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The role of fiscal instruments in encouraging the private sector and smallholders to reduce emissions from deforestation and forest degradation: Evidence from Indonesia

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ABSTRACT

While developing countries around the world are preparing to implement REDD+, there is a debate on the possible role of fiscal instruments in encouraging the private sector and smallholder stakeholders in reducing emissions. Drawing on a case of Indonesia, an early leader on REDD+, this paper investigates the role of fiscal instruments in encouraging the private sector to reduce forest-based emissions and the implications for improving the forest sector governance. In particular the study highlights the perspectives of a range of forest sector stakeholders on the role of fiscal instruments that contribute either positively or negatively to reducing emissions from deforestation and forest degradation in Indonesia. The study comprised a review of the existing instruments in Indonesia, as well as surveys and interviews. An online survey and structured face-to-face interviews were conducted with a range of forest sector stakeholders, including government, civil society, academia, and palm oil concession holders. Findings indicate that there is a range of formal and informal fiscal instruments at the various jurisdictional levels, and a variety of incentives and disincentives. More emphasis on cross-sectoral co-ordination, alternatives to commodities such as palm oil, and continued land reform, is required.

1. Introduction: climate change, forest-based emissions, and Indonesian fiscal policy

The global climate initiative Reducing Emissions from Deforestation and Forest Degradation (REDD+), negotiated under the UNFCCC in 2005, seeks to provide financial incentives for developing countries to reduce carbon emissions from forests and encourages the conservation, management, and enhancement of forest stocks particularly in developing countries (Mbatu, 2016; Khatri et al., 2018; Sheng et al., 2018). The concept of REDD+ received widespread attention after the UN Climate Change Conference held in Copenhagen in 2009 (COP15) as a means to contribute performance based payments to reduce emissions from deforestation and forest degradation (UNFCCC, 2011). In recent years, there has been a growing interest in REDD+ as a means to mitigate greenhouse gas emissions as well as biodiversity and ecosystem protection (Mbatu, 2015; Nielsen, 2016). Increasingly, policy-makers and other actors including the private sector and civil society are beginning to understand the potential role of REDD+ as a tool of global forest governance (Mbatu, 2015; Roessing Neto, 2015). REDD+ has a role to play in providing financial flows from the international to local

levels (Irawan et al., 2014), thereby bringing incentives to developing countries to eliminate and act on the historical trend to deforest and transform forest land to other land-use activities (Sheng et al., 2018).

As the repository of the world's third-largest area of tropical rain-forest, Indonesia has been identified as playing a potentially significant global role in combatting climate change and deforestation and was an early leader in implementing REDD+ (Fay and Denduangudee, 2018). Its forests have been subjected to major transformation over recent decades, however, largely on account of extensive changes to forest composition, and conversion to plantations (Sahide et al., 2016). Forest loss increased from the 1970s to the mid 1990s as a result of a growing log-export industry and agricultural crop production. From the mid 1990s to 2015 illegal logging in Indonesia increased at the same time as international demand for timber rose. It has been claimed that changes to forestry regulations from 2011 have led to some decline in deforestation rates (Tsujino et al., 2016). This change has been attributed partially to the influence of international forest regimes on domestic policy through the provision of financial support, exemplified by Indonesia's development of Forest Management Units (FMUs, or Kesatuan Pengelolaan Hutan – KPH), and global initiatives such as REDD+,

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financed by a range of donor countries (Sahide et al., 2016). While the question as to how REDD+ will be financed and how to deal with the drivers of deforestation such as oil palm plantation, commentators question whether it will tackle the root causes of deforestation (Hein et al., 2018).¹

Consequently, the country faces many hurdles in its efforts to reduce forest-based emissions. The country's peatlands, for example, are the largest source of forest-based emissions of any nation globally, and bringing them into the carbon reduction economy has significant economic potential (Abram et al., 2016). However, forgoing the contributions to the domestic economy from activities that impact negatively on forests – including the revenue that such activities bring in in terms of taxes and charges – is not easy. Initiating alternative governance arrangements, when provincial and district governments benefit from the redistribution of this revenue makes it all the more difficult. Creating viable, alternative, land-use incentives to business-as-usual practices in such a decentralized, high-emitting, tropical forest country context therefore has considerable relevance for other developing countries seeking to combat deforestation, and climate change (Irawan et al., 2013).

The Indonesian government has also developed a detailed strategy for reducing national emissions from forest-based activities by using a variety of fiscal incentives, including benefit-sharing arrangements and results-based payments for verifiable emissions reductions. These actions notwithstanding, there are considerable implementation challenges in achieving forest-based emissions generated by private sector companies, as well as from forest fires, and there is debate as how incentives should be applied (Saito-Jensen et al., 2014; Purnomo et al., 2017). Proponents argue that fiscal incentives entering into national budgetary system can achieve REDD+ goals by providing incentives to the stakeholders (Irawan et al., 2013). However, considering the role of fiscal instruments in the implementation of REDD+, there is limited analysis of the perspectives of a wider range of forest sector stakeholders on the role of fiscal incentives and disincentives that contribute either positively or negatively to reducing forest-based emissions in Indonesia.

The Cancún and Paris Agreements both permit and encourage non-state actors (“non-Party stakeholders”) to play a role in combatting climate change (UNFCCC, 2011; UNFCCC, 2015). The national policy environment engendered in Indonesia by these agreements presents an opportunity to redirect income generated from non-tax state revenue (NTSR) to private sector and community-based management activities for emissions reduction activities. The timber industry as a whole, whether they are active in natural forests or pulpwood plantations, is expected to contribute to government income through fees, levies and royalties, referred to in Indonesian as *Penerimaan Negara Bukan Pajak* (PNBP). State revenue, particularly NTSR, has been identified as potentially applicable to forest conservation and emissions reduction in Indonesia, by means of intergovernmental fiscal transfer, with conditions that funds provided be not used for other purposes (Irawan et al., 2014; Nurfatmiani et al., 2015).

The remainder of the paper examines the role of global climate finance in Indonesia, and continues with an in-depth exploration of national fiscal instruments of relevance to the forestry sector, and their role in reducing forest-based emissions. Data were generated from an online survey of national stakeholders conducted in 2016, and comments collected during face to face interviews in 2016–2017. A final section summarises the views of research participants, and provides some observations as to how Indonesia's fiscal instruments can contribute positively to the country's emissions reduction targets and climate policy more generally. Policy solutions identified by interviewees are also included.

2. Financing emissions reductions in Indonesia

Global financing mechanisms designed to support climate change actions are largely contained in Article 9 of the Paris Agreement, which includes provisions for financial support from developed to developing countries to adapt to and mitigate the impacts of global warming. Funding needs to be transparently communicated to the public and requires formal approval mechanisms. The global funds for climate action increased by more than 70% from USD 28.8 billion to USD 49.4 billion between 2011 and 2016, providing a great incentive for developing countries to shift their conventional development towards the green economy. Most financial support instruments are grants, followed by loans through multilateral, bilateral and regional cooperation mechanisms. Multilateral channels include the Global Environment Facility, the Green Climate Fund, various UNFCCC trust Funds, and financial institutions such as the World Bank, Asian Development Bank, and the International Finance Corporation. Of the total funds, no more than 6% are designated for the forestry sector (UNFCCC, 2016).

