Australian Government

Australian Centre for International Agricultural Research

Final report

project	**Enhancing smallholder benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia**
project number	FST/2012/040
date published	1/06/2019
prepared by	Prof Luca Tacconi
co-authors/ contributors/ collaborators	Dr Muhammad Zahrul Muttaqin
approved by	Tony Bartlett, Forestry Program Manager
final report number	FR2019-21
ISBN	978-1-925746-97-6
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

Contents

1 Acknowledgments

Too many people and colleagues contributed to the successful implementation of the project to list them all. But we would like to express our thanks in particular to:

Pak Wahjudi Wardojo, former Director General of FOERDIA, who through his commitment to sustainable forest management and conservation saw the need to initiate a research program on deforestation and emissions reduction. Without his foresight, this project and the previous one probably would have not taken place, and he graciously accepted many invitations to take part in project meetings and workshops;

Pak Iman Santoso and Pak Bambang Suprianto, former Directors of the Research and Development Centre of Socio-economics, Policy and Climate Change of FOERDIA, who wholeheartedly supported the project and always provided constructive and challenging ideas; The team of researchers in FOERDIA who provided invaluable research and administrative support;

Mr Tony Bartlett, Forestry Research Program Manager, who oversaw the implementation of the project and provided very useful comments on issues to be considered during its implementation, and supported our efforts to disseminate the research findings as widely as possible;

The many local government officials in Riau, Central Kalimantan and Papua who collaborated with and supported the project; And finally, and most importantly, the many people in the villages where the project carried out its field activities, for their patience to discuss many questions from project researchers, and their interest and willingness to participate in workshops and training activities.

1.1 Acronyms and Abbreviations used in this report

ACIAR	Australian Centre for International Agricultural Research
APRIL	Asia Pacific Resources International Holdings Limited
ATL	Australian Team Leader
AusAID	Australian Agency for International Development
BAPPENAS	Ministry of National Development Planning
BPREDD+	National REDD+ Agency (*Badan Pengelola REDD+*)
CO2e	Carbon Dioxide equivalent
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
DFAT	Department of Foreign Affairs and Trade
DG	Directorate General
ENSO	El Niño-Southern Oscillation
ER-PIN	Emission Reductions-Program Idea Note
ES	Environmental Services
FCPF	Forest Carbon Partnership Facility
FFVP	Fire Free Village Program
FGD	Focus Group Discussion
FMU	Forest Management Unit (*Kesatuan Pengelolaan Hutan*)
FOERDIA	Forestry, Environment Research, Development and Innovation Agency
FORDA	Forestry Research and Development Agency
FREL	Forest Reference Emission Level

G20	Group of Twenty
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GoI	Government of Indonesia
GR	Government Regulation
GtCO2e	Giga tonne Carbon Dioxide equivalent
ha	Hectare
HA	Customary Forest (Hutan Adat)
HD	Village Forest (*Hutan Desa*)
HKm	Community Forest (*Hutan Kemasyarakatan*)
HTR	Community Plantation Forests (*Hutan Tanaman Rakyat*)
IDR	Indonesian Rupiah
IPB	Bogor Agricultural Institute (*Institut Pertanian Bogor*)
IPHPS	Permit for Social Forestry Utilisation (*Izin Pemanfaatan Hutan Perhutanan Sosial*)
KPH	Forest Management Unit (*Kesatuan Pengelolaan Hutan*)
LPHD	Village Forest Management Agency (*Lembaga Pengelolaan Hutan Desa*)
LULUCF	Land Use, Land-Use Change and Forestry
MB-IPB	Graduate Program of Management and Business, Bogor Agricultural Institute
MoA	Ministry of Agriculture
MODIS	Moderate Resolution Imaging Spectroradiometer
MoEF	Ministry of Environment and Forestry
MRV	Monitoring, Reporting and Verification
MtCO2e	Million tonne of Carbon Dioxide equivalent
NDC	Nationally Determined Contribution
NGO	Non-Government Organisation
NRS	National Registry System
NTFP	Non-Timber Forest Product
NTSR	Non-Tax State Revenue
Perhutani	State Forest Enterprise (*Perusahaan Hutan Negara Indonesia*)
PES	Payments for Environmental Services
PIAPS	Indicative Map of Social Forestry Allocation (*Peta Indikatif dan Areal Perhutanan Sosial*)
PIN	Project Idea Notes
PNPM	National Program for Community Empowerment (*Program Nasional Pemberdayaan Masyarakat*)
PRISAI	Principles, Criteria and Indicators for REDD+
PUSPIJAK	Center for Climate Change and Forest Policy Research and Development
RAN-GRK	National Action Plan for Reducing Greenhouse Gas Emissions (*Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca*)
RCCC-UI	Research Center for Climate Change, University of Indonesia
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REL	Reference Emission Level
RHL	Forest and Land Rehabilitation (*Rehabilitasi Hutan dan Lahan*)

Rp	Rupiah
SF	Social Forestry
SFM	Sustainable Forest Management
SIGN-SMART	National Greenhouse Gas Inventory System - Simple, Easy, Accurate, Compact, Transparent (*Sistem Inventarisasi Gas Rumah Kaca Nasional - Sederhana, Mudah, Akurat, Ringkas, Transparan*)
SIS	Safeguards Information System
SRAP	State REDD+ Action Plan
SSH	Sultan Syarif Hasyim (Grand Forest Park)
SWIR	Shortwave Infrared
TORA	Land Subjected to Agrarian Reform (*Tanah Obyek Reforma Agraria*)
UKP4	President's Delivery Unit for Development Monitoring and Oversight (*Unit Kerja Presiden Bidang Pengawasan dan Pengendalian Pembangunan*)
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VAT	Value Added Tax
VCS	Verified Carbon Standard
VI	Vegetation Index
WB	World Bank
WI	Wetlands International
WWF	World Wide Fund for Nature

2 Executive summary

Indonesia committed to cut emissions by 26% by 2020 and, with international support, by as much as 41%. And it made a similar commitment going forward to 2030. Its Nationally Determined Contribution, submitted to the United Nations Framework Convention on Climate Change states that the largest contribution to emission reductions will come from the forestry sector. The implementation of REDD+, which requires international funding, will take place as part of those emissions reduction efforts.

With an estimated 18 million people living in, or near forest areas, the Government of Indonesia knows that to implement REDD+, it needs to establish effective and efficient policy and governance regimes, and it has to create an equitable environment where the smallholders that change land management practices are provided with appropriate (financial) benefits for doing so. Therefore, the aim of this project was to conduct research to support the development and monitoring of policy and the design of institutional arrangements at the national, provincial and local levels to facilitate the effective implementation of REDD+, and the equitable distribution of its benefits to communities.

The project focused on delivering policy relevant research, strengthening the capacity of Indonesian researchers to carry out research with a focus on policy, as well as contributing to the capacity of local government official to implement emission reduction programs in forestry, particularly by providing support to interested local communities. Self-evaluation by the main Indonesian implementing agency, the Forestry Environment Research, Development and Innovation Agency of the Ministry of Environment and Forestry indicates that the project has been very useful and beneficial to support its capacity to address climate change issues, especially in REDD+. The project has built capacity and institutional improvements through collaborative research, training, and financial support. The capacity improvement of its researcher can be seen, among others, from the invitations to join international, national and local efforts for avoiding deforestation and minimising forest degradation as well as restoring degraded lands, including peat. More researchers have been involved in this project compared to previous projects; therefore, more researchers have strengthened their skills.

Project research has been presented in several scientific publications in international journals and book chapters. It has also been disseminated in Indonesia, among stakeholders and key policy-makers, through the publication of information and policy briefs, as well as workshops involving central and local government officials, representatives of companies and non-government organizations, and local communities. Local communities in Riau, Central Kalimantan and Papua were supported through participatory planning processes to develop concept notes forest management and carbon conservation activities that could be funded through funding programs being developed by the Government of Indonesia. The approach to community involvement in carbon conservation planning activities demonstrated by the project could also provide useful input to Indonesia's renewed effort to significantly expand its social forestry program.

Indonesia has embarked in one of the largest forest land reform programs in the world. The program has extremely important implications for people's livelihoods and for the climate. Research support on how best to implement and monitor the program would be of significant benefit to Indonesia, its people, and efforts to mitigate climate change.

The project identified several issues that could be addressed in order to improve the likelihood that emission reduction policies and activities will be effective and equitable, they include: i) revisions to several regulations within and outside the forest sector should be carried out; ii) a jurisdictional approach to the implementation of REDD+ should be considered, and it should involve district and village governments; iii) communities should be directly involved in emission reduction activities, and could be supported through intergovernmental fiscal transfers to the village level; iv) forest law enforcement is a key

element of an emission reduction strategy, and Indonesia can learn from Brazil's experience.

3 Background

A mechanism on Reducing Emissions from Deforestation and Forest Degradation (known as REDD+, with the '+' referring to sustainable management of forests, conservation and enhancement of carbon stocks) was reached at the 2010 Cancun meeting of the UN Framework Convention on Climate Change, and later formally included in the 2015 Paris climate change agreement.

Indonesia has been a consistent promoter of the REDD+ mechanism. Already at the 2009 G20 Leaders Meeting in Pittsburgh, the Indonesian President had stated that his country would change the status of Indonesia's forests from a net-emitting sector to a net-sink sector by 2030. This commitment is a key element of government policy to cut emissions by 26% by 2020 and, with international support, by as much as 41%. With an estimated 18 million people living in, or near forest areas, the Government of Indonesia knows that to implement REDD+, it needs to establish effective and efficient policy and governance regimes, and has to create an equitable environment where the smallholders that change land management practices are provided with appropriate (financial) benefits for doing so.

Climate change mitigation action in Indonesia was initially developed and coordinated under the President's Delivery Unit for Development Monitoring and Oversight, known as UKP4. UPK4 activities included the establishment and coordination of the REDD+ Task Force, which published the REDD+ National Strategy (hereafter, referred to as the Strategy) in June 2012. The Strategy was formulated with the intent to: i) prepare an effective institutional systems to implement the REDD+ program; ii) provide a basis and direction for integrated governance and regulatory systems to ensure the implementation of the REDD+ scheme; iii) develop systematic and consolidated processes and approaches to save Indonesia's natural forests and the flora and fauna within them; and iv) to provide a reference for the expansion of investment in the utilization of forests and peatlands for the production of forest and/or agricultural commodities, and the provision of ecosystem services that include the conservation and accumulation of carbon stocks. The Strategy demonstrates the significance that the Government of Indonesia attaches to the implementation of REDD+. In 2015, the GoI created the Ministry of Environment and Forestry, which has authority over climate change matters, including REDD+.

With 90 million hectares of forests and annual deforestation at about one million hectares (second only to Brazil, and amounting to about 14% of global deforestation), Indonesia can play a central role in REDD+. It also stands to gain significantly from carbon reduction emissions through the implementation of international and/or bilateral agreements on REDD+ financing, as demonstrated by agreement with Norway, worth $1 billion. Given the potential size of the financial benefits and the implications for the livelihoods of smallholders and other community members, it is imperative for the country to design appropriate mechanisms to ensure that the implementation of REDD+ is effective, efficient, equitable, transparent and accountable (as stated in the Strategy). Therefore, Indonesia gave high priority to this project, which built on the research and capacity building activities of project FST/2007/052. That project focused mostly at the local level (i.e. provincial and district governments and local communities) rather than at the national level. The local level analysis yielded, however, nationally relevant results because the local level work was designed to be representative of national level issues. Project FST/2007/052 highlighted, among other research, that:

i) Mechanisms to distribute funding from REDD+ to lower levels of government and to communities need to be developed to ensure the effectiveness, efficiency and equity of REDD+. Options for the design of these mechanisms were developed.

ii) The forestry regulatory framework allowed for the devolution of control over forests to communities both in areas where communities claim customary rights to forests (such as in Papua) as well as where they do not appear to have customary claims (such as in Riau). Regulatory mechanisms could be used to provide incentives aimed at bringing benefits from REDD+ to communities.

This project build on these findings to address a number of research questions (see below) that were raised by stakeholders and project staff following the consideration of Project FST/2007/052 outputs, literature on REDD+ and discussions with decision makers in Indonesia. The development of the research questions also took into account FOERDIA's active research program on the social, economic, and governance aspects of REDD+. Some of the research questions had to be revised due to issues encountered during project implementation (as communicated to ACIAR in the Annual Report for Year 2). The revised questions were as follows.

1. How can the proposed REDD+ fiscal incentive mechanism be integrated to the current arrangements of community development programs to provide additional benefits to communities?

2. At what level can jurisdictional REDD+ be implemented and what is the feasibility of each option (village, district or provincial)?

3. Can fiscal instruments be used to promote business sector engagement in REDD+?

4. How are smallholders' livelihoods, risk management strategies, vulnerability and resilience affected by forest management activities? What factors need to be incorporated in order that activities are designed to maximize positive outcomes and minimize negative ones?

5. What are the most appropriate incentives to offer to encourage smallholders to participate in community-based forest management activities that are located on state forest land allocated to them under community forestry regulations? And what are options for scaling up the approach?

> The first question will be answered by addressing the following sub-questions:
>
> Are smallholders interested to participate in forest management activities located in forests allocated to them under community forestry regulations or on their customary forest land?
>
> - What are smallholders' interests in managing forests?
> - What support is necessary to implement community-based forest management at scale?

6. Is there an appropriate business model to promote partnerships between companies and communities in implementing REDD+ and sharing benefits?

7. Are there policies in Indonesia that counter the effectiveness of REDD+ policies and activities?

8. How can the performance of REDD+ policies and activities be improved?

4 Objectives

The aim of the project was to conduct research to support the development and monitoring of policy and the design of institutional arrangements at the national, provincial and local levels to facilitate the effective implementation of REDD+, and the equitable distribution of its benefits to communities.

Objective 1. To support the development of institutional arrangements and fiscal mechanisms for REDD+ linking implementation at the national with local levels

The activities planned under this objective included:

- Assessment of the appropriateness of international proposals for the implementation of REDD+ at the national/subnational level (so called jurisdictional approaches) for the implementation of REDD+ in Indonesia.
- Consideration of whether the REDD+ fiscal incentive mechanism, which is designed to provide incentives to regional governments to reduce emissions, could be integrated with a benefit sharing system designed to provide benefits from REDD+ to smallholders and forest communities.
- Analysis of the possible use of fiscal instruments to promote business sector engagement in REDD+, and consideration of the potential for Indonesian Government's Corporate Social Responsibility obligations for private forestry companies to include REDD+ implementation.
- Development of policy options for the design of institutional arrangements and fiscal mechanisms for REDD+, linking implementation at the national with local levels.

Objective 2. To identify options to protect smallholder interests and encourage private sector involvement in benefit sharing mechanisms

The activities planned under this objective included:

- Analysis of the effects of PES and other benefit sharing schemes on smallholders' risk management strategies, livelihood vulnerability and resilience.
- Assessment of appropriate incentives to encourage participation and pilot testing of benefit sharing mechanisms in selected smallholder communities.
- Analysis of appropriate business models to promote partnerships between companies and communities in implementing REDD+ and sharing benefits.
- Developing policy lessons for benefit sharing mechanisms to maximise benefits to smallholders.

Objective 3. To enhance the design and performance of REDD+ policies and activities

The activities planned under this objective included:

- Assessment of the implications of policies outside the forest sector for the effectiveness, efficiency and equity of REDD+ policies and activities.
- Assessment of whether there are factors limiting the adoption and/or implementation of REDD+ policies and activities at the national, provincial and local government levels.
- Development of policy options to improve the performance of REDD+ policies and activities.

Capacity building activities, including training and workshops, where built into each objective. These activities aimed primarily at FORDA staff and research partners, as well as government officials in stakeholder/partner ministries at national and local government levels.

5 Methodology

Several research methods were used by the project in order to deliver the specific outputs. Methods specific to each output are discussed below. All outputs carried out literature reviews, including published and unpublished material. Therefore, the discussion below focuses on methods other than literature reviews.

Most project activities focused on the provinces of Riau, Central Kalimantan, and Papua. However, not all activities focused on all provinces as a result of requirements of the research methods, or availability of resources, or presence of relevant initiatives to be studied. The geographic focus of the research activities will be discussed in detail below.

Objective 1. To support the development of institutional arrangements and fiscal mechanisms for REDD+ linking implementation at the national with local levels

The first study under this objective (Output 1.2) focused on how best to implement the jurisdictional approach to reducing emissions at the local level across different jurisdictions, i.e. villages, districts and provinces. Research was carried out by reviewing the proposals presented by different international organizations, discussions with proponents of the jurisdictional approach in Indonesia. The study had been proposed to work in the three provinces that were the focus of this project, Riau, Central Kalimantan and Papua. However, once the methods were planned in detail it became evident i) that the resources available allowed the inclusion of only one case study, and ii) that the lessons learnt from one single case study (instead of three) would still be valid as the key issue in designing a jurisdictional approach is the consideration of the levels of government that apply to the specific country, and they do not vary from province to province. Therefore, it was decided to carry it out in Central Kalimantan.

This main data collection and analysis for this study involved the assessment of the deforestation in the jurisdictions considered: Central Kalimantan Province, Kotawaringin Barat District, Sungai Sekonyer Village. The following methodology was applied 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 hectares 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 datasets (MoEF, 2016a). 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.

Activity 1.4 was designed to assess options for integrating a fiscal incentive mechanism with benefit sharing for communities. Given that there had been limited progress on the design by the GoI of a fiscal incentive mechanism, the project considered the option of using the Village Fund (which distributes significant financial resources to every village each year) as a possible mechanism to transfer funds to communities for forest management purposes. In this study, we explored how the Village Fund could be used for financing tree planting. We did this by analyzing the experience of a previous program focused on providing funding

to villages that also had a component focused on supporting environmental activities between 2008 and 2012. The focus of the funding in the case study villages (in Southeast Sulawesi Province) was on small-scale community activities. The research had to be carried out in a that province because the program studied did not appear to have had sites in the main three provinces that were the focus of this research project.

For the study, we interviewed village heads in 38 villages and four administrative villages (Table 1). The sites were distributed across five districts: Buton, South Buton, Central Buton, Kolaka, East Kolaka, Muna and West Muna. The 42 sites were chosen as they had all participated in the PNPM Green program according to the final report of the PNPM Green Project in Southeast Sulawesi (Purwanto, 2013). The study involved field visits during the period of 11 to 16 April and 14 to 22 June 2017. In each village, the respondents were current or former village heads in the periods of: i) The PNPM Green Project: 2008 – 2013; and ii) The Village Fund: 2015-2017.

Table 1. Villages and Administrative Villages Surveyed per district in South East Sulawesi Province

District	Number of villages	Number of administrative villages
Central Buton	9	
Buton	3	
South Buton	5	1
Kolaka	7	2
East Kolaka	3	1
Muna	7	
West Muna	4	
Total	**38**	4

In addition to the villages surveyed, we also interviewed four heads of administrative villages. Administrative villages are practically identical to villages in terms of geography and structure, however, administratively they are governed by a government appointed leader. Administrative villages are not eligible for the village fund, however, many of the administrative villages in Southeast Sulawesi participated in the Rural PNPM Mandiri program, including PNPM Green.

