 543,400 hectares of oil palm in 2005, Sarawak's planted area has expanded to more than 1.4 million hectares in 2015, accounting for 25.5% of all palm oil planted land in Malaysia. It contributed about $2.03billion (9%) of the state's total exports in 2015, of which the State is able to collect substantial state tax (Borneo Post, 2016). The state has earmarked a total of 2 million hectares, or 15% of the state's land for palm oil by 2020 (Borneo Post, 2011; Chin, 2011). Reaching this 2 million hectare target would bring Malaysia's national forest cover down to about 51%, just at the brink of its pledge. At the national level, an additional 3.5% of forest cover loss does not seem like very much, but considering that almost all of this expansion will be concentrated in a single state, the consequences are worrying.

Sarawak, a megadiverse area home to charismatic fauna like the orang-utan and the sun bear, currently has the world's highest rate of tropical forest loss, according to data from Global Forest Watch. Most of the oil palm expansion in Sarawak has been on arable lands, which are either natural forests, NCR lands or peatlands. Expansion of oil palm in Sarawak started during the chief ministership of the long-serving Taib Mahmud. During this time, patronage land transactions were rampant, and it was easy for companies to flaunt laws and offer bribes for land (Lapidus, 2016). Mahmud's successor, Adenan Satem, seemed to be a breath of fresh air for environmentalists when he stated that "no more palm oil is needed – *cukup* (enough)" (Chia and Ten, 2015) and declared that his government would not approve expansion of palm oil plantations (Lapidus, 2016).

Satem's reputation among environmentalists was jeopardised, however, by his announcement in 2016 that his government had decided to open up coastal lowland areas (peatlands) as the most strategic alternative resource to dwindling arable land, to encourage the development of the oil palm industry in Sarawak (Lian and Sibbon, 2016). It was revealed that about a quarter of Sarawak's peatlands have already been converted for oil palm (Lian, 2016). More than 100 local and international scientists responded with a strongly worded letter in the journal Global Change Biology declaring that peatland development in Sarawak for oil palm would have dire consequences for climate change as carbon is released during land clearing, and as haze pollution worsens due to fires related to peatland draining (Wijedasa et al., 2016). This echoed an earlier call by Malaysia's leader of the opposition, Anwar Ibrahim, for Malaysian companies to stop planting oil palm on peat, due to carbon emissions and sequestration concerns. Ibrahim's call was viewed by the palm oil industry as a further sign that the opposition leader had been "bought over" by Western interests who were not interested in seeing Malaysia prosper (Ooi, 2013).

Following Satem's sudden death just three years after taking office, the Sarawak government focused more on expansion into NCR lands. As of 2016, out of the 1.5 million hectares of NCR land, 328,000 hectares have been converted into oil palm plantations. Sarawak's minister for Agriculture Modernization and Rural Economy said the focus on NCR land was to transform the large tracts of unproductive and under-utilised lands into viable economic

603 units (Goh, 2016) to help boost the rural economy (Borneo Post, 2016). The identification of
604 these lands as idle and underutilised is problematic (Carlson et al., 2012), as often these lands
605 are used for community farming or as areas for hunting and gathering.

606 Problems related to expansion into NCR lands are twofold. Firstly, companies that have
607 received concessions that include NCR lands are almost certain to be involved in conflicts
608 with local communities. Indeed, a list by Danish forest consultants Pro Regenwald (2010)
609 identified at least 57 land conflicts from 1995 to 2010 related to oil palm plantations on NCR
610 lands. A particularly high-profile case was that of Tabung Haji, one of Malaysia's biggest oil
611 palm plantation companies, clashing with over 100 Iban families near Serian as they blocked
612 the company from harvesting oil palm on 3,000 hectares of their NCR land (Papau, 2014). In
613 the midst of negative publicity, Tabung Haji was compelled to abandon its plans.

614 Secondly, we observed[16] that villagers who willingly hand over NCR lands to implementing
615 agencies are essentially "bribed" to do so because this is the only way that they are assured to
616 receive titles deeds for their land (SALCRA, 2012). Obtaining the title deeds through other
617 means is almost impossible. Furthermore, implementing agencies such as the SALCRA have
618 poor track records of managing these lands productively. SALCRA runs about 51,000
619 hectares of NCR land on behalf of indigenous groups in Sarawak. However, on average, the
620 reported productivity of these areas is about a tenth of that achieved in commercial
621 plantations (about $391 compared to $2,905 per hectare in 2009). While these figures may be
622 underrepresented due to alleged siphoning off of profits by SALCRA's chairman before
623 formal reporting (Sarawak Report, 2011), it is clear that there is very little incentive for
624 technology-based land saving intensification for agencies such as SALCRA.