The Paris Agreement is of major significance for the future design and implementation of REDD+, particularly for the private sector, whilst maintaining a central role for the state. Article 5 re-endorses existing frameworks for REDD+ and the results-based model for payments for reducing emissions as well as calling for alternative approaches to policy making processes. Article 6.4 on the other hand refers to the somewhat vague notion of a sustainable development mechanism (SDM) to mitigate greenhouse gas emissions, which leaves the option open for a replacement (or continuation) of the market-based Clean Development Mechanism (CDM) (UNFCCC, 2015). The reasons for separating REDD+ from the negotiations around the SDM appears to be an attempt to allow REDD+ negotiations to continue, while the more contentious discussions between pro-market and anti-market governmental Parties to the Convention continue. It keeps the door open for voluntary, private-sector activities while also acknowledging the desire for governmental control and non-market mechanisms (NMM) (Leonard, 2017). Importantly, the Paris Agreement also welcomes the role of non-state actors in reducing emissions including civil society, business, finance, cities and other jurisdictional authorities at the subnational level (UNFCCC, 2015). This has been interpreted as a good outcome for business as it keeps the regulatory and reporting requirements in the hands of the state, as well as providing for a degree of certainty in decision-making (Glynn et al., 2017).

In the context of non-state actors, Paris leaves open the option for further incentive mechanisms for emissions reduction including national-level policies such as putting a price on carbon (UNFCCC, 2015). These are positive developments, as private sector participation in REDD+ has been historically impeded by policy uncertainty, the dominance of the state in forest management thereby undermining competition, as well as poor inter-sectoral co-ordination, and land tenure issues (Chokkalingam and Vanniarachy, 2011). This has led to less business involvement in the REDD+ process than other sectors, despite the critical role of business and industry in making sustainable land use decisions for REDD+ (Somorin et al., 2014). This has also led to calls more efforts that should be put into development of financial arrangements that can be applied in the context of REDD+, notably via fiscal incentives aimed at encouraging private sector involvement, and understanding what factors are required to encourage more business participation in the reducing forest-based emissions (Henderson et al., 2013).

The Government of Indonesia has conservatively estimated that around USD 247 billion is required to implement the climate change mitigation actions under the conditional NDC target of 2030. Meanwhile, REDD+ implementation requires about USD 5.6 billion, the second highest after the financial needs required for energy and transportation sectors (MOEF, 2018). Funds generated will support four prioritised REDD+ policies: reducing deforestation about 450 thousand ha within 2011–2020 and about 325 thousand ha within 2021–2030;

¹ See the paper by Tacconi and Muttaqin in this special issue for more details on the REDD+ mechanism in Indonesia.

enhancing the implementation of sustainable forest management principles; rehabilitating up to 12 million hectares of degraded forest by 2030; and restoring approximately two million hectares of peatlands (DJPP, 2017).

In 2008, the National Development Planning Board (Bappenas) established a trust fund for the purposes of climate mitigation activities, with pledges from France and Japan (USD\$400 million each), Germany and Australia (USD\$30 million each) and the US (USD\$2.8 million) (Simamora, 2008). In 2010, Government Regulation No 46/2017 on Environmental Economic Instruments was published. The regulation mandates the establishment of a public service unit (Badan Layanan Umum/BLU) that will have the authority to manage climate change funds. Presidential instruction No 77/2018 on Management of Environmental Funds, contains the technical provisions for managing the BLU although the organizational structure has not yet been determined, and is awaiting the input of the Minister for Finance. Funding managed under the BLU may come from national and regional state budgets in the form of tax and environmental retributions using intergovernmental fiscal transfers, as well as from other domestic and overseas loans, investments, or grants. The fund will be channelled to the entities using the various mechanisms that will eventuate from the UNFCCC negotiations under Article 6, including carbon trading (6.4), and loans, subsidies, grants and other non-market approaches (6.8).

Over the period of 2006–2014 the country received USD \$1.4 billion from REDD+ contributing Parties, with some commentators estimated that going forward, the country could receive as much as USD\$5.6 billion (Clements et al., 2010; Norman and Nakhooda, 2015). From 2015 to 2016, Indonesia received about USD 1.8 billion in the form of concessional loans mostly to finance climate change mitigation projects in energy, transportation and waste sectors, while USD 36.73 million was received to support mitigation actions mainly in forestry and multi-sector projects. The financial contribution to the forestry sector accounted for almost 45% of funding. Bilateral sources included Japan (USD 885.11 million), Germany (USD 213.54 million), and France (USD 124.6 million), while funds mobilized from multilateral funds mainly came from the Asian Development Bank (USD 403.04 million) and the Asia Investment Facility (USD 100 million) (MOEF, 2018).

In 2010, Norway alone pledged \$1 billion, allocating USD\$200 up front for preparation activities, conditional on a moratorium on conversion of peat-lands to palm oil (Venter and Koh, 2012). The remaining \$800 million was due to be paid in 2014, once emissions reductions were verified, but by 2016 the Indonesian government had still not put in place the requisite reporting mechanisms, leading Norwegian climate minister declaring that he was “impatient to see more results on the ground” (Jong and Parlina, 2016). Nevertheless, Norway signed an agreement with Indonesia at the end of 2017 and in early 2019, after a decline in deforestation in 2018, committed to providing payments, once deforestation reductions were verified. (Ompusunggu, 2017; Taylor, 2019).

The participation of the private sector in emissions reductions was initially encouraged using ‘nested’ activities at the national, sub-national, local and project levels (Pedroni et al., 2009). Based on the existing market-based instrument (MBI) of payments for environmental services (PES), preliminary ‘pilot’ activities involved a range of interests including donors, private corporations and non-governmental organizations (NGOs) while the formal policy negotiations continued to determine what the final model should look like (Kashwan and Holahan, 2014). A range of MBIs promote the transfer of emissions reductions in participating countries including the emissions trading schemes (ETS) of Europe and Korea; the Clean Development Mechanism (CDM) of the Kyoto Protocol, the Joint Credit Mechanism (JCM) of Japan, and the voluntary Verified Carbon Standard (VCS). Carbon taxes have also been implemented in UK, Chile and Norway as well as result based payment mechanisms in Japan and Australia. However, countries also have their own targeted emission reductions to meet their NDC commitments and the rules for these instruments are still unclear (Goers et al., 2010;

Kreibich and Hermwille, 2018). The implementation of domestic carbon trading in Indonesia has been a long and challenging discussion. Tradable emission allowances are a prerequisite for implementation of domestic carbon trading and have not yet been finalised. Arrangements that currently exist are still on voluntary basis and the verification system has not been formalised.

3. Fiscal instruments of forestry sector in Indonesia

Tariffs are the main fiscal instruments used in the forestry sector in Indonesia (Nurrochmat et al., 2010). According to Indonesian regulations, a tariff refers to charges and fees imposed by the government to generate revenue, including Non-Tax State Revenue (NTSR). The dominant sources of revenue are the Reforestation Fund, Forest License Fee, and the Forest Resource Provision. Conventional taxes also apply to the forestry sector such as the land and building tax, value added tax (VAT), and income tax. Government Regulation (GR) No. 12 of 2014 constitutes the legal basis for the imposition of NSTR by the Ministry of Environment and Forestry (MoEF).

As of 2014, there were thirty-one sources of NTSR in the forestry sector, centrally formulated by government and administered by MoEF (PP12/2014, 2014). They take the form of charges on extractive and non-extractive activities and use of forest infrastructure and services. They include levies imposed on holders of licenses permitting the use of forests either for forest conversion to other uses, extractive purposes, or rehabilitation, as well as for forest and non-forest-oriented business activities; levies on the exploitation of forests for water and energy generation, and for the use of infrastructure and forestry services; and fees imposed from the generation of income from forest and non-forest products, including tourism, and ecosystem services. In the case of businesses involved in carbon-related activities, there are also transaction fees on carbon sequestration and stocking. The inclusion of conservation and carbon-related activities under 12/2014 indicates the government's intention to support a wide range of environment-related activities, including REDD+, from these charges (Ardiansyah et al., 2015) although this is still to be fully implemented. Businesses subjected to these charges include state-, private and community enterprises engaging in forestry activities. Companies that impact forests, notably palm oil companies, which are subjected to their own sector levies, are also included.

