

Contributions of Company-Community Forestry Partnerships (PHBM) to the Livelihoods of Participants in Java, Indonesia: A Case Study in Madiun, East Java

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Abstract

The State Forest Company of Indonesia launched its Company-Community Forestry Partnerships system on the island of Java in 2001 (PHBM system). We examined the PHBM's effects on the economic lives of participating villagers through a case study in Madiun, East Java. We specifically examined the potential and limits of the PHBM's contribution to villagers' livelihoods by quantitatively evaluating (i) the system's impact on household livelihoods and (ii) the continuity of its impact. Of households engaging in PHBM, 45.6% had more than half their arable land in the forest, and 10.0% of households had arable land only in the forest. The bulk of non-timber forest products, mostly fuelwood, was collected in the forest. Among villagers earning an income, 12.2% earned more than half via the PHBM, which was the only source of cash income for 2.2% of the engaged villagers. For some households, PHBM has helped significantly improve their livelihoods. However, the benefits derived from the PHBM were tempered by problems of quality, quantity, and continuity. The benefit of the system could be increased by providing preferential opportunities (to access farmland in the forest and/or cash income) to small-scale or impoverished farmers by improving the usage of intercropping land under planted trees, and promoting small business as a group enterprise.

Discipline: Forestry and forest products

Additional key words: Perum Perhutani, teak forest management

Introduction

The Indonesian island of Java has teak plantations that are globally recognized as a major source of desirable timber. Most of the stands are state-owned and managed by the State Forest Company of Indonesia (*Perum Perhutani*; hereafter, Perhutani). The management task of Perhutani has been delegated to 57 forest district offices (*Kesatuan Pemangkuan Hutan* or KPH).

Following the 1997/98 financial crisis in Asia, the incidence of illegal cutting on state forestland soared. Perhutani launched the Company-Community Forestry Partnerships system (formally designated the *Pengelolaan Sumberdaya*

Hutan Bersama Masyarakat or PHBM system) in 2001 in an attempt to restrict illegal logging (Yokota et al. 2009). Local people were asked to cooperate in forest management. Prior to launching the PHBM system, Perhutani had initiated collaboration with local people and promoted support programs for them, such as an afforestation system based on the *Tumpang Sari* agroforestry method, a prosperity approach, and a Forest Village Community Development Program (*Pembangunan Masyarakat Desa Hutan* or PMDH) (Peluso 1992). Under the PHBM system, local people are not merely providers of labor, but also business partners who receive shares in profits from sales. The standing of local people and their entitlement to benefits have improved. The specific implementation of the PHBM sys-

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tem is determined by each KPH to reflect local circumstances. During the implementation process, each village forms a group of local people who engage in the PHBM system and endorse a contract with the local KPH; the village group and the local KPH are recognized as equal partners in the contractual agreement. By 2010, the PHBM system had been adopted by 5,054 (93.5%) of the 5,403 forest villages (or *Desa Hutan*) located near state forests (Perum Perhutani web site).

Several academic studies have already examined the PHBM system, but have focused principally on analyzing its characteristics and the distribution of rights between Perhutani and local people (Astuti et al. 2004, Djajanti 2006, Shiga et al. 2012, Yokota et al. 2009). Few field surveys have analyzed the benefits for local people, e.g. household income surveys (Djamhuri 2012, Fujiwara et al. 2012, Maryudi & Krott 2012). However, Mayers & Vermeulen (2002) demonstrated that concrete economic benefit “tended to be uppermost among the motives” for local people engaging in the Company-Community Forestry Partnerships; individual economic advantage is an important factor in the partnership’s success.