625 The rate of land use change in Sarawak due to oil palm is worrying because of the fact that
626 Sarawak, due to its separate colonial legacy from Peninsula Malaysia, is exempt from most
627 national policies and standards and can set their own regulations (Mukherjee and Sovacool,
628 2014). Hence, while Sarawak's target of 2 million hectares of palm oil by 2020 would still
629 bring overall forest cover within the 50% pledge limit, there is no guarantee that Sarawak will
630 keep to these national limits to growth. Sarawak leaders continually admonish the central
631 government for not paying adequate attention to Sarawak, resulting in a large development
632 gap between Sarawak and Peninsula Malaysia. The rapid expansion into palm oil is part of
633 the state's insistence that "Sarawak should not be left behind" (Ling, 2016). Sarawak also
634 often reminds critics of the fact that its current forest cover, at 65%, has exceeded the national
635 commitment of 50% (Lian and Sibbon, 2016). Hence, such arguments for development could
636 possibly be used to justify further expansion into peatlands and supposedly idle and
637 underutilised NCR lands in Sarawak. While expansion in accordance with the Jevons paradox
638 in other parts of Malaysia has been regulated by the forest cover pledge, as well as access to
639 land in Indonesia, it remains to be seen if the same national pledge is enough to regulate
640 further expansion in Sarawak.

641

642 **3.2. Indonesia: Prospects for a U-Turn?**

[16] During a University of Newcastle field trip to NCR areas near Kuching, Sarawak in March 2017.

While local political and socio-economic realities in Sarawak may be creating expansionary incentives, the current situation in Indonesia may reveal a trend in the opposite direction. Even though both the Malaysian and Indonesian oil palm sectors have consistently been the target of anti-deforestation pressures at local and international levels (Mukherjee and Sovacool, 2014), such pressures have always been more pronounced in Indonesia (Jong, 2016). This is because, unlike Malaysia, most of the land use change related to oil palm expansion in Indonesia affects large areas of primary rainforests and peatlands (Wicke et al., 2011). These pressures have translated into particular responses from both the Indonesian government and major buyer corporations involved in the sector.

President Jokowi, who took office in 2014, has been particularly progressive in putting land saving policies in place. Just a few weeks into his new presidency the region was hit with a serious transboundary haze crisis (Nazeer, 2015). Transboundary haze is largely a result of fires in forests and peatlands in Indonesia's outer islands, often related to land clearing activity for agriculture, and improved land management to overcome the haze crisis has been a priority area for the Jokowi administration since 2014 (Lim, 2015).

In 2015 Jokowi extended a moratorium set by his predecessor, President Yudhoyono, that halts the issuance of new conversion permits for primary forests and peatlands for business purposes (Jakarta Post, 2015). Jokowi also announced plans to claw back concessions in fire-prone peatlands that have not been cultivated (Chan, 2016), an important response to the recent land banking trend in Indonesia. The beginning of 2016 saw the establishment of the Peatland Restoration Agency (Badan Restorasi Gambut, BRG), tasked with coordinating and accelerating the recovery of peatlands to increase their resilience against fires. Led by a team of conservationists, the BRG aims to rehabilitate more than 2 million hectares (Situmorang and Dunstan, 2016). To complement this, Jokowi also announced a moratorium on all activities that could damage the nation's peatlands (Harvey, 2016). The President signed Government Regulation No. 57/2016, which declared that no new land opening on peatlands will occur until the zonation for conservation and cultivation is fixed.

In April 2017 Jokowi announced plans to issue a decree on a new moratorium suspending all new oil palm plantation issuances for the next three years (Rachmat, 2017). This is the first land moratorium specifically targeting the oil palm industry. Contrary to past policies that focused on market creation to meet ever increasing palm oil production targets, a draft text of the new proposed moratorium highlights intensification as a strategy to reduce pressure on land. Through this moratorium, Jokowi aims to reduce further geographical expansion of the palm oil industry through increasing productivity on existing planted areas through replanting with improved seeds, encouraging certification, and also smallholder capacity building. The president stated that "current plantations are enough, as long as the seeds are proper, it is possible to double productivity" (CRR, 2017a). The draft moratorium also specifically instructs provincial governors, district heads and mayors to postpone the issuing of principle location permits and clearing permits for new oil palm plantations (CRR, 2017a).