The charges may be categorized as follows: 1) levies imposed on the license holders of forest products and forest area utilization including the Reforestation Fund and Forest Resource Provision; 2) business license fees in forestry concession areas (the Forest License Fee); 3) fees on timber and non-timber forest products, and environmental services; 4) levies from forest area utilization for non-forest purposes; 5) fines; 6) fees for ecotourism utilization; 7) levies imposed on the utilization of water and energy; and 8) levies on infrastructure and the provision of forestry services. Forestry fiscal instruments and policies are under central government authority, apply nationwide and are implemented through intergovernmental fiscal transfer (IFT) (Nurfatriani et al., 2015). The IFT system in Indonesia consists of two channels, grants and revenue sharing arrangements. A grant consists of general purpose transfer (DAU - *Dana Alokasi Umum*) and specific purpose transfer (DAK- *Dana Alokasi Khusus*). This system is a consequence of fiscal decentralization in Indonesia whereby the central government allocates the budget for implementation to the regional level. Meanwhile a sharing revenue mechanism is applied through *Dana Bagi Hasil* (DBH). According to Law No 33/2004, the general purpose transfer (DAU) is in the form of a block grant and its use is largely determined by regional governmental plans regarding administrative costs and servicing public needs. The specific purpose transfer (DAK) is allocated to certain districts with criteria outlining the activities permitted, relevant to national priorities. The sharing revenue arrangement (DBH) is sourced from national revenues generated from natural resources and taxes, and allocated to local governments based on the percentage the local

Table 1
National fiscal instruments of relevance to forestry sector activities in Indonesia.

Acronym	Name	English	Type
IUPK	Ijin Usaha Pemanfaatan Kawasan	Forest Area Utilization Permit	License
IUPJL	Ijin Usaha Pemanfaatan Jasa Lingkungan	Environmental Services Utilization Permit	License
IUPHHK	Ijin Usaha Pemanfaatan Hasil Hutan Kayu	Commercial Forest Concession License	License
IUPHHBK	Ijin Usaha Pemanfaatan Hasil Hutan Bukan Kayu	Non Timber Forest Product Utilization Permit	License
IPHHK	Izin Pemungutan Hasil Hutan Kayu	Commercial Forest Concession License	License
IPHHBK	Izin Pemungutan Hasil Hutan Bukan Kayu	Non Timber Forest Products Utilization Permit	License
IPK	Ijin Pemanfaatan Kayu	Wood Utilization Permit (Land-Clearing)	License
IPPKH	Izin Pinjam Pakai Kawasan Hutan	Forest Estate Temporary Use License	License
DR	Dana Reboisasi	Reforestation Fund	Charge
PSDH	Provisi Sumber Daya Hutan	Forest Resource Provision	Charge
IUPH	Iuran Ijin Usaha Pemanfaatan Hutan	Forest License Fee	Charge
GRT	Ganti Rugi Tegakan	Sustainability Repayment	Charge
DPEH	Denda Pelanggaran Eksploitasi Hutan	Forest Exploitation Violation Fine	Charge
PNBP -PKH	Penerimaan Negara Bukan Pajak Penggunaan Kawasan Hutan	Non Tax State Revenue Of Forest Estate User Fee	Charge
PNT	Penggantian Nilai Tegakan	Stumpage Value Replacement Fee	Charge
PNBP Karbon	Transaksi Kegiatan Penyerapan Dan Atau Penyimpanan Karbon Dari Kawasan Hutan	Non Tax State Revenue Transaction Activity Of Carbon Absorption and/or Storage From Forest Area	Charge
PPh	Pajak Penghasilan	Income Tax	Tax
PPn	Pajak Pertambahan Nilai	Value Added Tax	Tax
PBB	Pajak Bumi Bangunan	Land And Building Tax In Forestry Sector	Tax

(KPK, 2015; Nurfatriani et al., 2018). Note: PPh, PPn and PBB are taxes, which means they are not technically NTSR as stipulated in PP 12/2014.

governments have generated (Mumbunan et al., 2012). The most significant revenue is generated from the Reforestation Fund or *Dana Reboisasi* (DR) and the Forest Resource Provision or *Provisi Sumber Daya Hutan* (PSDH), both of which are generated from forest extraction (Nurfatriani et al., 2018). See Table 1 below for the most significant revenue from the forestry sector.

Non-tax state revenue has been identified as playing potentially significant role in emissions reduction, sustainable forest management, and alleviating poverty in Indonesia. This role is expected to be provided through the utilization of the fees and charges in forestry sector to achieve those objectives as stated in national development planning. When the fees are collected the mechanism of fiscal transfer from the central to the provincial and district governments ends up rewarding those districts with the highest rates of deforestation, since payments are based on the amount of timber extracted not good forest management (Nurfatriani et al., 2015). It is exacerbated by the low of awareness from license holders to replant their logged over area. Another problem with fees and charges in forestry sectors in particular is that although the conversion of forest to non-forest uses generates revenue from forest area utilization for non-forest use fee and DR and PSDH if there is still forest stand on that area, it also reduces the forest estate, and leads to losses in state revenue from the foregone assets. It has been calculated that up to 60% of legal timber that could otherwise be sold is lost, and is encouraging illegal logging as a consequence (Indrarto et al., 2012).

Other land-use sectors – notably palm oil – have the potential to create incentives for deforestation (Varkkey et al., 2018). The Crude Palm Oil (CPO) fund, introduced in 2015 is intended to support sustainable oil palm plantation in Indonesia. According to Presidential Regulation No 61/2015, the CPO fund was allocated to support the intensification and better management of smallholders' oil palm plantations (ie to allow for replanting), as well as infrastructure development, and industry research. Furthermore, the regulation also permitted the fund to incentivize biodiesel development, expand the domestic consumption and stimulate downstream processing for other products. The fund is collected from CPO exporters via the CPO Fund Management Agency of the Finance Ministry, which collects, administers, manages, banks, and distributes the fund. Interestingly, the allocation for supporting biodiesel development is categorized as an incentive, not a subsidy. With a secondary objective of maintaining the viability of the palm oil estate with annual plantings of up to 100,000 ha the fund also helps maintain smallholder production

through financing replanting (Anonymous, 2015; Singgih, 2017). This has been claimed as supporting sustainable palm oil since smallholders tend to expand their plantation into forest area, the while fund encourages intensification in an effort improve productivity and maintenance of existing plantations (Nurfatriani et al., 2018).

The oil palm sector in Indonesia plays an important role as a major contributor to the country's foreign exchange earnings. In 2017 CPO production reached 37.8 million tons with an export volume of 31 million tons and generated export value of USD 22.97 billion (Mudassir, 2018). However, some literature revealed that in some places there are still social conflicts due to oil palm cultivation which in the end have not been able to contribute to poverty alleviation (World-Growth, 2011; Cahyadi and Waibel, 2016; Krishna et al., 2017; Bou Dib et al., 2018). There are also expressions of concern that unless fiscal incentives within the palm oil industry are correctly aligned with activities outside the sector, such as forest management, oil palm establishment may increase and result in further loss of high conservation value forest as well as forest encroachment by local communities. There are several incentives identified in all stages of the palm oil supply chain including land access, finance for investment in production, and in CPO production. Land access is freed up by formalising land rights, relaxed permitting requirements, and reclassification of lands to enable palm oil development (UNEP, 2016). Consequently, Indonesia's forests are challenged by a range of activities that incentivize conversion to non-forest use and mitigate against emissions reduction.