Thus, among the many impacts of the PHBM system on local society, its effect on local people’s economic outcomes (Maryudi 2011) was the main focus of the present study, which quantitatively examined (i) the system’s impact on household livelihoods and (ii) the duration of this impact. Neither topic has been examined in detail in previous studies. We conducted a survey in the jurisdiction of the KPH Madiun in East Java and determined the economic benefit/positive impact and the cost/negative impact of the KPH Madiun’s PHBM system (hereafter, the Madiun model) for local people by examining the model’s contribution to local people’s livelihoods; we also identified problems with the model. The KPH Madiun approached the PHBM system in

a positive manner from the beginning and among KPHs, it has been one of those with the least problematic engagement of local people. The KPH has also been engaged in a collaborative research project with Gadjah Mada University that predates the Madiun model, and has consistently pursued a path of coexistence and mutual prosperity for Perhutani and local people.

Methods

1. Overview of the survey area

The KPH Madiun is responsible for managing a tract covering 31,221.8 ha. Most of this area is under a teak forest (27,485.5 ha) that extends over the Madiun, Ponorogo, and Magetan districts of western East Java (KPH Madiun 2009) (Fig. 1). The jurisdiction of the KPH Madiun is divided into a north sub-KPH and a south sub-KPH; the north sub-KPH (16,031.5 ha) is located in Madiun District. The Madiun model was implemented in the north sub-KPH in 2002; we selected it as the survey area for this study.

The Madiun District encompasses 101,086 ha of either flat or gently sloping landscape (BPS Kabupaten Madiun 2003). As of 2002, the district included 206 villages with a combined human population of 666,498 and an average density of around 659 individuals/km² (BPS Kabupaten Madiun 2003).

Forty-one forest villages were in the north sub-KPH of the Madiun District in 2002. Local people’s livelihoods depended mainly on farming and wages gained in agricultural employment. Paddy fields made up the largest proportion of land under agricultural production, but cassava and maize were also grown. There was a general shortage of arable land (KPH Madiun 2009) and the opportunities for intercropping in the state forest were important for local people. However, the forest is located in a karst landscape,

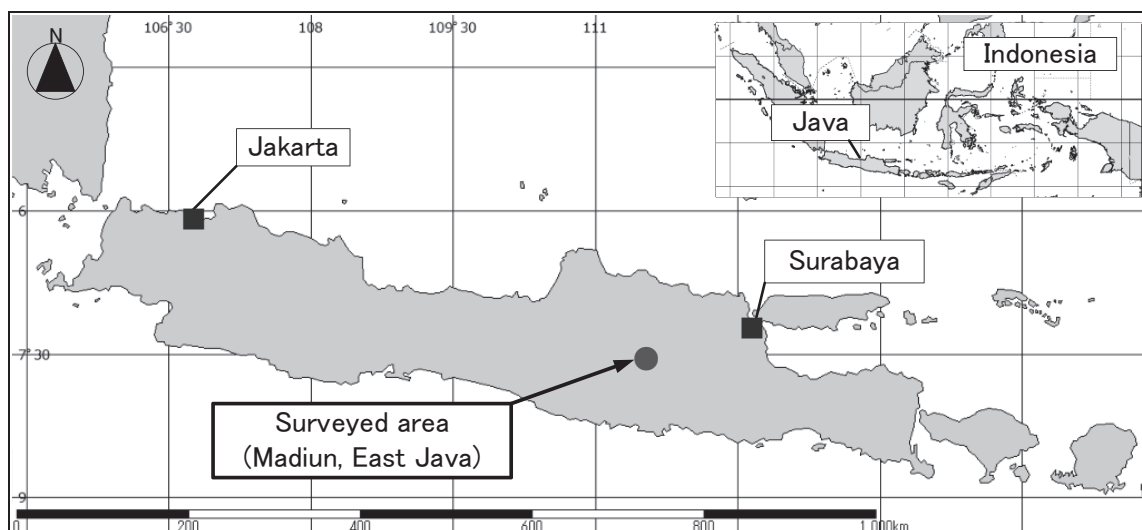


Fig. 1. Location of our survey area on the Indonesian island of Java

Table 1. Details of the forest resource management group (MPSDH) and the working unit (KKP)

