

IMPACTS OF SOCIAL FORESTRY ON FARMERS' REVENUES IN YOGYAKARTA AND LAMPUNG: ECONOMIC, SOCIAL, AND ENVIRONMENTAL PERSPECTIVES

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Abstract

The persistence of inequality, poverty, and deforestation in Indonesia has forced policy makers to reconsider social forestry as a key policy reform since 2014. There was about 42.25 million hectares of Indonesian forests in which the private firms, mostly owned by conglomerates, have hold and utilised about 95.76% of forest areas. Ironically only 4.14% of the forest areas are given and utilised by either local farmers or Small-Micro Enterprises. The central government during Joko Widodo regime introduced a new paradigm of social forestry that was designed to change the inequality drastically. Forest areas are not only for big players that exploiting forest for wood-based industry. Now the local communities in and around the forest areas are given the license of social forestry, free access to forests and a right to run business from core crops, supplementary crops, animal husbandry, to tourism-based activities. Our paper attempts to explore to what extent economic, social, and environment factors have brought any impacts on farmer's revenues participating in social forestry? Our analysis pioneers the study of Indonesia's social forestry development that incorporates economic, social, and environmental perspectives. An explanatory ethnographic study and binary logistic regression model prove to be useful as the basis to integrate the three perspectives. We found that partnership, number of workers, log stealing and core crops are the key predictors of farmers' revenues. Some economic, social, and environmental variables are insignificant to explain the revenues as the period of implementing social forestry is relatively short. Our findings offer some insights about impacts of social forestry, and hence, suggest some policy recommendation to improve the planning and implementation of social forestry.

Keywords: social forestry, revenues, predictors, binary logistic, Forest Inequality

INTRODUCTION

Forest for people is a new paradigm for forest development and management in Indonesia. In fact, there was about 42.25 million hectares (ha) of Indonesian forests in which the private firms, mostly owned by conglomerates, have hold and utilised about 95.76% of forest areas (see Table 1). Ironically only 4.14% of the forest areas are given and utilised by either local farmers or Small-Micro Enterprises (SME). The new paradigm of social forestry is designed to change this huge inequality dramatically. Forest areas are not only for big players that exploiting forest for wood-based industry or agro-based industry but also for local people living in and around forest areas. The local small farmers or SME are often chased by forest guards because they are accused to steal woods, involve in illegal logging, destroy or even burn forest to clear land and cultivate crops illegally in protected or stated-owned forests. Now the local communities in and around the forest areas are given the license of social forestry.

Table 1. Utilization of Forest

Forest Land	Actor			Total
	Large Private Enterprises	Local Farmers/ SME	Public Utility	
Total (hectares)	40,463,103	1,748,931	41,200	42,253,234
Percentage of total	95.76	4.14	0.10	100

Source: Ministry of Natural Environment & Forestry (2018)

The president of Indonesia, Joko Widodo, has approved to eliminate illegal logging in Indonesia by focusing on social forestry for the benefit of the local communities. Regulation on social forestry is written under the ministerial regulation of the Ministry of Natural Environment and Forestry (KLHK) Number P.83/MENLHK/SETJEN/KUM.1/10 year 2016, a revision of previous social forestry program rules. This regulation explained in detail about the social forestry scheme, starting from simplification of proposal process mechanism until the issuance of a permit. The policy's objective is to increase the local community welfare while being sustainable extracting forest resources. The ministerial regulation explains in detail what and how social forestry works. The objectives are set as follows: first, to give a guideline for granting rights for licensing, partnership, and forest management in the field of social forestry. Second, to solve tenure and justice problems for local communities, within or around forest areas. In short, this candy boils down to prosperous people, but the forest must also be sustainable.

Implementation of this initiative is fraught with challenges. The debate surrounding the right set of property rights, whether for the community, private or individual in the sustainable use and management of forest resources, remains an unresolved problem. It is debatable whether and how social forestry in Indonesia can provide the expected tenure security as well as contribute to improving livelihoods and forest conservation. Showing performance of social forestry, our study will focus on the improvement of local farmers' welfare. Our analysis will elaborates the extent of the impact of welfare improvement concerning economic and social dimension to the community around the forest, and the extent to which social forestry can support forest sustainability. Lastly, using binary logistic regression models, we will analyze to what extent some key variables incorporating economic, social, and environment perspectives influence farmers' revenues.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Our study proposes a change of point of view of measuring key performance indicator of social forestry. Highlighting perception of the locals regarding social forestry including what has changed since the licensing reward. "Cultural-cognitive: emphasizes the shared conceptions that constitute the nature of social reality and the frames through which meaning is made" (Scott, 2001). Borrowing Scott's definition of cultural-cognitive, our study aims to analyse how social forestry is perceived by the society.

Like many other third-world countries, many countries are still working on building robust regulation that works effectively to manage social forestry. Working towards bettering the national policy in Liberia, reorientation of the forest policy is government's realisation of the need to better forest governance to ensure effective poverty alleviation (Brown, 2002).

The case of social forestry in Thailand offers an interesting case. Aiming to modify teaching, learning, and school-community relations in Thailand, a pilot project of Social Forestry, Education and Participation (SFEP) involving students in learning local village problems related to forest management (Mcdonough & Wheeler, 1998). As achievements of the project, school contributes to local communities by allowing their fifth and sixth grader to assess real-life problems and applying what they have been taught in class enhancing their knowledge of essential concepts. A more integrated relationship between all players benefiting a greater community capacity. Mcdonough & Wheeler (1998) has defined the key subjects and lessons of schools and communities collaboration from the standpoint of villagers.

