学位論文の要旨（論文の内容の要旨）
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論 文 題 目
Dissertation title

A Study on Forest Permits and Deforestation in Indonesia

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The main objective of this thesis research is to investigate essential factors that explain why Indonesia has still experienced deforestation while some mitigation efforts has been established and implemented. Reducing deforestation in Indonesia contributes to climate change mitigation at a globally and regionally significant scale (Busch et al. 2015). Some policies and actions have been undertaken by the government to reduce forest cover loss and GHG emissions from forestry sector, such as the moratorium forest policy, illegal logging prevention, the preparation for reducing emissions from deforestation and forest degradation (REDD), Sustainable Forest Management (SFM), forest and peat land fire prevention, forest land use boundary and customary enforcement, One Map Initiative, and so forths. However, deforestation in Indonesia remains high, in terms of the amount of area and rate. The Global Forest Change (GFC) or Hansen dataset (Hansen et al. 2013), at which the present analysis is based on, reports that forest cover has been reduced from around 0.75 million ha in 2001 and nearly 1.18 million ha in 2005 to 2.03 million ha in 2012, or on average nearly 1.30 million ha/year during this period. The recent data from the Ministry of Forestry reports that the rate of deforestation was around 0.61 million hectares in 2011-2012 (MoF 2014).

The majority of forests in Indonesia is state forest, managed under concession or permit system (Karsenty et al. 2008). Multifarious types of forest permits are issued, especially for commercial purposes. Two major permits are the logging permit (LP) for productive (high tree cover) production forest, where permitted business entities may harvest timber selectively referred as, and the plantation conversion permits (PCP) for unproductive production forest, where permitted business entities must first do planting and then harvest the timber when the planted trees are mature. In recent decades, although forest permit system has been criticized because of their damaging environmental impacts (Gautam et al. 2000; Dennis et al. 2008; Amacher et al. 2012), the causality and the association between forest permits and deforestation remain inconclusive. By expecting a positive correlation for LP and a negative association for PCP, therefore, the first analysis of this thesis is to estimate impacts of forest permits on deforestation.

Within forest permit system, global society has put a strong attention for unsustainable logging practices (Dudley et al. 1995; Sierra 2001; Gullison 2003; Damette and Delacote 2011). To counteract environmental issues surrounding timber harvesting, such SFM guidance or practices have been developed and promoted for decades (Gullison 2003; Dennis et al. 2008). Indonesia has adopted, developed and promoted SFM certification schemes since 1993, in the forms of the voluntary or the market-driven and the domestic or the government-established schemes. Although it has been more than two decades, the domestic SFM certification scheme has not been analysed yet. The second research topic of this thesis aims at investigating this potential mitigation of the mandatory SFM certification scheme on deforestation reduction, expecting that it can significantly reduce deforestation.

As forest resources decline, forest land will be likely to be converted to other land uses. The government has established the Convertible Forest that can be legally but limitedly converted to other non-forest land uses (such as infrastructure provision, agriculture development and mining). Forest conversion is also stimulated by other factors, especially higher rent values of other non-forest land uses. Rapid agricultural expansion, especially oil palm (Casson 2000; MoF 2008; Hansen et al. 2009), has been cited to be one of the major causes of forest

conversion that bring significant pressures on forest (Margono et al. 2012; Gaveau et al. 2013; Abood et al. 2014; Lee et al. 2014; Busch et al. 2015). To mitigate deforestation in oil palm development, increasing oil palm productivity has been proposed by scholars and adopted by the government and the international development institutions (WB 2011; Miyake et al. 2012; Hoffmann et al. 2014). However, their relationships are mixed in which improved oil palm could be potential or risks for the forest. Hence, the last analysis of the thesis is to quantitatively investigate impacts of oil palm expansion and productivity on deforestation in Indonesia, expecting that oil palm expansion accelerates deforestation while oil palm productivity mitigates deforestation.

The main data of this thesis is based on the first version of GFC (Hansen et al. 2013). In the analysis, deforestation is measured by annual forest cover loss at current year in the period of 2000-2012. The first and the last analysis have been done with panel data at provincial level, while the second analysis is at forest permit level. By employing the fixed-effect estimation, the first analysis results in the insignificant sign of LP, but unfortunately PCP stimulates a greater deforestation. Unexpected results have also been revealed in the second analysis using the random-effect estimation, in which mitigating impacts of the domestic SFM certification to reduce deforestation can not be robustly confirmed, but partially observed. Since the effects of the agricultural yield on deforestation is mediated through the agricultural area expansion, the Causal Mediation Analysis (Imai et al. 2010) is employed for the last analysis. Results show that both the oil palm productivity and the oil palm area have positive and significant impacts on deforestation. Approximately 54% of total effects of oil palm productivity on forest cover loss are mediated through the area expansion of oil palm.

Several results of this thesis` analysis have been in consistency with other empirical studies (an insignificant association between LP and deforestation, and a positive correlation between oil palm expansion and deforestation). However, results on PCP, the domestic SFM certification and the oil palm productivity have been on the contrary with the expectation and the current policies, in which the government has established and supported PCP, SFM and oil palm productivity to be some of mitigation actions to reduce deforestation. This thesis argues that the unexpected results of PCP and oil palm productivity are mainly due to the fact that most of PCP and oil palm plantation have been established on the forested areas (Koh and Wilcove 2008; Obidzinski and Chaudhury 2009; Carlson et al. 2012). Hence, suspending new permits for PCP and oil palm plantation could be a temporary alternative policy to reduce deforestation in a short-term. However, it is highly recommended for the government to reposition their current policies by emphasizing on some longer-term actions, such as redefining the current criteria of unproductive and forested areas, evaluating the current implementation of PCP, the oil palm plantation and the domestic SFM, and directing and incentivizing the development of oil palm on unproductive and non-forested areas. In sum, this thesis concludes that reducing deforestation has to take into account other non-forestry factors that potentially bring about crucial effects on deforestation.