Two survey instruments were used. The first survey was used to ask former, and sometimes current, village heads about their knowledge and perceptions of the PNPM Green program. The second survey was used to ask current village heads about their knowledge and perceptions of the Village Fund. Both survey instruments included questions about knowledge about the process, perceived effectiveness and alignment with community goals and levels of participation in the decision-making and planning processes. The main focus of the surveys on PNPM Green were to understand how useful and effective the grants were for financing activities that were beneficial to both the local communities and the environment. The responses were analyzed and categorized according to the type of projects, the types of benefits they provided and who received those benefits. These were then assessed against perceptions of transparency, participation and effectiveness. The main focus of the surveys on the Village Fund were to understand how the Village Fund is being used, how effective it is as well as perceptions of transparency, fairness and participation.

Activity 1.6 focused on the assessment of policy options to use fiscal instruments to promote private sector engagement in REDD+. This study explored the insights of a range of actors (government, forest industry, palm oil companies and others) on the role of fiscal incentives to encourage the participation of the private sector and other stakeholders in reducing forest-based emissions in Indonesia. An anonymous online survey of Indonesian stakeholders was deployed between April and October 2016 to determine their general awareness of fiscal instruments relevant to REDD+, and their effectiveness. A total of fifty-four respondents participated in the survey, broken down into government (22), Forestry sector (13), Education/research (14), and 'Other' (5). Other was comprised of respondents identifying as NGO/civil society (3), consulting, and 'mitigation of climate change'. Respondents to the anonymous online survey were also invited to provide more detailed anonymous interviews. Seven agreed to do so. A total of thirty-five individuals agreed to be interviewed. Interviews lasted approximately one hour, and were conducted in Jakarta and Bogor in 2016 in April (2 interviews) May (7), September (1) and October (25). 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', Ecosystem restoration concession holders (2), NGOs – international (3) and national (2), and Palm oil (2).

Objective 2. To identify options to protect smallholder interests and encourage private sector involvement in benefit sharing mechanisms

The new Activity 2.0 was introduced to inventory PES/REDD /benefit sharing schemes in Indonesia in order to identify potential case studies to replace the one that had been planned in the project document (the AusAID's Kalimantan Forest Carbon Partnership, which was terminated). The first step to assess the experience of PES in Indonesia was to compile a comprehensive list of all projects and programmes taking a market-based approach to the provision of ecosystem services – whether individually or in combination in Indonesia. This list was compiled by searching both published and grey literature for projects described as being (or having the potential to be) linked to an ecosystem service market. In order to reduce the chance of excluding PES projects in the first instance, the search and construction of a long-list was designed to be as inclusive as possible, and incorporate a wide range of projects, including those described as being specifically PES, as well as others, for example those described as REDD+, as clean development mechanism or voluntary carbon standard projects. Further information was then sought about partners (individuals or organisations) involved in the design, implementation or funding of the scheme, whether they were government or non-government, Indonesian or international. In order to determine if the identified projects could actually be classified as an active PES scheme, these partners were then contacted by telephone or email to determine whether they matched the specified PES scheme criteria. There is a growing literature dealing with the definition of PES (see for example, Wunder 2005, Tacconi 2012), and for the purposes of this research, schemes were included in the analysis if:

- the purpose of the scheme is/was to create or sustain the provision of ES by 'ES sellers' who participate voluntarily;
- buyers pay for either: (i) activities thought to generate ES provision (i.e. payments for inputs, where payments are based on some biological/ecological understanding of the connection between the activity being paid for and ES provision) or (ii) ES provision directly (i.e. payments for outputs);
- payments are made only if (agreed) criteria to provide ES is met (conditionality);
- the scheme is making/has made payments for ES provision at one or more site in Indonesia.

Project contacts were interviewed about long-listed projects to determine whether they met these criteria, and were also questioned about their knowledge of other projects (i.e. snowball sampling) to ensure as complete coverage of actual and potential projects as possible. Information derived from this first round fact checking was used to confirm the existence of projects; to add, supplement or amend the information about projects; or to

remove projects that did not meet the criteria from the long-list. For those projects that met the criteria, project contacts were also interviewed about their perspective of the reasons for PES success and of constraints to the further spread of PES in Indonesia. A number of other stakeholders were also interviewed about their perceptions of these issues – stakeholders that could be reasonably interpreted as playing (or potentially playing) a role in supporting, designing and/or implementing local-level PES schemes. This included a range of government officials, conservation-oriented non-government organisations, donor agencies and some private sector stakeholders who are actively involved in existing or developing PES or REDD+ activities.

Interview notes were transcribed and then analysed using NVivo. All interviews were coded for a number of themes. One thematic group related to the motivation for project design, including views on the types of payments to communities and/or individuals typical of PES schemes. Another group related to the reasons for the lack of spread of PES across Indonesia, and what elements may facilitate such spread in the future. For those interviews discussing an active or defunct PES scheme, interviews were also coded for elements of the design of the PES scheme.

Activity 2.3 was designed to analyse the effects of PES and other benefit sharing schemes on smallholders' livelihoods vulnerability, and resilience and risk management strategies. When the AusAID project noted above closed, and no appropriate case studies to replace that project could be found through Activity 2.0, the implementation of this activity as originally designed became problematic. The closest project that we could find to a PES scheme, that was also relevant to this project and was willing to collaborate with the project team was Fire Free Villages Program implemented by the private sector forestry company APRIL in Riau province. The program is aimed at reducing the occurrence of fires in villages near APRIL's plantation through the provision of a range of incentives to smallholders.

The study compares villages that were part of the Fire Free Villages Program in Pangkalan Kerinci district (Riau Province) during the first year of the scheme with nearby villages that were not part of the scheme. Program villages were selected based on whether they received a full, half or no reward. Control villages were selected according to their similarity with the program villages selected, including size and relative risk according to APRIL's risk assessment map. Geographically, the villages were all located in the same region, with some control and program villages adjacent to each other. In 2016, Asian Agri, a palm oil company that belongs to the same Royal Golden Eagle International Group as APRIL, also launched a Fire Free Village Program, which included two of the control villages, Segati and Lalang Kabung Village. As the program started in 2016, it would not have affected the behaviour of communities during the 2015 period. In each of the villages, focus group discussions and five individual interviews were conducted during the daytime, although some of the discussions and individual interviews were conducted in the evening to adjust to the availability of the respondents. The focus group discussions involved village leaders and key informants and discussed general information about the villages including livelihoods as well as their perceptions on burning. The individual interviews were similarly structured although without questions regarding the general profile of the village. The results of the focus group discussions and individual interviews from both control and program villages were used to compare individual and collective perceptions, especially regarding the causes of fire, the reasons for stopping and the benefits of the program.

Based on our literature review and preliminary fieldwork, we identified four potentially confounding factors that could affect the results from any study of the effectiveness of the incentive program. These four factors were:

- Environmental conditions such as ENSO events;
- Strictly enforced regulations for prohibiting burning;
- Actual and alternative livelihood systems; and
- Unrestricted community financing initiatives such as the Village Fund, which could dilute the effects of the incentive scheme.

To try to mitigate these confounding factors, we selected the year 2015 as the study period. That year was the first year of the program, as well as coinciding with the major ENSO event, but also the year before the Presidential Instruction that banned burning was enforced nationwide. According to national regulations issued prior to the Presidential Instruction, there was a degree of flexibility for smallholders to burn as part of their livelihood activities. To identify the conditions that enabled farmers to switch to non-burning livelihoods, we analysed their transitions in livelihoods as well as any outside support that may have been provided, including corporate social responsibility (CSR) programs. The study period also coincided with the launch of the Village Fund, a national program designed to provide unrestricted funds to villages largely for infrastructure development. Administrative villages were excluded from the scheme. We also specifically asked respondents in villages to describe the benefits of the village fund and, specifically in the program villages, compare with them the FFVP incentives to identify the additionality of the incentives.

The interviews were complemented with remote sensing data related to land use/cover in the FFVP and control villages as well as estimations of the severity and extent of fire events. Fire activity is heavily influenced by the presence and extent of particular land use/covers, such as degraded forests and scrublands, at least where these are proximate to forest incursions and agricultural activities (Cattau et al., 2016a; Sloan et al., 2017). To ensure the comparability of our fire-free villages and control villages in this respect, we quantified the proportional areas of various land use/cover classes in each village and each village set according to visual interpretations of Landsat and SPOT ~30-m satellite imagery of ca. 2015 by (Miettinen et al., 2016a). This interpretation defined ten land use/cover classes including plantation cover, smallholder agriculture, and pristine and degraded forest classes (Miettinen et al., 2016a). Around 40% of the total area of the Control Villages (mostly accounted for by Segati village and Kerumutan village) were not visually interpreted because they were not situated on peatland defined by Miettinen et al. (Miettinen et al., 2016a). For these areas, we quantified land use/covers using the MODIS 250-m land-cover classification of Miettinen et al. (Miettinen et al., 2016b).

The land use/cover classes of the MODIS classification were equated to those of the visual interpretation according to Table A.1. In general, while the distribution of land covers amongst individual villages is variable, including within the set of FFVP or Control villages exclusively, the two sets of villages are comparable with each other overall, “Total FFVP” and “Total Control”). The extent of burn scars was calculated using the MCD64AI data. The data contains both the quantity and quality of the burned area collected using Terra and Aqua sensor from 500 m Moderate Resolution Imaging Spectroradiometer (MODIS) surface reflectance and 1 km MODIS active fire observations (Giglio et al., 2009). The burned pixels were identified by applying a threshold based on the vegetation index (VI) from shortwave infrared (SWIR) band of MODIS satellite image and temporal texture measurement (Giglio et al., 2015, 2009). The burned pixel represents the burned area within a year with an exclusion of the missing data and water bodies at 500 m resolution from 2013 to 2017. The burn scar data was also compared against hotspot data, derived from MODIS data, for the same period. Where available, these figures were also compared against burn scar analyses provided by APRIL.

The work carried out under Activities 2.6, 2.7, and 2.E1 was focused on finding ways to supporting local communities to utilise forest ecosystem services through the identification of ecosystem services, assessing the biophysical and human resources available to villagers, identifying potential partners for the utilization of ecosystem services, and developing management plan for utilizing ecosystem services. This study was conducted in:

1. Riau Province: Kampar, Siak and Pekanbaru Districts
2. Central Kalimantan Province: Palangkaraya, Kapuas, and Gunung Mas Districts
3. Papua Province: Jayapura District.

The selection of research sites considered the institutional architecture of state forest management in Indonesia where, based on its function, Indonesian forest is classified into conservation, protection, and production forest. Table 2 reports the study sites and the related forest functions.

Table 2. Site Selection

Province	Forest Function	Location
Riau	Production	Kepau Jaya Research Forest, Kepau Jaya Village, Kampar District
	Protection	Rumbio Customary Forest, Kampar District
	Conservation	Rantau Bertuah Village adjacent to Sultan Syarif Hasyim Grand Forest Park
Central Kalimantan	Production	Rakumpit Customary Forest, Gunung Mas District
	Protection	Katimpun Village Forest, Kapuas District
	Conservation	Kereng Bangkirai Village adjacent to Sebangau National Park, Palangkaraya City
Papua	Production	Elseng Customary Forest, Kemtuk Sub-District, Jayapura District
	Protection	Yapase Customary Forest, Depapre Sub-District, Jayapura District
	Conservation	Customary Communities of Sereh and Kemiri Villages adjacent to Cycloops Strict Nature Reserve, Jayapura District

Data collection was conducted through focus groups involving local communities. A focus group is a well-designed discussion to obtain the perception of participants in conducive circumstances (Krueger, 1988). A focus group is useful to explore the way particular groups of individuals think and talk about phenomena, to generate ideas, and to generate diagnostic information (Stewart & Shamdasani, 1990). This study involved 9 focus groups representing 9 locations of the study. In each focus group, there were 10 – 15 participants selected by the researchers in consultation with customary leaders or heads of village.

The study also employed in-depth interviews involving representatives of governmental agencies, NGOs, and the private sector. An in-depth interview is a face-to-face discussion between researcher and informant in order to understand the informant's perspective in relation to their experience and knowledge that are stated through their own words (Rahayu, 2008). The in-depth interviews in this study were conducted to gather information related to efforts to avoid deforestation and forest degradation at the community level.

Data was analysed using descriptive-qualitative analytical techniques. Communities' motivation in managing forest resources was assessed against the following criteria: (1) benefits obtained from forests; (2) forms of forest management; (3) efforts to maintain and sustain forest resources; and (4) factors motivating communities to conserve forest resources. Communities' interests in participating in a REDD+ program were assessed using expert judgement against the following criteria: (1) the willingness of communities in managing forest resources; (2) community's initiatives to establish forest management institutions; and (3) the existence of management plan. The level of participation is high if local communities comply with all criteria, medium if only comply with 2 criteria, and low if only comply with 1 criterion. The design of incentive for local communities is derived from their motivation and interest in managing forest resources, especially forest ecosystem services, sustainably.

Objective 3. To enhance the design and performance of REDD+ policies and activities

In the project proposal, the focus of Activity 3.1 was stated as 'Analysis of Indonesian and international experience in environmental policy to determine the political and economic factors critical to the successful development and implementation of sustainable resource

management policies'. During the implementation of the project it became clear, after considering international experience, particularly that of Brazil, that one of the key factors in reducing deforestation was the enforcement of existing laws. It was therefore decided to carry out a comparative case study between Brazil and Indonesia to ascertain how forest law enforcement in the two countries is being carried out in order to derive lessons for Indonesia.

In the project design, the main focus of Activities 3.2 and 3.3 was to address forest and non-forest sector policies that support or conflict with the implementation of REDD+. Two reports (and the summary paper prepared for publication) have focused particularly on laws and regulations at the national and local levels. These studies employ policy evaluation as the research approach. Policy evaluation is a comprehensive assessment of the whole process and the policy context, starting from policy formulation, policy implementation, policy environment and policy performance Dunn (2009). Policy evaluation is carried out to investigate the performance of a policy and the achievement of the policy towards its goals and objectives. It is required in order to identify problems so that corrective actions can be taken. The policy evaluation approach used here uses the descriptive method to produce valid and reliable information regarding policy outcomes (Dunn, 2009). Policy evaluation is used to examine the content, implementation or impact of a policy (Stewart et al., 2007). The behaviour of actors is analyzed in relation to REDD+ instruments including: national strategy and action plan, Reference Emission Level (REL), Measurement Reporting and Verification System, Safeguards, and Benefit Sharing Mechanisms.

As the project was being implemented, it become clear that there was a need to analyse not just laws and regulations but also how policies on the reduction of emissions were being implemented in order to derive lessons to improve the effectiveness of future implementation efforts related to the NDC and REDD+ (Activity 3.3B). To assess the implementation the Indonesian climate change action plan (2010-2014), also known by the acronym of RAN-GRK, we adopted program theory evaluation. This approach has emerged in the past two decades with the aim of understanding whether, and sometimes how, interventions—policies or programs— achieve the desired changes. A program theory should describe a particular program, explain why, how and under what conditions the program effects occur. In doing so, it can also identify the necessary conditions to bring about the desired program effects (Sharpe, 2011; Sidani and Sechrest, 1999). Researchers can draw on existing literature and expert opinions to better detail the theory—and associated assumptions—behind interventions. In doing so, it is possible to build models, often called logic or program models, that detail the program theory and illustrate theoretical causal links between interventions and desired outcomes. These models ideally 'explain the mechanisms believed to influence the achievement of the desired program outcomes' (Mertens and Wilson, 2012, p. 34). Such a process can be used for formative evaluation, that is, ensuring that a program is feasible and appropriate. It can also be used to evaluate the implementation of a program and as such provide evidence to improve future programs. This is because, unlike evaluation which may be based solely on statistical analysis, using program theory to evaluate allows us ''to specify not only the what of program outcomes but also the how and the why' (Weiss, 2000).

There is a very long list of terms associated with program theory—theory-driven, theory of change, intervention theory, program theory, logic modelling and program logic, to name a few (Brousselle and Champagne, 2011; Donaldson and Gooler, 2003). Each term is defined differently according to the author and in many cases the actual differences may be subtle. For this paper, we follow the logic analysis framework (Brousselle and Champagne, 2011). Logic analysis, is an 'evaluation that allows us to test the plausibility of a program's theory using available scientific knowledge-either scientific evidence or expert knowledge' (Brousselle and Champagne, 2011, p. 70). This allows us to detail some of the finer causal mechanisms by which an intervention may work (Donaldson and Gooler, 2003). Logic analysis can identify assumptions in program design that may not be appropriate in the context of the intervention. In this way, a logic analysis is similar to the more common theory of change model (Brousselle and Champagne, 2011). However unlike a theory of

change model - which typically begins at the desired outcomes and works backward to identify and design interventions (Stame, 2004; White, 2009) - logic analysis can be used to assess interventions in the forward direction to assess existing programs and whether actions may lead to desired outcomes.

For this research, we adopt the direct logic analysis, as opposed to the reverse logic analysis of theory of change models. This is because this research was conducted after the design and implementation of the RAN-GRK had already occurred. If the research was about assessing all the potential options for reducing emissions in the LULUCF sector, theory of change models could provide alternative actions.

One of the benefits of program theory evaluation is that it can be used to identify or evaluate appropriate performance indicators. A detailed and evidence based logic analysis can ensure that the outputs measured (indicators) are clearly linked to the desired outcomes. Whilst this does not necessarily ensure that the desired outcomes are achieved—as there may be many factors, which affect the link between outputs and outcomes—it can provide a more solid basis to ensure that if targets are achieved, this is reasonable evidence that the desired outcomes will also be achieved. This is particularly important in situations where data are not available to directly measure outcomes, as is the case for emissions reductions. Therefore, in evaluating the impact of the RAN-GRK on reducing emissions in the LULUCF sector, the logic analysis allows us to assess whether and how the actions could plausibly lead to emission reductions, but it also enables us to evaluate the indicators for each action. The results of the logic analysis can help determine whether there is a clear and accurate link between outputs (indicators) and desired outcomes (emission reduction targets).

We focus on the 13 actions related to the LULUCF sector, and particularly seven of them, which represent 71% of the intended emissions in this sector. The remaining actions were not considered as they account for relatively limited expected contributions to emission reductions and there was a lack of data. In order to conduct the logic analysis, 28 semi-structured interviews were conducted with key stakeholders at the national level during the period April, 2016 – March 2017. Respondents included those involved in the design of the RAN-GRK Actions, staff within the Ministry of Environment and Forestry and the Ministry of Agriculture implementing the various actions, and staff with broader responsibilities in climate change, e.g. the Monitoring, Reporting and Verification team in the Ministry of Environment and Forestry. In addition to public servants, respondents were also sought from key research bodies (two) and national NGOs (three). Finally, an additional two phone interviews were conducted with representatives from one district in Sumatra Island as a means to develop some insights into the process at the sub-national level.