4. Methods

The research adopted a multi-stage sampling methodology consisting of an online survey followed by in-depth interviews with stakeholders. The intention was to follow an actor-centred approach, gaining a holistic understanding of the complex interdependence of the issues, and privileging the voices of those engaged in the subject-matter, rather than simply relying on the literature. Multi-stage sampling is widely used as it reduces populations into smaller groups which can help address the issue of random sampling from a large cohort. It is also a cost efficient way of sampling and can be used in resource constrained environments (Jelsma et al., 2017; Maraseni et al., 2019).

4.1. Online survey

An online survey of Indonesian stakeholders was deployed between

Table 2
Breakdown of interview subjects by sector.

Respondents Characteristics	N	%
Government	22	40
Forestry Sector	13	25
Education/research	14	26
Other*	5	9
Total	54	100

* Other included: NGO/civil society (3) and climate-change related consultants (2).

April 2016 and October 2017 to determine perceptions regarding the effectiveness of fiscal instruments for reducing forest-based emissions. Respondents were asked self-identify their sector/group. A total of fifty-four participated in the survey and identified themselves as government (22), forestry sector (13), Education/research (14), and 'Other' (5). 'Other' was comprised of respondents identifying as NGO/civil society (3) and climate-change related consultants (2). 'Forestry sector' included six respondents who identified as 'primary industry', five as 'business' and two as simply 'forest industry'. They were from large, medium and small enterprises serving domestic and international markets, and were active in native forests and plantations, supplying round wood and pulpwood, as well as being engaged in sawmilling (Table 2).

Respondents were asked to evaluate the effectiveness of a range of fiscal instruments (Table 4), using a five-point Likert scale, in which points one and two were 'very ineffective' and 'ineffective', point three was neutral ('neither effective not ineffective') and points four and five were 'effective' and 'very effective'. The types of instrument are described in Table 3. The collected data were used to determine effectiveness by means of a weighted average score, whereby the total number of responses for each point on the scale were multiplied by the total number of responses on that point of the scale, and divided by the total number of respondents.

4.2. Stakeholder interviews

Survey respondents were also asked if they were willing to be interviewed. Of the fifty-four respondents, thirty-five agreed to be interviewed. In-depth interviews lasted approximately one hour and were conducted in Jakarta and Bogor between April and October 2017. Interviews were largely focused on, but not limited to: effectiveness of different fiscal instruments; impacts of palm oil subsidies; policy uncertainties within SFM and REDD+; vertical and horizontal co-ordination and collaborations between different governments and non-governmental organizations; land-use governance; and benefit sharing mechanisms. Interviewees were from government (12), forestry sector (9), education/research (4), and 'other' (10). 'Other' was comprised of respondents identifying as 'Carbon stock and storage concession holder'

Table 3
Fiscal instruments surveyed.

Type of fiscal instruments	Definition
Taxes	Levies imposed by the government on taxpayers without direct benefit that can be directly appointed.
Tradable permits	Fiscal instruments aimed at reducing pollution. A maximum permissible emission rate is determined by government and permits that allow for the production of a maximum emission are issued to industry players. These permits can subsequently be traded to firms that require more permits in order to continue their activities.
Subsidies	Fiscal instruments that aim to improve people's welfare by reducing the government's role significantly in economic activities, so that the government which acts as a regulator deserves to execute subsidies for the economic sector that concern the lives of many people
Tariffs	Levies imposed by the government and must be paid by taxpayers or the public for the goods or services provided by the government that can be directly appointed
VAT/excise duty	Tax imposed on each value added of goods or services in distribution chain from producers to consumers. It is a type of consumption tax
Incentives	As policy instruments in the context that they are important for influencing and cultivating the implementation of policy objectives

(Comerford, 2004; Suparmoko and Nurrochmat, 2006; Yustika, 2008)

Table 4
Views on the effectiveness of fiscal instruments directed at the private sector/businesses in reducing emissions (rating out of 5).

	Government	Forestry sector	Education/research	Other
Taxes	2.71	3.33	2.86	2.75
Tradable permits	2.29	3.00	2.71	2.75
Subsidies	2.81	2.33	3.00	2.25
Tariffs	2.53	3.17	3.43	2.5
VAT/excise duty	2.80	2.83	3.14	1.75
Incentives	3.24	3.33	3.50	3.25
Other	2.67	4.00	1.00	NA

(1), Ecosystem restoration concession holder (2), NGO – international (3) NGO – national (2), and Palm oil concession holder (2).

Ethics approval was sought and obtained before commencing the field study (Griffith University Protocol no: 2016/216).

5. Results and discussion

5.1. Results from online survey

As noted, survey participants were asked to identify which fiscal instruments they thought were most effective in reducing emissions. In general, government, education/research and 'other' identified incentives as the most effective. It should be noted that the forestry sector identified 'other' forms of instrument as being the most effective, followed by incentives and taxes. Why this was the case is difficult to determine, but it may show a desire in this sector to pursue avenues other than charges and taxes to reduce emissions.

A smaller sub-set (33) expressed a view as to whether current fiscal instruments actually encouraged or discouraged deforestation and degradation, with a small majority (55%) expressing the view that they encouraged them (Table 4). Those who thought they encouraged deforestation and degradation (15) were asked to specify to which instruments they were referring; the answers being: charges (4), notably PSDH and DR; subsidies (4), particularly for those in the palm oil sector, and for fertilizer; license- and permit fees (3) including IPPKH for forest conversion; intergovernmental fiscal transfers (2); and taxes – value added tax and export tax (2) (Table 5).

5.2. Results from stakeholders' interviews

Interviewees provided useful information on options for fiscal instruments to promote private sector engagement in REDD+ and identified issues impacting on the ability of forest sector enterprises to undertake activities that would lead to emissions reductions. Interviews revealed the damaging nature of competition between native forests and planted forests, and between both forest types in comparison to palm oil plantations, as a result of the timber export ban and subsidies

Table 5

Views on whether current fiscal instruments encourage or discourage deforestation and forest degradation (Number of responses; percentage).

	Government	Education/ research	Forestry sector	Other
Encourage (18)	10 (56%)	3 (43%)	3 (60%)	2 (50%)
Discourage (15)	7 (41%)	4 (57%)	2 (40%)	2 (50%)
Total (33)	17 (100%)	7 (100%)	5 (100%)	3 (100%)

to palm oil production. The significance of palm oil as a business activity also encouraged local community encroachment into forests. Fees, charges and funds levied on the forest sector did not meet the objectives, for which they were established. In addition, high fees, as well as informal charges, all acted as constraints on the viability of the extractive and non-extractive forest sectors. There was also a lack of policy clarity around the relationship between SFM and REDD+, and between REDD+ and broader carbon policy, which in turn was impeded by a high degree of uncertainty.

From an options-oriented standpoint, interviewees demonstrated a desire for greater coordination of land use practices (native and plantation forestry, and palm oil); more collaboration between forest users – notably extractive and non-extractive forest enterprises and local community smallholders; more flexibility in the paying of fees and approaches that might be adopted for paying fees, as well as the need for greater emphasis on incentives; and the creation of closer linkages between SFM, REDD+ and Indonesia's broader international carbon policy negotiations under UNFCCC. These perspectives are reproduced in more detail in the results section below.

5.2.1. Impacts of palm oil incentives

Oil palm concession holders revealed the existence of incentives to maintain the price of palm oil via production of biodiesel during periods of oversupply. The consequence of the incentive was that the supply of crude palm oil (CPO) was reduced because it was used for biodiesel: demand remained, so the prices rose. CPO producers sold the biodiesel to State Owned Oil and Gas Company (Pertamina). Under this programme, approximately 3 million kilolitres of CPO was burnt as biodiesel in 2016, under the twin justification of maintaining price stability, and preventing carbon emissions. The production of biodiesel had also been incentivized to the sum of around IDR 5000 a litre through the fund. One respondent stated that this incentive was ultimately “charged to consumers”. Another interviewee explained that incentives acted as a “trigger [to] forest encroachment due to palm oil plantation expansion” – a view shared by a second interviewee who explained that “smallholders and local community” were responsible for “encroaching forest areas” as well as seeking to “convert their forest into a palm oil plantation.”

