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Exploring the design of jurisdictional REDD+: The case of Central Kalimantan, Indonesia☆

Silvia Irawan[a,*], Triyoga Widiastomo[a], Luca Tacconi[b], John D. Watts[a,c], Bernadinus Steni[a]

[a] Inovasi Bumi, Jl. Ciungwanara I No. 32, Renon, Denpasar Selatan, 80226 Denpasar, Bali, Indonesia
[b] Crawford School of Public Policy, The Australian National University, Canberra, Australia
[c] Earth Innovation Institute, 98 Battery Street, Suite 250, San Francisco, CA 94111, United States

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ABSTRACT

Jurisdictional approaches to REDD+ have received less attention than project-based REDD+ activities, yet they are needed for the successful implementation of REDD+ at the national level. Three subnational levels can be considered for the implementation of jurisdictional REDD+ in Indonesia: Provincial, District and Village. REDD+ implementation should involve all levels of jurisdiction, however, the implementation at the village level will be better coordinated at the district level due to the size of areas and potential emissions reduced. In this paper, we estimate the potential contribution of sub-national jurisdictions to reducing deforestation and greenhouse gas emissions using a case study from Central Kalimantan. District governments can contribute to reducing emissions by stopping deforestation from oil palm concessions, which in the case study considered has the potential of reducing emissions by as much as 15% from the business as usual scenario. Provincial governments have the authority to reduce emissions from state forest areas. In Central Kalimantan, if no more deforestation occurs in production forests, the projected avoided emissions between 2013 and 2020 are about 21% from the business as usual scenario.

1. Introduction

The successful implementation of REDD+ will require a national approach, which should also take into account sub-national level issues (Streck, 2010). Therefore, whilst most studies have focused on the implementation of REDD+ projects (Boer, 2018), there has been a growing interest in the so called jurisdictional approach to REDD+.[1] The approach aims to reduce greenhouse gas (GHG) emissions at the scale of an entire jurisdiction (Nepstad et al., 2013). Jurisdiction in this context refers to the administrative unit at the chosen administrative level, such as country, state (in a country with a federal system), province or municipality (Feldman and Martin, 2005).

The jurisdictional approach is compatible with a national level implementation approach (with or without sub-national implementation). This is demonstrated by the Jurisdictional and Nested REDD+ (JNR) framework developed by the Voluntary Carbon Standard (VCS). JNR is a carbon accounting and verification platform (which also includes tools to assess leakage and the risk of non-permanence) that can be used by jurisdictions to develop REDD+ programs.[2] Two positive features of a jurisdictional approach are also at the core of the preference for a national level approach to the implementation of REDD+. First, it can be designed to operate across an entire jurisdiction so that it can align all processes that may take place within it, such as domestic policies (Earth Innovation Institute, 2017; Nepstad et al., 2013). Secondly, given its larger geographical basis, it can address the issues of permanence and leakage better than project-based REDD+.

Whilst many REDD+ projects have been implemented and analyzed (Angelsen et al., 2012; Panfil and Harvey, 2016), there is much less experience with, and knowledge about, the implementation of jurisdictional REDD+. The state of Acre (Brazil) is the most advanced jurisdictional REDD+ to reduce emissions from deforestation (Alencar et al., 2012; Nepstad et al., 2012). The choice of the jurisdictional level for the implementation of REDD+ may seem straightforward: for example, Brazil has a federal system and REDD+ is implemented at a

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* Corresponding author.
E-mail address: sirawan@inobu.org (S. Irawan).

[1] A Google Scholar search carried out on 4 October 2017 yielded 13,410 citations from a search for "REDD* project" and 183 citations for "jurisdictional REDD*".

[2] http://www.v-c-s.org/project/jurisdictional-and-nested-redd-framework/.

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jurisdictional level of the state in Acre. However, normally countries have several jurisdictional layers and whether just one or multiple layers need to be involved has to be considered.

Indonesia intends to implement REDD+ as part of its Nationally Determined Contribution to reducing emissions through the "National Approach with Sub-National Implementation" approach (Government of Indonesia, 2016). However, there have not been specific studies considering the level of jurisdiction at which REDD+ could be implemented, although the potential role of local governments in forest conservation has been highlighted in several studies (Irawan et al., 2014; Irawan and Tacconi, 2016; Nurfatriani et al., 2015). In the case of Indonesia, a jurisdiction can range from the village level (according to the Village Law no 6/2014)[3]; the district and the provincial levels (according to the Local Government Law); and the national level. The Ministry of Environment and Forestry currently considers establishing a Forest Reference Emission Level (FREL) only at the provincial level, while there are no ongoing discussions in the country about establishing FREL at the other government levels.[4]

This paper investigates the issue of which jurisdictions may need to be considered for the implementation of programs aimed at reducing GHG from forests in Indonesia, and how jurisdictional REDD+ could be designed in the case study considered. It specifically aims to answer the following questions: At what level of government should jurisdictional REDD+ be implemented, and what is the feasibility of each option (provincial, district, village)?

The paper is structured as follows. First, it summarizes the main building blocks of jurisdictional REDD+ and then presents the roles and responsibilities of different jurisdictions in Indonesia. The regulatory analysis was carried out to understand how the authority for land use is devolved to different government levels, which also determine their power to reduce deforestation and to implement REDD+ within jurisdictions. The paper then presents estimates of the reference emission levels and identifies possible actions to reduce emissions at different jurisdictional levels. The analysis is focused on the level of the jurisdiction of a village, Sungai Sekonyer, located in Kotawaringin Barat district, which is part of Central Kalimantan province. Finally, a comparison of the jurisdictions and the conclusion of the analysis are provided.