For respondents involved in the broader formation and review of the RAN-GRK, interviews focused on process, stakeholder engagement, data availability, and perceived challenges and outcomes. For those involved in implementing activities, questions focused on what activities had been implemented, the perceived impact of those activities, any emission reductions and potential challenges or positives found in the process of implementing the RAN-GRK Actions.

Following the interviews, we developed a list of actual activities implemented and used this to investigate respondents' perspectives about the main way that those activities may have contributed to emission reductions. Using the literature that has examined emission sources in Indonesia – such as on causes of deforestation, forest degradation and peat degradation and fires—we assessed the rationale behind the actions. We also referred to studies that evaluated previous policy interventions designed to reduce deforestation, forest degradation and peat fires. Based on this analysis, the actions were then categorised as: those with a direct emission reduction potential; and those that were best considered as supporting actions, that is, actions that set up conditions for improved forest management, but may not directly lead to emission reductions.

To assess the validity of the indicators used in the RAN-GRK, we drew on the findings from the logic analysis. For each action there are at least two potential indicators. The first is a so-called *project output,* which is the alpha-numerical indicator that measures the achievement of the stated action, for example, establishing 120 forest management units

across the county. The second indicator relates to measuring the actual outcome of the action, that is, the potential emission reductions. Given the lack of data about reduction of emissions (including how the indicative emission reduction targets were calculated), the analysis focuses on the project output. In each case, based on the logic model, we could assess whether the outputs were clear and measurable and, secondly, whether they accurately reflect a change in drivers of GHG emissions in the LULUCF sector.

Activity 3.E2 was focused on the analysis of the implications for emissions reduction of policies to provide greater access for communities to forests and community plantations (HTR) and implications for the NDC and REDD+. Research involved four main activities. First, we reviewed government documents, including policy instruments and regulations, and media articles on land reform and social forestry in Indonesia. Second, we conducted semi-structured interviews with national policy makers, practitioners, and academics working on land reform and social forestry. Third, we carried out fieldwork in Central Kalimantan province, applying semi-structured interviews to local communities participating in social forestry initiatives and other relevant local actors. We selected this province because it is one of the provinces that has significant area of forests remaining, large areas of peatland, and REDD+ initiatives, which are all relevant to emissions reductions from forest lands. We focused on four districts in Central Kalimantan to allow coverage over the different types of social forestry schemes in that province. They are the districts of Gunung Mas, Pulang Pisau, Katingan, and Kapuas. Fieldwork in Indonesia were carried out in October 2017, and January and February 2018. Fourth, we conducted a mapping exercise on areas reserved for social forestry and agrarian reform in the four districts.

For each land use class of the map series, its area was disaggregated according to all observed combinations of peat depth / status, current land cover, and forest-use designation, by district. The respective classes of the PIAPS (social forestry allocation map) and TORA (land to be allocated to agriculture) map series were manually digitised in a GIS on the basis of 1:250,000 scale map sheets obtained in high-resolution digital format (MoEF, 2017b, a). Map sheets were georeferenced across the four districts of interest (list here) with a mean spatial error of <250 m. No overlap was observed between adjacent PIAPS and TORA areas.

The extent and depth of peatlands were mapped according to data from the Ministry of Agriculture (MoA). The MoA peatland map is based directly on the earlier peatland map of Wetlands International (WI) (Wahyunto and Subagjo, 2004), but were continually revised with respect to depth classes and peatland extent as part of a national campaign of official cartographic revision and reconciliation following the issuance of a forest-concession moratorium in 2011 (BAPPENAS *et al.*, 2013; Sloan, 2014). As detailed by BAPPENAS *et al.* (2013), notwithstanding various site-specific revisions, the MoA peatland map downscaled each WI depth class to the next most shallow class. Thus the 2 m peatland depth contour line in the WI map became the 1 m line in the MoA map, and the 1 m line became the 0.5 m line. (See also Wahyunto *et al.* (2014) for methodological overview). One consequence of this revision is that all peatlands mapped as <0.5 m by WI were omitted from the final, revised, peatland map of the MoA, presented in Figure 3 of BAPPENAS *et al.* (2013), with these peatlands summarily described as mostly lno onger existing. Further, the MoA peatland maps presented in BAPPENAS *et al.* (2013) observe no depth class of <0.5 m, despite the fact that the WI class of 0.5-1 m existed. These MoA data are therefore spatially conservative. Whereas WI data probably under-estimated actual peat extent by ~10% in Sumatra and Kalimantan, the MoA data described in BAPPENAS *et al.* (2013) are 17% less extensive in Kalimantan (BAPPENAS *et al.*, 2013: 20).

While these revisions are apparent in our MoA data, our data also delineate 178,156 ha of peatlands of <0.5 m along the northern reaches of the peatlands of study region (These peatlands were 0.5-1 m according to WI). This discrepancy may reflect the possibility that

our MoA map is a penultimate version[1] to that presented in BAPPENAS *et al.* (2013), or that the shallow peatlands in question were subsequently officially recognised. Regardless, in light of the spatial conservativeness of the peatland delineations and the fact that they consistently under-estimate actual peat depths (BAPPENAS *et al.*, 2013:13-19), we opted to retain this shallow peat extent here. Its overlap with the PIAPS and TORA areas is minimal and, upon disregarding PIAPS and TORA areas reported as coincident with this peat depth, our results (i.e., findings, tabled areas) would be entirely consistent with the MoA data presented by BAPPENAS *et al.* (2013).

The land covers classes observed across the PIAPS and TORA sites were derived from the 2015 MODIS land-cover classification of Miettinen *et al.* (2016a). Four classes were observed as conflations of the more detailed classes of Miettinen *et al.* (2016a): Intact Forest, Forest Regrowth / Agro-Forest / Some Plantation, Agricultural and Plantation, and Bare Land and Grassland.

Validations of the forest classes comprising Intact Forest by Miettinen *et al.* (2016) describe them as corresponding to "predominantly primary (including degraded) forests" of >60% canopy cover and occasionally including mature secondary forests that have attained structural characteristics similar to primary forests. In contrast, the Forest Regrowth class encompasses mixed forest covers that are largely agro-forest, highly degraded forest in actively managed landscapes, and small plantations.

Legal designations of permitted forest uses/functions were according to the latest publicly available spatial data from the Ministry of Environment and Forestry (Decree of the Minister of Forestry SK.529/Menhut-II/2012), believed to be at 1:250,000 scale (typical for Indonesia) or less (1:50k is the next step down). These forest designations specify the extents of forest reserved for conservation or hydrological function, which are protected from all exploitation; two production forest classes, which are protected from conversion and negligibly to moderately degraded by selective logging; and conversion forests, which are the most degraded and thus eligible for conversion. Non-forest land or 'areas for non-forest uses' were also observed. These areas may still contain small amounts of forests in otherwise non-forest landscapes. Legal designations are valid.

[1] More recent official, digital, spatial data on peatland extent and depth in Indonesia were unavailable.

6 Achievements against activities and outputs/milestones

The full implementation of the project in Indonesia was delayed by more than six months (as noted in the Annual Reports to ACIAR) due to the following reasons:

- The implementing team was carrying out some activities funded through the extension of the previous project (FST-2007-051) which were related to the current project thus providing an input into it;
- Dr. Muttaqin was working on the revision of his PhD thesis and then took some leave to resettle in Indonesia after living in Australia.

The implementation of the project was also delayed by other factors, that were reported to the Steering Committee and to ACIAR:

- A key site for the project was supposed to be the Kalimantan Forest Carbon Partnership, but it was closed by DFAT and therefore the project had to revise part of its research strategy and find new field sites;
- An Australian research staff resigned to take up alternative employment working on Africa.

Due to the reasons noted above, there were therefore several activities that could not be completed by the scheduled completion date the project (April 2017). Therefore a no-cost extension was needed. The extension was initially granted to April 30th 2018. Given that the project had a relatively ambitious publication pipeline (i.e. preparing a special issue of the journal Forest Policy and Economics), a further extension was granted to June 30th 2018. At the time of completing this report in early July 2018, some papers for the special issues are still being completed, as detailed in the table below.

The numbering convention used in the table below is as follows. Numbers with an 'A', such as 2.2A indicate an activity Additional to the original project plan that was identified by the project team. Numbers with an 'E', are also activities that were additional to the original plan, and which were implemented during the extension period of the project.

Objective 1: To develop institutional arrangements and fiscal mechanisms for REDD+ linking implementation at the national with local levels

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	Simulations of the economic implications of jurisdictional proposals for emissions reductions in case study provinces	Maps of provinces with carbon stocks and projected emissions Excel spreadsheet developed	December 2014	This input into Activity 1.2 was carried out while preparing the report in Activity 1.2. Due to the cost of data collection, which proved higher than originally planned (as a result of a lack of availability of secondary data for the all the project provinces and districts) the assessment was focused on Central Kalimantan, due to data availability.
1.2	Assess suitability of jurisdictional approaches for Indonesia	Original output was Report, a Journal article has been prepared (A, PC)	March 2015	This report was scheduled for completion in June 2015, but the draft was completed in March 2015. The report was revised and edited during the Extension period to accommodate changes in broader Indonesian policies and has been submitted for publication in a special issue of Forest Policy and Economics journal.

1.3	Workshop on jurisdictional approaches	Workshop report presenting recommendations (PC, A)	September 2015	The workshop was completed according to plan. It involved presentations from the project, the Ministry of Environment and Forestry, and The Nature Conservancy. An Information Brief was prepared by the project.
1.4	Assessing options for integrating fiscal incentive mechanism with benefit sharing for communities	Journal article	June 2018	This activity was rescheduled and included in the Extension of the project. This work will also be relevant to the implementation of the NDCs. It has been submitted for publication in a special issue of Forest Policy and Economics journal.
1.5	Assess case study companies' interest and capacity to implement REDD+	Book chapter	June 2015	As the activity was being implemented (by partner organization Griffith University), it became clear that there was limited interest among forestry and oil palm companies to be engaged in REDD+ due to the slow international and national progress in the implementation of REDD+. This activity was therefore modified and involved a review of theory of private sector engagement in environmental management and implications for REDD+. The purpose was to better understand current theory about firms' motives to engage in environmental management and clarify possible implications for REDD+.
1.6	Assessment of policy options to use fiscal instruments to promote private sector engagement in REDD+ and benefits to smallholders	Report (A)	July 2016	The report was submitted by Griffith University to the ATL at the end of June 2016. This activity was included in the Extension of the project. The report has been submitted for publication in a proposed special issue of Forest Policy and Economics journal. A general overview of REDD+ and fiscal issues in Indonesia was also prepared by project team members and was published as a book chapter.
1.7	Workshop on fiscal incentives and benefit sharing mechanisms	Workshop report presenting recommendations (PC, A)	April 2017	This workshop was included in the Extension proposal, but it was possible to deliver it according to the original schedule
1.8	Training for government officials at the national and local level on regional planning and financing for REDD+	Training implemented, summary report prepared (PC)	November 2017	This training was carried out during the extension of the project

Objective 2: To identify options to protect smallholder interests and encourage private sector involvement in benefit sharing mechanisms

No.	Activity	Outputs/ milestones	Completion date	Comments
2.0	Compilation of an inventory of PES/REDD /benefit sharing schemes in Indonesia	Comprehensive list of PES projects in Indonesia – both active, and planned/future activities.	November 2014	This was a new activity for the project. In order to assist in the process of selecting PES schemes to be used as case study sites, it was necessary to identify active and on-going PES projects. The inventory showed that there are no appropriate PES schemes that could be used to assess their impacts in Indonesia. This is one of the reasons that led to a need to change focus in relation to PES research, as discussed in the Annual Report for 2014-15. The paper was published in the journal *Oryx*.
2.1	Review of vulnerability and resilience studies in forestry and other primary commodity sectors	Review report (A)	October 2014	Fewer documents than expected about Indonesian livelihoods and vulnerability were found to exist, but the review was used as an input into a report about how PES design mechanisms potentially impact on livelihoods and on the identified sources of household vulnerability. The draft was being revised for submission to a scientific journal, although progress slowed down due to: i) the first author, Helen Suich, resigned from the project; 2) several related papers have been published; and 3) the ATL had to give priority to the completion of a new output for the project (3.6 below). The ATL was not able to bring the drafts to publication standard.
2.2	Review of benefit sharing mechanisms in Indonesia and elsewhere	Review report (A, PC)	November 2013	Data from this review was incorporated into the review of design principles paper (Activity 2.2A). This review focussed on local-level benefit sharing mechanisms and design, with the purpose of identifying the mechanisms by which PES schemes could potentially impact positively on household level poverty and vulnerability.
2.2A	Review of design principles for PES	Review report (A)	October 2014	This is a new activity for the project. During the work for activities 2.1 and 2.2 we identified the need to review the design principles for PES programs that are most relevant to the improvement of livelihoods and addressing vulnerability. A draft report was prepared, and it was being revised for submission to the journal Ecosystem Services. Progress slowed down due the fact that the ATL had to give priority to the completion of a new output for the project (3.6 below). The ATL was able to bring the draft to publication standard.

2.3	Analysis of effects of PES and other benefit sharing schemes on smallholders' livelihoods vulnerability, and resilience and risk management strategies		June 2018	This activity was delayed, and had to be modified, for several reasons: 1. The Kalimantan Forest Carbon Project, which was going to be used as case study, was discontinued by DFAT; 2. Activity 2.0 did not identify suitable replacement case studies; 3. Dr Helen Suich who was in charge of carrying out this activity resigned from the project. This activity was therefore modified, (see description of progress reported in Annual Report 2016-17). Dr Irawan was contracted to carry out this work with her team. The paper has been submitted for publication in a special issue of Forest Policy and Economics journal.
2.4	Training on community-based forest management for PES	Training implemented, summary report prepared (PC)	June 2014	Due to delays in project start up phase, and in staff allocation within FORDA, this activity was postponed from the original schedule and completed in June 2014.
2.5	Training on community-based carbon monitoring systems New title of activity: Training of development of Emission Reduction Program at Community level with Plan Vivo	Training implemented, summary report prepared (PC)	October 2016	This activity was redesigned as training to develop a Project Design Document for Emission Reduction Program at Community Forestry Level using Plan Vivo. The reason for the redesign is that Plan Vivo training is considered more useful for communities involved in this project that already have management rights to their forest to utilise forest ecosystem services. This supports the implementation of community based forest management plans prepared in the revised Activity 2.6.
2.6	Participatory forest management planning with communities	Participatory forest management plans and report (PC, A)	April 2017	It was changed as documented in Annual Report Year 2, to address revised Research Question 5. Nine plans (in Bahasa Indonesia) were prepared. One plan was translated in English as a sample. The report describing the planning process has been integrated with the report describing the implementation process in Activity 2.7.
2.7	Implementation of PES plan	Report on implementation process and costs (PC, A) Recommendations for scaling up (PC, A)	December 2017	This activity was completed during the extension of the project. A report describing the planning and implementation processes was completed in December 2017. As this report is quite lengthy, a shorter scientific paper for publication in Forest Policy and Economics was prepared (see activity 2.E1).
2.E1	Journal article on the role of communities in reducing emission for forests in Indonesia	Journal article	March 2018	This aims to disseminate the findings from the project beyond an Indonesian audience. The draft was completed in March 2018, and it is being edited for submission to the special issue of Forest Policy and Economics.

2.E2	Training on development of Emission Reduction Program at Community level with VCS	Training implemented, summary report prepared (PC)	July 2017	This activity was aimed at supporting the scaling up of community participation in forest management within Forest Management Units (known as KPHs) as researched in Activities 2.6 and 2.7. This activity took place in November 2017.
2.E3	Workshop on the development of Project Idea Note for Plan Vivo	Project idea notes for 3 communities prepared	August 2017	This activity was aimed at facilitating communities trained in Activity 2.5 to develop Project Idea Notes (PIN). This was a new activity that resulted from separating Plan Vivo and VCS because Plan Vivo does not apply to peat land areas, and some of the communities that were trained in Activity 2.5 have peat lands that can only do an emission reduction program using VCS. Project Idea Notes were prepared, and are listed in project publications section.
2.8	Assess potential partnership models between companies and smallholders documenting lessons learned with respect to national-level benefit sharing schemes	Report (A, PC)	March 2018	The report for this activity was completed in October 2016 by IPB. It was included in the Extension period as the report was going to be revised and submitted to Forest Policy and Economics. However, the authors have not yet replied to comments on the manuscript sent by the ATL
2.9	Workshop for presentation of policy recommendations on incentive design and benefit sharing mechanisms	Workshop report presenting recommendations (PC, A)	November 2017	This activity was delayed given that the activities that are needed to inform it (2.6 and 2.7) were delayed. This activity was completed in the Extension period.
2.10	Training on institutional design, fiscal instruments and benefit sharing for REDD+	Training implemented, summary report prepared (PC)	Not completed	This activity was delayed given that the activities that were needed to inform it (2.6 and 2.7) were delayed. This activity was included in the Extension period but could not be completed due to time and resource constraints. It was originally planned for November 2017, but given that workshop 2.9 had a related focus, it was decided to give priority to Training Activity 1.8.

Objective 3: To enhance the design and performance of REDD+ policies and activities

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	Analysis of Indonesian and international experience in environmental policy to determine the political and economic factors critical to the successful development and implementation of sustainable resource management policies	Report (A)	March 2018	The activity was commenced with a review of anti-deforestation policies in Brazil, which has been considered one of the most successful examples of implementation of policies aimed at reducing deforestation. We thought about hiring a consultant to carry out a review of anti-deforestation activities in Mexico, but we then realised that the situation in Mexico is rather different to Indonesia, so decided against that. An academic from Gadja Madah University was contracted to provide an input to the analysis of forestry law enforcement in Indonesia, given that law enforcement was key to Brazil's success in controlling deforestation. The two analyses (Brazil and Indonesia) are compared to draw out lessons for policy in Indonesia. The comparative analysis paper will be included in the proposed special issue of Forest Policy and Economics.
3.2	Assessment of non-forest sector policies that may reduce the effectiveness of REDD+ policies	Report (A, PC) Recommendations for change	Draft in Bahasa Indonesia completed in June 2016	The report in Bahasa Indonesia was completed and then translated into English. The focus of this report is at the regulatory level and its effects on specific provinces.
3.3	Assessment of forest sector policy and other factors limiting the adoption and/or implementation of REDD+ policies and activities at the national and local government levels	Report (PC, A) Recommendations for change	Draft in Bahasa Indonesia completed in June 2016	The report in Bahasa Indonesia was completed and then translated into English. The focus of this report is at the regulatory level and its effects on specific provinces. A paper for publication in the proposed special issue of Forest Policy and Economics has also been prepared. (see Project publications Output 3.2-3)
3.3 A	Assessment of key fire and peatland management policies	Journal article	November 2015	This is a new activity for the project. In 2015 Indonesia experienced the second most significant fire season since 1997-98, therefore the project prepared this short article to highlight key issues that need to be dealt with to address the carbon emission, biodiversity impacts, and human impacts of fire and haze. The paper was published in the journal Nature Climate Change in June 2016.