The policy brief is funded by the USAID for decision maker and practitioners in developing countries ensuring they are exposed with the sustainability knowledge enhancing environmental quality. The Environmental and Natural Resources Policy and Training (EPAT) Project is part of their programme to also encourage the adoption of economic policies to promote sustainable use of natural resources (Josiah & Gregersen, 1995).

An institutional framework Joint Forest Management (JFM) in Andhra Pradesh, India, found a framework that works with active local stakeholders to protect and manage forest resources (Mukherji, 2000). State forest departments partner up with local communities commit to increasing incomes of the locals by providing more fair distribution of the benefit. To analyse the level impacts of JFM in three regions, the collection of primary data help measure economic well-being, inequality, and poverty. When limiting the assessment to forest-dependent villages, the program successfully achieve their goal which is to increase financial welfares for the forest-dependent.

Presenting a complete assessment of the present social and economic benefits of forestry, forests and woodlands in Scotland, a research was based on the seven 'Forestry for People'. The typology themes include; "employment and volunteering, contribution to the economy, recreation and accessibility, learning and education, health and well-being, culture and landscape, and community capacity" (Edwards et al., 2009). Multiple benefits derived from the initiatives were available; thus livelihood benefits have resulted from planning and delivery of the framework.

A study by Ingram et al. (2016) explored an evaluation method of the influence of large-scale plantations by focusing on value chain and stakeholders. The paper offers a framework to use as a guideline on examining the impacts of a modern plantation in Africa. By assessing two cases of investments in sustainable forestry operations in Tanzania and Mozambique, this research applies the theory of change of impact logic to evaluate economic, social and environmental impacts.

The concept of forest for people in the 8th World Forestry Congress (WFC) in 1978 implies that forest development should aim at 'forestry for local community development'. The objective is to improve the living standards of rural communities around the forests by involving them in decision-making process and forest management activities with local wisdom. Since then the new paradigm was born in the development of forest called Social Forestry (SF).

In Indonesia, the SF program was introduced by the Ministry of Forestry in 1995. The birth of the SF program is regulated by the Minister of Forestry Decree No. 622/Kpts-II/1995 on Community Forest Guidelines. The program aims to answer the demands of the local parties as many problems emerged in the implementation of SF. SF program has undergone many changes, namely successively with the issuance of: (1) Minister of Forestry Decree Number 677/Kpts-II/1998 on Community Forest; (2) Forestry Minister's Decree No. 31/ Kpts-II/2001 on the implementation of Community Forestry; (3) Minister of Forestry Regulation Number P.01/Menhut-II/2004 on Local Community Empowerment in and around forests in the framework of social forestry; (4) Minister of Forestry Regulation Number P.37/ Menhut-II/2007 on Community Forest; (5) The legal basis of SF in Government Regulation Number 6 of the Year 2007 as a revision of Government Regulation Number 34 of the Year 2002. In the Government Regulation Number 6 of the Year 2007, what is meant by SF is state forest whose central utilization is intended to empower the community. In addition, PP No. 6/2007 also explains about forest utilisation, one of which is Timber Forest Product Utilization Permit which is a cultivation land in SF program.

Areas that may be designated as SF areas include protected forest areas and production forest areas, to the extent that they are not encumbered with permits in the use of forest products and or become a source of local livelihoods. For the granting of community forest permits per Minister of Forestry No: 37/2007 covers the facilitation and licensing stages.

To achieve the objectives above facilitation activities are done through the provision of legal status, institutional development, business development, technological guidance, education and training, open market access, and coaching and control. Such facilitation activities shall be undertaken by district/municipality governments that may be assisted by the government and provincial governments and may be assisted by other parties such as universities/research institutes

and community services, non-governmental organisations, financial institutions, cooperatives and village-owned enterprises (BUMDes).

As many corporation attempts at shifting their supply chain to a more sustainable pathway by purchasing only from certified “sustainable” products. Answering the question of whether or not a certification of the sustainable supply chain has any difference, the project evaluates if certification meets such pledges. A study on CF uses “statistical analyses to satellite-based estimates of tree cover loss to infer the causal impact of a third-party certification system on deforestation and fire within Indonesian oil palm plantations” (Carlson et al., 2017). Although finding suggests a substantial reduction of forest degradation with certification, fire and peatland is outside the parameter.

The SF licensing and facilitation procedure scheme starts from the local community group applying for permission to the governor/regent, the application is completed with a sketch of the requested work area and the Certificate of Group containing the fundamental data of the community group from the Village Head. The governor/district head proposes the establishment of the SF working area to the Minister after verification by the team formed by the governor /regent. Against the proposal of the governor/regent, verified by the verification team established by the Minister. If they meet the conditions, then the Minister of Forestry will set the SF working area according to the proposal of the governor/district head.

In 2006 the program did not experience much growth in the field. The lack of clarity of management areas, business license, and facilitation become the problem causing the program not to develop in the field. This condition is slightly different in 2007, post-birth Regulation of Minister of Forestry Number P.37/Menhut-II/2007, the community of Social Forestry program participants can breathe a little relieved. With the birth of P.37, there is a bright spot on the certainty of working area, business permit, and clarity of facilitation. The certainty of a work area and business licensing is a significant legal aspect in ensuring the sustainability of sustainable forest management efforts. Facilitation from various parties is needed to improve the institutional capacity of the community in managing the forest.