2. Building blocks for jurisdictional REDD+, authority and jurisdictions in Indonesia

To implement jurisdictional REDD+, a number of important elements need to be established. In late 2017, several regulations were issued by the Ministry of Environment and Forestry (MoEF) on the implementation of climate mitigation actions, including REDD+. Ministerial Decree 70/2017 specifically stipulates the implementation of REDD+, including the forest reference emission level (FREL), REDD + National Registry System (NRS), Monitoring Reporting and Verification (MRV), Safeguard Information System (SIS) and payments. The details of the NRS are further elaborated in Ministerial Decree 71/2017. The MRV is discussed in detail in Ministerial Decree 72/2017, while the inventory of greenhouse gas emissions is regulated in Ministerial Decree 73/2017. The highlights of the regulations that are relevant to this paper are provided below.

A jurisdiction has to develop a baseline reference level and target for deforestation reduction for the entire jurisdiction. A baseline reference level provides an estimate of the future GHG emissions from deforestation and forest degradation (Olander et al., 2008) that would take place within the jurisdiction in the absence of REDD+. The baseline reference level should be agreed upon and formally adopted by a regulation within a jurisdiction that plans to receive REDD+ offsets (Nepstad et al., 2012). Once a reference level is established, a crediting reference level may be necessary to set the target for deforestation reduction in a jurisdiction. This crediting reference level is usually established below the baseline level where offsets can be issued.

In 2016, Indonesia submitted its national FREL document to the UNFCCC detailing the definition of deforestation and the reference level. The national FREL was developed based on the historical rate of deforestation, forest degradation, and peat decomposition between 1990 and 2012 as the reference period (MOEF, 2016). Based on the historical emissions from 1990 to 2012, the emissions from deforestation, forest degradation and the associated emissions from peat decomposition for 2013 was projected to be 0.57 GtCO2e. Emissions are projected to increase to 0.59 GtCO2e in 2020 (MOEF, 2016). The reduction target set by the first Nationally Determined Contribution is reducing as much as 29% of emissions against the business as usual scenario by 2030 with domestic resources. A further reduction of 12% below the business as usual scenario by 2030 would be implemented if there were international support, including that for REDD+ (Government of Indonesia, 2016).

With the current approach to REDD+ implementation, the success of reducing emissions from deforestation and forest degradation is measured at the national level and not at the subnational level (MOEF, 2016). In the FREL document submitted to UNFCCC (MOEF, 2016), the estimations of FREL have been conducted for the main islands of Java, Kalimantan, Maluku, Nusa Tenggara – Bali, Papua, Sulawesi and Sumatra. The national government is currently developing provincial level FRELs and will then assign quotas to provinces to reduce deforestation. It should be noted that, the process is on-going without much consultation with provincial governments. There is no current plan to develop FRELs at the district level. The issue of nesting and the methodology to develop the FREL has not been regulated. However, since every province is divided into several districts, the jurisdictional baseline developed at the lower level could be nested, or accounted for, into a higher jurisdiction. Similarly, as each district is subdivided into several villages, nesting the expected emissions reductions from the village level to the district level would be viable.

To ensure the aggregate of the subnational FREL does not exceed the national FREL that has been established, it is important to have a quota for each province. The Ministerial Decree 70/2018 specifically mentions assigning a buffer for the subnational FREL considering the biogeophysical condition (based on carbon stock-flow analysis), the need for development and the risks of not achieving the emission reduction targets. There was no further explanation on how the buffer would be developed.

Once the FREL is clearly assigned to each local government, actions should be developed and registered through a National Registry System (NRS). In November 2016, the Ministry launched the NRS, although the regulation regarding the NRS (Ministerial Decree 71/2017) was only issued in late 2017. The Decree establishes the process of registering activities including mitigation, adaptation and joint mitigation-adaptation actions. The Decree clearly stipulates the roles of the MoEF to monitor, evaluate and report actions as well as to provide a certificate as an acknowledgement.

3. Environmental, economic and social aspects of the case study area

The study focuses on Central Kalimantan province, and within that considers Kotawaringin Barat district and Sungai Sekonyer village

[3] The Village Law 6/2014 provides increased authority to villages, which are the smallest administrative units in the country. The Village Law also provides the authority to a village to plan and execute development activities funded by the village budget, the contribution of local communities and also the district budget. Villages have the authority to develop a village spatial plan to identify, manage and determine the types of activities to use space at the village level.

[4] Based on a discussion between the members of Governors Forest and Climate Task Force and Director for GHG Inventory and Monitoring, Reporting and Verification of the Ministry of Forestry and Environment on 17 July 2017 in Jakarta.