3.3 B	Assessment of the effectiveness of implementation of emission reduction policies	Journal article	June 2018	This was a new activity focused on the evolution and implementation of climate change policies at the national level This was necessary because those policies are complex and needed to be addressed separately from specific regulations (addressed in Activities 3.2-3.3) in order to understand how policies are being implemented and derive lessons. The paper, will be included for publication in the special issue of Forest Policy and Economics
3.4	National workshop to present the results and discuss options for policy change	Workshop report presenting recommendations (PC, A)	April 2018	This workshop brought together lessons learnt from the research on REDD by the project and other organizations to inform the implementation of REDD+ and NDC in Indonesia
3.5	Training in policy analysis	Training implemented, summary report prepared (PC)	October 2016	This training activity was held on September 2016.
3.6	Analysis of challenges to uptake of the project's research findings	Journal article	May 2017	This was a new activity for the project. The analysis was requested by the ACIAR's program manager. The paper was published in a special issue of Australian Forestry.
3.E 1	Journal article on architecture and readiness for REDD+	Article	March 2018	This new activity builds on Activities 3.1, 3.2, and 3.3. Following the idea to propose a special issue of Forest Policy and Economics journal, this will be the introduction to the special issues. It will aim to set the broad picture for the analysis of the issues involved in the implementation of REDD+ and its relevance for the NDCs. It is currently being drafted and will be included in the proposed special issue of Forest Policy and Economics
3.E 2	Analysis of the implications for emissions reduction of policies to provide greater access for communities to forests and community plantations (HTR) and implications for the NDC and REDD+	Report	March 2018	This new activity addresses the climate change implications of the GoI's policy that seeks to allow communities' access to over 12 million ha of forests, as well as the long-standing policy to promote community plantation forests (HTR). The paper is currently being edited and will be submitted to the special issue of Forest Policy and Economics

7 Key results and discussion

In order to better locate the findings of the project within Indonesia's approach to emissions reductions we start at the national policy level, which was researched under the project's Objective 3.

Findings from Objective 3

Indonesia has been a consistent promoter of the REDD+ mechanism. The previous government committed the country to cut emissions by 26% by 2020 and, with international support, by as much as 41%. The current government has confirmed Indonesia's commitment to cut emissions, although the actual reduction in emissions is somewhat unclear. It appeared to have pledged an unconditional reduction target of 29% and conditional reduction target up to 41% of the business as usual scenario by 2030 in its Nationally Determined Contribution (NDC) (p. 2) submission to the UNFCCC. However, in Table 1 of the Indonesian NDC – which presents the breakdown of the sectoral contributions to emissions reductions – the total reduction in emissions amounts to 38% by 2030, of which 29% is unconditional and 9% conditional on international support (including REDD+). Whether the commitment is a 38% or 41% reduction, it is nevertheless very substantial and significant efforts will be required to deliver on the commitment. The research carried out by this project can inform the implementation of policies and activities to reduce emissions in the forest sector.

At a regulatory level, Output 3.2-3 found some laws and regulations support the implementation of REDD+, while others constrain it. This situation is understandable since Indonesia is a developing country where natural resources are still used for various economic development activities. Some policies have been issued to facilitate investment in mining and plantation to improve economic growth as mentioned in the Master Plan for Accelerating and Expanding Indonesian Economic Development 2011-2015.

Laws and regulations that conflict with REDD+ relate to land clearing by burning, mining and geothermal utilization within forest areas, expansion of plantations into forest areas, creation of new regional government areas, and calculation of reforestation tax and the balancing fund. The poor design and implementation of the laws and regulations is strongly linked to weak coordination between sectors. REDD+ implementation requires coordination between policies related to climate change, forests and other policies. In addition, national and local institutions also determine the success of the REDD+ programs. The transfer of responsibility for the implementation of REDD+ from a task force (known as BPREDD+) to the Directorate General of Climate Change in the MoEF has limited the flexibility in the implementation of REDD+ and slowed it down.

This study has shown that several regulations for the forestry sector need to be revised: (1) the formula for sharing reforestation funds should be changed from incentives for districts to produce or harvest more timber into disincentives; (2) tariffs for mining in state forests should be increased so that the funds can fully cover reclamation and rehabilitation costs of mined areas; (3) the percentage of tariff (10%) imposed to revenues from carbon trading should be reassessed. Currently, Forestry Ministerial Regulation No P.20/2012 on forest carbon administration mentions that only 49% of reduced emissions produced by a party can be traded, the remaining 51% should contribute to the national target. This provision has been a disincentive for the private sector to participate in REDD+ implementation. In addition, it is necessary to tighten the technical requirements for underground mining in protection forests to limit the issuance of mining permits by local governments.

Some regulations outside the forestry sector also need to be revised, among others: (1) regulations regarding burning peatland for land clearing by local community; (2) strengthening the intensification program for oil palm plantation rather than its extensification program; (3) regulating the possibility of land swap between forested and non-forested land; (4) providing incentives for oil palm companies that properly manage High Conservation Value Forests; (5) reviewing the criteria forest for the creation of new district/city/province governments to include relevance and effects on forests; (6) shifting

the paradigm of fiscal policy in the forestry sector to provide more incentives for the utilization of non-timber forest products and forest environmental services rather than timber; (7) licences for mining companies to operate in forests should not be extended; and (8) regulate, administer and monitor smallholder mining.

Much preparatory work has been carried out, however, to enhance the effectiveness of REDD+ much more needs to be done including:

1. Strengthening the legality and legitimacy of REDD+ National Action Plans by integrating the action plans into the programs of the Directorate General of Climate Change, as well as integrating REDD+ SRAP into regional development programs. Currently, there are only eleven provinces out of thirtyfour that have formulated REDD+ SRAP.
2. Completing Forest Reference Emission Level (FREL) documents by incorporating three activities: conservation, sustainable forest management, and increasing carbon stock. Forestry Ministerial Decree No 633/Menhut-II/2014 regarding FREL should be revised.
3. Creating MRV system guidelines and mechanisms which are transparent, accountable and participatory, as well as clearly describing stakeholders' roles and responsibilities. In addition, increasing the local capacity to implement MRV through SIGN-SMART and National Registry System.
4. Establishing safeguards which consist of general principles not common standards, given the diversity of the existing REDD+ devices and schemes. Institutional safeguards consisting of government representatives, civil society, private sectors and NGOs should be developed prior to REDD+ implementation. Social safeguards development can be accelerated by refining Principles, Criteria and Indicators for REDD+ (PRISAI) in Indonesia through synchronizing its criteria and indicators with Strategic Environmental and Social Assessment and Regional Environmental and Social Assessment. Therefore, PRISAI can be used as a guideline for national safeguards.
5. The benefit sharing acceleration can be implemented immediately through the Pilot Provincial REDD+ in East Kalimantan supported by the Forest Carbon Partnership Facility. The REDD+ pilot project could be used to test current arrangement for REDD+ funding including trustee and on-granting mechanisms.

It is not only important to review the regulatory framework as just noted above, there is also a need to consider how the regulatory framework is enforced. Output 3.1a carried out a comparative analysis of forest law enforcement in Brazil and Indonesia to derive lessons for reducing emission from land use change. This comparison is important for two reasons. First, 40% of deforestation primary forest in Indonesia occurred in forest land use types that restrict or prohibit land clearing (Margono et al. 2014), indicating that enforcement of the law to address illegal land clearing should be a priority for reducing deforestation. Second, Brazil has been very successful in reducing deforestation in the Amazon, and law enforcement was a key factor in reducing deforestation. Two of the key factors that lead to Brazil's success in forest law enforcement were: i) targeted law enforcement in municipalities with the highest rates of deforestation, and ii) improved remote sensing systems for the detection of deforestation, which provided more systematic and timely inputs to prioritisation of enforcement operations.

Indonesia does not have a strategic approach to law enforcement which could target the most significant acts of illegal deforestation in a timely manner. Enforcement activities are initiated at the local level, by forest rangers. They do not have access to remoted sensing data that could inform them about illegal activities, both large or small scale ones, which often take place in remote areas. Therefore, the key lesson emerging from this comparison is that Indonesia needs to develop a more centralized forest law enforcement

strategy that relies on frequent remote sensing data and which target the largest illegal land clearing activities.

In relation to the implementation of emission reduction policies to deliver on the commitments stipulated in the NDC, it will be important for Indonesia to take into account the lessons learnt from its past experience. Some lessons have been noted by the assessment of the implementation of its National Action Plan for Greenhouse Gas Emissions Reductions (RAN-GRK) for the period 2010-2020 (Output 3.3B). The RAN-GRK was meant to provide a clear action plan on how Indonesia was going to reduce emissions from the forest sector. However, after the implementation phase from 2010 to 2014, there is little evidence as to whether any of the actions implemented have reduced emissions (Table 3). The analysis shows there was a disconnect between the actions and their intended outcomes. For most of the actions outlined, there was no direct link between implementation and outcome and any indirect link is tenuous. Given the difficulty historically to address the drivers of deforestation, forest degradation and peat degradation, it is also questionable how realistic many of the actions are. Moreover, the indicators selected rarely provide an appropriate measure that would allow any statement as to whether the successful implementation of the intervention has reduced emissions. As the Indonesian government continues to develop policies and plans to address emissions and meet its international commitments under the NDC process, the following can be learned from the implementation of the RAN-GRK. Firstly, there is a need for a more rigorous policy design process, that draws on literature to create explicit logic of change models. A requirement that any action is accompanied by a proposal that outlines the theory of change, the associated assumptions and how they are being dealt with, could go a long way to creating a more realistic action plan. Secondly, a theory of change model can be used to better identify indicators that are clear and measurable as well as being appropriate indicators of the changes that are sought.

While the project was in its fourth year, the GoI announced that it would considerably expand the existing social forestry program as well as carry out an agriculture oriented land reform program. The project team thought that it would be important to address directly the climate change implication and the livelihood aspects. Therefore, the new Activity 3.E2 was carried out during the extension of the project.

The reform aims to provide legal state recognition of land rights through the two distinct processes concerning lands subjected to agrarian reform (TORA) and social forestry (SF). TORA concerns the formalization of ownership through certification and distribution of land, targeting small or landless farmers, while SF the distribution and formalization of community access to state forest lands through licensing or partnership arrangements. With ownership, the TORA program provides the most extensive form of land rights that include alienation rights that can be bequeathed and a greater degree of freedom in the use of the land. SF schemes, on the other hand, only provides access to state forest lands through licenses/permits or partnership arrangements. These are thus usufruct rights, where grantees are allowed to manage and use the forests for a specified period of time and bound by certain regulations. Because the land under SF schemes continues to be under the purview of the state, it is not transferable. Another important difference between the TORA and SF programs is that, in addition to enhanced wellbeing, the SF program has a parallel and strong objective of sustainable forest management. As in the past, the department in charge for the execution of TORA is the National Land Agency of the Ministry of Agrarian and Spatial Planning, while the Ministry of Forestry and Environment (MoEF) for social forestry. In addition, the MoEF plays a pivotal role in TORA as the authority releasing forest lands for TORA.

Table 3. Summary of achievement of RAN-GRK Actions for forestry and peatland

No.	Action	Activity/objective and indicator	Success of activity implementation*	Indication of emissions reduction (million tonne of CO2e) (Target)	Emission reduction target achieved
1	Establishment of Forest Management Units (FMUs)	120 FMUs established	Yes	31.15	NA
4	Inauguration of forest areas	25,000 km of Forest Area Boundary (outer boundary and boundary of forest area function) are established	Yes	123.41	NA
6	Management of peat lands for sustainable agriculture	Research and development of land resources of 325,000 ha (including peat lands) for agricultural land management development	No	103.98	NA
7	Development of agricultural land management in abandoned and degraded peat land areas to support plantation, livestock and horticulture subsectors	Rehabilitation, reclamation and revitalization of abandoned and degraded peat lands in agricultural areas and optimized use of non-food crop lands of 250,000 ha	No	100.75	NA
8	Implementation of a forest and land rehabilitation and forest reclamation in the prioritized watersheds	8.1 500,000 ha of forest in prioritized watershed are rehabilitated	86%	18.35	NA
		8.2 Critical areas of 1,954,000 ha in prioritised watersheds are rehabilitated	94%	71.71	NA
		8.3 6,000 ha of city forest is planted	85%	0.22	NA

		8.4 40,000 ha of mangrove/coastal forest is rehabilitated	79%	1.47	NA
9	Development of social forestry	9.1 Facilitated designation of Community/Village Forests management area of 2,500,000 ha	Designated, actual allocation during the period unclear	91.75	NA
		9.2 Facilitated setting up of business partnership in 250,000 ha of people's forest	Yes	9.18	NA
10	Forest fire control	Decreased number of hotspots in Kalimantan, Sumatra and Sulawesi islands by 20% on average from 2005-2009, with level of success 67.20%	Almost achieved during the period, but insufficient to prevent fires	21.77	No

Legend: *Percentages of achievement are calculated on the basis of implementation reported in MoEF (2016b).

The agrarian reform program, which is supposed to be completed by 2019, involves the certification of 4.5 million hectares of lands already informally controlled by individual farmers (including transmigration areas), the redistribution of 4.1 million hectares of state forest lands and of idle or abandoned lands under use rights (0.4 million hectares). In April 2017, MoEF issued the Indicative Map of Forest Land Allocation for TORA, which identifies 4.8 million hectares. They comprise areas earmarked for release to crop plantations, unproductive forests slated for conversion, areas identified as potential for new wet rice farming, existing rice paddy fields, dryland agriculture, settlements, and transmigration settlements with permit in principle status. Some of these areas have no forest cover, such as those identified as settlements. As these are indicative areas only, the MoEF reserves more than the 4.1 million hectares targeted, as they would need further verification.

The PIAPS is a set of 1: 250,000 scale maps that identify indicative areas of state forests for SF schemes. They are revised every six months, with the most recent (considered in this research) being from September 2017. The total area was 13,887,068 hectares comprising 1,002,992 hectares of forests already under SF permits and 7,101,032, 2,441,065, and 3,341,980 hectares respectively allocated within Production Forests, Protection Forests, and peatlands. In addition, there are 222,137 hectares of unmapped areas identified as potential for SF within forest areas managed by Perhutani in Java.

Characteristics of Indonesian social forestry initiatives

Following MEF regulation 83/2016, with the exception of *Hutan Adat*, SF schemes are the granting of community access to state forests, manifested in usufruct rights, through a permit (HKM, HD, HTR, IPHPS) (see Table 4).

Table 4. Characteristics of social forestry initiatives

Features	**Scheme**					
	HD	**HKM**	**HTR**	***Kemitraan***	**IPHPS**	**HA**
State forests or rights forests	State Forests	State Forests	State Forests	State Forests	State Forests	Rights Forests
Type of rights	Usufruct/ Manage-ment	Usufruct/ Manage-ment	Usufruct/ Manage-ment	Usufruct/ Manage-ment	Usufruct/ Manage-ment on Perhutani area	Communal ownership
Legal document of rights	Permit	Permit	Permit	Cooperation Agreement	Permit	HA stipulation through Decree
Function	Protection and Production Forests	Protection and Production Forests	Production Forests	Production, Protection, Conservation Forests	Production and Protection Forests	Production, Protection, Conservation Forests
Rights holders	Village institution representing village	Group or groups of people	Group of people or individuals	Unspecified – either group or individuals	Group(s) of farmers, cooperatives	*Adat* community

Table 4 continued.

Features	Scheme					
	HD	**HKM**	**HTR**	***Kemitraan***	**IPHPS**	**HA**
Period of rights	35 years, possible extension	35 years, possible extension	35 years, possible extension	Unspecified	35 years, possible extension	No time limit
Size under permit	No limit	No limit	Group member: up to 15 Ha, cooperatives: 5,000 Ha	2 – 5 hectares for timber utilization; no limit for NTFP	Up to 2 hectares per head of household	No limit
Forest cover	Unspecified	Unspecified	Unspecified	Unspecified	≤ 10 % standing stock	Unspecified
Permitted utilization	NTFP, forest area, ES, timber in Production Forests	NTFP, forest area, ES, timber in Production Forests	timber (planted and from secondary regrowth, other forest products	NTFP, forest area, ES, timber in Production Forests	NTFP, ES, planted timber in Production Forests	NTFP, ES, timber in forests with production function
Rights & responsibilities	Non-transferrable; forest status and function alteration prohibited	Non-transferrable; forest status and function alteration prohibited	Non-transferrable; forest status and function alteration prohibited	Not applicable	Non-transferrable; forest status and function alteration prohibited	Forest status and function alteration prohibited
Specific prohibition	Oil palm prohibited- up to 12 years for existing plants	Oil palm prohibited - up to 12 years for existing plants	Oil palm prohibited - up to 12 years for existing plants	Oil palm prohibited- up to 12 years for existing plants	Not specified	Oil palm prohibited – - up to 12 years for existing plants
Priority objective or target communities	Conflict resolution, peatland and/or ecosystem restoration	Conflict resolution, peatland and ecosystem restoration	Conflict resolution, peatland and ecosystem restoration	Communities in or around forests under encumbent rights or forest manager; primary livelihood dependent on area	Group head or atleast one member owning ≤ 0.5 hectares of land	*Adat* communities

Benefit sharing mechanism	NA	NA	NA	Specified in cooperation agreement	Regulated benefit sharing between Perhutani and communities	NA

In the case of *kemitraan*, right of use is formalized through an agreement of cooperation between the forest manager or the license holder with communities. Permits are issued by the MEF, and provided certain conditions are met, by the Governor. At the time of writing, all permits are issued by the MEF. Permits are granted to a group, groups of farmers, a community, or in the case of HTR, can also be individuals, over forest lands with no existing encumbered rights. The duration of these permits are 35 years that can be extended upon satisfactory 5-year evaluations. They provide rights to access (and manage) forests and thus are non-transferrable. Management and use of land under these permits is government-regulated; lands must only be used for activities set out in work plans endorsed by designated authorities. An important imperative is the prohibition to alter the (legal) status and functions of the lands under the permits. For instance, forests classified as Protection Forests in a HKM area must remain protected, and consequently have limited use options. This requirement is particularly important, as it serves as an institutional check for achieving the parallel objectives of forest conservation. Interestingly, a particular commodity, oil palm, is specifically and explicitly prohibited for planting in all types of SF schemes, including in *kemitraan* and *Hutan Adat*.

Hutan Desa (HD), or Village Forest, is forests with no encumbered existing rights that are granted to a village community. The stated primary aim is the improvement of community welfare. The *Hutan Desa* permit is granted to a village institution known as Lembaga Pengelolaan Hutan Desa (LPHD). This institution manages the forests on behalf of and for village residents. To carry out business undertakings, the LPHD can form a cooperative or a village-owned enterprise. The HD must be located within the village administrative boundaries and can be granted in Protection or Production Forests. Activities in Protection Forests are limited to area utilization, environmental services and NTFP collection, while activities in Production Forests can include timber collection.

Hutan Kemasyarakatan, HKM, is granted to a farmers group or groups of farmers or cooperatives. As with HD, it can be granted in both Protected and Production Forests with no existing encumbered rights. Similar to HD, restrictions that timber utilization can only be carried out in Production Forests also apply.