Large manufacturing corporations that buy oil palm in bulk from Indonesian growers have also been receiving pressure from their consumers to source their palm oil more sustainably. As a result, 365 global companies have adopted zero-deforestation or NDPE policies, including 25 of the largest palm oil traders and refiners in the world (CRR, 2017b). For example, Unilever has released its Sustainable Palm Oil Sourcing Policy which commits the

company to sourcing 100% NDPE palm oil by 2020. Unilever uses about 1 million tonnes of crude palm oil (CPO) and about 0.5 million tonnes of palm kernel oil (PKO) per annum in the manufacturing of its consumer goods. This makes Unilever among the largest users of palm oil in the world, buying up about 8% of global palm oil production (Unilever, 2017).

These are new forms of market-driven change that are having land saving effects. If a grower continues to develop its land bank on peat, through deforestation or by exploiting local communities, it runs a risk of suspension by buyers with NDPE policies, and will be unable to sell CPO and PKO. Indeed, Indonesian growers such as IOI Corporation, Austindo Nusantara Jaya, Sawit Sumbermas Sarana, and Provident Agro have been suspended by their buyers due to NDPE non-compliance. Even if these growers find niche buyers that do not adopt NDPE policies, this would likely be at a cheaper price. In contrast, NDPE compliant growers enjoy wider, more secure markets, and can sell their CPO and PKO at higher prices (CRR, 2017b). Hence, the potential benefits from green products can be used to compensate the 'benefits' of using primary forests, peat, and exploitation (Purnomo et al., 2018). While a booming market can result in expansion in accordance with the Jevons paradox, a market that changes to display a preference for land saving should result in intensification to make up for the lost opportunities of expansion. Indeed, the research consortium Chain Reaction Research calculated that about 29% of Indonesia's land bank which has already been leased out cannot be developed without violating buyers' NDPE policies (CRR, 2017b).

The combination of market pressure and the newly proposed government moratorium, if passed, will impact on the oil palm industry's expansion potential. The moratorium will effectively halt any new increases in land leased out for oil palm, and this would limit expansion to only 3 million hectares in the future, based on existing permits (Rachmat, 2017). Within these 3 million hectares of potentially developable land, growers would be unlikely to develop the 29% that do not fulfil NDPE requirements if they cannot find a market for non-NDPE CPO and PKO. Undeveloped land would likely be subject to the claw back provision where licenses for unused productive forestland can be revoked. This means that only about 71% of the 3 million available hectares[17] can be developed. While this is still a huge area to be developed and significantly more than the estimated 0.5 million hectares set to be developed in Sarawak, it still indicates a significant shift away from policies that incentivise expansion in the past.

It is possible that shifting consumer patterns and new moratoriums will trigger an about-turn in Indonesia's strategy, from historically expansionist to land saving in favour of intensification. However, there are risks that come along with such increased regulations. As we know, the Malaysian palm oil industry is among the most regulated industries in the country, and yet most of the big plantation players in Malaysia are local companies, who are less likely to divest if regulation gets too tight. This is not the case with Indonesia. Over-regulation of the Indonesian oil palm industry, which is made up of about 50% foreign interests, may result in investors leaving the country for newer greenfield areas like Africa, Papua New Guinea or Latin America (CRR, 2017a), a point which the Indonesian Presidential Staff Office concurs.[18] Hence, the most likely outcome may be that both expansion and intensification will occur simultaneously in Indonesia.

[17] Author's own calculations extrapolated from available sources.
[18] Interview with officials at the Indonesian Presidential Staff Office on 6 January 2016.

The clock is ticking. Indonesia is going to face scarcity for land suitable for sustainable oil palm cultivation in the near future. According to a study by Pirker (2016) which maps the lands suitable for oil palm cultivation, there are 18.2 million hectares of land in Indonesia suitable for the plant. With 12.3 million hectares already in operation as oil palm plantation areas, there are around 5.9 million hectares left for further cultivation. As many scholars have argued, the business model that relies on expansion to satisfy increasing demands is no longer feasible (Murphy, 2007; Pirker et al., 2016). And yet, change will not be easy. The government is not the only actor affecting public policy and its results. On February 2017, the government issued new rules to oblige agribusinesses to hand over and protect carbon-rich concessions in protected peat areas. Rather than sitting quietly, the business sectors, aided by politicians, resisted the regulation and brought the regulation to the Supreme Court. On October 2017, the Supreme Court finally concluded that the regulation is invalid (Jong and Arumingtyas, 2017).