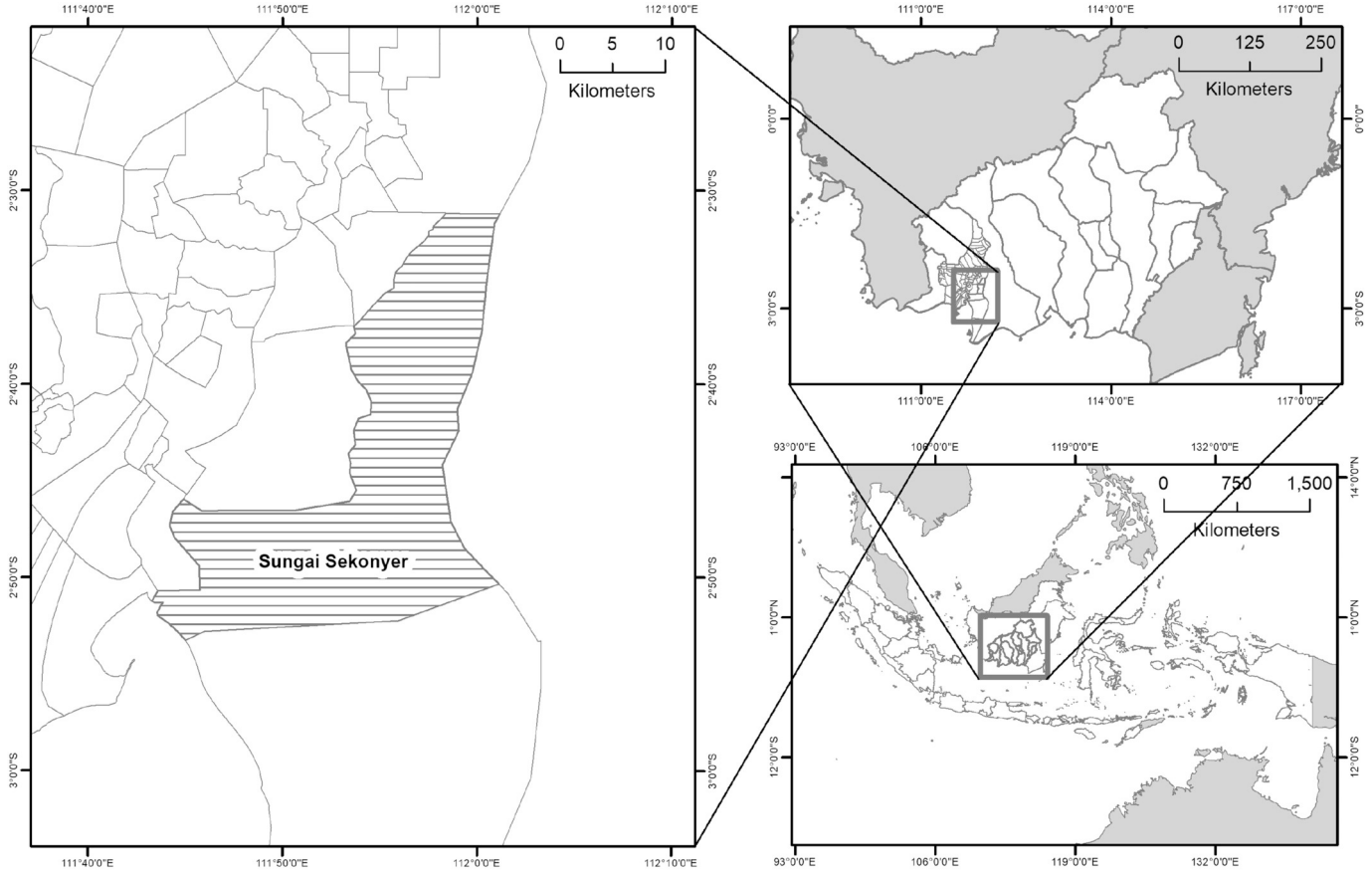

Fig. 1. Map of Central Kalimantan, Kotawaringin Barat District and Sekonyer Village.

Table 1
Land classification in the case study areas.

	Protected Area	Production Forest	Conversion Forest & Non-Forest Area
Central Kalimantan Province	19%	46%	33%
Kotawaringin Barat District	23%	30%	46%
Sungai Sekonyer Village	82%	4%	13%

within that district (Fig. 1). Central Kalimantan is a large province with a total land area of 15.5 million hectares, slightly larger than Bangladesh or Nepal. Kotawaringin Barat district has a total land area of around one million hectares, similar to the size of Lebanon. Sungai Sekonyer village is located at the center of Kotawaringin Barat district. The total area of the village is 57,031 ha, and around three quarters is located within the Tanjung Puting National Park (TPNP). All these jurisdictions still have a large share of their land covered by forests (Table 1). Each district in Central Kalimantan has different proportions of production and conservation/protection areas.

We apply the following methodology for the spatial analysis. In order to identify the deforestation rate within the natural forest cover from 2001 to 2016, we masked the global forest cover change dataset version 1.4 from Hansen et al. (2013) using the 2000 primary forest cover dataset from Margono et al. (2014). The global forest cover change needs to be masked because it also includes agro-industrial tree cover, such as oil palm estates (Bellot et al., 2014; Tropek et al., 2014). The 2000 primary forest data is defined as mature natural forests of 5 ha or more, including both primary intact forest and primary degraded forest (Margono et al., 2014). The definition of primary intact forest and primary degraded forest are similar to the MoEF's primary forest and secondary forest, respectively. The overall agreement from MoEF's land use map and primary forest cover by (Margono et al., 2014) data comparison is more than 90%, indicating a very high similarity between the two dataset (MoEF, 2016).

To assess the land use change after deforestation, we used both the masked global forest cover change and land use map from MoEF. The former was used to estimate the annual deforestation rate from 2001 to 2016, while the latter was used to explain the land use change after deforestation of 2000, 2003, 2006, 2009, 2011, 2012, 2013, 2014, 2015 and 2016 (Hansen et al., 2013; Margono et al., 2014; MoEF, 2015). The land use change after deforestation was assessed by analysing the deforestation from both datasets that matched both spatially and temporally. The forest-use designation map was derived from the 2014 provincial spatial plan and 2010 administrative boundaries.

Agriculture contributes about 30% of the regional gross domestic product (RGDP) of Central Kalimantan.[5] At the provincial level, oil palm is the major commodity produced with a total operational plantation area of 1.3 million hectares (the size of small country like Bahamas or Montenegro),[6] followed by rubber with an area of 445,134 ha. However, only a few districts are currently palm oil producers,

[5] http://www.kalteng.go.id/goto.asp?URL=http://kalteng.bps.go.id.

[6] See Setiawan et al. (2016) and Sumarga and Hein (2016) for descriptions of oil palm expansion in Central Kalimantan or Susanti and Maryudi (2016) and Cramb and McCarthy (2016) for more broadly in Indonesia.

including Kotawaringin Barat, Seruyan, Kotawaringin Timur. Other districts mainly produce rubber, rice and other commodities. The plantation sector is the biggest employer in the agricultural sector in the province (with 196,675 households involved), followed by the food sector (146,650 households).[7]

The three largest contributors to the district economy of Kotawaringin Barat are agriculture, manufacturing, and trade, and restaurants and hotels. During the period 2008–2013, the regional gross domestic product (at current prices) of Kotawaringin Barat nearly doubled, with the main contributor being the agricultural sector, especially oil palm plantations. The second main source of growth was the trade sector, also due to the fact that Kotawaringin Barat is home to Tanjung Puting National Park, with a large orangutan population. Many tourists pass through Pangkalan Bun, the capital city of Kotawaringin Barat. Furthermore, the agricultural sector is the biggest employer in the district, where plantations provide the largest contribution to earnings for agricultural households (BPS Kotawaringin Barat, 2013).