Name of village surveyed	Level of engagement in the PHBM	Demographics in 2004			Status of the MPSDH in 2004			Status of the surveyed KKP in 2004		interviewed households	
		Population (people)	Household (HH)	Village area (ha)	Number of members (HH)	Number of working units (KKP) (groups)	Area of forest managed by the MPSDH (ha)	Number of surveyed KKP (groups)	Number of members in surveyed KKP (HH)	number of interviewed households (HH)	sampling ratio (%)
Da	active	3,634	993	553	72	2	135.9	2	72	30	41.7
Ba	middle	1,140	250	413	153	5	122.6	2	62	30	48.4
Bo	low	2,839	746	686	357	14	592.8	2	65	30	46.2
Total		7,613	1,989	1,652	582	21	851	6	199	90	45.2

Source: Interviews with MPSDH village heads and chiefs

Categories of "Level of engagement in the PHBM" are explained in Section 2 of the Methods.

Table 2. Number of interviewed households incorporated in the household survey

Name of village surveyed	Members of the MPSDH			Non-members of the MPSDH		
	Number of households interviewed (HH)	Number of members in the surveyed KKP (HH)	Sampling proportion (%)	Number of households interviewed (HH)	Number of non-members in sub-village with surveyed KKP (HH)	Sampling proportion (%)
Da	30	72	41.7	10	76	13.2
Ba	30	62	48.4	10	53	18.9
Bo	30	65	46.2	-	0	-
Total	90	199	45.2	20	129	15.5

Source: Interview with sub-MPSDH village heads and chiefs

which although facilitating teak tree growth, has soil which lacks fertility and is poorly suited to crop food production (Faculty of Forestry, Gadjah Mada University 2004). Another important source of cash income was migrant employment in urban areas away from the villages. Workers moved away during the farming off-season, and some even worked overseas for several years at a time.

2. Survey method

Twenty-five forest villages were engaged in the PHBM system within the jurisdiction of the KPH Madiun's north sub-KPH in 2004, when we started the study. Among the 25 forest villages, we selected three for our survey. A questionnaire survey on the household livelihood and engagement status in the PHBM system was conducted in 30 households in each of the survey villages, hence we included a total of 90 households in our analysis.

The villages we surveyed were selected by first dividing the 25 forest villages into three categories based on their level of engagement in the PHBM system (active, middle, and low). We then randomly selected one village from each category. To grade the level of engagement, we first scored each village using eight indicators of villager activities in the PHBM system, such as engagement in forestry activi-

ties, key persons' activities, and communication between the KPH Madiun and villagers. We then ranked villages from highest to lowest score and categorized the upper third as "active," the second third as "middle," and the lowest third as "low."

In the Madiun model, the forest resource management group (*Masyarakat Pengelola Sumber Daya Hutan* or MPSDH) was organized by villagers engaging in the Madiun model, and included several working units as subdivisions at the sub-village level (*Kelompok Kerja Prayasawana* or KKP). For the household survey, we first chose two KKP in each village surveyed, followed by a random selection of 30 households from the KKP. We also conducted another questionnaire survey among those who were not members of the MPSDH; we surveyed 10 households in this category within each of the sub-villages included in our analyses for a total of 20 households, because all of the villagers in the sub-village of Bo had joined KKP (Tables 1, 2).

Semi-structured interviews were conducted on the implementation status of the PHBM system; the livelihoods of villagers and general conditions in each village were assessed with the MPSDH board members, chiefs of the KKP, village offices of each surveyed village, Perhutani, the

Table 3. Villager participation in plantation operations before and after implementation of the Madiun model