While the President has proposed a new moratorium and is attempting to hold companies accountable for their actions, it remains unclear when and how seriously the measures will be implemented. Furthermore, the issue of intensification policies is located in a complex policy environment of land use trade-offs and competing interests. In Indonesia, forest and land management is not only related to the interactions between government policies and the industry, but also to other actors such as indigenous people and local populations. For instance in September 2017, in response to land conflicts between companies and forest dependent communities, President Jokowi issued Presidential Regulation No.88/2017 on Resolving Land Disputes Inside Forest Zones (Peraturan Presiden Nomor 88 Tahun 2017 tentang Penyelesaian Penguasaan Tanah dalam Kawasan Hutan) to protect the rights of indigenous people and local communities. However, this policy could have unintended consequences related to forest conservation. Using this regulation, smallholders claiming local community status can legally add more lands for their oil palm land.

4. Conclusion

The key economic principles of Jevons' classic paradox are reconstituted in contemporary energy, forestry and extractive sectors, where efficiencies lead to lower costs and potential savings, but demand and consumption continues to rise, thus driving growth and increases in total output. The human manifestation of the Jevons paradox, driven by complex social and political factors, means that R&D technical breakthroughs, such as high-yielding seed varieties and ideal levels of nutrients and fertilisers for plants, makes production more efficient and enables consumers to buy more palm oil. When palm oil is produced more efficiently, for example, the basic tendency is for people to buy larger volumes of edible palm oil, to fill larger items of cookware, and to prepare larger (often excessive) quantities of food. Middle class Indonesians, Malaysians and many others seem to be living in a culture of excess, and arguably have not yet hit the crucial (but difficult to quantify) turning point in the Kuznets curve, where rising incomes and shifting consumer preferences begin to reduce environmental impacts. There is, however, a potential market impact stemming from pledges by commercial buyers to use only "no deforestation, no peat, no exploitation" (NDPE) palm oil that needs to be monitored. And yet we are still facing the sustainability dilemma raised by Czech (2006), who found that efficiencies — which in our case result from intensification, R&D and better land management linked to incentives — will increase consumption rather

than biodiversity conservation, keeping us locked in a model of economic growth that requires further land conversion and deforestation.

This paper conducted a research mapping exercise to explore the interconnected but divergent trends of land use change in Indonesia and Malaysia. Generally for both countries during the early years of the palm oil boom, the increasing price and demand for CPO and PKO resulted in high levels of market-driven intensification as more farmers changed their product mix to the more profitable oil palm. Different socio-political developments in both countries have resulted in almost opposite trajectories of land use. Most significantly, expansion in Malaysia has been constrained by the Malaysian government's voluntary pledge in the late 1990s to keep 50% forest cover, and this has steered Malaysia's oil palm strategy towards technology-driven intensification alongside controlled expansion. Malaysia's 50% pledge is non-binding and politically symbolic, and while there are tangible results that seem to be linked to the land conservation pledge, the degree of capital mobility and the opportunities to invest in neighbouring Indonesia have driven an expansionist corporate strategy that transcends the apparent land restrictions in Malaysia. Indonesia has made no such pledges and has followed expansionist policies focused on market creation and production goals, which has in turn resulted in limited incentives for technology-driven intensification. In short, continued prosperity in this deeply regionalised sector is based on intensification in Malaysia and expansion in Indonesia, driven not only by local interests but also significantly by Malaysian capital and investment. Hence, deforestation in Indonesia is linked to the regional palm oil complex, as Cramb and McCarthy (2016) call it, and all regional (and global) stakeholders will bear the brunt of the environmental stresses caused by increased palm oil production.

As a final observation, this paper found that in recent years, new socio-political developments in both countries are changing the patterns of land use, production and forest management. Sarawak, as Malaysia's final frontier with room for plantation expansion, has substantial state autonomy in land policies, and has the authority to exclude itself from the nationally-mandated forest cover pledge. On the other hand, the combined effects of President Jokowi's proposed moratorium to suspend all new oil palm plantation issuances, and CPO and PKO buyers who are increasingly subjecting themselves to NDPE, policies may have a land saving effect on Indonesia's land banks. There are signs of change in government policy and industry practice, and the pressure is mounting on Southeast Asian countries to find cooperative solutions to transboundary haze and deforestation that is linked to plantation agriculture, although in the words of Czech (2006), we continue to fiddle while Rome is burning.

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