Sungai Sekonyer village has the largest land area compared to other villages in the Kumai sub-district. Sungai Sekonyer had 538 residents in 2012, grouped into 158 households (BPP Kumai, 2013). The major livelihoods were agriculture including livestock, and fishing. One oil palm plantation that is currently operating in Sungai Sekonyer is Andalan Sukses Makmur (ASMR). ASMR obtained the location permit from the government of Kotawaringin Barat to open an oil-palm plantation in Sungai Sekonyer village, Teluk Pulai village and Kumai Hilir village. With a total area of 9276.5 ha, including 930.84 ha identified as high conservation value area (RSPO, 2014). The total area of the permit in Sungai Sekonyer village is 4082 ha.

Data from the Ministry of Environment and Forestry from 2016 indicates that there were 7.4 million hectares of forest cover in Central Kalimantan or 48% of the total land area. The rate of deforestation in Central Kalimantan between 2001 and 2016 was 93,840 ha annually (Fig. 2). Immediately after deforestation, the landcover was bareland and scrubland, which accounted for 78% of the total deforestation. In 2016, some areas classified as bareland and scrubland have been further converted to agricultural areas or plantations. The total areas classified as bareland and scrubland decreased from around 77% at the time deforestation occurred to only 45% in 2016 (Table 2).

Annual deforestation in Kotawaringin Barat averaged at 11,648 ha between 2001 and 2016 (Fig. 3). At the district level, the direct land use change after forest clearing is mainly scrubland and bareland which is around 61%, while around 30% of natural forests were converted to agricultural lands and plantations. In 2016, only 13% of the total deforested area remained as bareland and scrubland, while the rest have been further converted to agricultural areas and plantations (Table 2).

Deforestation in Sungai Sekonyer Village between 2001 and 2016 was recorded at 1448 ha annually (Fig. 4). The land was mostly converted to scrubland/bareland immediately after forest clearing. Around 31% of the deforested area was later converted to plantations, based on the satellite image taken in 2016.

In 2015–2016, there was a significant jump in deforestation occurrence at all levels of government in Central Kalimantan. The significant increase was mainly due to the extensive forest fires during the El Niño event over that period.

4. Options for reducing deforestation and forest degradation

The options for reducing deforestation and forest degradation largely depend on the authority of each jurisdiction over land use activities. At the national level, different government agencies are responsible for land management in different land classifications (Brockhaus et al., 2012; Sahide and Giessen, 2015). Areas classified as

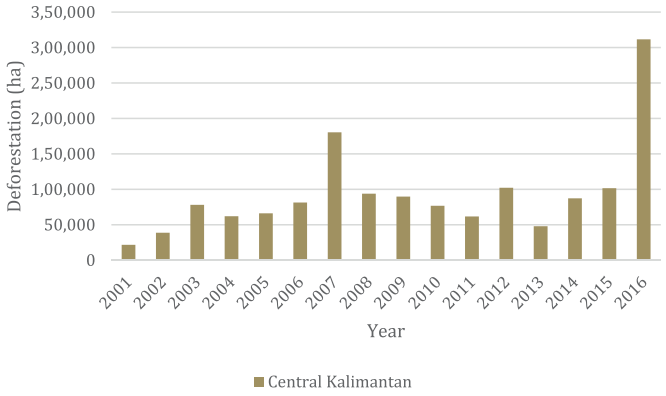

Fig. 2. Total area deforested annually in Central Kalimantan.

Table 2
Land use change following deforestation in Central Kalimantan, Kotawaringin Barat and Sekonyer Village.

	Forest Cover Change					
	Central Kalimantan		Kotawaringin Barat		Sungai Sekonyer	
	Direct LU change*	2016 Land use	Direct LU change*	2016 Land use	Direct LU change*	2016 Land use
Scrubland	48.36%	38.42%	52.98%	8.89%	76.68%	68.27%
Plantation	20.76%	49.91%	27.99%	58.75%		31.73%
Settlements		0.04%				
Bareland	28.38%	6.98%	8.84%	4.29%	23.32%	
Agriculture	1.80%	3.61%	10.19%	28.06%		
Mining	0.69%	1.04%	0.01%	0.00%		

* We observe the immediate land use after deforestation. Deforestation was measured periodically based on the data available.

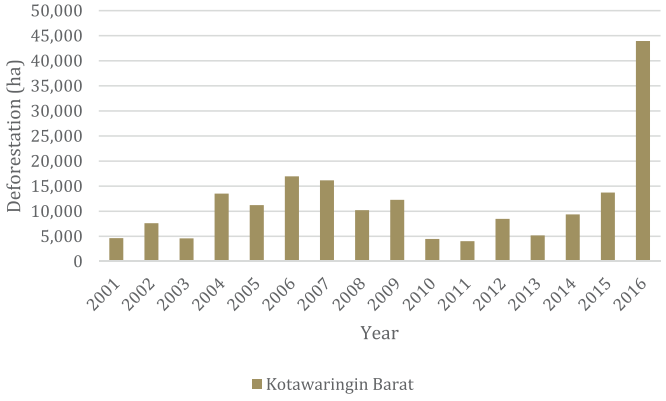

Fig. 3. Total area deforested annually in Kotawaringin Barat District.

state forest are controlled by the central government and administered through the Ministry of Environment and Forestry. Therefore, deforestation in state forest would seem to be the primary responsibility of the national government, and, eventually, the jurisdictions that are delegated the management authority.