After going through a reasonably winding road, in 2007, the farmer group struggle SF program participants began to show a glimmer of hope. From the evaluation of the implementation of temporary permits for SF in 6 districts in 3 provinces (Lampung, DIY and West Nusa Tenggara), the community is considered capable of managing the forest well and deserves formal legal recognition. The community of Social Forestry program participants in the six districts is entitled to get the Decree of the Minister of Forestry on the Determination of Community Forestry Working Areas and the Regent's Decree on Permit for Community Forest Utilization to 57 SF Farmers Groups in the six districts. On December 15, 2007, at Gunung Kidul, the Minister of Forestry Decree on the Establishment of Community Forestry Working Area by the Vice President of the Republic of Indonesia, Jusuf Kalla.

Table 2. Distribution of Recipient Location of Establishment of Working Area of Community Forestry 2007

No.	District	Area (ha)	% To Total
1.	Gunung Kidul	1.087,45	12,34
2.	Kulonprogo	196,80	2,23
3.	Lampung Barat	1.970,09	22,36
4.	Lampung Utara	1.200,00	13,62
5.	Tanggamus	2.547,22	29,91
6.	Lombok Tengah	1.809,50	20,54
Total Area of Community Forestry		8.811,06	100,00

Source: Ministry of Forestry (2008); Kuncoro et al. (2018)

Table 2 shows the distribution of the location of the recipients of the 2007 community forest works in 6 districts in Indonesia. Massive community forestry in Indonesia is located in Tanggamus Regency (29.91%). Kulonprogo and Gunungkidul districts have a much lower community forest area of 2.23% and 12.34% respectively. Table 2 shows the distribution of the location of the recipients of the 2007 community forest works in 6 districts in Indonesia. Massive community forestry in Indonesia is located in Tanggamus Regency in Lampung (29.91%). Kulonprogo and Gunungkidul districts in Yogyakarta Special Region (DIY) have a much lower community forest area of 2.23% and 12.34% respectively.

As a target between the set of community forest targets in 2009 covering an area of 429,125.29 ha. This target is determined by the extent and spread of the SF Development Project location in 1993-2001, the proposed area of the district and the social forestry work area. The location of the SF area is spread across several provinces as shown in Table 3. By 2014, the SF area reached an area of only 64,046.49 ha and keep increasing to 6,858,606 ha in 2024.

Table 3. Realization of Social Forest Areas through CFUP (IUPHKm) by Provinces
 in 2009, 2014, 2016, 2024

No.	Province	SF Areas (ha)			
		2009	2014	2016	2024
1.	Aceh	-	-	200,00	152,142.6
2.	Sumatera Utara	-	-	-	88,477.7
3.	Riau	-	-	-	153,258.8
4.	Jambi	-	-	-	218,319.6
5.	Sumatera Barat	-	1.511,00	-	340,633.4
6.	Sumatera Selatan	-	-	-	140,125.7
7.	Bengkulu	1.762,75	-	-	70,951.2
8.	Lampung	15.001,30	46.867,67	-	234,707.8
9.	DIY	-	-	-	1,565.9
10.	Jawa Barat	-	-	-	83,743.3
11.	Jawa Timur	-	-	-	194,687.4
12.	Kalimantan Barat	-	-	-	665,339.7
13.	Kalimantan Tengah	-	-	1.885,00	429,292.3
14.	Kalimantan Selatan	-	730,00	-	100,978.3
15.	Kep. Bangka Belitung	-	1.227,00	-	49,841.0
16.	Sulawesi Selatan	-	5.025,66	-	224,949.4
17.	Sulawesi Tengah	31,00	590,00	-	118,105.8
18.	Sulawesi Tenggara	-	-	-	443,719.2
19.	Sulawesi Utara	-	-	-	47,734.35
20.	Sulawesi Barat	-	4000,00	-	58,879.4
21.	Bali	150,00	-	-	29,077.0
22.	NTB	185,00	3.805,16	380,46	76,001.4
23.	NTT	500,00	-	-	81,084.1
24.	Maluku Utara	-	290,00	-	248,911.4
25.	Papua	-	-	-	117,125.3
Total		17,630.0	64,046.5	2.465,46	6,858,606

Source: MoEF (2016; 2025); Kuncoro *et al.* (2018)

Minister of Forestry Regulation no. P.88/Menhut-II/2014 is a refinement of evaluation P.37/Menhut-II/2007 and P.52 /Menhut-II/2011. In Regulation P.88/ Menhut-II / 2014 SF aims to improve the welfare of local communities through the utilisation of forest resources in an optimal, fair and sustainable manner while maintaining the sustainability of forest and environmental functions. This regulation is more about the rights and obligations of SF participants such as licensing permit in SF located in production forest and protected forest areas.

As time went by the latest regulation was Minister Forestry Decree Number 83/MENLHK/SETJEN/KUM.1/10/2016 on social forestry aimed at providing guidance on the granting of customary forest management, licensing, partnership and forest rights in the field of Social Forestry. This Ministerial Regulation aims to solve tenure and justice problems for local communities and indigenous and tribal peoples living around forest areas to improve forest welfare and sustainability. As it was supported by Presidential Regulation Number 88 Year 2017 on land reform and social forestry and Government Regulation Number 57 Year 2016 on peatland management, Figure 1 illustrates how sustainable forest management and environmental governance are operated by the MoEF (2024), which translate and operationalize new paradigms and balances driven by: (1) scientific development and understanding; (2) evolving conceptual frameworks; (3) results-based solutions; (4) social relevance; (5) interrelation with the planning process; and (6) efforts to continuous improvement. In this regulation, the scope of social forestry is village forest, community forest, community plantation forest, forestry partnership, and customary forest. This social forestry program has been regulated so that the period and evaluation for village forest, community plantation forest and community forest shall be valid for 35 years and evaluated every five years. Monitored on social forestry programs by assistants/ working groups of the Local Forestry Program or Forest Management Area. The holder of the management license also gets protection from harmful interference and environmental pollution or unilateral pickup by other parties.