According to one plantation forest concession holder representative whose company was growing sawlogs, it was “very difficult...to compete with palm oil”, because palm oil was grown on “shorter rotations”, implying that there was a direct competition between forest and palm oil plantations in terms of options for revenue generation. A representative from another plantation pulpwood company explained how palm oil “has been declared a priority industry by the government, because of the perceived benefits” which made it more economically attractive than forestry. According to them they had to pay the Forest Resources Provision (PSDH) every time they harvested the trees. It was different “with the oil palm, they take the fruit, but they don't have to pay the tax, because they just take the fruit” (i.e. not the palm tree itself). In addition, forest companies came under a different ministry (MoEF) from palm oil and were obliged to follow its ten-year and annual plans. Palm oil on the other hand was under the Ministry of Agriculture, and it did not require such planning cycles. This led them to observe that, taken together, “this acts as an incentive for oil palm

conversion.” One NGO interviewee concluded that because Government had “declared [palm oil] a priority industry, because of the perceived benefits”, it had become “number one” with harvesting from native forests “a far distant third.”

5.2.2. Effectiveness of fees, charges and funds levied on forest sector

Holders of forest concessions, whether they were for wood production, or other purposes such as restoration or carbon sequestration, questioned the effectiveness of the fees and charges currently in existence in the forestry sector. According to two interviewees, the reforestation fund (DR), (designed specifically to finance reforestation and forest rehabilitation) had been used to finance research and development in the aviation sector (although this had been in the ‘eighties some years before). One of them (Education/Research) saw this as evidence that DR “has been misused.” The second (Other, Certifier) also considered this inappropriate and argued: “the fees should go back to the forest.” One NGO, with long-term experience of the fund saw the non-return of funds a “problem.” Concession holders “felt they no longer had responsibility to the forest, as they had already paid.” Because the funds “did not go back from the government to rehabilitation” concessionaires did not undertake reforestation. This perspective was echoed by one of the natural forest concession holders. The company had to pay the government once the trees were cut, “but in reality, the rehabilitation fund is not used for replanting the area, but rather for other purposes – by the government.” As a result, the forest was “not of good quality.”² Another NGO argued the “primary aim” of the instruments was to “generate revenue”, and asked: “is the revenue influencing people's behaviour, and benefitting them? The answer really is no.” Concerning the Forest Estate Temporary Use License (IPPKH), one government respondent (MoEF) was concerned that the revenue derived from this charge “has not been used for forest activities; it is now in the state treasury, but we still have not done anything with it.” One of the Ministry of Finance interviewees provided an explanation suggesting that: “the logic may also be that because this is ‘non-forest money’ it should not go back to the Forest Ministry.”³

Forest sector interviewees universally complained about the level of fees and taxes, whether they were natural forest, plantation, ecosystem restoration, or carbon concession holders. One plantation concession holder pleaded for the government to “simplify the fees and reduce the costs.” They also complained about “double counting” as a consequence of paying fees to the central and provincial governments. This led them to conclude there were “disincentives everywhere: from the market [log export, ed.] ban, and from the operations' fees and charges.”

For one of the non-extractive ecological concession (ERC) holders the current fee-paying structure was “not adapted to this new regime” of emissions reduction. For them up front fees were a “fiscal disincentive.” Forestry concessions realised an up-front benefit from logging but they only realised their assets in the future, which they found frustrating because “we are not leading to emissions – we are reducing emissions.”

The other significant issue commented on by interviewees were the unofficial or informal fees, which they were obliged to pay. These ranged from being quasi-legal to illegal, and were usually in the form of stumpage, ranging from USD\$1 to \$10 per cubic metre, depending on the market value of the timber. As one plantation concessionaire explained, “We pay stumpage to the local community – USD\$2 per cube. Paying stumpage is illegal, but if we don't pay, we cannot operate. The cost differs across communities and forest types, but the pattern is the

² This perception appears to demonstrate that the interviewee presumed that since they had already paid the fees and charges, reforestation was the government's responsibility.

³ This appears to contradict government regulations stipulating that DR revenue be earmarked for financing forestry activities, implying that other fees not specifically designated for forest activities are being incorporated into NTSR.

same. It is a hidden cost.” This led one natural concession holder to comment that “the profit that could be made from the business” as a consequence was “not much higher” than cost of the wood itself.

5.2.3. SFM, REDD+ and carbon policy uncertainties

There was confusion among interviewees about the nature of the relationship between the Paris Agreement, SFM and REDD+, and carbon policy generally. Opinions were split as to whether REDD+ was subordinate to SFM, or the other way around. One plantation concessionaire argued “if a company applies SFM, they are already engaging in reductions, so REDD+ should be seen as an SFM management activity.” Another interviewee (MoEF) agreed, arguing that SFM regulations were “well established”, but REDD+ did not have “the same level of regulations”; consequently “SFM should lead REDD.” In addition, the urgency of conserving forests was more compelling. On that basis “REDD should revert to SFM principles, rather than emissions reduction.” However, one NGO was critical of the role SFM had played in the emissions reduction debate. According to them “more than ten years” had been lost “because of misconceptions.” They argued that REDD+ was “more advanced” than SFM “on methodologies.” SFM was “very subjective in terms of measurements, depending on the experts.” Confusion may be attributable to the fact that certain forest management practices could be seen as relevant to both, notably reduced impact logging (RIL). One natural forest concession holder noted that they “have already implemented reduced impact logging, but only for SFM.” Another natural and plantation concessions holder also stated that they were “interested and willing” to implement RIL. They knew they could “reduce emissions by forty per cent”, but the problem with REDD was the results-based payment system, “because this comes at the end.”

Various interviewees also commented on the lack of clarity in carbon policy. Several government interviewees, all from MoEF, expressed concerns. One was of the view that there was “no clear support, and no clear policy for carbon” as well as “no clear market”, or guidance on “how programmes will be managed.” In their absence, they thought, that: “the interest will disappear”, except for “some companies that have good connection to international donors and markets.” Another government interviewee acknowledged that there were “ministerial regulations for carbon companies” in planted forests, however they were largely focussed on “only technical issues on how to apply for a concession, etc., but nothing in relation to fiscal instrument policy.” With “no published government policy for carbon markets” it was “hard to sell the carbon.” This same interviewee noted that beyond carbon market incentives there were nevertheless “incentives for carbon in production forests” in the form of ecosystem services, such as water, eco-tourism, and so forth. They also noted that even though many of these activities had been certified by companies through schemes such as Voluntary Carbon Standards (VCS), they were no longer able to “sell or trade” their carbon credits due to the collapse of the voluntary carbon market, and policy uncertainty on account of the evolving intergovernmental negotiations. As there was an existing demand for non-timber forest products, such as honey, many companies were simply “focused on supplying conventional [non-carbon] domestic markets.”

The major problem for REDD+ from a governmental policy perspective, as explained by a MoEF representative was that “the context is different now, especially given market issues, which are now less relevant, because Paris is focused on results-based payments.” According to another (Environment/Research) the change in emphasis had shifted REDD+ from being “market driven” to a mechanism that was now “becoming policy driven.” They were of the view that “carbon markets have not worked”, because “our current policy is not linked to markets.” This was compounded by the “further problem” that any emissions reductions would now go to achieving “Our domestic NDC targets.” This meant there was “no money internationally” because emissions reductions were “buyer driven” and now “the demand is not there.”