Hutan Tanaman Rakyat or HTR is established on Production Forests with unencumbered rights, with the emphasis to “develop the potential and quality of Production Forests through silviculture practices to ensure the sustainability of forest resources” (MEF Regulation 83/2016). This is quite different from HD and HKm where village welfare or community empowerment is stated as the main purpose. The focus of HTR is thus on timber production and associated activities, from preparation of the land to planting to marketing of products. Consistent with the purpose, HTR can be proposed by an individual forest farmer, a forest farmer group or several forest farmer groups, forest farmer cooperative(s), or individuals with forestry education, other fields with experiences in facilitation, or a forestry extension worker who forms a group or a cooperative with local communities. HTR activities can be done independently (*HTR Mandiri*) or through partnership *(HTR kemitraan*). *HTR Mandiri* can be facilitated by the government through Forest and Land Rehabilitation (RHL), land and water conservation, sustainable forests certification, and timber legality certification activities. Timber products from H*TR Mandiri* is processed by smallholder wood industry while those from *HTR Kemitraan* is processed and marketed by large-scale timber industry.

While HKm, HD, and HTR are established in areas with no existing encumbered rights, the SF scheme also includes *Kemitraan Kehutanan*, a partnership arrangement between forest managers or forestry license holders and the local community living in or around the area. Local communities can produce timber, harvest NTFPs, and engage in activities that provide environmental services. Forest managers include KPH, forestry conservation units such as National Parks, and forestry state-owned enterprises. Forestry license holders include companies holding licenses for the utilization of the forest zone, forests environmental services, timber and NTFP harvesting, carbon initiatives, and primary forest industries. Empowering local communities through the *kemitraan* scheme is required for forest managers and forestry license holders (MEF Regulation 83/2016, Art 60).

Unlike the other schemes (HKm, HD, HTR), the area allocated to each household in *kemitraan* is regulated, in particular for timber utilization. Each household in an area overseen by forest managers can work on a maximum 2 hectares of land, and on a maximum of 5 hectares in an area managed by a licensee. On areas under conflict, regulation on the upper limit is not immediately enforced, but is to be followed in due course in phases. For NTFPs or environmental services, the 2- or 5-hectare limit does not apply. Benefits sharing from these activities are outlined in the partnership agreement.

We observed several challenges in implementation post-securing permits that ultimately have potential implications on livelihoods and forest management that affect climate change mitigation.

Levels of understanding of the particular schemes are diverse among group members and between groups. Some members, and sometimes including the leaders of the farmer's groups or community, appear to have little understanding of the permit, what it entails, and unaware of regulations concerning SF. Therefore, there is a lack of understanding of rights and responsibilities attached to the permit. In HD, some participate because others in the community participates or by default are included in the scheme. Some recipients of HD and HKM under this study, however, appear to be genuinely concerned of the fate of forests and have applied for these schemes with the primary intention to protect the remaining forests. Others are interested in the scheme because of economic expectations.

Activities post-obtaining permits are visibly slack due to the multitude of challenges that permit holders are facing. Major constraints conveyed by communities and farmer groups are inaccessibility of areas under the permit and lack of capital. Some of the sites are quite a distance away from settlements, and can only be reached by motorized canoes or motorcycles at least part of the way, while the rest on foot. Thus, to get to the site itself incur costs, both money and time, to participants. In other cases it is simply difficult to get to the site, due to fallen bridges or other obstacles. In one case, access to the site through waterways has become more difficult due to the recent canal blocking as part of peatland restoration activities in the area.

Lack of capital results in minimal activities on the ground, which appears to affect all of study sites. In addition to the costs involved just to get to the sites, communities often do not have the resources to carry out seemingly basic initial activities such as installing boundary markers. This challenge is even greater for permits that cover a large area of forests. The area of our study sites range from 107 to 7,025 hectares. One can only imagine the tasks and costs involved in marking boundaries for these sites, especially the larger ones. In addition to inadequate capital, tools and technical knowhow, data regarding the area under the permit are often not accessible. For example, exact coordinates are needed to accurately install boundary markers of the site. Without continued facilitation, this will be a challenging task. The MoEF does provide a one-time support of 50 million IDR (or less than 4,000 USD) for each site; however, this is not only inadequate, but also often used inappropriately.

HD or HKM under Protection Forests or that require protection can easily pose a burden to communities, rather than provide an income stream. This is because allowable activities for HD in protected areas are limited to NTFPs and environmental services. Proceeds from NTFPs are generally smaller than timber, for example, and initiatives that monetize provisions of environmental services are still limited and at best in its infancy in

Indonesia. One HD in Pulang Pisau district aims for ecotourism and with support from an NGO, village funds, and active members' own resources, has successfully built a modest accomodation aimed for tourists. However, the distance from the capital of Palangkaraya or a nearby town, limited access, lack of large attractive fauna, and a relatively small size of the protected area (about 170 hectares) can be serious constraints to this goal.

Active members of the same HD, however, are willing to dig into their own pockets to carry out monitoring activities to protect their site. Adjacent to this HD is a Production Conversion Forest where small-scale illegal logging occurs and where it is easy to transgres into the HD. This self-financing effort, while commended, can only last so long, and an income stream or external support would be needed to sustain it sooner or later. Because activities are slow – which members of the HD managing institution attributed to lack of government assistance – villagers who were unsupportive of the HD in the first place become even more sceptical of the HD benefits.

At this point in time and in the current situation, the promise of financial gains arising from these permits, particularly those HDs and HKM received more recently, appears unlikely to be realized in the near future. Because resources are limited, communities or community groups are struggling to find the means to protect and maintain their area, and money-making activities are seen as a later priority. Also, realizing the limited potential due to the limitations of use within forests with protection functions or forests that they wish to protect, their aim is to accrue just enough to finance protection activities, such as monitoring.

In Indonesia's Third National Communication to UNFCCC, social forestry Is explicitly stated as one of the country's core mitigation strategies in the forestry sector. SF is expected to deliver 20% of the emissions reduction target from avoided deforestation and degradation. The assumption put forward in the document is that distributing legal access to communities encroaching on state forests is expected to promote sustainable forest management.

Analysis on the most recent PIAPS shows an area of 688,017 hectares of forests under various condition/uses and soil types have been distributed or reserved for SF in the four study districts. About 42.3% of the area (290,870 hectares) is intact forest, slightly over a third is forest regrowth, agro-forests, and fallow, 12.1 percent is agriculture and plantations, and approximately 10 percent is grass or bareland. 10.9 percent intact forests are Protection Forests, 21.9 percent are Production Forests, and 9.4 percent are Production Conversion Forests. (Note: 100% refers to the entire area allocated or reserved for SF in PIAPS, i.e., 688,017 hectares). Peatland makes up nearly half or 45.17 percent (i.e., 310,810 hectares) of the entire area within the PIAPS, comprising of 1.51 percent peat below 50 cm, 16 percent between 0.5 and 3 meters and 27.7 percent (190,580 hectares) of over 3 meters deep.

According to Government Regulation 57/2016 on the Protection and Management of Peat, peat of 3 meters or above is to be protected and cannot be cultivated. Nearly half (18.4 percent of total area within PIAPS) of intact forests is peatland, and 11.9 percent has peat depth of above 3 meters. Most of deep peat of over 3 meters (17.9 percent) is located in Protection Forests where 8.5 percent is intact forest. This area of deep peat Protection Forests that translates to 58,253 hectares has the highest potential for contributing to emissions reductions. The rest of Protection Forests consist of forest regrowth and agroforests (7.8 percent), and 1.2 percent is agriculture and plantations and 0.4 percent is bare or grass land.

Overall, of the Production Forests in the four districts reserved for SF, 17.92 percent (or 123.274 hectares) is peat of various depth, with 7.52 percent peat of 50 cm to 3 meters, and 9.13 percent (62,787 hectares) peat above 3 meters. Three percent (20,355 hectares) of peat above 3 meters deep in Production Forest is intact forest. This would be problematic in terms of emissions reductions efforts because Production Forests are earmarked to support timber production and can be designated as HTR.

It is important to note that PIAPS is indicative in nature, so the areas under the PIAPS are to be verified prior to the actual designation of SF and provision of permit. However, interviews with farmers and observations on the ground suggest that at least some areas

already issued HTR permits are of deep peat and will be established as sengon (*Paraserinthes Falcataria*) plantations. Sengon cannot thrive on deep peat, necessitating the drying of peat and canal building. The sengon then are planted on dry land, usually on the mounds in between the canals. This practice, hence, is not accompanied by GHG emissions reductions. Designating HTR in peatlands thus also in a way contradicts the current effort of the government to restore and maintain peat in the same area.

It is also of concern that the proportion of intact forest under Conversion Production Forest in PIAPS make up almost one tenth (9.4 percent) of the entire PIAPS area in the four study districts. Of this, 5.2 percent is mineral soils and the remaining 4.2 percent is peat over 50 cm. Following regulations, Production Forests can be cultivated, hence cleared first, for timber production. Although the larger portion is situated in mineral soils, the fact that it is intact forests suggests that maintaining it would prevent the release of significant GHG emissions. The current regulations do not specify the condition of forest cover that can be cleared to be replaced with vegetation nor the types of vegetation cultivated. Despite the specific prohibition of growing palm oil, the possibility for clear cutting intact forests and replacing them with fast growing species, as is the current trend, would contribute to GHG emissions.

Findings from Objective 1

There is scope to improve the effectiveness of efforts to achieve the commitments of the NDC, including the implementation of REDD+, by considering the role of fiscal instruments directed at the private sector, which were considered by Output 1.6. Fiscal instruments in the forestry sector refer to charges and fees imposed by government at the national level to generate revenue. They include sources of income, such as the forest restoration fund, forest license fees and the forest resource provision, and taxes such as the land and building tax, value added tax (VAT), as well as income tax. Incentives to reduce deforestation and forest based emissions include non-financial incentives such as clarification of land tenure or granting clear rights over use of the land. Financial incentives include upfront payments, such as grants, loans and investments, or results-based payments, such as payments for environmental services (which could include carbon). Other relevant instruments include the removal of perverse incentives such as increasing the accessibility of forests for activities leading to deforestation or forest degradation (which could include forest conversion). Formal tariffs constitute the fiscal instrument most commonly used in forest management in Indonesia, and follow state regulations. Forestry fiscal instruments are largely embodied in the form of Non-Tax State Revenue (NTSR) and are classified as charges or fees. Tariff policies in the forestry sector are intended to ensure the sustainability and preservation of the forest. Forestry businesses are also taxed on some conventional taxes such as land and buildings tax, income tax and value added tax (Nurrochmat et al., 2010). There are approximately 30 types of non-tax state revenues in the Ministry of Forestry and Environment (MoFE), based on Government Regulation (GR) No. 12 of 2014 covering the type of NTSR tariff overseen by the MoFE.

Respondents to an online survey had a generally high level of awareness of fiscal instruments relevant to REDD+ in Indonesia. The highest number of respondents (31 out of a total of 54) identified incentives aimed at reducing emissions via sustainable forest management (22) and payments for ecosystem services (19). Fewer respondents (35) expressed a view as to whether current fiscal instruments encouraged or discouraged deforestation and forest degradation, with a small majority (57 per cent) expressing the view that they did encourage deforestation and forest degradation. Respondents identified a range of fiscal instruments that they felt encouraged deforestation and forest degradation including: fertiliser subsidies; forest conversion permits (2); forest resource rent provision (3); forest restoration fund (2); high taxes and license fees (4); lack of instruments to encourage SFM; lack of penalties for failing to re-establish forests; palm oil subsidies (2); shared revenue transfer system (2); and tradable permits. Interestingly, these respondents also identified incentives as one of the most effective fiscal instrument aimed at reducing emissions (Government, Education/research, Other), although it should be noted that the forest sector selected ‘other’ as being the most effective.

Face to face interviews provided a range of useful information on options for fiscal instruments to promote private sector engagement in REDD+ and provide benefits to smallholders. Specific issues worth noting were the desire amongst non-state actors to ensure fiscal instruments also included incentives commensurate to the degree of the sustainability of forest management and extent of actions aimed reducing emissions; and increased clarification of the roles of the different levels of government, how specific instruments should operate, and the responsibilities of all stakeholders either benefitting from or paying for forest use. Stakeholders identified a number of issues impacting on the ability of business to undertake activities that would lead to reducing deforestation and forest degradation, and emissions.

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 to palm oil. Fees, charges and funds levied on the forest sector did not meet the objectives, for which they were established. In addition, the high fees and the charges at the different jurisdictional levels (national, provincial, district), as well as informal charges, all acted as constraints on the viability of the extractive and non-extractive forest sectors. For the forestry sector these also acting as disincentives to practicing SFM, as did the competing objectives of different silvicultural practices. There was also a lack of policy clarity around the objectives of SFM and REDD+, and between REDD+ and broader carbon policy, which in turn was impeded by a high degree of uncertainty. A number of interviewees commented on issues relating to local communities and smallholders. In summary, concession holders were generally aware of their obligations to local communities, in terms of benefit sharing around infrastructure development, employment, and so forth. Financing of such activities was not always forthcoming, which led concessionaires to recognise that lack of resources often encouraged encroachment, as did other non-forest activities, such as palm oil. Overall, however, there was recognition of the necessity of involving local communities in forest management activity, providing the relevant compensation for any activities forgone, and collaborating with all forest users. Above all, there was an acceptance that there needed to be incentives of a sufficient scale to make deforestation and forest degradation less attractive as land use and resource-extraction options.

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 carbon policy.

The successful implementation of emission reduction policies and activities will require the participation of lower level governments as well as local communities. With regard to local level governments, Output 1.2 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. In Indonesia, the implementation of a national level approach to reducing emissions from forests could adopt a nested jurisdictional approach, designed to involve three levels: province, district and village.

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 per cent 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 per cent emission reduction from the business as usual scenario, while stopping deforestation in state forests could reduce emissions by as much as 29 per cent 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 per cent 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 which could focus on the efforts for maintaining standing forests, for instance. The potential to reduce emissions from these initiatives is up to 13 per cent 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 per cent from the business as usual scenario. For example, in Kotawaringin Barat district, the business as usual emissions for the district is estimated at 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 per cent and 9 per cent 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 our case study village of Sungai Sekonyer, the annual emissions are 79 thousand tons CO2e per year. In Kotawaringin Barat district, 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 village comes from stopping encroachment which can result in the reductions as much as 40 per cent from business as usual scenario. Stopping oil palm production would only reduce emissions by as much as 5 per cent 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, it can be seen 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 hectares of peat swamp forests in Seruyan district, which is next to Kotawaringin Barat district.[2] Rimba Makmur Utama, a concessionaire of 149,800 hectares 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.[3] 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.[4]

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 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.

The national government has also developed the National Registry System (NRS), which enables the REDD+ implementers to register activities or efforts to reduce emissions from deforestation and forest degradation. The NRS aims to avoid double counting in estimating

---

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

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

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

the emissions that can be reduced. However, the Ministerial Decree 71/2017 has not clarified which actions should be registered. The activities can be location specific but also can be in the format of issuing standards and regulations. The involvement of multiple actors is required to ensure the success of one activity. For instance, reducing deforestation in state forests requires the national government to ensure that future licenses in state forests are issued for ecosystem restoration activities. The provincial government can also work through forest management units to ensure that state forests without licenses are managed properly. However, the success of such activities requires the involvement of the district and village administrations that are closer in proximity to the locations where specific activities will be implemented to reduce deforestation. The NRS should hence allow each government level to register specific actions to reduce emissions although not necessarily be location specific activities.

After the activities or efforts to reduce deforestation are registered, the REDD+ implementers are responsible to monitor the progress of achieving the emission reduction targets. As stipulated by the regulation, the implementers, which can be private entities or subnational governments, will report the achievement of the emission reduction to the MoEF, who will then verify the report. The Ministerial Decree 73/2017 regarding the inventory of GHG emissions stipulates the responsibilities of the provincial and district governments to carry out GHG emissions inventories within their jurisdictions. This provides the basis for the implementation of the jurisdictional REDD+. Developing a GHG inventory at the provincial level, for instance, can detect leakage between districts.

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 caused by oil palm plantations and timber production is costly (Irawan et al., 2013; Irawan and Tacconi, 2016). For example, based on the 2011 BPS Annual Manufacturing Survey data, eleven out of 35 palm oil manufacturers in Central Kalimantan were located in Kotawaringin Barat district, 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, sixty seven per cent 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 4,618 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. Jurisdictions should also properly plan their socio-economic development. In the case of Kotawaringin Barat, for instance, the district government together with local people could agree on the targets and goals of socio-economic development and the amount of forests that should be converted to achieve them.

The provision of financial support could facilitate the reduction of emissions at the village level, which can have costs, as just noted above. Output 1.4 evaluates the question: could intergovernmental transfers to villages be used to provide financial support to communities for forest conservation and rehabilitation? The study focuses on the case of the Village Fund, an Intergovernmental Fiscal Transfer designed to finance development at the community level. It studies the case of PNPM Green, which was a short-term initiative for financing environmental activities at the village level, itself a sub-program of the National Program for Community Empowerment in Rural Areas (known with the Indonesian acronym PNPM), the predecessor of the Village Fund. The study explores if, and how, the Village Fund could be used for financing conservation and ecosystem rehabilitation, and how the lessons from the PNPM Green program could inform the design of environmental transfers.

Although several years had passed since the completion of the PNPM projects, the respondents remembered the project as a single initiative for financing environmentally related activities. A common difficulty among many respondents was distinguishing between the broader PNPM Mandiri program and the more targeted PNPM Green. However, after some clarification, people were able to distinguish between the two programs. Across the villages, the respondents were able to describe the process relatively consistently. For respondents, PNPM Green was a *one-off* project where the village was given the opportunity to choose a *green project* which would be of some benefit to the village. Although the projects were supposedly provided through the sub-district, they were generally implemented by staff of Operation Wallacea, a non-government organization based in Southeast Sulawesi, who were contracted to implement them. The projects that we selected ranged from infrastructure projects and community development to land and mangrove rehabilitation. Overwhelmingly, tree planting projects were selected, which included timber species such as mahogany and teak, to tree crops such as nutmeg, cashew and clove trees. The range of projects was restricted through a list provided by the extension worker from the sub-district, who was employed through the program, and then projects were decided at the village level and then submitted to the subdistrict for approval through a ranking process.

The majority of projects provided benefits for both the environment and livelihoods, which related largely to the choice of tree planting activities. Despite these benefits, the majority of respondents (67%) stated that the project did not align with the goals of the village. The reasons ranged from the uneven distribution of benefits as only limited numbers of farmers to selected to participate in tree planting projects, the lack of alignment with village planning and lack of substantive participation. Lack of participation in the planning phase was a common complaint (51%) among village heads, with a further 21% stating that they were only involved in signing the legal documentation. These complaints arose from the feeling that there was little advance notice of the program and little dissemination of the aims and goals of the project, consequently, limiting the opportunities for substantive participation. Overwhelmingly, there was no significant participation among village heads in the implementation of the project, with most saying that they were only superficially involved through signing the required documents (79%) and the implementation of the activities being undertaken by the sub-district and project staff. None of the respondents were involved in reporting the results of the activities implemented.