In the Social Forestry and Environmental Partnership program, the Directorate General of 2015-2019 targets to improve access to community forest management, to increase conflict and tenure resolutions in forest areas and to improve environmental and forestry behaviour. This program supported by the provision of social forestry area with a target of 12.7 millions ha in 2019.

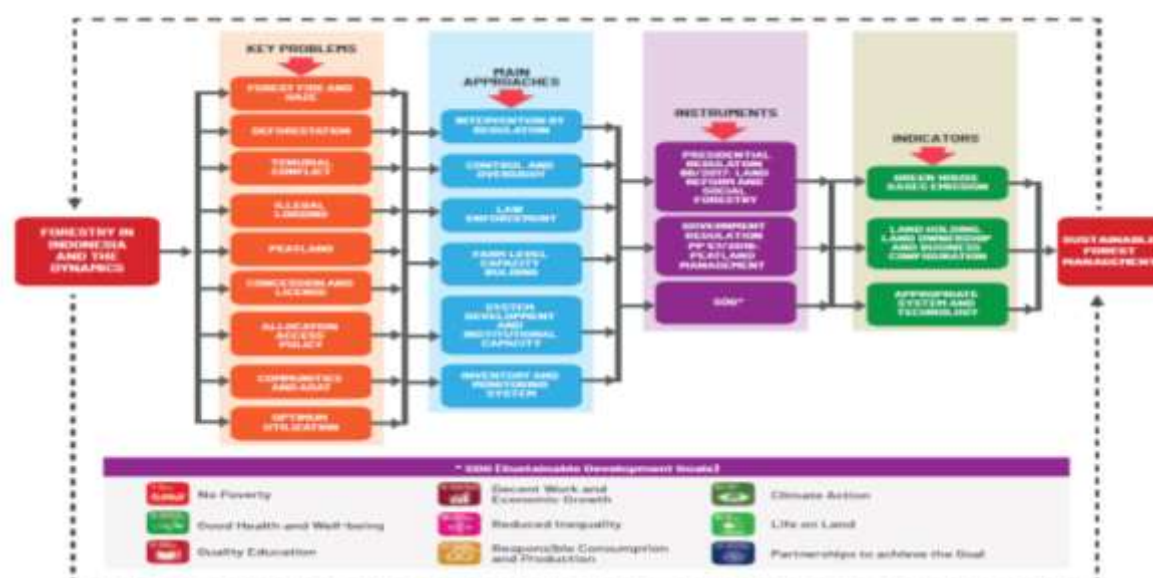


Figure 1. New Paradigm in Forest Governance

In the framework of achieving the Millennium Development Goal (MDGs) in 2015, the targeted working area of the Community Forest Program is 2.1 million ha. The Ministry of Law and Human Resources is committed to contributing to reducing poverty, especially the poverty of communities living around the forest. With the Social Forestry target of 2.1 million ha, an expectancy that by 2015 the forestry sector can reduce poverty by at least 50%. Until 2017, the area of social forestry has reached 7.6 million ha spread throughout Indonesia.

The Social Forestry and Environmental Partnership program is in line with the Nawacita program targeting to reduce the frequency and extent of illegal logging, enhancement of timber forest products and water security (see Figure 2). Nawacita is the 9 missions that the President of Jokowi set to be achieved until 2019. With social forestry programs involving the community, forest

security will see improvement because not only the government agencies but also the community have a stake in maintaining the area they have managed through a proper management license through village forest management rights, community forest utilisation permit, and permit utilisation of forest timber forest product. Improvement of timber forest products will apparent from the maximum area management by involving forest communities by combining with local wisdom. With the preservation of forests, it will have an impact on water security considering the function of the forest as a water store.



Figure 2. The Linkage between the Nawacita (9 Missions) and the Social Forestry Program

The social forestry strategic plan and programs focus on granting social forestry management access and capacity building of social forestry enterprises. These strategies and programs emphasize that forests should be able to provide prosperity for the communities living around the forest. Implementation of strategies through the provision of access to forest land and business capacity building are key for reducing poverty, especially for forest communities (see Figure 3). The social forestry program must also be supported by financing for business development, capacity building of human resources and institutional strengthening through intensive facilitation so that the community is self-reliant and able to optimize the existing resources.



Figure 3. Social Forestry Strategy

Social forestry is a sustainable forest management system implemented in forest areas. As it aims to improve welfare, environmental balance and socio-cultural dynamics of the locals, main actors are local communities or SME. Furthermore, it spans five types involving village forest (*hutan*

desa or HD), community forest (*hutan kemasyarakatan* or HKm), people plantation forest (*hutan tanaman rakyat* or HTR), indigenous forest (*hutan adat*), and forestry partnership (*kemitraan kehutanan*). Until the end of the former Susilo Bambang Yudhoyono (SBY) regime (October 2014), there were only 449,104 ha, or accounted about 4% of total forest areas, given to local communities who got the permit to access the five types of the forests in Indonesia. Until December 2017, under the Jokowi Working Cabinet, 4,150 of social forestry permits granted to 293,367 households with the forest areas of 1.336 millions ha. Figure 4 shows the development of social forestry programs comparing the era of SBY and Jokowi regime. Under Jokowi, the area of social forestry has risen dramatically to 1,069,761 ha in April 2018. In other words, there is an increase of about 66.4% compared to that of SBY era (33,6%). In total, the social forestry program has granted 1,336,295.25 ha with 4,150 permits to 293,367 households for local communities across Indonesia.