5.2.4. Co-ordination of land-use governance and benefit sharing

Several interviewees spoke of the need to better coordinate land use practices. This was clearly expressed by one of the Education/Research participants, who argued that Indonesia had to have “effective integrated land use policy, and authority.” At present land use was split between MoEF (approx. 130 million ha) and the National Land Agency, BPN (approx. 60 million ha), making integration “very difficult”, and posing a “practical problem” around getting permission, because “land is often registered under the wrong agency.” Other Ministries were also impacted by MoEF activities, including fisheries, tourism, and small to medium enterprise. This interviewee wanted to see them all work together “to develop local economics so that [the] local community will not do encroachment and illegal logging for their livelihood.” One licensee holder of an ecological restoration concession (ERC) pointed to divisions within the ministries themselves as a problem. They singled out the production, conservation, plantation, forest conversion and climate change directorates in MoEF, referring to them as “interests” that “need to be co-ordinated” both internally and in their dealings with the Ministry of Finance.

One natural forest logging concession holder noted further, that: “Other ministries also impact on the forest sector, especially the Industry ministry. It tends to look at the downstream industries and overlook the upstream companies.” A palm oil concessionaire agreed, explaining there were “community palm oil plantations in the forest area.” This created a problem for the “forestry sector in the upstream side” because it wanted to “prevent forest encroachment to avoid the forest conversion into palm oil”, but the sector had to “overcome the palm oil estates that now already exist in the forest area.”

Concerns were also expressed about the forest management unit (FMU) system. One natural forest/plantation concession holder commented that everything was “still very unclear, especially what the role of private institutions will be”, and secondly “the role of local and district agencies (forest services, etc.)” The transfer of administrative authority from the provincial to the district level needed “to be clarified...at the moment, they are still in competition; these issues are interconnected.”

A number of interviewees were aware of the need for greater collaboration between all stakeholders for better forest governance, from the ministries, down to the communities. One government interviewee (MoEF) identified “problems with land tenure as there are no clear boundaries, and this results in encroachment” which is “perpetuated in the absence of collaboration around zoning.” Another plantation concession holder noted that they were involved in “collaboration with society to support the Adats”, but it was “limited”, partly because local communities still needed “to prepare their land claims, as tenure is still unclear.” Another government interviewee (MoEF) also noted that while there was “a regulation and decree which requires companies to collaborate with local people to develop the programme”, there was “nothing specified in relation to capacity building, just about the need for partnership.” Interestingly, despite the opinion of one MoEF interviewee that “local benefit sharing...is a company matter; it is not a ministry requirement”, forest sector and palm oil interviewees were unanimous that government should specify arrangements for benefit sharing and include them within the relevant fiscal instruments. One plantation concession holder was of the view that “aside from the company, the local people around the forestland should benefit”, but that how this occurred “should be covered in the instrument.”

It was also noted that there was a greater need for greater intra-sectoral collaboration across the forest industry. One plantation concession holder indicated that they would like to “collaborate over the longer term” with the larger pulp and paper companies but the companies they might work with needed “to provide the incentive” for them to do so. The problem was that as smaller, plantation-based enterprises they had “no bargaining position” and were “powerless in negotiations with the big players in this limited market.” Once relations between the

large and small companies were “more fair...then we would be happy to integrate downstream and upstream processing.”

5.2.5. More effective fiscal instruments

Interviewees also provided useful information as to how fiscal instruments could be used to promote private sector engagement in REDD+, and also identified barriers to forest sector enterprises undertaking activities that would lead to emissions reductions. Their comments revealed the damaging nature of competition between native forests and planted forests, and between both forest types in comparison to palm oil plantations, arising from the timber export ban and subsidies to palm oil production. Several noted how the economic value of palm oil encouraged local community encroachment into forests. In addition, interviewees were of the view that fees, charges and funds levied on the forest sector did not meet the objectives, for which they were established. In addition, high fees, as well as informal charges, acted as constraints on the viability of the forest industries (both logging and non-extractive). Finally, interviewees also noted there was a lack of policy clarity around the relationship between SFM and REDD+, and between REDD+ and broader carbon policy, which resulted in a high degree of uncertainty.

All concession holders, whether engaging in logging or other non-extractive activities, made a number of suggestions as to how to make fees and charges work more effectively. Some suggestions were relatively simple, with one representative from a large pulp and paper company suggesting there should be “a scale of fees dependent on the type of land (natural forest or degraded).” One plantation timber concessionaire thought that: “government should reduce fees to encourage business.” Another plantation timber concession representative wanted to develop a range of activities but felt constrained by existing fee structures. This concession holder wanted to get involved in ecological restoration, but thought that there should be a difference in license fees between extractive and non-extractive activities:

The arrangements for the two concessions should be different, but the arrangements at present are the same. The bank guarantees are required for both. In the future it would be better to get the license before we pay the fees. It should be less complicated for the ERC than plantations, especially because we do not know what is going to happen with the carbon, but the government has the same system for both.

One logging concessionaire active in natural forests put forward the idea, that if the government financed companies to replant harvested areas it would be able to “take larger fees for the rehabilitation fund” the next time the area was harvested. Their logic was that government support for silviculture would lead to “optimised rehabilitation.” Companies were financially constrained and did not do undertake effective rehabilitation “because of the current conditions in the forest sector, as there is not enough liquidity.” Government support would ultimately result in “more and larger trees for harvest” in the future.

One Education/Research academic was of the view that the current system did not “give incentive” to “green business.” They wanted the central government to “adjust the formula” of fiscal transfers “by integrating the sustainability index of the natural resources managed.” They suggested, that: “if we extract a certain amount of logs, and we cut the trees more than we should, there should be a penalty.”

One of the oil palm concessionaires wanted to see incentives “to avoid deforestation”, including “funds for social and economic development” but in addition “the government should develop law enforcement.” One NGO supported this view, arguing the only regulations the industry currently followed were “technical only.” Their suggestion was to link “fiscal incentives” to more stringent “regulatory enforcement” and “compliance audits.”

Although tax relief was seen as important by a number of concessions holders, there were other approaches. One natural forest/plantation interviewee thought the government should “simplify regulation”; “less taxes” and “more transparency” were “helpful.” This would make business “more efficient” and “that would work as well.”

5.2.6. Better policy linkages

A number of interviewees commented that emissions reduction activities needed to be integrated with existing management activities and linked to markets, with clear leadership from government. However, several interviewees argued emissions reduction activities could not occur in the absence of a carbon market, whatever the post-Paris arrangements were. According to a MoEF interviewee “a domestic carbon market”, meant Indonesia could “manage the projects that deal with the existing voluntary schemes through a domestic emissions trading scheme.” A number of concessionaires agreed, with one adding: “the idea of a national carbon market is not a bad idea, it depends how it is designed.” Rather than creating special pilot areas, REDD+ should be applied in existing forest management areas. According to another Education/Research interviewee it should be “implemented in production forest management...through [the] additionality concept” (i.e. ensuring emissions reductions would not otherwise have occurred without REDD+). One plantation concessionaire suggested REDD+ needed to be integrated with other management activities, including non-timber forest products as well as logs, and this should be allowed to happen: “concurrently.” It was not possible at the moment because there were “disincentives everywhere”, ranging from the excessive number of fees and charges, through to the log export ban, and the “timber oligopolies.” According to one natural forest/plantation concession holder, encroachment was more attractive to local communities, and REDD+ needed to become “an economic activity...and thereby avoiding deforestation and degradation.” Finally, another NGO recommended that there should be “alignment of REDD financing” with the “governmental annual budget...and fiscal policies and incentives/disincentives” This would ensure the country did not have “budgets inconsistent with REDD goals (e.g. finance to protect forest and finance to cut forest).”