In non-forest areas, governors or district heads have the authority to issue permits for the utilization of land for plantations, mining, housing and others, while the Land Agency is responsible for land administration. District governments have the authority to issue licenses for companies to operate in areas classified as productive lands, or known as area for other purposes (area penggunaan lain), while village governments usually represent the local communities in negotiating with companies or investments entering their village. The provincial level has limited power in terms of agricultural activities. The provincial

[7] https://st2013.bps.go.id/dev2/index.php/site?id=62&wilayah=Kalimantan-Tengah, downloaded on 12 March 2018.

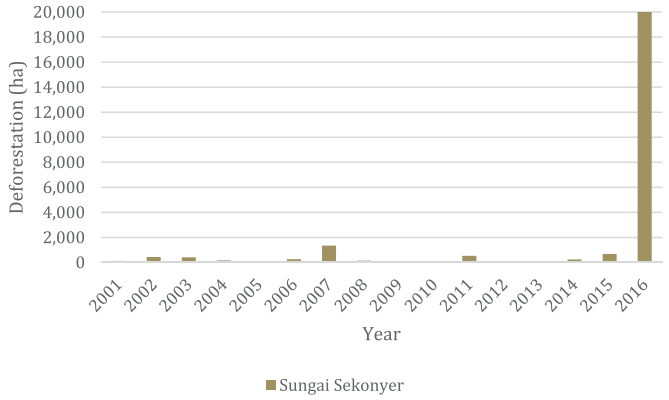

Fig. 4. Total area deforested annually in Sungai Sekonyer.

government is only responsible for issuing licenses in areas that cross districts.

We apply the methodology presented in the FREL document (MOEF, 2016) to estimate the baseline level which is the total emissions generated when no action or effort is taken. Based on the analysis, we can estimate the magnitude of emissions reduction at different government levels and then assess the feasibility of REDD+ implementation at different levels. As previously mentioned, the national FREL was developed based on the historical rate of deforestation, forest degradation, and peat decomposition between 1990 and 2012. Based on the historical emissions within that period, the future emissions from deforestation, forest degradation and peat decomposition are predicted for the period of 2013–2020. The potential of emissions reduction in each jurisdiction considers the actions that have been identified to avoid deforestation, forest degradation and peat decomposition within a jurisdiction based on the historical patterns of deforestation, forest degradation, and peat decomposition between 1990 and 2012. This paper does not apply spatial modelling in the estimation of the potential reductions of the emissions which identify the specific locations where the activities can be implemented, as it is beyond the scope of this study. In addition, although recent research has shown that historically converted peatlands continue to emit CO2 unless properly restored or inundated (Wijedasa et al., 2018), these emissions are beyond the scope of this paper.

4.1. Stopping encroachment

The authority to manage national parks remains with the Ministry of Environment and Forestry (Bettinger, 2015). Stopping encroachment should therefore be the main focus of the park management unit (which is a unit of the ministry). However, the involvement of local communities surrounding the park and the district government is crucial.

The village government, based on the Village Law, could decide to reduce deforestation and conserve forests. Villages are the government units with the closest proximity to the park so it could immediately detect any issues related to deforestation and report to law enforcement authorities. The villagers should be encouraged to take such responsibility to partake in conservation as follows. First, the villagers need to have the understanding that the national park is part of their village so they can actively participate in forest conservation and obtain the benefits from it such as through eco-tourism or harvesting non-timber products in the areas surrounding the buffer zone. Economic activities that are allowed by government regulations can be promoted for the villagers. Second, after the villagers understand the importance of conservation, knowledgeable villagers could report any illegal practices to the authorities. The village government could also issue a regulation that prohibits illegal activities in the buffer zone and enforce the regulation through applying sanctions to people who violate the regulation.

Based on the national FREL methodology, the total emissions that would be generated under the business as usual scenario in Sungai Sekonyer is estimated at 838,963 tons CO2e between 2013 and 2020. If the village government of Sungai Sekonyer were to entirely reduce encroachment, the total emissions that would be reduced is around 333,681 tons CO2e by 2020. This figure is equivalent to 142 ha of secondary swamp forests deforestation per year. This initiative could reduce as much as 40% of the emissions from the business as usual scenario.

If the Kotawaringin Barat Government reduced deforestation from encroachment by using the 1990–2012 period as the baseline, the total reduction of deforestation between 2013 and 2020 will be 6.1 million tons CO2e, or equivalent to 2449 ha per year or around 14% from the business as usual scenario. At the provincial level, reducing encroachment in state forests would result in the reduction of 139 MtCO2e, equivalent to a 21% from the business as usual scenario. This figure also represents around 52,000 ha per year.

4.2. Reducing conversion of forest in productive land

Between 2000 and 2016, an area of 579,633 ha of forest was cleared inside oil palm plantations throughout the province. Deforestation within concession areas in Kotawaringin Barat averaged 2052 ha annually during the period of 2001–2016. Deforestation that occurred outside plantation concession boundaries due to oil palm plantations is estimated at 22,238 ha during the same period.

There are two main options to reduce deforestation caused by the expansion of oil palm plantations in the district. First, additional licenses should not be issued in areas with forest cover. The total areas with forest cover in productive areas but without licenses are 109,067 ha and 8686 ha in Central Kalimantan and Kotawaringin Barat respectively in 2016. An additional 285,139 ha and 36,523 ha of forest cover without licenses can be found within Conversion Forests, which can be legally converted for oil palm plantations, in Central Kalimantan and Kotawaringin Barat respectively. Second, the remaining forest cover within existing areas that have been licensed to plantation companies could be conserved. The remaining forest cover within oil palm concessions was around 656,623 ha and 29,968 ha respectively in Central Kalimantan and Kotawaringin Barat in 2016. However, around 377,038 ha of these concessions are located in production forests, which are not supposed to be converted to non-forest activities. Therefore, these allocations appear to violate existing regulations and should be rescinded.