There was more participation among sub-groups in the villages as part of the preparation and implementation phases. Despite the participation of these groups, the majority (62%) of the respondents reported that there was no community discussion as part of the selection of the projects. In a minority of the cases (38%) there was some form of community consultation about the PNPM Green program, led by either the head of village or the extension worker from the sub-district or project. The majority of projects were selected by the technical consultants (52%) or the sub-district (21%), and only 27% of the projects were developed through community consultative process. Although most felt that the project was beneficial (36%) or beneficial with some caveats (45%), the long-term benefits were more disputed. Only 23% respondents felt there were long-term benefits to the program, with another 47% saying that the project had some long-term benefits but needed

improvements. As the project was a one-off, with no further technical support provided, a common complaint among respondents was that farmers were unsure about how to maintain and harvest the trees, affecting the long-term benefits of the scheme. Other complaints related to the unequal distribution of the benefits and the haphazard planting of the trees, which mainly benefitted individual households rather than targeting critical or degraded lands.

The Village Fund can explicitly be used for the dual functions of promoting rural development and restoring and rehabilitating degraded areas through tree planting and other activities. As the implementation of the Village Fund expands and matures, the potential for the fund to meet multiple objectives increases. The increase in scope and size of the Village Fund, however, has also led to more scrutiny over the use of the funds it provides, with the media in particular highlighting cases of misuse. Although limited in scope and duration, the PNPM Green program provides some lessons that could inform the improvement of the Village Fund. The main lessons that emerged from the PNPM Green project that have relevance for the Village Fund are: i) technical assistance and/or access to markets or providers of materials should be provided and ii) the projects should align with village spatial plans.

A central challenge of rural development in Indonesia is that villages lack access to adequate technical assistance and inputs. With the general exception of irrigated rice farming (Simatupang and Timmer, 2008), smallholders in a range of crops, including oil palm (Brandi et al., 2015), cocoa (Neilson, 2007) and timber species such as teak (Roshetko et al., 2013), have limited, sporadic or no access to extension support or subsidized inputs. Increasing financial transfers to village governments, by itself, will not overcome this challenge. Without specialized technical assistance, including access to expertise and materials including seedlings, communities lack the skills to effectively design and implement both infrastructure and environmental projects. Although financing these activities may be transparent and participatory, they may still be ineffective without adequate technical support. Where the PNPM Green program was led and implemented with the assistance of extension workers from the sub-district, most villages reported that there was little, if no technical support for designing and implementing nominated projects. This result is even more concerning as the majority of the Village Fund projects selected were infrastructure projects. The improved effectiveness of the Village Fund is contingent on village governments having access to this specialized technical assistance and requisite materials. Currently, the design of the Village Fund does not provide contributions for technical assistance, rather, it is the responsibility of district governments to fund and provide this assistance. Based on the findings of the research, district governments have not adequately filled this role.

Conservation and rehabilitation activities should be aligned with village spatial plans to ensure that degraded or critical areas are targeted and to avoid elite capture. From the results above, the main benefits of reforestation and agroforestry projects were to household livelihoods. Consequently, farmers had a vested interested to plant on their lands because of the more secure tenure. Although there are intrinsic values to tree planting including carbon sequestration, these lands were not necessarily degraded or critical to protecting ecosystem services, such as buffer areas for conservation areas or watersheds. Scientifically robust village spatial plans are needed to ensure interventions are properly targeted. As part of the Village Law and associated regulations, villages are required to prepare these plans, which should align with district level plans.[5] It is unrealistic, however, to expect that villages will be able to prepare these plans by themselves. Consequently, support is required from the relevant district and provincial agencies to develop them. The planning process should identify critical and degraded areas, and how the Village Fund could be used to finance planting in these areas. Aligning tree planting with social and

[5] *Article 83 Paragraph 3 Letter a of the Village Law 6/2014.*

community forestry schemes could ensure that planting occurs where it is needed most, and that farmers have secure claims over their planted trees and harvested products.

These three recommendations should support more effectively targeted community agroforestry and forestry interventions, financed through the Village Fund. Despite the increased tree planting, based on the results of the study, it does not seem likely that this will encourage the rehabilitation of critical and degraded ecosystems with native species. If, however, the focus of the intervention is carbon sequestration, then tree planting, that is not at the expense of standing forest, should be sufficient. Generally, the interest of farmers has been in planting trees that have direct benefits for their household, such as timber or cash crops. Rehabilitating local ecosystems, such as mangroves or forests on watersheds, will generate benefits to the local community over time. For individual farmers to rehabilitate these ecosystems, they should both understand the benefits of these activities and be willing to act collectively to restore areas where they do not necessarily have a personal interest. Without outside intervention, such as facilitation or a reward payment, then it seems unlikely, although possible, that communities will undertake these activities alone. The more recent versions of the regulations for the Village Fund allow these activities, however, these activities must compete for funding with for other projects, such as infrastructure. Ideally, financing rehabilitation and restoration using native species should be in addition or separate to the current Village Fund design, with more explicit conditions on how the funds could be used. Similar to the previous recommendations, that funding should be tied to technical assistance, in particular for identifying the necessary actions and support, including materials, for implementing the activities.

Although the Village Fund enables activities for protecting environmental services, there is no guarantee that farmers will select environmental activities over other activities, such as infrastructure development. Elements of PES schemes could be introduced to incentivize additional environmental activities at the village level. A PES scheme should be tied to additional or earmarked financing that is allocated conditionally. For the purposes of meeting REDD+, the ecosystem service that should be provided by villages should be carbon sequestration. In practical terms, this should either involve conservation and/or reforestation activities. Conservation activities should either focus on remaining forest areas and peatland areas. Reforestation activities, if only aiming to sequester carbon and not provide other ecosystem services, such as watershed protection or biodiversity, could potentially involve a wider range of tree species, including agroforestry and timber species, with no restrictions on where to plant. Tree planting, however, should not be at the expense of standing forests or contributing to the degradation of peatland areas. Participation in the scheme should be voluntary for households and administered by the village administration. Payments could include an upfront payment for seedlings and materials, or the actual provision of those materials, and then payments based on areas conserved/rehabilitated, including tree survival rates. Monitoring and verification could either be conducted by the village administration or district agencies, to ensure the impartiality of the scheme.

Findings from Objective 2

The provision of incentives at the local level, to support environmental activities, could also come from the corporate sector. In fact, there are PES schemes in various countries that have been initiated by companies. The Fire Free Village Program was initiated by the pulp and paper company APRIL in Riau in order to reduce the risk of occurrence of fires in villages close to their plantations. Output 2.3 analysed this initiative in order to understand its effectiveness in reducing the occurrence of fires (which provide a significant contribution to emissions in Indonesia) and the impact on smallholders.

The program includes No Burn Village Rewards, where a full reward of IDR 100,000,000 is given to the village community, through the village government, under the condition that fires do not occur within the village boundaries during the dry period, usually from July to October. A half reward, amounting to IDR 50,000,000, will be given to the village community if the burnt areas are maintained below 2 hectares, and no reward will be given if the burnt areas are larger than 2 hectares. The community decides the allocation of the funds to a

high priority community initiative. Other components of the FFVP include: appointing a local fire crew leader in each village, awareness raising programs, air quality measurements, and providing alternative technologies for land clearing. Selected villages are eligible for the No Burn Village Rewards for two years and will enter the Fire Resilient Community phase in the third year, where they will no longer be eligible for the rewards but will continue to receive support from APRIL for the other components of the program. An initial review of the program has pointed to promising success in some aspects of the program, while encountering limited success in others (APRIL, 2016). Overall, however, the review found that the program appears to have led to a reduction in the incidence of fire in the villages surrounding the plantations that had been included in the FFVP. The program was planned prior to the extensive fires of 2015, and implementation started just after the beginning of the fire season in July 2015. The new administration of President Joko Widodo responded to the fires and subsequent haze by issuing a Presidential Instruction No. 11/2015 that banned burning, including by smallholders. The regulation was implemented strictly in Riau, with harsh penalties for farmers caught burning.

The results of the study indicate that the incentive component of the Fire Free Village Program had an effect other than inducing a voluntary behaviour, in this case restricting the use of fire. The incentives were used as a pathway for disseminating information about the laws governing burning and the legal consequences of non-compliance. The compliance with these laws, however, did not occur in isolation. There had been a regional transition from swidden subsistence crops to plantation crops, in particular oil palm and rubber as well as non-farming livelihoods. In general, farmers in the villages were either cultivating alternative crops on separate plots or were in villages that already were cultivating these crops, simplifying the transition to permanent crops when the fire bans were implemented. Many of these changes occurred prior to the Presidential Instruction issued in 2015. The issuance of this regulation cemented the trajectory that had begun several years before.

The study consequently, does not either present a simple case study for the effectiveness of voluntary incentives nor the effectiveness of strict compliance regimes. The inception of the program either coincided or was preceded by information dissemination of the illegality of burning, in particular forest fires, done in the presence of the police, reinforcing the severity of the consequences of non-compliance. Although the local interpretation of these laws was fairly strict, and supported by a local police department decree, the underlying national laws at the time allowed some flexibility for burning by smallholders. Consequently, despite there being the potential for the program to incentivize voluntary changes in practices and behaviours prior to 2016, the program on the contrary was interpreted as a legal requirement. This perception was shared among both control and program villages.

The fire ban is, for the most part, accelerating the existing transition from swidden farming to oil palm and rubber. With the issuance of the local government instruction banning fire in 2014, followed by the Presidential Instruction in late 2015, bans on the use of fire became strictly enforced at the local level, leading to changes in livelihoods and land uses. Awareness campaigns, followed by actual prosecutions were the motivating factors in most villages. These transitions could be summarized as follows. Where farmers had access to alternative land uses or livelihoods, they intensified these activities, such as replacing maize and rice with oil palm. Where farmers had no viable alternative, they continued farming without burning or burning covertly and not reporting it. The patterns found in the study sites reflect the trends reported in other recent research in Sumatra, indicating a more systematic trend across the island (Rohadi, 2017). Although most of the farmers interviewed seemed able to adapt to the fire bans, the consequence of these adaptation strategies was replacing staple food crops with cash crops. Whether this affects food security in the present or future was not addressed as part of this study, although in one village, respondents reported now having to rely on subsidized rice or purchasing rice from the market as a result of the changes in farming.

Consequently, replicating the program or similar incentive instruments across Indonesia should be considered carefully. The strictly interpreted Presidential Instruction remains in

force, although Indonesia has not experienced an ENSO event since that of 2015. Similarly, the particular land use dynamics of Riau are not consistently found throughout Indonesia. Transitions to independent, smallholder oil palm production systems are contingent on a range of factors, most importantly, is access to a mill. Rubber farmers are constrained by their access to processing facilities although can travel further distances when dried. In the absence of a similarly accessible and profitable crop, enforcement or incentives by themselves would not be sufficient to prevent the use of burning without causing harm to smallholders and small-scale ranchers. In such a strict regulatory environment, the most effective financial instruments for fire prevention among smallholders and local communities should be measures for assisting farmers to find alternatives to burning. Such assistance bundles could include both alternative crops and cropping methods as well as mechanical alternatives to clearing land. These should be supported through local regulations to simplify the use of mechanical clearing methods in smallholder plots, while also ensuring continuous reinforcement of regulations, socialization about the impacts of haze from inappropriate burning on human health as well as presence of the Village Crew, as these components are measures that are deemed more effective than the incentives.

It is important to consider whether local communities have reasons other than external (monetary) incentives to conserve forests that they control, because the extent to which communities are interested in conserving forests of their own accord influences the (need for) external incentives. The objectives of Output 2.E1are to: i) analyse communities' needs for forest products and services and investigate their interests in joining the effort to reduce emission from deforestation and forest degradation; and ii) analyse the potential of ecosystem services in each research sites as a basis to develop an ecosystem service utilisation plan, including reduction of emissions from deforestation and forest degradation.

This study indicates that communities think that forests contribute to supporting their livelihood. Even in conservation area, communities think forests have the potential to be used for both wood and non-timber forest products, despite regulations limiting that use. However, there are also several non-monetary values that explain why communities want to manage their forests well (Table 5). Various functions of community-managed forests, as illustrated by Table 5, show a strong relationship between communities and forests. The forest is seen as a source of life that can provide daily needs and protect its territory from natural disasters. This finding is consistent with other research that shows that people have a world view that managing forests wisely will bring goodness to the region and the impact on sustainable living (Dev, Yadav, Baginski, & Soussan, 2003).

The attitude shown by communities in the study sites is supported by norms that seek to maintain natural resources for future generations. Of the three provinces, the role of customary institution (*adat*) is still strong in Papua, while in other provinces the behaviour of communities are determined more by institutional arrangements made by the communities or imposed by the state.

From a forest function point of view, communities living inside or in surrounding different types of forest function have different priorities in managing forest resources. As demonstrated by Table 6, communities managing conservation forests focus on soil and water conservation, biodiversity protection and reduction of flood and drought risks. Communities surrounding protection forests focus on the utilisation of non-timber forest products and ecosystem services. In the production forest, communities are interested in timber utilisation for subsistence and in shifting cultivation. Understanding the difference of communities' interest in utilising their forests in various forest functions is important to design incentive for community-based sustainable forest management. Collaborative management at each level of forest functions through synergy between the community, government, and other institutions must share a commitment and is used as an approach to sustainable forest management which would then encourage the participation of communities in a REDD+ scheme (Gray et al., 2001; Sample, Kavanaugh, & Snieckus, 2006). The potential ecosystem services that could be provided by the forest in the research sites, and constraints are presented in Table 7.

Table 5. Monetary and Non-monetary Values of Forest that Motivate Community to Manage the Forest

No.	Location	Tangible Value	Intangible Value
Riau Province			
1.	Kepau Jaya Research Forest, Kepau Jaya Village, Kampar District	Forest stands (*Shorea* sp., *Dyera* sp. & *Alstonia* sp.),	A study site to improve capacity of human resources
2.	Rumbio Customary Forest, Kampar District	Wood, non-wood forest products, water	Customary value, water source, carbon, carbon, tourism potential
3.	Rantau Bertuah Village adjacent to Sultan Syarif Hasyim Grand Forest Park	Honey, palm sugar	Tourism potential
Central Kalimantan Province			
4.	Rakumpit Customary Forest, Gunung Mas District	Ironwood forest, non-wood forest products, wild animal	Indigenous identity, carbon, and water regulator
5.	Katimpun Village Forest, Kapuas District	Gemor (*Notaphoebe coriacea*), Tutup kebali, Pantung, Rattan, Galam, Gandis (rambutan hutan), Nepenthes, wild boars, Deer, Wak-wak, Lizards, Beavers, and honer bears.	Water regulator for peat area, and has the potential as carbon storage
6.	Kereng Bangkirai Village, Palangkaraya City (adjacent to Sebangau National Park)	Gemor (*Notaphoebe coriacea*), resin, aloeswood, earth peg, kelanis, *Dyera* sp, fish, and Fir	Potential for tourism development
Papua Province			
7.	Elseng Customery Forest, Kemtuk	Wood, Water, Cendrawasih bird, hunted animals (wild boars, wood rats)	Water regulator, carbon storage, spiritual values, and indigenous identity
8.	Yapase Customary Forest, Depapre Sub-District	Water, hunted animals (wild boars), Cendrawasih bird	Water regulator, landscape beauty, carbon storage, spiritual values, and indigenous identity
9.	Customary Communities of Sereh and Kemiri Villages adjacent to Cycloops Strict Nature Reserve, Jayapura District	Water, Cenderawasih bird	Landscape beauty, water regulator, biodiversity potential, spiritual values, and indigenous identity

Table 6. Communities motivations in managing forest based on its function

Forest Function	Motivation
Conservation	- Soil and water conservation - Biodiversity protection - Reduction of flood and drought risks
Protection	- Non-timber forest product and ecosystem service utilisation
Production	- Utilising the area for farming and plantations - Maintaining heritage

Communities have different levels of interest in the implementation of REDD+ which is influenced by the characteristics and accessibility of communities to information on REDD+. The study identifies that the higher the livelihood dependence on the forest, the higher the desired compensation from REDD+ activities. This finding is in line with a study conducted by (Komba & Muchapondwa, 2017) in Tanzania where households taking most forest products wanted greater compensation for participating in REDD+ and they will demand lower compensation once they understood the objectives and incentives of REDD+. Communities in the study site still doubt the potential success of REDD+, but they are motivated to perform activities within the framework of REDD+ considering that the purpose of REDD+ is to conserve forests in their area. Communities expect that the implementation of REDD+ will provide better income compared to their usual activities.

Table 7. Potential ecosystem services in the study sites and constraints

Province/Type of Community	Ecosystem Service Utilisation	
	Potential	Constraint
Papua/Customary	• Abundance of flora and fauna • Forest landscape • Forest carbon service utilisation • Landscape beauty utilisation • Forest stand utilisation • Non-timber forest product utilisation • Spring utilisation	• Customary rules are increasingly neglected • Illegal hunting • Yapase Forest Protection potentials are not yet identified maximally • Land encroachment • Illegal logging • Illegal mining
Central Kalimantan/Customary+Modern	• Non-timber forest product utilisation • Water ecosystem services utilisation • Forest stand carbon utilisation • Carbon service utilisation from peatland • Landscape beauty services	• Illegal hunting by community • Forest fires • Limited fund • Limited human resources and access to technology and information • Customary institutional factors • Illegal logging • The inclusion of customary forest area into concession of companies • Limited dissemination activities
Riau/Modern	• Water ecosystem service utilisation • Landscape beauty utilisation for nature tourism • Forest carbon service utilisation • Non-timber forest product utilisation • Types of flora and fauna	• Land encroachment • Limited fund • Formal inauguration of customary forests • Management agency has not run optimally • Lack of customary structures in conducting surveillance of forests • The price of palm is high and the markets are clear

This study identifies the level of community's interest to participate in REDD+ activities based on community involvement in forest management, institutional management of forests and forest management plans. According to (Ehara, Hyakumura, & Yokota, 2014), the identification and understanding of forest priorities can assist the activities that will be proposed in REDD+. As explained in the methodology section, communities' interests in participating in a REDD+ program was assessed using expert judgement against the following criteria: 1) the willingness of communities to manage forest resources; 2) community's initiatives in establishing forest management institutions; and 3) the existence of management plan. The results of assessment are reported in Table 8.