6. Conclusions

Indonesia faces many hurdles in its efforts to reduce forest-based emissions. Forgoing the contributions to the domestic economy from activities that impact negatively on forests – including the revenue that such activities bring in in terms of taxes and charges – is not easy. Initiating alternative governance arrangements, when provincial and district governments benefit from the redistribution of this revenue makes it all the more difficult. Creating viable alternative land-use incentives to business-as-usual practices in such a decentralized, high-emitting, tropical forest country context therefore has considerable relevance for other developing countries seeking to combat deforestation, and climate change. Although REDD+ has not yet been fully implemented in Indonesia, commentators view it as an effective incentive mechanism to address these challenges, by channeling international donor investments from high-emitting developed countries seeking to reduce their own emissions, by providing forest stakeholders with social, environmental and financial benefits, while making re-establishment and reforestation more cost effective. However, different stakeholders benefit from different types of incentives, such as tax relief, carbon trading or alternative investment activities. As a result, there is no single mechanism that can be applied, since landholders, such as local communities, are not always the same as those wishing to develop forests, such as forestry companies. In addition, governmental policy objectives, whether they be poverty alleviation, social equality or environmental sustainability will also affect the types of incentives used. In short, a mix of fiscal instruments is required to meet governmental objectives, and stakeholder needs in response to those objectives.

This paper has investigated the diverse perspectives and agendas of government, forest and palm oil industries, and other stakeholders, on the role of fiscal incentives in encouraging the participation of the private sector to reduce forest-based emissions in Indonesia. In the qualitative survey conducted during the course of the research, it

appears that while a broad suite of stakeholders (government, education/research and others) prefer incentives above other forms of fiscal instrument, the forestry (i.e. logging) sector was less convinced. Surveyed respondents were also divided as to whether current fiscal instruments encouraged or discouraged deforestation. It is perhaps worth noting that the two primary non-tax instruments used in the forestry sector, PSDH and DR were not seen as effective, and that DR was not viewed as fulfilling its intended objective of restoring forests. From an options-oriented standpoint, interviewees demonstrated: a desire for greater coordination of land use practices (native and plantation forestry, and palm oil); more collaboration between forest users – notably extractive and non-extractive forest enterprises and local community smallholders; more flexibility in the paying of fees, approaches that might be adopted, and greater emphasis on incentives; and the creation of closer linkages between SFM, REDD+ and Indonesia's broader international carbon policy negotiations under UNFCCC.

What the research furthers suggests is that there is a need for greater law enforcement and coordination of land use practices to conform with existing spatial planning. This would positively impact forest-based emissions in Indonesia (whether native and plantation forestry, or palm oil cultivation). Fiscal incentives should encourage land managers to follow spatial planning requirements. Fiscal incentives should therefore be directed to securing formal land tenure, and reducing the expansion into forest areas where tenure is currently unclear. A further incentive would be the deduction of land and building tax for license holders who maintain and manage high conservation value (HCV) areas within their concessions; something that is not done at the moment.

Such measures would be further enhanced by increasing the collaboration between forest users, notably forest enterprises and local community smallholders. A more actor-centred model, combining public policy with market incentives in a hybrid state and non-state system integrating civil society business within supply chains may represent a better method than the current 'top-down' state-centric approach. This would also provide 'horizontal' benefits by improving relations between actors and strengthening the power of local communities.

On a governmental level, closer linkages need to be forged between SFM, REDD+ and climate policy. In combination, these measures have the potential to enhance the business prospects for the sustainable use and management of Indonesia's forests, whilst reducing emissions and creating more certainty in national climate policy. The adoption of practical and context-based approaches would contribute to the overall aim of supporting the development of institutional arrangements and fiscal mechanisms for effective implementation of REDD+ within and among various levels of government as well as ensuring that business and industry benefits from emissions reduction activities in Indonesia.

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None.

References

- Abram, N.K., MacMillan, D.C., Xofis, P., Ancrenaz, M., Tzanopoulos, J., Ong, R., Goossens, B., Koh, L.P., Del Valle, C., Peter, L., Morel, A.C., Lackman, I., Chung, R., Kler, H., Ambu, L., Baya, W., Knight, A.T., 2016. Identifying where REDD+ financially out-competes oil palm in floodplain landscapes using a fine-scale approach. *PLoS ONE* 11 (6), 1–23.
- Anonymous, 2015. Disbursement of CPO funds ready to spur industry. In: *The Jakarta Post*.
- Ardiansyah, F., Marthen, A.A., Amalia, N., 2015. Forest and Land-Use Governance in a Decentralized Indonesia: A Legal and Policy Review. CIFOR.
- Bou Dib, J., Alamsyah, Z., Qaim, M., 2018. Land-use change and income inequality in rural Indonesia. *Forest Policy Econ.* 94, 55–66.
- Cahyadi, E.R., Waibel, H., 2016. Contract farming and vulnerability to poverty among oil palm smallholders in Indonesia. *J. Dev. Stud.* 52 (5), 681–695.
- Chokkalingam, U., Vanniarachchy, A., 2011. Sri Lanka's REDD+ Potential, Myth Or Reality? *Forest Carbon Asia Colombo*.
- Clements, G.R., Sayer, J., Boedihartono, A.K., Venter, O., Lovejoy, T., Koh, L.P., Laurance, W.F., 2010. Cautious optimism over Norway – Indonesia REDD pact. *Conserv. Biol.* 24 (6), 1437–1438.
- Comerford, E., 2004. Choosing between Incentive Mechanisms for Natural Resource Management: A Practical Guide for Regional NRM Bodies in Queensland.
- DJPII, 2017. Menuju Operasionalisasi Pendanaan Iklim. Kementerian Lingkungan Hidup dan Kehutanan. <http://km.reddplusid.org/d/e9a53d0ed1816293ef24647c7b33d819>, Accessed date: 3 June 2019.
- Fay, C., Denduangrudee, H.-M.S., 2018. An Uneven Path Toward Rights and REDD+ in Indonesia.
- Glynn, P.J., Cadman, T., Maraseni, T.N., 2017. *Business, Organized Labour and Climate Policy: Forging a Role at the Negotiating Table*. Edward Elgar Publishing, Cheltenham.
- Goers, S.R., Wagner, A.F., Wegmayr, J., 2010. New and old market-based instruments for climate change policy. *Environ. Econ. Policy Stud.* 12 (1–2), 1–30.
- Hein, J., Guarin, A., Fromm, E., Pauw, P., 2018. Deforestation and the Paris climate agreement: an assessment of REDD+ in the national climate action plans. *Forest Policy Econ.* 90, 7–11.
- Henderson, I., Coello, J., Fischer, R., Mulder, I., Christophersen, T., 2013. The role of the private sector in REDD+: the case for engagement and options for intervention. UN-REDD Programme Policy Brief 4, 1–12 (Web: www.un-redd.org).
- Indrarto, G.B., Murharjanti, P., Khatarina, J., Pulungan, I., Ivalerina, F., Rahman, J., Prana, M.N., Resosudarmo, I.A.P., Muharrom, E., 2012. The Context of REDD+ in Indonesia: Drivers, Agents and Institutions. Cifor.
- Irawan, S., Tacconi, L., Ring, I., 2013. Stakeholders' incentives for land-use change and REDD plus: the case of Indonesia. *Ecol. Econ.* 87, 75–83.
- Irawan, S., Tacconi, L., Ring, I., 2014. Designing intergovernmental fiscal transfers for conservation: the case of REDD plus revenue distribution to local governments in Indonesia. *Land Use Policy* 36, 47–59.
- Jelsma, I., Schoneveld, G.C., Zoomers, A., van Westen, A.C.M., 2017. Unpacking Indonesia's independent oil palm smallholders: an actor-disaggregated approach to identifying environmental and social performance challenges. *Land Use Policy* 69, 281–297.
- Jong, H.N., Parlina, I., 2016. Norway slams slow REDD+ project progress. In: *The Jakarta Post*.
- Kashwan, P., Holahan, R., 2014. Nested governance for effective REDD+: institutional and political arguments.
- Khatri, D.B., Marquardt, K., Pain, A., Ojha, H., 2018. Shifting regimes of management and uses of forests: what might REDD+ implementation mean for community forestry? Evidence from Nepal. *Forest Policy Econ.* 92, 1–10.
- KPK, 2015. Preventing State Losses in Indonesia's Forestry Sector: An Analysis of Non-tax Forest Revenue Collection and Timber Production Administration.
- Kreibich, N., Hermwille, L., 2018. Carbon Pricing: Using Market-Based Mechanisms to Mitigate Climate Change.
- Krishna, V., Euler, M., Siregar, H., Qaim, M., 2017. Differential livelihood impacts of oil palm expansion in Indonesia. *Agric. Econ.* 48 (5), 639–653.
- Leonard, S., 2017. Analysis: Getting down to business in Bonn. In: *Forest News*, <https://forestsnews.cifor.org/49709/getting-down-to-business-in-bonn?fnl=en> (Accessed 07/03/2019).
- Maraseni, T.N., Bhattarai, N., Karky, B.S., Cadman, T., Timalina, N., Bhandari, T.S., Apan, A., Ma, H.O., Rawat, R., Verma, N., 2019. An assessment of governance quality for community-based forest management systems in Asia: prioritisation of governance indicators at various scales. *Land Use Policy* 81, 750–761.
- Mbatu, R.S., 2015. Domestic and international forest regime nexus in Cameroon: an assessment of the effectiveness of REDD+ policy design strategy in the context of the climate change regime. *Forest Policy Econ.* 52, 46–56.
- Mbatu, R.S., 2016. REDD+ research: reviewing the literature, limitations and ways forward. *Forest Policy Econ.* 73, 140–152.
- MOEF, 2018. Indonesia second biennial update report. https://unfccc.int/sites/default/files/resource/Indonesia-2nd_BUR.pdf, Accessed date: 3 June 2019.
- Mudassar, R., 2018. Kinerja Minyak Sawit Mentah: Ekspor CPO naik 21%. <https://kalimantan.bisnis.com/read/20180130/12/732167/kinerja-minyak-sawit-mentah-ekspor-cpo-naik-21>, Accessed date: 3 July 2019.
- Mumbunan, S., Ring, I., Lenk, T., 2012. Ecological Fiscal Transfers at the Provincial Level in Indonesia. UFZ-Diskussionspapiere.
- Nielsen, T.D., 2016. From REDD+ forests to green landscapes? Analyzing the emerging integrated landscape approach discourse in the UNFCCC. *Forest Policy Econ.* 73, 177–184.
- Norman, M., Nakhooda, S., 2015. The state of REDD+ finance. In: *GCD Working Paper*. Centre for Global Development, Washington.
- Nurfatriani, F., Darusman, D., Nurrochmat, D.R., Yustika, A.E., Muttaqin, M.Z., 2015. Redesigning Indonesian forest fiscal policy to support forest conservation. *Forest Policy Econ.* 61, 39–50.
- Nurfatriani, F., Salminah, M., Cadman, T., Sarker, T., 2018. Incentives and disincentives for reducing emissions under REDD+ in Indonesia. In: *Pathways to a Sustainable Economy*. Springer, pp. 191–207.
- Nurrochmat, D.R., Solihin, I., Ekayani, M., Hadianto, A.d., 2010. *Neraca Pembangunan*