	Before implementation of the Madiun model	After implementation of the Madiun model
<i>Tumpang Sari</i>	Opportunities were provided through field staff of the KPH. Period of intercropping was officially limited to 2 years.	Opportunities were provided through the MPSDH. Members of the MPSDH had priority over others in the contract forest. Period of intercropping was not limited.
Intercropping under planted trees	-	The KPH allowed local people to intercrop in the forest in areas where agricultural activities were not prohibited.
Wage labour in the forest	Opportunities were provided through field staff of the KPH.	Opportunities were provided through the MPSDH. Members of the MPSDH had priority over others in the contract forest.
NTFPs collection	Local people were not allowed to enter the forest officially except for those engaged in <i>Tumpang Sari</i> and/or wage labor in the forest.	The KPH allowed local people to enter the forest. The KPH allowed local people to collect and sell NTFPs.
Benefit sharing	-	The MPSDHs received a maximum of 25% of the benefits accruing from the sale of timber yielded by the contract forest.
Forest protection	The KPH asked for cooperation in forest protection from villages surrounding the forest. Field staff requested local people engaged in <i>Tumpang Sari</i> and/or wage labor in the forest to cooperate in forest protection.	The MPSDH was obligated to cooperate with the KPH in managing the contract forest. The MPSDH was requested to join anti-illegal-cutting patrols. The MPSDH was requested to report on the status of the contract forest regularly and on demand.
Support for the local people participating in forest management	The KPH provided budget support for group activities for local development. Field staff of the KPH mainly provided technical support to local people, depending on the circumstances. The KPH asked Gadjah Mada University to support the local people through a collaborative research project.	The KPH was obligated to support all MPSDH activities with advice, funds, and requests to other institutions. The Division of PHBM & Environment and field facilitators provided continual support to the MPSDH. In establishing the MPSDH and signing a memorandum of understanding (MoU) with KPH and MPSDH, Gadjah Mada University provided support to the MPSDH. The local government was an official guarantor of the MoU, and provided technical and financial support to the MPSDH.

Source: Field survey

KPH Madiun, and field facilitators responsible for promoting the PHBM system. Relevant documents and statistics were also collected from the KPH Madiun, Perhutani Central office, Perhutani Unit II office, each village office, each MPSDH, and the Indonesian Central Agency on Statistics.

The questionnaire survey to quantitatively determine the system's impact on the livelihoods of engaged villagers was conducted between August 2004 and January 2005. Semi-structured interviews and document collection were conducted in 2003 and continued until 2011 to assess the continuity of the PHBM system's impact.

Results

1. Overview of the PHBM system in the Madiun District

We considered four principal features of the Madiun model: implementation of the MPSDH, increased agricultural opportunities, increased opportunities for forest man-

agement and utilization, and the MPSDH support system (Yokota et al. 2009) (Table 3).

(1) Implementation of the MPSDH

The MPSDH is organized by the villagers, who are entrusted with its autonomous establishment and administration (in other KPHs, the term "Forest Village Community Association" [*Lembaga Masyarakat Desa Hutan* or LMDH] is frequently used). Under the Madiun model, the KPH Madiun and MPSDH signed a contract to manage the teak forest (an interorganizational agreement). The contract is long term (with a 10-year renewal period) and covers all stages of forest management (from afforestation, through tree felling, to sales) for the entire state forest (with which the village is engaged) managed by Perhutani.

(2) Increased agricultural opportunities

Under the Madiun model, the period of *Tumpang Sari* is unlimited. Members are prioritized over non-members in the village and over local people from other villages in engaging in *Tumpang Sari*. In addition, members are also allowed to intercrop under full-grown planted teak trees

(PLDT: *Pemanfaatan Lahan Dibawah Tegakan*) (Fig. 2).

(3) Increased opportunities for forest management and utilization

The MPSDH receives a share of the profits obtained from the sale of periodically thinned and final felled teak from the KPH. The ratio of benefit sharing depends on the time elapsed since the contract signing and the number of illegal cutting incidents, with a maximum of 25% being distributed to the MPSDH. The trees cut down in the first thinning are all distributed to the MPSDH and consumed as fuelwood. MPSDH members are also prioritized when engaging in paid forest labor. Both members and non-members can collect fuelwood, teak leaves, potatoes, herbs, and other vegetables in the state forest, which may be sold or consumed locally when collected. In return for these benefits, the MPSDHs must engage in Perhutani's forest conservation activities, e.g. patrolling, firefighting, providing information on forest conditions, and advising others inside and outside the village on forest conservation protocol.