In fact, spill-over and multiplier effects of social forestry will bring direct and indirect impacts. Direct impacts are enjoyed by the impoverished local communities who get the permits not only by the private large firms. Indirect benefits and impacts will also be felt for local communities, mostly small farmers and SME, in and around forest areas from job creation (lower unemployment), increased value-added and economic growth, and lower inequality.

Key Performance Indicator of Managed Forest Area

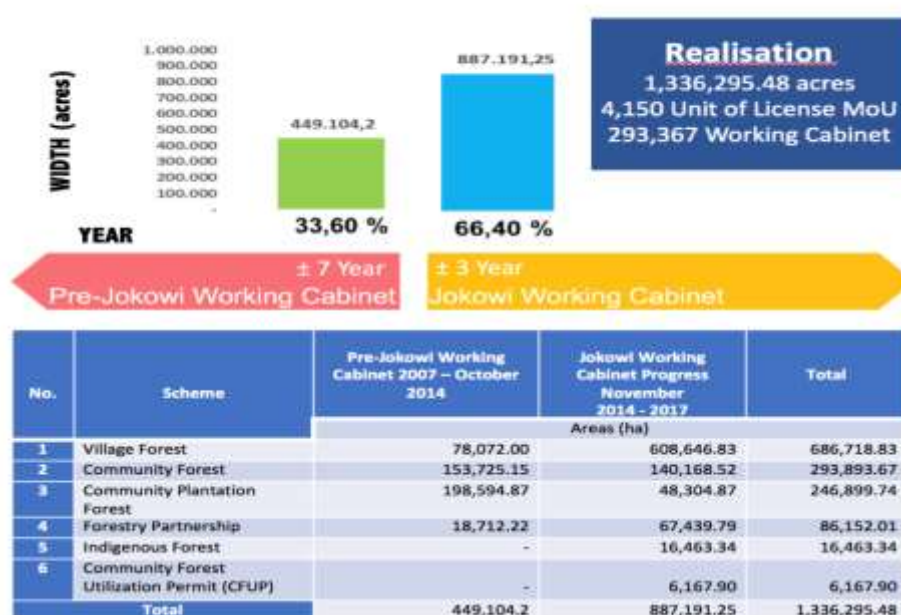


Figure 4. Key Performance of Social Forestry Areas: SBY vs Jokowi Regime

Until 2017, the permit for social forestry utilisation has reached 301,548.67 ha spread over 26 provinces in Indonesia (see Table 4). For reserve area Community forest until 2017 has reached 432,598.86 ha. The difference between the reserve rate of the social forestry area and the permit grant becomes an opportunity for the forest community to gain access to manage the land more widely.

Table 4. Key Performance of Preparation of Social Forestry Areas (ha)

No.	Year	Reserve	MOU
1.	2007-2014	328.452,86	153.725,15
2.	2015	49.128	20.945,06
3.	2016	55.018	2.465,46
4.	2017	-	124.413
TOTAL		432.598,86	301.548,67

Source: MoEF (2017)

Figure 5 shows the data of Social Forestry Utilisation Business Permit (IUPHKm) from the beginning of community forestry is rolled out until December 2017 spread over 34 provinces in Indonesia. Achievements of the program up to December 2017 are still below the number of working area stipulated. Lampung Province got the largest permit area of 109,360.73 ha while Bali received the permit for social forestry utilisation of at least only 150 ha. This area can be increased considering the social forestry area identification data which is not yet the same as the permit for social forestry utilisation data. In the social forestry area determination data, it has been assigned an area of 432,598.86 hectares by December 2017. In Lampung Province, it has been set as wide as 111.115,61 ha still above achievement.

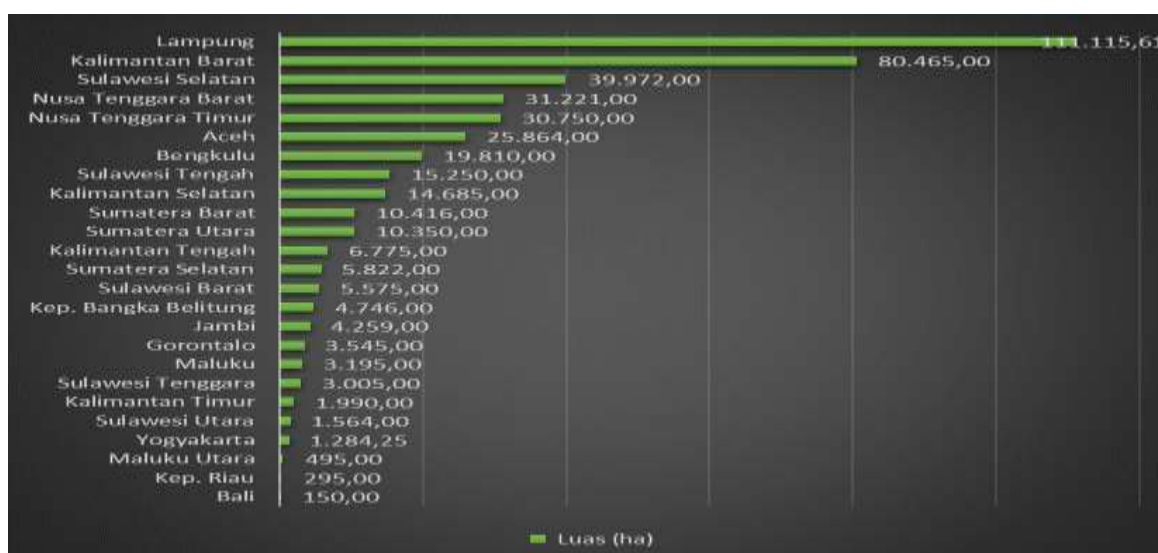


Figure 5. Establishment of Working Areas of Community Forests (IUPHKm) up to December 2017

RESEARCH METHODS

The identification of economic, social and environmental impacts of social forestry conducted in two research sites: Lampung Province and Yogyakarta Special Region (DIY). These two provinces are chosen because they have been designated as social forestry pilot provinces in Indonesia. Each province is taken into two community forest locations.