If there was no more forest clearing for oil palm within oil palm concessions in Central Kalimantan, the avoided emissions would be around 22% from the business as usual scenario, or equivalent to 54,707 ha per year. If the Kotawaringin Barat district government stopped forest clearing for oil palm entirely within oil palm concessions throughout the district, the avoided emissions would be about 15% from the business as usual scenario, equivalent to 2421 ha per year. In Sungai Sekonyer, stopping forest clearing for oil palm plantations entirely could only reduce emissions by as much as 2%, or around 8 ha per year. Furthermore, the impact of stopping new licenses being issued in production areas currently with forest cover but without licenses would only result in the reduction of 3% from the business as usual scenario in Central Kalimantan. By not issuing new licenses in conversion forests with forest cover in Kotawaringin Barat and Central Kalimantan, this would avoid emissions of up to 5% from the business as usual scenario, at both the district and provincial levels.

The implementation of the two options considered above would stop the expansion of oil palm plantations, and the total production of palm oil, unless there was a significant increase in productivity. It should be noted that the regulatory system (Government Regulation 11/2010) requires all oil palm concessions to clear forest and plant the area within a maximum period of three years from the date of the

license. Therefore, the second option noted above would only be viable if the regulatory system was changed to allow oil palm concessionaires to maintain forest areas.

4.3. Reducing deforestation from timber production

The national government retains control over the classification of forest and issuing licenses for logging activities according to the new Decentralization Law 2014. The provincial government could have some influence to reduce deforestation from timber production, as they are responsible for establishing forest management units (FMU) (Kim et al., 2016; Sahide et al., 2016). There is no regulation preventing a FMU from setting a target for reducing deforestation and forest degradation.

Around 7.2 million hectares of land is allocated for production forests in Central Kalimantan. Two major types of concessions for timber production are commercial logging and timber plantations. At present, there are 61 commercial logging concessions, with a total area of 4.5 million hectares and an annual production target of 3.5 million cubic meters. Central Kalimantan is home to 21 concessions for Industrial Timber Plantations, with 12 of them managed by state-owned companies. Forestry concession areas are not equally distributed across all districts. Kotawaringin Barat, for instance, is one of the districts with limited forestry concession areas.

Both types of concessions contribute to deforestation. In timber plantation concessions, deforestation between 2001 and 2016 is estimated at 9515 ha and 5796 ha annually in Central Kalimantan and Kotawaringin Barat respectively. In the commercial logging concessions, deforestation between 2001 and 2016 is estimated at 3299 ha and 2310 ha annually in Central Kalimantan and Kotawaringin Barat respectively.

Deforestation can be detected in the production forests that are currently under concessions or without concessions in Central Kalimantan. Higher deforestation occurrence is detected in production forests without concessions. In Central Kalimantan, if no more deforestation occurs in production forests, the projected emissions that can be reduced between 2013 and 2020 are around 21% from the business as usual scenario. If deforestation within concessions in production forests in Central Kalimantan can be stopped entirely, the projected emissions that can be reduced between 2013 and 2020 are around 8% of the business as usual scenario or 15,736 ha per year. If deforestation can be stopped outside concessions in production forests in Central Kalimantan, around 13% of emissions could be reduced from the business as usual scenario or 33,226 ha per year.

The production of timber in Central Kalimantan is declining over time. According to the Head of the Provincial Forestry Office, an assessment carried out in 2014 showed that twelve logging concessions were not active. Timber production in those concessions in previous years was below 50% of the target. The low production target is often due to no more timber stock remaining in the forests. When timber stock in a natural forest declines below a certain level (16 m^3/ha),[8] the Ministry of Environment and Forestry can allocate a production forest area to timber plantations, where the logged over areas are replaced with monocultures of timber species. As an alternative to the timber plantations, logged over areas can be allocated to ecosystem restoration concessions, whose aim can be to avoid GHG emissions and generate carbon credits. In Central Kalimantan, two such companies with restoration ecosystem concessions are: PT Rimba Makmur Utama (108,255 ha) in Katingan and Kotawaringin Timur districts, and PT Rimba Raya in Seruyan District (37,151 ha). If no more production forests are allocated to timber plantations, and, instead, they are protected as restoration ecosystem concessions, for instance, there could be a 2% reduction of emissions from the business as usual scenario.

[8] Kartodihardjo and Supriono (2000)

The contribution of the aforementioned interventions to reducing emissions from the baseline varies between jurisdictions (Fig. 5). At the provincial level, the implementation of all the interventions can reduce emissions from deforestation up to 51% from the baseline level. In Kotawaringin Barat District and Sungai Sekonyer Village, the interventions can reduce emissions from deforestation up to 37% and 42% respectively. The remaining portion comes from emissions generated from peat decomposition (44–55%) and deforestation will occur in the productive land or non-state forest areas but outside the oil palm concessions (4–8%). For the latter, deforestation is often caused by infrastructure development, food crops and other uses that are important for public interests.

5. Discussion

In Indonesia, the implementation of a national level approach to reducing emissions from forests could adopt the jurisdictional approach, designed to involve three levels: province, district and village. The possible scenario for nesting the FREL is discussed below, before we present the advantages and disadvantages of implementing REDD + at different levels.

Under the UNFCCC, the national government is the main authority responsible for the implementation of REDD + as the Climate Agreement is currently at the level of the state or the national government. So, all REDD + infrastructure should be prepared at the national level. Alternatively, the national government can provide the necessary regulations to delegate authority to lower levels of government if needed. The Government of Indonesia, through the Ministry of Environment and Forestry, has issued relevant regulations as part of building the infrastructure to implement REDD + including FREL, NRS, MRV, and SIS. However, the roles of subnational governments have not been detailed in the regulations, except that they are considered as one of the possible REDD + implementers in the regulations and that they need to carry out a GHG inventory in their jurisdictions.

To implement REDD + at the subnational level, a subnational FREL should be developed. Currently, discussions about developing FREL at the provincial level is ongoing. Using the same methodology of determining FREL issued by the Ministry of Environment and Forestry, the level of annual emissions in Central Kalimantan is estimated at 63 MtCO2e or around 14% of the total national annual emissions between 2013 and 2020. The total emissions during the same period is estimated around 657 MtCO2e, mainly from deforestation, forest degradation and peat decomposition. Stopping forest clearance in oil palm concessions could result in a 22% emission reduction from the business as usual scenario, while stopping deforestation in state forests could reduce emissions by as much as 29% from the business as usual scenario. The national commitment to reduce emissions can be applied equally across the provinces, where Central Kalimantan should reduce as much as 29% of emissions by 2030.