- Hijau-Konsep dan Implikasi Bisnis Karbon dan Tata Air di Sektor Kehutanan. (Bogor).
- Ompusunggu, M., 2017. Indonesia's REDD+ begins new chapter. The Jakarta Post.
- Pedroni, L., Dutschke, M., Streck, C., Porrua, M.E., 2009. Creating incentives for avoiding further deforestation: the nested approach. *Clim. Pol.* 9 (2), 207–220.
- PP12/2014, 2014. Peraturan Pemerintah Republik Indonesia Nomor 12 Tahun 2014 Tentang Jenis Dan Tarif Atas Jenis Penerimaan Negara Bukan Pajak Yang Berlaku Pada Kementerian Kehutanan. (http://www.anggaran.depkeu.go.id/peraturan/PP12_2014_Tarif_PNBP_Deptan.pdf Accessed 04/03/2018).
- Purnomo, H., Shantiko, B., Sitorus, S., Gunawan, H., Achdiawan, R., Kartodihardjo, H., Dewayani, A.A., 2017. Fire economy and actor network of forest and land fires in Indonesia. *Forest Policy Econ.* 78, 21–31.
- Roessing Neto, E., 2015. REDD+ as a tool of global forest governance. *Int. Spectator* 50 (1), 60–73.
- Sahide, M.A.K., Maryudi, A., Supratman, S., Giessen, L., 2016. Is Indonesia utilising its international partners? The driving forces behind Forest management units. *Forest Policy Econ.* 69, 11–20.
- Saito-Jensen, M., Rutt, R.L., Chhetri, B.B.K., 2014. Social and environmental tensions: affirmative measures under REDD + carbon payment initiatives in Nepal. *Hum. Ecol.* 42 (5), 683–694.
- Sheng, J., Zhou, W., de Sherbinin, A., 2018. Uncertainty in estimates, incentives, and emission reductions in REDD+ projects. *Int. J. Environ. Res. Public Health* 15 (7), 1544.
- Simamora, A., 2008. Govt to set up climate trust fund to woo donors. In: The Jakarta Post. Indonesia's CPO levy collector mulls endowment fund for sustainability. In: Singgih, V.P. (Ed.), The Jakarta Post, Niskala Media Tenggara.
- Somorin, O.A., Visseren-Hamakers, I.J., Arts, B., Sonwa, D.J., Tiani, A.-M., 2014. REDD+ policy strategy in Cameroon: actors, institutions and governance. *Environ. Sci. Pol.* 35, 87–97.
- Suparmoko, M., Nurrochmat, D.R., 2006. Prospek Pengembangan Penerimaan Bukan Pajak (PNBP) Penggunaan Kawasan Hutan. Badan Planologi Departemen Kehutanan, Jakarta.
- Taylor, M., 2019. Norway Starts Payments to Indonesia for Cutting Forest Emissions. <http://news.trust.org/item/20190218111225-swep6/>, Accessed date: 3 July 2019.
- Tsujino, R., Yumoto, T., Kitamura, S., Djamaluddin, I., Darnaedi, D., 2016. History of forest loss and degradation in Indonesia. *Land Use Policy* 57, 335–347.
- UNEP, 2016. Fiscal incentives for Indonesian palm oil production: pathways for alignment with green growth.
- UNFCCC, 2011. Outcome of the work of the ad hoc working group on long-term cooperative action under the convention. Cancun Agreements.
- UNFCCC, 2015. Paris Agreement as Contained in the Report of the Conference of the Parties on its Twenty-First Session.
- UNFCCC, 2016. UNFCCC standing committee on finance 2016 biennial assessment and overview of climate finance flows report. http://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/2016_ba_technical_report.pdf, Accessed date: 3 June 2019.
- Varkkey, H., Tyson, A., Choiruzzad, S.A.B., 2018. Palm oil intensification and expansion in Indonesia and Malaysia: environmental and socio-political factors influencing policy. *Forest Policy Econ.* 92, 148–159.
- Venter, O., Koh, L.P., 2012. Reducing Emissions from Deforestation and Forest Degradation (REDD+): Game Changer or Just Another Quick Fix? 1249 (1). *Annals of the New York Academy of Sciences*, pp. 137–150.
- World-Growth, 2011. The Economic Benefit of Palm Oil to Indonesia.
- Yustika, A., 2008. Refleksi Subsidi Dalam Perekonomian Indonesia. *Bisnis dan Ekonomi Politik* 9 (3), 1–112.