The research location for Lampung Province is conducted in Pekon Margoyoso Sub Sumberejo and Pekon Sukamaju Ulu Belu District Tanggamus Regency. For the province of DIY, we focus on Hamlet Kalibiru, Hargowilis Village, Subdistrict Kokap, Kulon Progo Regency and Menggoran II Hamlet, Bleberan Village, Playen District, Gunungkidul Regency. Social forestry areas in DIY and Lampung areas contribute about 0.41% and 36.3% respectively of the total community forest areas in Indonesia.

The unit of analysis in this study is a member of the Community Forest Group (*gapoktan*). The analytical unit studied for DIY Province is a member of Mandiri community forest group in Kalibiru Hamlet, Hargowilis Village, Kokap, Kulonprogo Regency and community forestry group Tani Manunggal, Menggoran II Village, Bleberan Village, Playen, Gunungkidul Regency. While the analysis unit in Lampung Province is members of Beringin Jaya community forest group, Pekon Margoyoso, Sumberejo Sub-district and members of community forestry group Sinar Mulya, Pekon Sukamaju, Ulubelu District, Tanggamus District.

We use cluster and purposive sampling method to choose the key respondents in an exploratory ethnographic study. Cluster sampling is also called sampling area. Cluster sampling used when elements of the population are geographically dispersed so that it is difficult to construct frame sampling. In the implementation, sampling method with cluster sampling, we divides the population into subgroups based on certain criteria as we attempt to maintain heterogeneity in one subgroup and homogeneity between subgroups, then we choose the number of subgroups randomly (Cooper & Schindler, 2014; Kuncoro, 2013: 136). In this context, selected clusters are social forestry forests in Sukamaju Village and Margoyoso Village Ulubelu Subdistrict in Tanggamus Regency, Hargowilis Village in Kokap Subdistrict of Kulon Progo Regency and Bleberan Village in Playen Subdistrict of Gunungkidul Regency.

The technique of determining the respondents using purposive sampling. This technique is intentional sampling following the required sample requirements such as related properties, key characteristics, and different main crops. Respondents in the study were members of the social forestry farmer group. The number of respondents for each social forestry location is 50 samples so that we have 200 respondents for four locations. In order to sharpen the analysis, we also conducted focused group discussions with other informants such as: farmer group management, tourism awareness group (*pokdarwis*), farmer groups (*gapoktan*), farmer group members, business units within *gapoktan*, and related stakeholders from various types of government (head regents, subdistrict, village, *dukuh/pekon*) and NGOs.

Our research is based on three perspectives, namely economic, social, and environmental aspects in realizing community welfare and forest sustainability. From economic perspective, we will identify the economic impact will be seen from the following economic indicators: total revenues of farmers, employment arising from the existence of social forestry, poverty reduction, and business partnership being developed. From social perspective, key indicators for social impact are as follows: public perception, institutional design, behavior change, and key constraints in the development of social forestry. From environment perspective, we used the following key indicators: sustainability environment, emerged threats (forest fires, animal intrusion, thieves and strikes), and community participation in supporting environmental sustainability.

In this study used descriptive analysis which includes case method, statistical method and logistic regression analysis used to predict the determinants of revenue classification of respondents. Binary logistic regression model was used to explain the significance of the identified factors influencing farmers' revenues. The model is as follows:

$$\pi_i = \Pr(Y_i = 1 | X_i = x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1 + \exp(\beta_0 + \beta_1 x_i)} \quad (1)$$

Equation (2) is the simplification of (1):

$$\begin{aligned} \text{logit}(\pi_i) &= \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta_1 x_i \\ &= \beta_0 + \beta_1 x_{i1} + \dots + \beta_k x_{ik} \end{aligned} \quad (2)$$

Equation (2) can be written as follows:

$$\begin{aligned} \text{Logit (REVENUES}_i) = & b_0 \text{LAMA_SK}_i + b_1 \text{LUAS_LAHAN}_i + b_2 \text{TK}_i + b_3 \text{B_TRANSPORT}_i + b_4 \text{B_INPUT}_i + \\ & b_5 \text{KEMITRAAN}_i + b_6 \text{P_HKM}_i + b_7 \text{KENDALA}_i + b_8 \text{KEBAKARAN}_i + b_9 \text{PENCURIAN}_i + \\ & b_{10} \text{PENDAMPINGAN}_i + b_{11} \text{TANAM POKOK}_i + b_{12} \text{PARTISIPASI_RENCANA}_i + \\ & b_{13} \text{PARTISIPASI_PELAKSANAAN}_i \\ & + b_{14} \text{PARTISIPASI_MONEV}_i \end{aligned} \quad (3)$$