Table 8. Assessment of community interest in REDD+ activities

No.	Location	Level of Interest	Reason
1.	Kepau Jaya Research Forest, Kepau Jaya Village, Kampar Regency	Low	More than 90% of the area has been occupied and communities are more interested in planting oil palm that has certain price and markets.
2.	Kanagarian Rumbio Customary Prohibited Forest, Kampar Regency	Very High	There is an NGO that supports the establishment of customary forests and hava good understanding on the development of carbon ecosystem services.
3.	Rantau Bertuah Village Surrounding Sultan Syarif Hasyim Grand Forest Park	Medium	The tenurial confllict between Rantau Bertuah Village and forest areas becomes a constraint in the development of activity programs of the Grand Forest park
4.	Rakumpit Customary Forest, Gunung Mas Regency	High	Communities want to preserve the ironwood trees located in the customary forest
5.	Katimpun Village Forest, Kapuas Regency	High	Communities want to rehabilitate their damaged village forest and derive benefits from Katimpun Village Forest establishment located in a protection area.
6.	Kereng Bangkirai Village, Palangkaraya Municipality (surrounding Sebangau National Park)	Low	Communities in Kereng Bengkirai prefer to utilize the tangible value of forests
7.	Elseng Customary Forest, District of Kemtuk	Medium	The government chose to give permits to companies rather than the communities, few community members having sufficient knowledge of REDD+
8.	Yapase Protection Forest, District of Depapre	High	Communities have traditions that support forest conservation, presence of community members who attended trainings for carbon measurement
9.	Customary Community of Kampung Sereh dan Kemiri (surrounding Cycloops Nature Preserve)	High	Cycloops Nature Preserve has 30 springs and 13 rivers that is used for government's piped water with 24 intakes spreading from Anafre Jayapura to meet the needs of the activities of Fisheries, Agriculture, Animal Husbandry, Restaurants, Hotels, Drink Water/Domestic Water. The beautiful landscape can be used as nature tourism project.

Considering the communities' perspectives on forest resources and ecosystem services, including efforts to reduce emissions and the biophysical and socio-economic potentials, strengthening institutional arrangements for community-based forest management are important to building a strong foundation for utilising ecosystem services at the community level. In some cases such as Kepau Jaya Research Forest, Sebangau National Park, SSH Gran Forest Park, and Cycloops Strict Nature Reserve, the involvement of communities in the management of the forests required establishing institutional arrangements that can formally link between the group of people and the forest surrounding their territories.

Efforts to strengthen the institutional arrangement of Rumbio, Rakumpit, Yapase, and Elseng Customary Forests, and the improvement of the institution managing Katimpun Village Forest are essential steps to utilise ecosystem services. The traditional acknowledgment and formal legality of the forest management need to be enhanced and strengthened with an inclusive and flexible organisational structure. This is a form of incentive that can be provided by REDD+ schemes. Other incentives that may be provided to the communities to encourage them to proactively reduce emissions from deforestation and forest degradation include: 1) facilitating the development of management plan for utilising ecosystem services; 2) establishing business unit such as cooperatives and village-own enterprises; 3) developing marketing infrastructure; 4) developing ecotourism; and 5) facilitating the activities for protecting and securing forest area from illegal activities.

Table 9. Strategies to provide incentives to communities to reduce emissions from deforestation and forest degradation in three types of forest functions

Forest Function	Strategy
Conservation	• Strengthening the role of village-level institutions • Establishing partnership with communities in the form of community's empowerment • Promoting forest and land rehabilitation activities • Designing carbon payment scheme from peatland through VCS • Increasing the promotion of nature tourism • Developing economic business alternatives for communities
Protection	• Strengthening the performance of existing customary forest management agencies • Designing forest carbon service payment scheme through Vivo Plan • Supporting the legal establishment of customary forests • Increasing the promotion of nature tourism • Designing water service utilisation scheme • Increasing public awareness or participation • Establishing community groups for managing nature tourism • Designing peat carbon service schemes through VCS • Fire prevention and management • Canal blocking • Constructing artesian wells • Building guard houses • Deer farming • Rehabilitation and enrichment of forest
Production	• Designing cooperation schemes for managing forests with communities using partnership schemes or social forestry • Empowering communities starting with the formation of farmer groups • Developing agroforestry systems • Preparing regulations at the village level • Establishing village owned enterprises • Establishing nurseries • Completing the survey of customary area boundaries • Supporting the legal establishment of customary forests • Preparing customary forest management programs • Developing water ecosystem service schemes

8 Impacts

8.1 Scientific impacts – now and in 5 years

The project has already published several studies, but the majority of the publications have been submitted to the journal Forest Policy and Economics for publication to a special issue, dedicated to the research carried out by the project. The publication of the research carried out by the project in a special issue will enhance scientists' understanding of the multifaceted issues to be addressed to implement REDD+, which was the initial focus of the project, but also to deliver on the commitments made by Indonesia and many other countries in their Nationally Determined Contributions to reduce forestry emissions without external support, that is through REDD+. Whilst so far a significant number of publications has addressed REDD+, relatively limited research has been carried out on the unconditional emissions reductions from forestry promised by the NDCs which account for the largest share of promised reductions. Therefore, research from this project will provide a much needed new contribution.

Contributions to scientific practice are generally difficult to measure but could be approximated, for example, by citations of publications produced by the project. However, this measure cannot be yet used as most publications are still been completed or are relatively recent to attract many citations. Therefore, this measure of impact could be assessed in about five years. However, their potential impact could be approximated at this stage by saying that the journal articles published have all appeared in international journals. One of them was published in a journal with one of the highest impact factors among journals focused on environmental science, *Nature Climate Change*. That paper has so far attracted 32 citations since 2016.

8.2 Capacity impacts – now and in 5 years

FOERDIA believes that the project has been very useful and beneficial to support its capacity to address climate change issues, especially in REDD+. The project has built capacity and institutional improvements through collaborative research, training, and financial support. The capacity improvement of its researcher can be seen, among others, from the invitations to join international, national and local efforts for avoiding deforestation and minimising forest degradation as well as restoring degraded lands, including peat. More researchers have been involved in this project compared to previous projects; therefore more researchers have strengthened their skills.

Activity 2.4, focused on the development and management of community based forest management to access environmental services. The utilisation of environmental services is an alternative development that can be applied to various arrangements of community-based forest management including Community Plantation Forest (HTR), Community Forest (HKm), Village Forest (HD), and the conservation village model. The utilisation of environmental services is expected to contribute to sustainable forest use while empowering local communities. The utilisation of environmental services such as water, nature tourism, biodiversity protection, and carbon sequestration/storage, could contribute to the diversification of forest conservation efforts. In addition, Payments for Environmental Services (PES) mechanisms that provide payments to environmental services providers could improve the prosperity of people living inside and surrounding forest areas. The implementation of PES mechanisms requires understanding of all involved parties. The training was aimed at improving the capacity of local government officers and forest management unit (KPH) managers to develop and manage community forestry, especially in the utilisation of forest environmental services. Training involved 30 participants representing Provincial Forestry Offices, KPH managers, heads of the village, and customary leaders in the provinces and districts of the research sites (Riau, Central Kalimantan, and Papua Provinces). The training was also attended by researchers from the

Center for Climate Change and Forest Policy Research and Development (PUSPIJAK), the Research Center for Climate Change of University of Indonesia (RCCC-UI), and the Graduate Program of Management and Business of Bogor Agricultural University (MB-IPB).

Activity 2.5 “Training for the Development of Community-Based Emission Reduction Program through Plan Vivo Mechanism” was conducted on 11-12 October 2016 in Bogor. The training provided community forest managers new knowledge and skills on the program for reducing emissions from deforestation and forest degradation and supporting communities in developing their programs for reducing emissions in their localities. Twenty people participated in the training, representing four communities within three provinces and government officers within Ministry of Environment and Forestry. The communities represented in the training were the customary community of Rumbio Forest, customary community of Rakumpit Forest, villagers from Katimpun Village Forest and officers from Low Carbon Development Initiative (Jayapura). Trainers came from Fauna and Flora International Indonesia, DG of Climate Change and FOERDIA. The communities were trained on how to develop project idea notes (PINs) to initiate the process of establishing community based carbon conservation projects.

Training in policy analysis for REDD+ (Activity 3.5) was conducted on 14 and 15 September 2016 at Hotel Margo, Depok, Jakarta. The training was attended by 20 participants representing local government, central government agencies and universities. The objective of the training was to improve understanding of current perspectives on REDD+ policies, laws, regulations and to deepen knowledge of carbon initiatives in Indonesia. The training provided participants with an analytical framework to investigate strengths and weaknesses of Indonesian policies in implementing REDD+. The participants were also able to increase their understanding of the steps required to initiate activities to reduce emissions from deforestation and forest degradation.

8.3 Community impacts – now and in 5 years

8.3.1 Economic impacts

The assessment of the economic impacts arising from this project can only be rather speculative and provisional, given its policy focus and the related uncertainty concerning the many factors that ultimately affect policy choices, which in turn it makes it difficult to attribute impacts directly to the project. In this respect it should be noted that the GoI and other development agencies started significant programs to address the issue of emissions reductions during the implementation of this project.

In relation to the overall economic benefits, it can be noted that with 90 million hectares of forests and annual deforestation at about one million hectares (second only to Brazil, and amounting to about 14% of global deforestation), Indonesia stands to gain significantly from carbon reduction emissions through the implementation of international and/or bilateral agreements on REDD+ financing. If Indonesia could halve its deforestation rate, it could receive some $1.5 billion per year in carbon payments, assuming an average emission rate of 300 t/CO_2/ha (including carbon loss from peat) and a price of $10/t/$CO_2$. Even if only a small fraction, such as 1%, of the policy choices that enabled the achievement of that reduction were attributable to the project, it could amount to $15 per year. This assessment will need to be considered in 2020 and 2030, the date for the delivery of emission reduction targets within the UNFCCC promised by Indonesia.

Another potential measure of economic impact relates to the costs of fire and haze. The project produced an output that analysed the economic implications of the fires and haze that affected Indonesia in 2015. That study found that the economic cost to Indonesia of the fire and haze event had been provisionally estimated by The World Bank at US$16.124 billion, or about 1.8% of Indonesia’s GDP in 2014. However, the total economic cost of the fires is likely to be much higher. The WB assessment estimated the cost of additional carbon

emissions at US$3.966 billion. But it would amount to US$16.3 billion, if it were calculated using the November 2015 price of carbon on the European market of about US$9.35 per tonne. Therefore, the total economic cost of the 2015 fire and event could be in the order of US$28 billion to Indonesia alone. The economic costs to the other countries in the region further add to the economic toll. The project study proposed policies to be considered by the Government of Indonesia in order avoid those economic impacts in the future. Given that significant fire and haze events appear to have been happening about every 20 years (excluding a future increase in intensity as a result of increased temperatures due to climate change), avoiding those events would result in a gross annual reduction in costs of US$2.8 billion. Even if only 1% of that reduction was attributed to this project, that would amount to US28 million annually. The net benefits are unknown at this stage as the costs of implementing improved fire management policies have not been estimated yet.

8.3.2 Social impacts

This project was designed with a clear social impact perspective: it aimed to achieve them by providing recommendations to the national, provincial and district governments about how to maximize the benefits from REDD+ to the rural population, particularly through the analysis of intergovernmental transfer mechanisms and PES.

The improved design of incentive mechanisms would provide widespread positive social impacts arising from the more efficient and effective implementation of REDD+ activities, including the improved capacity of government and NGOs/CSOs to facilitate participation more equitably. Improving forest communities' understanding of the implications of participation in REDD+ activities would allow them to make more informed decisions about whether and how to participate in REDD+ activities. This should improve the long run sustainability of REDD+ activities. The project has demonstrated:

1. A process of planning with communities to implement emission reduction activities that satisfy community needs and interests, and would provide them with financial benefits. Given that the GoI is implementing a large-scale forest land reform program, the examples developed by the project could inform its implementation and benefit many communities.
2. That the Village Fund could be used to provide incentives to villages to carry out environmental activities, including tree planting for carbon offset projects;

From a quantitative perspective, the potential size of the pool of people for these positive impacts is large because the number of forest-dependant people living inside, or surrounding, state forests is substantial. From a total of 31,864 villages in 15 sampled provinces, 7,900 (25%) are in surrounding forest zones, and 1,300 (4%) are located within forest zones (Ministry of Forestry and Statistics Indonesia 2007). Those villages occupy 49.35 million hectares, or about 46% of the total area of villages in the provinces, and are inhabited by almost 18 million people (Ministry of Forestry and Statistics Indonesia 2007).

8.3.3 Environmental impacts

As noted in the Project Proposal Document, Indonesia is estimated to have become the third largest emitter of GHGs as a result of emissions from peatlands that are converted to agricultural activities or simply degraded as a result of unsustainable forest harvesting. The information collated by a paper published by the project shows that first estimates suggest that during the 2015 fire event daily emissions were around 22 $MtCO_2e$ during September and October 2015, compared to the normal daily average of 2 $MtCO_2e$ in years without significant fires. At that level, Indonesia's emissions would have exceeded those of China for a total of about two weeks over the two months, as well as of the United States' total over the same period. The total emissions from the fires, which started in early July, have been in the order of 1.75 $GtCO_2e$, with significant uncertainty involved. Those emissions are about 43% greater than the country's annual emissions from land use change and forestry (~1.22 $GtCO_2e$ in 2012) and just 13% less than its total annual emissions (~1.98

$GtCO_2e$ in 2012). On the basis of the above information, the environmental impacts of project research would be significant if the project resulted even in a small improvement in the effectiveness of the GoI's the policies to reduce emissions.

8.4 Communication and dissemination activities

Project staff contributed knowledge and lessons from the project to a range of GoI activities by participating in meetings:

Dr. Sulistya Ekawati participated in a discussion about policies to address fire and peat management which was led directly by the Minister of Environment and Forestry, Dr. Siti Nurbaya. 27 – 29 Setember 2015.

Dr. Zahrul Muttaqin was involved in the discussion related to the design of fiscal policy to operationalise Forest Management Units (FMUs) to strengthen sustainable forest management and reduce deforestation and forest degradation. The discussion was held by the Ministry of Finance through the Centre for Climate Change Finance and Multilateral Policy on 5th October 2015.

Dr. Zahrul Muttaqin and Mr. Subarudi were involved in the preparation of the Emission Reductions – Program Idea Note (ER-PIN) for FCPF Carbon Fund (The World Bank), held by Ministry of Environment and Forestry in Samarinda, East Kalimantan on 26 – 29 October 2015.

Dr. Sulistya Ekawati and Mr. Subarudi were invited by DG of Forest and Environmental Planning, in collaboration with the Municipal Government of Jakarta, to analyse strategic options to rehabilitate Jakarta Bay, 10 June 2016.

Ms. Mega Lugina was invited by IPB (on 13 June 2017) to present about the potential of mangrove forests to reduce emissions from deforestation and forest degradation.

Dr. Subarudi made a presentation in the Capacity Building Workshop and Science Policy Dialogue on Climate Change: Low Carbon and Adaptation Initiatives in Asia, Bangkok, Thailand, 6-10 February 2017. The presentation title was Technology Need Assessment: Indonesia Country Report.

The workshops organized by the project were aimed at discussing and disseminating project research with a broad range of stakeholders from government, the private sector and civil society. As an example, organization that were represented, beyond FOERDIA, and the ANU, included WWF Indonesia, The Nature Conservancy Indonesia, Ministry of Finance, the NGO LATIN, Bogor Agricultural University, Riau Provincial Government, Papua Provincial Government, Central Kalimantan Provincial Government, the Ministry of Environment and Forestry (including the following Directorates: Natural Resource Conservation, Climate Change, and Natural Forest Utilisation, Social Forestry), peak bodies of forest concession holders, as well as private companies such as APRIL.

The project also produced the following Info Briefs and Policy Briefs to support the dissemination of findings among stakeholders and policy makers:

Info Briefs

- No. 1, May 2014; "An Overview of ACIAR Project No. FST/2012/040 Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia"
- No. 2, June 2014; "The Selection of Districts as Research Sites"
- No. 3, July 2014; "Training on The Development and Management of Community Forestry to Utilize Forest Environmental Services"
- No. 4, September 2014; "Evaluating the Collaborative Research of ACIAR FST/2012/040"
- No. 5, December 2014; "Steering Committee Meeting 2014"

No. 6, January 2015; “Stakeholder Analysis for ACIAR Project FST/2012/040 Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia”

No. 7, January 2015; “Jurisdictional REDD+ in Central Kalimantan: A preliminary result”

No. 8, February 2015; “An Effort to Develop Community-Based Forest Management for REDD+ Implementation: A Preliminary Result of the Research in Central Kalimantan and Riau Provinces”

No. 9, March 2015; “Focus Group Discussion (FGD) on the Policies Influencing REDD+ in Central Kalimantan and Riau Provinces”

No. 10, August 2015. Planning and Developing Community-based Forest Management to Reduce Emissions from Deforestation and Forest Degradation: Progress report from Central Kalimantan and preliminary result from Papua.

No. 11, September 2015. Policies Supporting or Impeding the Implementation of REDD+ In Indonesia.

No. 12, November 2015. Steering Committee Meeting of the ACIAR PROJECT FST/2012/040 “Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia”.

No. 13, December 2015. A Workshop on Jurisdictional REDD+. This brief is as Output 1.3

No. 14, January 2016. An Overview of ACIAR Project No. FST/2012/040 “Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia”.

No. 15, March 2016. The Development of Katimpun Village Forest Utilisation Plan.

No. 16, April 2017. An Overview of ACIAR Project No. FST/2012/040 “Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia”. Updated version.

No. 17, July 2017. An Overview of ACIAR Project No. FST/2012/040 “Enhancing Smallholder Benefits from Reduced Emissions from Deforestation and Forest Degradation in Indonesia”. Updated version.

Policy Briefs

Sulistya Ekawati, Subarudi, Kushartati Budiningsih, Muhammad Zahrul Muttaqin, 2016. Mendorong Kesiapan Implementasi REDD+ di Indonesia *(Accelerating the Readiness of REDD+ Implementation in Indonesia)*, Vol. 10, No. 5, Pusat Penelitian dan Pengembangan Sosial Ekonomi Kebijakan dan Perubahan Iklim, Bogor, Indonesia

Mimi Salminah dan Fitri Nurfatriani, 2017. Kebijakan Fiskal untuk Mendorong Keterlibatan Swasta Dalam REDD+ *(Fiscal Policy Encouraging Private Sectors to Involve in REDD+)*, Vol. 11, No. 9, Pusat Penelitian dan Pengembangan Sosial Ekonomi Kebijakan dan Perubahan Iklim, Bogor, Indonesia

9 Conclusions and recommendations

9.1 Conclusions

The project took longer to be fully implemented than originally planned, however, there were two major positive aspects to this longer implementation period. First, overall, more activities than originally planned could be implemented leading more a larger number of outputs. Second, and most important, is that the delayed implementation resulted in the final part of the project being able to contribute research relevant to Indonesia's planning for the implementation of its Nationally Determined Contribution to reducing emissions. This is particularly significant because most of the (unconditional and conditional) emissions reductions are expected to come from the forestry sector, and so far there has been very limited research carried out in Indonesia as well as globally on NDCs, their challenges and implications. Therefore, the research produced by the project should prove particularly useful for Indonesia, other countries, and other researchers.