(4) MPSDH support system

Under the Madiun model, continual efforts are made to ensure an effective structure capable of supporting the MPSDH and facilitating smooth system operation (Fig. 3).



Fig. 2. Intercropping under planted trees (PLDT: *Pemanfaatan Lahan Dibawah Tegakan*)

Image captured by the authors (February 17, 2006). The planted trees shown are teak (*Tectona grandis*) and the main crop under the canopy is *porang* (*Amorphophallus onchophyllus*).

In the operation of *Tumpang Sari*, local people plant agricultural crops and trees at the same time in open space. In the PLDT operation, local people plant crops in the forest only where trees have been planted, and the tree canopy is usually closed.

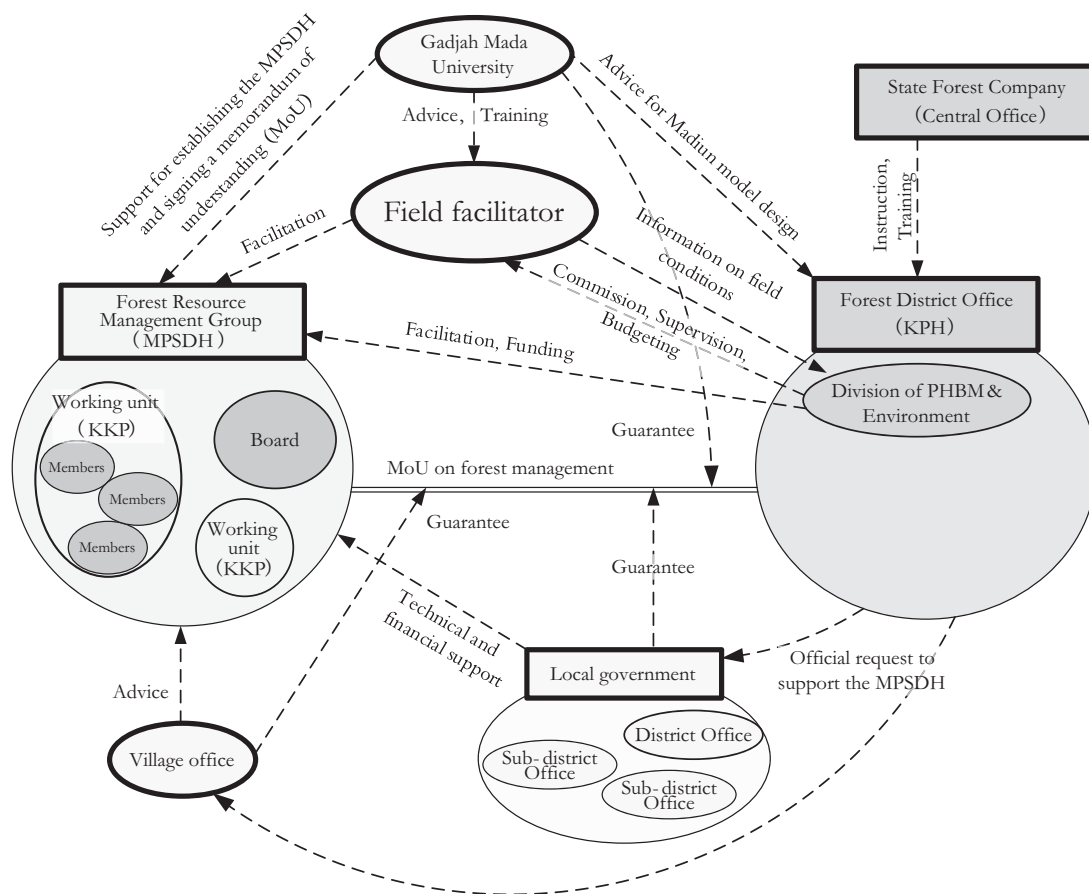


Fig. 3. MPSDH support system in the Madiun model

Source: Field survey

Table 4. Farmland inside and outside the forest (includes MPSDH members and non-members)