Central Kalimantan stakeholders can pursue several activities to reduce emissions from forests. Provincial governments have the mandate to develop spatial plans to regulate the use of lands throughout the province, including proposing for the change of functions for areas currently classified as state forests. They have less power compared to district governments in terms of issuing licensing, as they only can issue oil palm licenses if the concessions cross districts. The provincial government can regulate the behaviors of concessionaires in non-state forest areas, particularly related to oil palm plantations, through developing a set of social and environmental standards based on the Environmental Law. The provincial government can ensure corporations operate according to those standards, however, the participation of district governments is important particularly related to the enforcement of these standards. Moreover, provincial governments have the mandate to develop and administer state forest areas that are without existing licenses through forest management units. The provincial governments can develop and manage forest management units

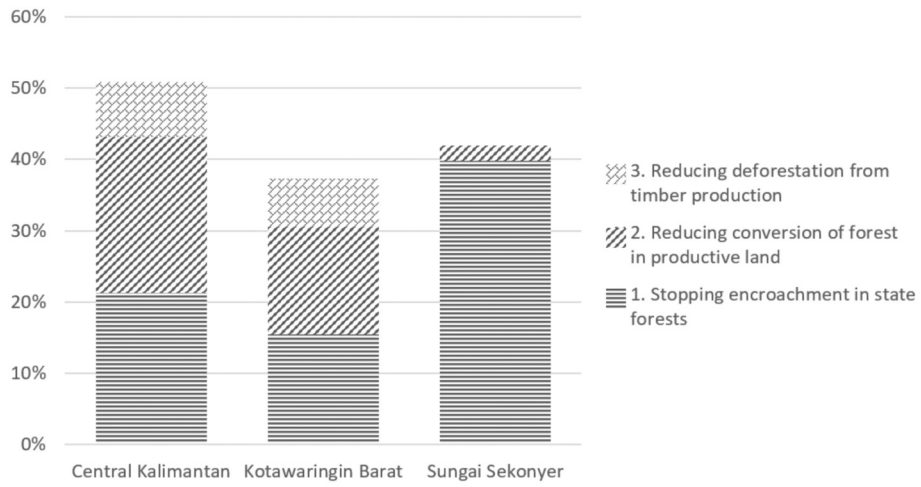

Fig. 5. The contribution of various interventions to reducing deforestation from the baseline level at different jurisdiction levels.

which could focus on the efforts for maintaining standing forests, for instance. The potential to reduce emissions from these initiatives is up to 13% from the business as usual scenario.

Currently there is no regulation or even discussion related to the FREL at the district level, although district governments play a crucial role in land management particularly outside of state forest areas. The district government can contribute to reducing emissions by stopping deforestation from oil palm concessions, which has the potential of reducing emissions by as much as 15% from the business as usual scenario. In Kotawaringin Barat, the business as usual emissions for the district is estimated to be 3.5 MtCO2e per year between 2013 and 2020. This figure is lower than the average annual emissions at the provincial level if we assume that the total emissions are distributed equally to all districts or municipalities in the province.

District governments have no power to issue any license or initiate any activity in state forests. Stopping deforestation in the production and conservation forests, however, could have the potential to reduce emissions by up to 14% and 9% respectively from the business as usual scenario. Consequently, the involvement of district governments in stopping deforestation, particularly caused by local communities encroaching forests, is crucial. District governments can incentivize or work together with village governments to reduce deforestation throughout the jurisdiction.

The implementation of REDD+ at the village level offers the potential for local level solutions for reducing deforestation. Nesting village RELs to the district level would not be problematic as districts are completely sub-divided into villages. In Sungai Sekonyer, the annual emissions are 79 thousand tons CO2e per year. In Kotawaringin Barat, there are 85 villages – where Sungai Sekonyer is one of the villages with the largest land area. The opportunity to reduce emissions in Sungai Sekonyer comes from stopping encroachment which can result in the reductions as much as 40% from business as usual scenario. Stopping oil palm production would only reduce emissions by as much as 5% from the business as usual scenario.

Actions to reduce deforestation at the village level will, however, directly impact the livelihoods of villagers. If REDD+ can generate positive benefits for villagers, that would yield the strongest forest protection measures as local villagers could immediately detect deforestation occurring in their village and take actions to address it. Moreover, REDD+ implementation at the village level presents several challenges that should be addressed together with higher levels of government. The village institutions, when they are not empowered, are often in a weak position to negotiate with private investors operating in their village. The scale of potential emission reductions at the village level is rather limited. The scale can be as low as, or lower, than the scale of project-based REDD+ implementation. Therefore, investors may need to deal with numerous village institutions, which can result in increased transaction costs. The village government may not have the authority to manage forest areas, unless their areas have been endorsed by the district government as village forests or customary forests. Finally, the village institution may not have the capacity to implement REDD+. The new Village Law provides more authority to villages, however current capacity to carry out their roles and responsibilities is rather low.