The project focused on delivering policy relevant research, strengthening the capacity of Indonesian researchers to carry out research with a focus on policy, as well as contributing to the capacity of local government official to implement emission reduction programs in forestry, particularly by providing support to interested local communities. It needs to be emphasised that it is particularly difficult to assess the impact of policy research given that i) it is supposed to provide an analysis of options available to decision makers to concerning possible policy options (which may or may not be recommended for implementation) and ii) many factors contribute to the final decision about whether to implement an option or not, as well as to its eventual outcomes. It is for this reason that it is difficult to provide certain assessment of the economic, social and environmental impacts of this project. It needs to be emphasised, however, that in terms of capacity building impacts, the self evaluation of the FOERDIA is very positive, particularly because the project involved, and contribute to the training of a larger number of scientists than other project had done before, and also because the majority of trained researcher were women. Finally, an example of the positive impact on capacity is the fact that right at the conclusion of the project, the lead Indonesian scientist on the project (who had been trained to the PhD level in the previous phase of the project) was assigned to the office of the office of the Minister of Environment and Forestry to support the production of publications, preparation of speeches, and accompanying the Minister to international meetings.

9.2 Recommendations

There are three main issues and related recommendations arising from this project.

The assessment of the impact of policy research is particularly difficult given the many influences that ultimately affect the adoption and implementation of policies. ACIAR may consider the development of guideline about how to assess policy research projects. This would not only support its evaluation work, but also provide guidance to the researchers implementing the projects about the information required by ACIAR to carry out the evaluation.

The project was particularly focused on building capacity of researchers as well as national and local government officials who implement policies. This was done by providing targeted training sessions. The assessment of capacity building initiatives would be facilitated if ACIAR provided project implementers with guidelines to monitor and evaluate those activities.

Indonesia has embarked in one of the largest forest land reform programs in the world. The program has extremely important implications both for people's livelihoods and for the climate. Research support on how best to implement and monitor the program would be of significant benefit to Indonesia, its people, and the efforts to mitigate climate change.

10 References

10.1 References cited in report

APRIL, 2016. Fire-free Village Program Review 2016.

BAPPENAS, Ditjen Sumber Saya Air, Partners for Water Program, 2013. Quick Assessment and Nationwide Screening (QANS) of Peat and Lowland Resources and Action Planning for the Implementation of a National Lowland Strategy. PVW3A10002 Agentschap NL 6201068 QANS Lowland Development. Report on QNAS Component 4, Jakarta, Indonesia.

Bellot, F. F., Bertram, M., Navratil, P., Siegert, F., & Dotzauer, H. 2014. The high-resolution global map of 21st-century forest cover change from the University of Maryland ('Hansen Map') is hugely overestimating deforestation in Indonesia. *FORCLIME Forests and Climate Change Programme, Jakarta, Indonesia*.

Brandi, C., Cabani, T., Hosang, C., Schirmbeck, S., Westermann, L., Wiese, H., 2015. Sustainability Standards for Palm Oil Challenges for Smallholder Certification Under the RSPO. Journal of Environment and Development. 24, 292–314.

Brousselle, A. & Champagne, F. 2011. Program theory evaluation: Logic analysis. *Evaluation and program planning,* 34**,** 69-78.

Cattau, M.E., Harrison, M.E., Shinyo, I., Tungau, S., Uriarte, M., DeFries, R., 2016a. Sources of anthropogenic fire ignitions on the peat-swamp landscape in Kalimantan, Indonesia. Global Environmental Change 39, 205–219.

Donaldson, S. I. & Gooler, L. E. 2003. Theory-driven evaluation in action: lessons from a $20 million statewide Work and Health Initiative. *Evaluation and program planning,* 26**,** 355-366.

Dunn, W.N. 2009. *Public policy analysis an introduction,* New Jersey, Upper Saddle River.

Giglio, L., Justice, C., Boschetti, L., Roy, D., 2015. MCD64A1 MODIS/Terra+Aqua Burned Area Monthly L3 Global 500m SIN Grid V006 [Data set]. NASA EOSDIS Land Processes DAAC. https://doi.org/10.5067/MODIS/MCD64A1.006

Giglio, L., Loboda, T., Roy, D.P., Quayle, B., Justice, C.O., 2009. An active-fire based burned area mapping algorithm for the MODIS sensor. Remote Sensing of Environment 113, 408–420.

Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., … Townshend, J.R.G. 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. *Science*, *342*(6160), 850–853.

Irawan, S., Tacconi, L., 2016. Intergovernmental fiscal transfers, forest conservation and climate change. Edward Elgar Publishing, Cheltenham and Northampton.

Irawan, S., Tacconi, L., Ring, I., 2013. Stakeholders' incentives for land-use change and REDD+: The case of Indonesia. Ecological Economics. 87, 75–83.

Krueger, R. A. 1988. *Focus Groups: A practical guide for applied research*. London: Sage.

Margono, B.A., Potapov, P.V., Turubanova, S., Stolle, F., Hansen, M.C., 2014. Primary forest cover loss in Indonesia over 2000–2012. Nat. Clim. Change 4, 730–735.

Mertens, D. M. & Wilson, A. T. 2012. *Program Evaluation Theory and Practice: A Comprehensive Guide,* New York, London, The Guilford Press.

Miettinen, J., Shi, C., Liew, S.C., 2016a. Land cover distribution in the peatlands of Peninsular Malaysia, Sumatra and Borneo in 2015 with changes since 1990. Global Ecology and Conservation 6, 67–78. https://doi.org/10.1016/j.gecco.2016.02.004

Miettinen, J., Shi, C., Liew, S.C., 2016b. 2015 Land cover map of Southeast Asia at 250 m spatial resolution. Remote Sensing Letters 7, 701–710.

Miettinen, J., Shi, C., Liew, S.C., 2016. 2015 Land cover map of Southeast Asia at 250 m spatial resolution. Remote Sensing Letters 7, 701-710.

MoEF. 2015. Peraturan Direktur Jenderal Planologi Kehutanan Tentang Pedoman Pemantuan Tutupan Lahan.

MoEF. 2016a. *National Forest Reference Emission Level for Deforestation and Forest Degradation: In the Context of Decision 1/CP.16 para 70 UNFCCC (Encourages developing country Parties to contribute to mitigation actions in the forest sector)*. Indonesia: Directorate General of Climate Change, The Ministry of Environment and Forestry.

MoEF 2016b. Indonesia first Biennial Update Report (BUR) under the United Nations Framework Convention on Climate Change. Jakarta: Ministry of Environment and Forestry.

MoEF, 2017a. Peta Indikatif Alokasi Kawasan Hutan Untuk Penyediaan Sumber Tanah Obyek Reforma Agraria (TORA) (Map). Ministry of Environment and Forestry, Jakarta, Lampiran Surat Keputusan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia. Nomor SK. /MenLHK/Setjen/Kum.1/4/2017. April 2017

MoEF, 2017b. Peta Indikatif dan Areal Perhutanan Social (PIAPS) (Revisi I) (map). Ministry of Environment and Forestry, Jakarta, pp. Lampiran Surat Keputusan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia. Nomor SK. 4865/MENLHK-PKTL/REN/PLA.4860/4869/2017. 4825 September 2017

Neilson, J., 2007. Global Markets, Farmers and the State: Sustaining Profits in the Indonesian Cocoa Sector. Bullettin of Indonesian Economic Studies. 43, 227–250.

Nurrochmat, D.R., Solihin, I., Ekayani, M., dan Hadianto, A. 2010. Neraca Pembangunan Hijau-Konsep dan Implikasi Bisnis Karbon dan Tata Air di Sektor Kehutanan. Bogor (ID): IPB Press.

Purwanto, E., 2013. Completion Report 2013. Kecamatan Development Program and Environment (PNPM-Green) in Sulawesi Component 3 Awareness Raising and Training (TF-090977) Province South and South East Sulawesi. Operation Wallacea Trust, Bogor.

Rahayu, M.A. 2008. *Psychological Well-Being*. Jakarta: FPSI Universitas Indonesia.

Rohadi, D., 2017. Zero-burning policy hurts small farmers - a flexible approach is needed. The Conversation. URL http://theconversation.com/zero-burning-policy-hurts-small-farmers-a-flexible-approach-is-needed-77969 (accessed 21/1/2018).

Roshetko, J.M., Rohadi, D., Perdana, A., Sabastian, G., Nuryartono, N., Pramono, A.A., Widyani, N., Manalu, P., Fauzi, M.A., Sumardamto, P., Kusumowardhani, N., 2013. Teak agroforestry systems for livelihood enhancement, industrial timber production, and environmental rehabilitation. Forests, Trees and Livelihoods 22, 241–256.

Sharpe, G. 2011. A review of program theory and theory-based evaluations. *American International Journal of Contemporary Research,* 1.

Sidani, S. & Sechrest, L. 1999. Putting program theory into operation. *The American Journal of Evaluation,* 20**,** 227-238.

Simatupang, P., Timmer, C.P., 2008. Indonesian Rice Production: Policies and Realities. Bulletin of Indonesian Economic Studies. 44, 65–80.

Sloan, S., 2014. Indonesia's moratorium on new forest licenses: An update. Land Use Policy 38, 37-40.

Sloan, S., Locatelli, B., Wooster, M.J., Gaveau, D.L.A. 2017. Fire activity in Borneo driven by industrial land conversion and drought during El Niño periods, 1982–2010. Global Environmental Change 47, 95–109.

Stame, N. 2004. Theory-based evaluation and types of complexity. *Evaluation,* 10**,** 58-76.

Stewart, D. W., & Shamdasani, P. N. 1990. *Focus Groups: Theory and practice* (Vol. 20). London: Sage

Stewart, J., Hedge, D. M. & Lester, J. P. 2007. *Public Policy: An Evolutionary Approach*, Cengage Learning.

Tacconi, L. 2012. Redefining payments for environmental services. *Ecological Economics*. 73: 29-36.

Tropek, R., Sedláček, O., Beck, J., Keil, P., Musilová, Z., Símová, I., Storch, D., 2014. Comment on "High-resolution global maps of 21st-century forest cover change." Science 344, 981.

Wahyunto, S., Subagjo, S.R.H., 2004. Maps of area of peatland distribution, area and carbon content in Kalimantan, 2000-2002. 1st edn. Book 1. Wetlands International - Indonesia Programme & Wildlife Habitat Canada. Bogor, Indonesia. Available from: http://www.wetlands.or.id/publications_maps.php. Accessed November 2011.

Wahyunto, W., Nugroho, K., Ritung, S., Agus, F., 2014. Indonesian peatland map: Method, Certainty, and uses. Prosiding Seminar Nasional Pengelolaan Berkelanjutan Lahan Gambut Terdegradasi untuk Mitigasi Emisi GRK dan Peningkatan Nilai Ekonomi (Proceedings of the National Seminar on Sustainable Management of Degraded Peatlands for GHG Emissions Mitigation and Enhancement of Economic Value). Indonesian Agency or Agricultural Research and Development, Jakarta, Indonesia, 2014, pp. 81-96.

White, H. 2009. Theory-based impact evaluation: principles and practice. *Journal of Development Effectiveness,* 1**,** 271-284.

Wunder, S. 2005. Payments for environmental services: some nuts and bolts. *CIFOR Occasional Paper No.42*. Bogor: CIFOR.

10.2 List of publications produced by project

Output 1.2: Irawan S., T. Widiastomo, L. Tacconi, J. Watts, B. Steni. Jurisdictional REDD+: The case of Central Kalimantan. Early draft to be revised and submitted to Forest Policy and Economics.

Output 1.4: Watts, J.D., L. Tacconi, S. Irawan, A.H. Wijaya. Village transfers for the environment: Lessons from community based development programs and the village fund. Submitted to Forest Policy and Economics.

Output 1.5: Tacconi, L. (2016). The role of firms in reducing greenhouse gas emissions from deforestation. pp. 295-312. In Bennett, J. ed. Protecting the Environment Privately. World Scientific Publishing, London.

Output 1.6: Cadman, T., T. Sarker, F. Nurfatriani, M. Salminah, T. Maraseni. Stakeholders' perspectives on fiscal (dis-) incentives for reducing emissions from deforestation and forest degradation in Indonesia. Submitted to Forest Policy and Economics.

Output 1.6a: Fitri Nurfatriani, Mimi Salminah, Tim Cadman and Tapan Sarker (2017). Incentives and disincentives for reducing emissions under REDD+ in Indonesia, In Hossain, M. Hales, R and Sarker, T. (Eds), *Pathways to a Sustainable Economy: Bridging the gap between COP21 commitments and 2030 targets of emission control*, Springer, December 2017.

Output 2.0A: Suich, H. M. Lugina, M.Z. Muttaqin, I. Alviya (2017). Payments for ecosystem services in Indonesia. *Oryx*. 51(3): 489-497.

Output 2.1: Suich, H., Tacconi, L Design characteristics of PES schemes and implications for vulnerability. This draft has not been published. The ATL has not found an appropriate channel to publish it.

Output 2.2a: Suich, H., L. Tacconi Design characteristics of PES schemes and implications for poverty. This draft has not been published. The ATL has not found an appropriate channel to publish it.

Output 2.3: Watts, J.D., L. Tacconi, N.D. Hapsari, S. Irawan, S. Sloan, T. Widiastomo. Incentivising compliance: evaluating the effectiveness of targeted village incentives for reducing forest and peat fires. Submitted to Forest Policy and Economics.

Outputs 2.6: The list of plans developed for this item is provided under separate listing below.

Output 2.7: Draft Report (Edited Book) in Bahasa Indonesia entitled “Pengelolaan Jasa Lingkungan Berbasis Masyarakat untuk Mengurangi Emisi dari Deforestasi dan Degradasi Hutan di Indonesia” (*Community-Based Environmental Service Management to Reduce Emissions from Deforestation and Forest Degradation*).

Output 2.E1: Muhammad Zahrul Muttaqin, Iis Alviya, Mega Lugina, Farid Almuhayat Uhib Hamdani, and Indartik. Developing Community-Based Forest Ecosystem Service Management to Reduce Emissions from Deforestation and Forest Degradation. To be revised and submitted to Forest Policy and Economics.

Output 2.8: Arief Daryanto, Sahara Sahara, Eka Puspitawati, Deden Djaenudin. Business Models to Promote Partnerships between Companies and Communities in Implementing REDD+. Draft articles was submitted which was meant for submission to Forest Policy and Economics was submitted to the ATL, however, the authors did contact respond to comments sent by the ATL. It is assumed they will not submit the paper.

Output 3.1: Rafael Jacques Rodrigues. Forest governance and law enforcement in Brazil: overview, challenges and perspectives. Consultant report

Output 3.1a: Tacconi, L., R.J. Rodrigues, A. Maryudi, M.Z. Muttaqin. Comparative analysis of forest law enforcement in Brazil and Indonesia: lessons for reducing emission from land use change. Draft partly completed, waiting for input by A. Maryudi. It will be submitted to Forest Policy and Economics.

Output 3.2: Sulistya Ekawati, Kushartati Budiningsih, Subarudi, Galih Kartika Sari and Muhammad Zahrul Muttaqin. Assessment of Non-Forestry Sector Policies Influencing the Effectiveness of REDD+ Policies in Indonesia

Output 3.3: Subarudi, Sulistya Ekawati, Kushartati Budiningsih and Muhammad Zahrul Muttaqin. The assessment of forestry policies limiting the adoption of REDD+ policies.

Output 3.2-3: Sulistya Ekawati, Subarudi, Kushartati Budiningsih, Galih Kartika Sari, Muhammad Zahrul Muttaqin. Policies Enabling the Successful Implementation of REDD+ in Indonesia. To be submitted to Forest Policy and Economics.

Output 3.3a: Tacconi, L. (2016). Preventing fires and haze in Southeast Asia. *Nature Climate Change*, 6(7) 640-643.

Output 3.3B: Meehan, F., L. Tacconi, Kushartati Budiningsih. Are national commitments to reducing emissions from forests effective? Lessons from Indonesia. Submitted to Forest Policy and Economics.

Output 3.6: Tacconi, L. (2017). Strengthening policy research and development through foreign aid: The case of reducing deforestation and forest degradation in Indonesia. *Australian Forestry*. 80(3): 188-194.

Output 3.E1: Tacconi, L., M.Z. Muttaqin et. Analysis of the institutional architecture and activities proposed to reduce emissions from forests in Indonesia. Currently being drafted, will be submitted to Forest Policy and Economics.

Output 3.E2: Ida Aju Pradnja Resosudarmo, Luca Tacconi, Faridh Almuhayat Uhib Hamdani, Sean Sloan, Subarudi, Iis Alviya, and Muhammad Zahrul Muttaqin. Reinvigorating Indonesia’s land reform: implications for people and climate. Currently being edited, will be submitted to Forest Policy and Economics.

List of outputs prepared under Activity 2.6

1. Alviya, I., K. Budiningsih, dan M. Z. Muttaqin, 2017. Rencana Revitalisasi Kelembagaan dalam Pengelolaan Hutan Larangan Adat Ghimbo Potai dan Sialang Layang Kenegerian Umbio, Kabupaten Kampar, Provinsi Riau.
2. Alviya, I. dan M. Z. Muttaqin, 2017. Rencana Pengelolaan Hutan Penelitian Kawasan Hutan Dengan Tujuan Khusus (KHDTK) Kepau Jaya Berbasis Masyarakat, Kabupaten Kampar, Provinsi Riau.
3. Alviya, I. dan M. Z. Muttaqin, 2017. Rencana Kolaborasi Pemanfaatan Kawasan Hutan Antara Masyarakat Desa Rantau Bertuah dengan Pengelola Tahura Sultan Syarif Hasyim, Provinsi Riau.
4. Muttaqin, M. Z., Hamdani, F. A. U dan Alviya, I. 2016. Rencana Pengelolaan Hutan Desa Katimpun, Kecamatan Mantangai Tengah, Kabupaten Kapuas, Provinsi Kalimantan Tengah.
5. Hamdani, F. A. U., Indartik, M. Lugina, M. Z. Muttaqin dan Siti Maimunah. 2016. Rencana Kolaborasi Pengelolaan Hutan Adat Rakumpit, Kelurahan Mungku Baru, Kecamatan Rakumpit, Kota Palangkaraya, Provinsi Kalimantan Tengah.
6. Lugina, M., Subarudi, F. A. U., Hamdani, dan M. Z. Muttaqin. 2016. Rencana Kolaborasi Pemanfaatan Kawasan Hutan Antara Masyarakat Kelurahan Kereng Bengkirai dengan Pengelola Taman Nasional Sebangau, Provinsi Kalimantan Tengah.
7. Hamdani, F. A. U., dan M. Z. Muttaqin. 2017. Rencana Pengelolaan Hutan Lindung Yepase Kampung Yepase, Kabupaten Jayapura, Provinsi Papua.
8. Muttaqin, M. Z., F. A. U. Hamdani dan M. Salminah. 2017. Rencana Pengelolaan Hutan Adat Elseng Kampung Aib, Distrik Kemtuk, Kabupaten Jayapura.
9. Muttaqin, M. Z. dan Hamdani, F. A. U. 2017. Rencana Pemanfaatan Jasa Lingkungan Berbasis Masyarakat Adat di Cagar Alam Cycloops.

Project Idea Notes for Plan Vivo Standards (Output of 2.E3)

1. Protection of Umbio Customary Forest
2. Protection of Ulin Customary Forest for Sustainable Utilization
3. Community-Based Sustainable Forest Management in the Low Carbon Emission Development of Yapase Village