Farmland	Members of the MPSDH						Non-members of the MPSDH					
	Aggregate area (ha)	Proportion of total area (%)	Engaged households (HH)	Proportion of engaged households in total (90HH) (%)	Average farmland area of engaged households (ha/HH)	Average farmland area across all households (90HH) (ha/HH)	Aggregate area (ha)	Proportion of total area (%)	Engaged households (HH)	Proportion of engaged households in total (20HH) (%)	Average farmland area of engaged households (ha/HH)	Average farmland area across all households (20HH) (ha/HH)
Farmland outside the forest (personal property)	22.41	36.7	80	88.9	0.28	0.25	5.77	83.7	18	90.0	0.32	0.29
<i>Paddy field</i>	9.43	15.5	40	44.4	0.24	0.10	3.19	46.3	11	55.0	0.29	0.16
<i>Homegarden</i>	7.24	11.9	60	66.7	0.12	0.08	1.81	26.2	12	60.0	0.15	0.09
<i>Upland</i>	5.74	9.4	31	34.4	0.19	0.06	0.77	11.2	6	30.0	0.13	0.04
Farmland outside the forest (leased land)	7.80	12.8	25	27.8	0.31	0.09	0.17	2.5	2	10.0	0.09	0.01
<i>Paddy field</i>	7.80	12.8	25	27.8	0.31	0.09	0.17	2.5	2	10.0	0.09	0.01
Farmland inside the forest	30.79	50.5	70	77.8	0.44	0.34	0.95	13.8	2	10.0	0.48	0.05
<i>Tumpang Sari</i>	17.84	29.3	49	54.4	0.36	0.20	-	-	-	-	-	-
<i>Under-planted trees</i>	12.95	21.2	31	34.4	0.42	0.14	0.95	13.8	2	10.0	0.48	0.05
Farmland (totals)	60.99	100.0	89	98.9	0.69	0.68	6.89	100.0	19	95.0	0.36	0.34

Source: Household survey (members; n = 90, non-members: n = 20)

Data are for the period between August 2003 and July 2004.

Only information on farmland cultivated by surveyed households is included.

The KPH, Gadjah Mada University, and field facilitators provide advice and support throughout the process of organizing the MPSDH and signing a contract with Perhutani; the signed contract is guaranteed by the sub-District and village offices. In addition, the KPH and field facilitators provide ongoing support for the MPSDH administration by providing advice and funds.

2. Madiun model in the field

(1) Benefits/positive impacts

(a) Agricultural activities in the forest

In the MPSDH surveyed, the opportunity for *Tumpang Sari* is first assigned to the KKP located near the forest sector previously designated as a *Tumpang Sari* site by the KPH Madiun. In the KKP, the opportunity to participate is subsequently given to members wishing to take part and with spare labor for engaging in *Tumpang Sari*; with special consideration for small landowners and low-income households. To intercrop under planted trees, members are allowed to cultivate on forestland where agriculture is permitted and where no other people engage in intercropping. Members wishing to intercrop simply inform the MPSDH and permission from the KPH Madiun is not required. On occasion, non-members also participate in intercropping under planted trees with the permission of the MPSDH.

Details of the household survey on farmland are compiled in Table 4. Forty-nine member households (54.4%) engaged in *Tumpang Sari*. The main crops planted in the allocated land were cassava and maize; a large proportion of which was sold. In total, 31 member households (34.4%) engaged in intercropping with shade-tolerant crops under planted trees. Shade-tolerant crops included *porang* (*Amorphophallus onchophyllus*), potatoes, and herbs, which formed the majority of the harvest, most of which was sold. The average areas of *Tumpang Sari* and intercropped land under planted trees were 0.36 and 0.42 ha, respectively. These forest plots were larger than private fields outside the forest (e.g. home garden or upland). Two non-member households (10.0%) also engaged in intercropping under planted trees in plots with average area of 0.48 ha.