The above equation is used to answer the research question as follows: Are categories of farmers revenue (REVENUES) can be explained by some key predictors (LAMA_SK, LUAS_LAHAN, TK, B_TRANSPOR, KEMITRAAN, P_HKM, KENDALA, KEBAKARAN, PENCURIAN, PENDAMPINGAN, TANAM POKOK, PARTISIPASI_Rencana, PARTISIPASI_Pelaksanaan, PARTISIPASI_Monev)? The explanatory variables are:

LAMA_SK = length of yearsholdingsocial forestry permit,
 LUAS_LAHAN = area of social forestry managed by each community,
 TK = number of workers including family wokeworkers,
 B_TRANSPORTASI = percentage of transportation cost to total costs,
 B_INPUT = cost of inputs to total costs,
 KEMITRAAN = type of partnership that the farmers involve,
 P_HKM = knowledge on social forestry (1 = know, 0 = do not know).
 KENDALA = key constraints identification (0 = do not know, 1 = market access, 2 = capital access. 3 = raw material access, 4 = traditional equipments, 5 = combination of 1-4, 6 = other),
 KEBAKARAN = fires (1 = never experience fires, 0 = fires occur),
 PENCURIAN = thefts (0 = No theft, 1 = theft occur),
 PENDAMPINGAN = assistance received (0 = no assistance, 1 = assistance is given),
 TANAM POKOK = main crops (1 = coffee, 2 = teak tree, 3 = other forestry crops),
 PARTISIPASI_Rencana = to what extent local communities involved in sustainable forest planning (3 = high, 2 = medium, 1 = low),
 PARTISIPASI_Pelaksanaan = to what extent local communities involved in implementing sustainable forest (3 = high, 2 = medium, 1 = low),
 PARTISIPASI_Monev = to what extent local communities involved in monitoring and evaluation of sustainable forest (3 = high, 2 = medium, 1 = low).

RESULTS AND DISCUSSION

Linking Economic, Social, and Environment Perspectives

From economic perspective, there is an increase in production, income, and employment in Lampung and Yogyakarta due to social forestry (Kuncoro et al 2018). The peasant farmers have come out from the poverty trap as shown by: (1) The farmers of social forestry have their own houses although some are still semi-permanent; (2) Most farmers own motorcycles between 1 to 3 units.

From social perspective, our analysis found that the social forestry program has increased public knowledge about social forestry, encouraging the emergence of a local institution (especially cooperatives), and changes in positive community behaviour (Kuncoro et al. 2018). Obstacles that may threaten the sustainability of identified social forestry programs are: lack of assistance from Ministry of Environment and Forestry, the form of assistance that appears is still oriented to the strengthening of institutions (silver), complaints related to the procedure of thinning (Gunungkidul), lack of management capacity in managing social forestry and weather factor (strong winds, rain and drought at times that do not fit the cycle) becomes a problem for the sustainability of coffee plantation business in Lampung.

From environment perspective, we used the following key indicators: sustainability environment, emerged threats (forest fires, animal intrusion, thieves and strikes), and community participation in supporting environmental sustainability.

Binary Logistic Regression

Figure 6 shows the distribution of annual revenues by respondents. Most of farmers have annual revenues between IDR 1 to 20 millions (53,5%); 25% of them have annual revenues of IDR20 to 40 millions, and 5,5% have annual revenues of IDR 60 to 70 millions. There are only 4% of farmers that have annual revenues above IDR80 millions. In average, annual revenues of 200 respondents are about IDR28.3 millions or only IDR 2.36 million per month.

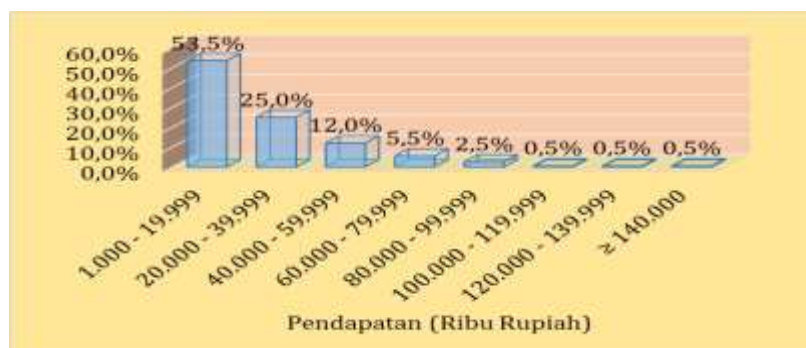


Figure 6. Annual Revenues (in thousands IDR)

Note: Means of annual revenues IDR28,340,724; US\$1=IDR13,500

We may classify annual revenues as high and low with the average revenue as a benchmark. We set the Y is a binary response variable in equation 2 and 3, $Y_i = 1$ if the revenues are classified as 'high' in observation i when they higher than the average; $Y_i = 0$ if revenues are classified as 'low' in observation i when they lower than the average. Table 5 shows 67% respondents have low revenues while 33% have high revenues.

Table 5. Annual Revenue Classification

		Frequency	Valid Percent
Valid	Low	134	67,0
	High	66	33,0
	Total	200	100,0

Binary logistic regression analysis proves that number of workers, log stealing, core crops cultivated, and partnership have a positive effect on revenues. The types of partnerships that have been done in the form of counselling, training, buying products, providing capital assistance, and mentoring.

Overall, binary logistic regression models can allocate more precisely over 84-86% of revenue classification. The modelling step can be described as follows: Firstly, all the predictor variables are included in the model 1. Secondly, with a Wald backwards stepwise procedure, some variables are eliminated from the initial model in an iterative process. At each iteration step the significance of variables included in the initial model is tested, and those insignificant variables are eliminated. Finally, a model is developed, and all insignificant variables are excluded and estimated coefficients are allocated to the significant variables or types. All the variables, together with their estimated coefficients and the corresponding Chi-square's significance values and summary of the classification for the model, are given in Table 6. Model 2 is the best model because the result can predict precisely the group membership of 82.8% for the respondents whose revenues are high after having the social forestry permit; while it can also predict precisely the group membership of 84.8% for the respondents who claimed the revenues are low.