After assessing the REDD+ implementation at different levels, we can see that the activities to reduce deforestation will occur mostly at the subnational level. FREL should be assigned to the district level, and not only at the provincial level, as each district will have different situation in terms of the historical rate of deforestation and remaining carbon stock, hence, it will lead to a different FREL. The FREL should be communicated to each district so that they know how much they contribute. At the village level, it will be cumbersome to distribute FREL to all villages. The potential of emission reductions at the village level is much lower compared to REDD+ implementation at the project level. The Rimba Raya REDD+ Project Concessionaire, for instance, claimed that they can reduce as much as 4.3 MtCO2e between July 2013 and June 2014 from a total area of 65,000 ha of peat swamp forests in Seruyan district, which is next to Kotawaringin Barat district.[9] Rimba Makmur Utama, a concessionaire of 149,800 ha of peat swamp forests in Katingan District of Central Kalimantan, claimed that the emissions reduction achieved between November 2015 and December 2016 was 4.8 MtCO2e.[10] The figures are higher than the total annual emissions generated by Kotawaringin Barat district. The project proponents are currently using a different methodology to estimate the baseline than the FREL methodology used at the national level.[11]

The reconciliation of FREL from one jurisdictional level to another should be clearly regulated. At present, however, there is no clarity regarding how FREL will be distributed among different jurisdictional levels. The government could consider the proposed methodology offered by the VCS. The JNR framework developed by the VCS suggested three possible scenarios in nesting the FREL and emission credits for jurisdictional REDD+ (VCS, 2011). In the first scenario, an emissions baseline is developed and registered at the level of the jurisdiction but crediting takes place at the project level. In the second scenarios, a jurisdiction develops and registers a baseline and jurisdictional

[9] http://rimba-raya.com/wp-content/uploads/press-release/2015.09.28-Rimba-Raya-Retains-Triple-Gold-CCB-Status.pdf.

[10] http://www.v-c-s.org/wp-content/uploads/2016/06/CCB_IMP_REP_1477_13JUN2016.pdf.

[11] http://www.v-c-s.org/project/vcs-program/methodologies/.

crediting scheme. The projects then claim credits for the GHG reductions in their areas and the jurisdiction claims the credits for reductions in its area, but outside the boundaries of the projects. In the third scenario, a jurisdiction develops and registers a jurisdictional baseline, and crediting takes place only at the jurisdictional level, that is, even if specific projects are carried out within the jurisdiction they do not receive credits.

There is no detailed discussion in the regulations regarding what happens if jurisdictions fail to meet their emission reduction targets. The Ministerial Decree 70/2017 only mentions the buffer assigned to the provincial level. If emission reduction targets are not met by several jurisdictions – then it will affect the entire achievement of the country and compromise the achievement of other jurisdictions. To address this problem, the national government needs to implement a mechanism to ensure that non-performing subnational governments are sanctioned for their non-performance. Currently the Government Regulation 46/2017 on the Economic Instruments for Environmental Management provides a basis for such a system. Other economic instruments that can also be used include fines, payment for environmental services, environmental insurance, and others.

A REDD+ mechanism would face significant obstacles to stop the production of commodities for food, fuel and fiber, particularly due to the fact that they generate significant revenues. Reducing deforestation cause by oil palm plantations and timber production is costly (Irawan et al., 2013; Irawan and Tacconi, 2016; Prabowo et al., 2017; Ruslandi and Putz, 2017; Susanti and Maryudi, 2016; Varkkey et al., 2018). Based on the 2011 BPS Annual Manufacturing Survey data, eleven out of 35 palm oil manufacturers in Central Kalimantan were located in Kotawaringin Barat, with a total output of IDR 12.9 trillion in 2011. Palm oil manufacturing shows a very fast growth in the district, with a tenfold increase between 2007 and 2011. In 2011, 67% of the output was exported. Value-added products have increased from merely IDR 268 billion in 2007 to IDR 3.9 trillion in 2011. The industry employed a total of 4618 people in 2011, more than twice the employment in 2009. In contrast, Central Kalimantan's timber industries are declining. The total value of Central Kalimantan timber production is estimated at Rp 1.3 trillion with an added value of Rp 0.74 trillion in 2009. Output has declined rapidly, in 2011, the timber industry output was only Rp 19 billion with added value of Rp 1.2 billion. REDD+ finance could then be used to change how these commodities are produced to reduce deforestation. It could also focus on preventing encroachment and illegal logging, instead of the conversion of forests that have been properly planned and have legal permits. In Central Kalimantan, the contribution of encroachment and illegal logging as a cause of deforestation is significant.

6. Conclusion

Indonesia's regulations have provided a legal basis for the implementation of REDD+. However, several important design elements that have not been decided or established constrain its implementation. First, Indonesia has developed a national registry system, however, the registry should operate based on an agreed nesting strategy including how emissions reductions at lower jurisdictional levels is accounted for by the higher level government institution. The nesting strategy has not been discussed nor agreed, hence, it will prevent the implementation of REDD+ in subnational jurisdictions. Second, the national government has developed the methodology and the reference emission level. However, there is no clarity for developing FREL at the subnational level. The effort for developing FREL at the provincial level is on-going, however, there is no discussion about developing the FREL at the district level. This could be a significant challenge for REDD+ implementation as district governments have significant power to issue licenses in non-forest areas, particularly for plantation activities.

A jurisdiction-wide implementation requires the strong participation of all stakeholders, including different levels of government. Each stakeholder has respective roles to ensure the success of REDD+ implementation. District level governments should lead the efforts to reduce deforestation in areas outside state forests, particularly from agricultural and plantation activities. Provincial governments play a crucial role to implement REDD+ in state forests that are currently without licenses through the establishment and operationalization of forest management units. The Provincial Governments can also ensure law enforcement and provide incentives for district governments to participate in reducing deforestation. Village institutions should ensure the participation of local communities in detecting, preventing and addressing the causes of deforestation within their village boundaries.

As noted above, deforestation has several causes, and a jurisdiction should focus on reducing it by using a comprehensive and holistic approach. Stakeholders within a jurisdiction can aim to reduce emissions from encroachment and illegal logging, while at the same time seeking to change how the main commodities are produced, such as oil palm. To shift how commodities are produced, governments can implement certain environmental regulations to prevent the conversion of forests for agricultural lands and promote an increase of productivity and also downstream industries. Plantation companies could innovate and meet such environmental standards if they are required. However, smallholders may not be able to meet the regulations without assistance. Therefore, financing, from mechanisms set up for the implementation of the overall NDC as well as more specifically REDD+, could be used to assist smallholders to make such transition.

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