Table 5. Proportion of farmland areas in the forest compared to farmland areas outside the forest (MPSHD members)

Area of farmland outside the forest	members of MPSHD										
	Number of households (HH)	Farmland in the forest			Proportion of farmland in the forest						Average proportion (%)
	Number of households with land (HH)	Proportion of households with land (%)	Average area of farmland per household with land (ha/HH)	0% (HH)	0-25% (HH)	25-50% (HH)	50-75% (HH)	75-100% (HH)	100% (HH)		
0-0.125ha	25	19	76.0	0.56	6	-	-	1	9	9	72.1
0.125-0.250ha	20	15	75.0	0.38	5	-	2	9	4	-	48.8
0.250-0.500ha	24	19	79.2	0.38	5	3	9	5	2	-	34.4
0.500-1.000ha	13	10	76.9	0.37	3	3	5	2	-	-	24.7
1.000ha-	8	7	87.5	0.50	1	5	2	-	-	-	16.4
Total	90	70	77.8	0.44	20	11	18	17	15	9	45.1

Source: Household survey (n = 90)

Data are for the period between August 2003 and July 2004.

One family had no farmland either inside or outside the forest.

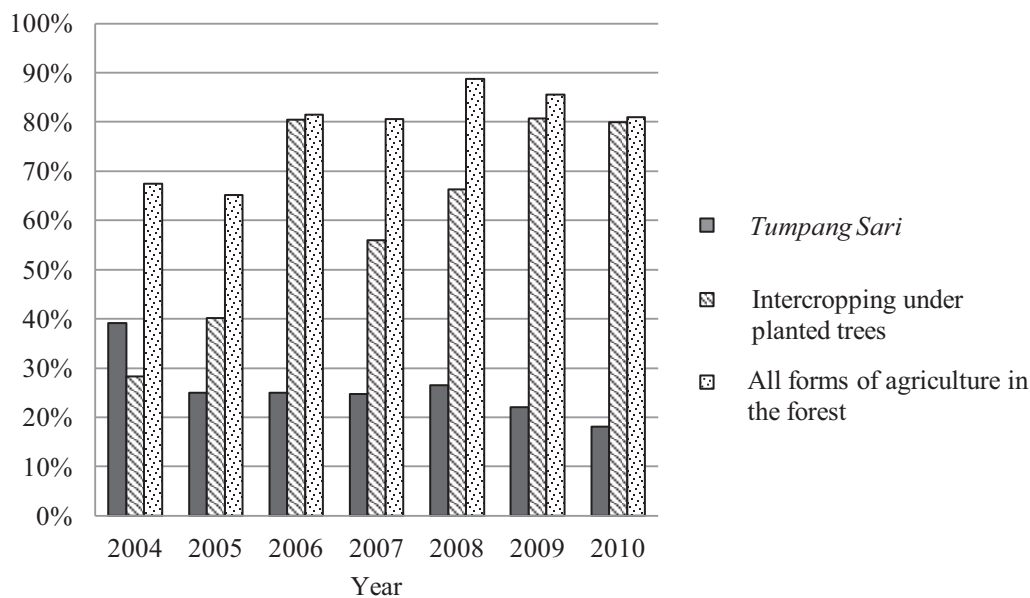


Fig. 4. Proportions of members engaged in agriculture in the forest during the period 2004-2010

Source: Interviews with chiefs of working units (KKP)

Membership of surveyed KKPs increased after 2003 (n = 92 in 2004, 2005, and 2006; 93 in 2007; 98 in 2008; 104 in 2009; and 105 in 2010).

The combined land allocated to *Tumpang Sari* and intercropping under planted trees comprised about 50.5% of total farmland for the members and about 13.8% of total farmland for non-members. Members obtained an average of around 0.34 ha additional farmland from the Madiun model; the comparable area for non-members was around 0.05 ha. The average farmland area for members thus increased from 0.34 to 0.68 ha as opposed to 0.30 to 0.34 ha for non-members. Therefore, members received much greater farmland benefits than non-members.