Table 6. Determinants of Farmers' Revenues Using Binary Logistic Regression

Predictor	Model ^a	
	1	2
Constant	0.340 (0.034)	1.248 (1.158)
Land size	0.103 (0.359)	
Length of forestry permit	-0.165 (1.026)	-0.184 (1.026)
Number of workers	0.153 (3.787)*	0.154 (4.402)*
Transport cost	1.225 (0.470)	
Input cost	-0.009 (0.000)	
Partnership	0.253 (4.602)*	0.205 (4.052)**
Constraints	0.025 (0.009)	
Know on social forestry	0.324 (0.263)	
Forest fire	-0.318 (0.095)	
Log stealing	-0.718 (2.359)	-0.741 (2.729)*
Guidance	0.153 (0.051)	
Core crops	-1.165 (1.314)	-2.685 (18.041)***
Planning Participation	0.294 (0.145)	
Implementation Participation	-0.132 (0.030)	
Monev Participation	-0.132 (0.030)	
High revenues	83.6%	82.8%
Low revenues	84.8%	84.8%
Overall Percentage	84.0%	86.4%
Chi-Square	116.854	114.530
Nagelkerke R ²	0.616	0.607

***) significant with degree of confidence 99%.

**) significant with degree of confidence 95%

*) significant with degree of confidence 90%.

Wald statistics in parentheses.

^a Model 1: full model; model 2: best model.

The key variables that determine the farmers' revenues increase or not are partnership, number of workers, log stealing and core crops. The logistic regression coefficients for log stealing are negative and significant with 90% confidence degree. This means that the higher log stealing

occur the higher the probability of the respondent's revenues to decline. Likewise the logistic regression coefficients for core crops are negative and significant with 99% confidence degree. It means that the higher reliance on core crops the lower the probability of the respondent's revenues.

Both partnership and number of workers influence revenues positively. The higher the farmers involve in partnership the higher the probability of the respondent's revenues to increase. The higher the farmers employ workers the higher the probability of the respondent's revenues to increase.

Other variables have insignificant coefficients are the land area, transport costs, input costs, fire occurrence, assistance, plan participation, and money participation. This means economic variables (land areas, transport costs, input costs), social variables (assistance, knowledge of community forests, and constraints on community forest management), and environmental variables (fire occurrence, plan participation, and money participation) has not significantly affected the revenue of respondents. This possibility is caused by the relatively short period of implementation of social forestry (3-4 years).

CONCLUSION

Our analysis pioneers the study of Indonesia's social forestry development that incorporates economic, social, and environment perspectives. An explanatory ethnographic study and binary logistic regression model are useful as the basis to integrate the three perspectives. Based on binary logistic regression analysis, some key variables that determine the revenues of the farmers are partnership, number of workers, log stealing, and core crops cultivation. Other variables are found insignificant statistically are the land areas, transport costs, input costs, fire, assistance, participation in planning, and money participation. This means economic variables (land area, transport costs, input costs), social variables (assistance, knowledge on community forests, and constraints on community forest management), and environmental variables (fire, core crops, participation in planning, and participation in money) has not significantly affected the revenue of respondents. This possibility is caused by the relatively short period of implementation of social forestry (3-4 years).

Based on the results of the analysis and findings, it can be drawn the policy implications from the perspective of each dimension as follows: first, from the economic dimension, our findings imply that: (a) the social forestry program, in particular community forest, should work together and synergise with stakeholders, namely: local governments, academia, business, local communities, and mass media (Penta Helix) as stakeholder engagement is expected to increase farmer's revenues and business partnerships; (b) Most of the respondents belonging to SME need support and assistance related to access to raw materials, access to capital, market access, and equipments.

Second, from the social dimension, we may suggest that: (a) more intensive facilitation of the Minister of Environment and Forestry are needed to improve through the strengthening of entrepreneurship (productive economic assistance and business meeting), access to capital and market; (b) Mentoring programs are needed to empower the local communities by focusing on enabling, creating community members' self-reliance, and increasing participatory planning; (c) The companion function needs more attention as its existence can provide benefits for the community in particular in three main tasks: community organising, capacity building, and documentation of social forestry programs; (d) From the aspect of regulation, it needs a legal umbrella so that community forest groups can contribute to local owned revenues (Kulon Progo); (e) The role of Ministry of Environment and Forestry in generating and socialising clear licensing procedures are needed in conducting tree thinning (Gunungkidul); (f) Strengthening of market access capacity on post-harvest coffee processing are required so that the value of selling coffee beans in farmers can be high and farmers have an alternative to sell coffee in the form of processed value added (Tanggamus).

Third, from the environmental dimension, our findings suggest: (a) the need for effective preventive action and the imposition of strict legal sanctions to provide a deterrent effect to illegal

actors who open forest land; (b) The role of stakeholders, especially protective forest management unit (*Kesatuan Pengelolaan Hutan Lindung* or KPHL), forest police or *Bintara Pembinaan Desa* (*Babinsa*) is needed to secure the forest from land clearing; (b) it is necessary to apply appropriate technology to safeguard forests from wildlife disturbance and animal hunting; (c) Stakeholder involvement in community forest management assistance needs to be improved.

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