On a per-household basis, the proportion of member farmland in the forest was 100% in 9 households, more than 50% in 41 households, and zero in 20 households (Table 5). In general, the dependence on farmland inside the forest was greater when the proportion of farmland outside the forest was small. However, some households had no farmland inside the forest, even when the area of their farmland outside the forest was small, while some had farmland inside the forest even when their holdings outside the forest were large.

Details on the continuity of members' agricultural activities inside the forest are depicted in Fig. 4. The opportunity for *Tumpang Sari* depended upon final cutting and reforestation activities in compliance with Perhutani's long-term forest management plan (RPKH: *Rencana Pengaturan Kelestarian Hutan*). Accordingly, no guarantees of sufficient opportunities for the entire village were made every year because the age distribution of this forest sector was uneven and the final cutting age of the teak was 80 years. Consequently, proportional engagement in *Tumpang Sari* was low (annual average of around 27.5%). Conversely, opportunities for intercropping under planted trees were always available, meaning members' engagement was high (annual average around 54.3%). When *Tumpang Sari* and intercropping under planted trees were combined, an annual average of around 73.9% of KKP members engaged in agricultural activities inside the forest.

Some respondents reported that even if they were to be offered an opportunity to farm inside the forest, they would not do so because some areas of forest farmland lacked soil fertility or were far from their homes. However, the interest in engagement increased when opportunities for work on other farmland or elsewhere were restricted. Other respondents also noted that they could not afford to engage in agricultural activities in the forest due to lack of family labor, disability, low physical strength, old age, or lack of a daily living income (i.e. respondents were not in a position to await the harvest of a cash crop).

(b) Wage labor in the Madiun model

In the MPSDH surveyed, opportunities for wage labor under the Madiun model were first distributed to the KKP located near the forest sector. Within the KKP, opportunities were distributed to members who wished to participate and had spare labor for engagement in waged employment with special consideration of small landowners and low-income households. Sometimes the MPSDH provided labor opportunities to non-members when members chose not to engage or were insufficiently skilled.

Details of our household survey of engagement in wage labor in the Madiun model and the earnings derived from this employment are listed in Table 6. Among the members, 35.6% engaged in some form of wage labor in the Madiun model and earned an average total of 419,000 rupiah/year (equivalent to around 50 days' earnings for a farmworker in East Java, each of whom earned an average wage of 8,000 rupiah per day (BPS 2009)) (one U.S. dollar was equivalent to around 9,290 rupiah in 2004 (BPS 2005)). The member households were most frequently engaged in forest "thinning" (Table 6). When total earnings were calculated for the member households surveyed, "work in a nursery" (Table 6) made up the largest proportion of household earnings (55.4%). About 35% of non-members also engaged in wage labor in the Madiun model. While the

engagement proportions of members and non-members were almost equivalent, earnings of members (around 149,000 rupiah on average) exceeded those of non-members (around 26,000 rupiah on average). Thus, members obtained greater benefits from waged labor in the Madiun model than non-members.

Details of the continuity in wage labor opportunities from the KPH are depicted in Fig. 5. The opportunities for wage labor were limited within Perhutani's long-term forest management plan and not necessarily available every year. Furthermore, the amount of work required was moderate when the plantation was established, and in some cases, could be completed by only a handful of laborers in a few days. A KPH nursery was located within the village of Da, where 12 or 13 MPSDH members were working continually. However, such employment opportunities did not exist in every village.

(c) Benefit sharing

The profits from the sale of teak were distributed by the KPH to the MPSDH. Details of the amounts distributed by the KPH through such benefit sharing are listed in Table 7. Work on periodic thinning and final felling of trees was in accordance with Perhutani's long-term forest management plan, which meant that benefit sharing would not occur in every village in every year.

The total shared benefits received from the KPH were distributed among the members, the MPSDH board members (honorarium), and the operating budgets of the MPSDH and village offices. The proportional distribution system was determined by each MPSDH and stipulated in the respective MPSDH bylaws. The proportion of MPSDH members surveyed was between 75 and 80% (Table 8). When the amount distributed to the members was moderate, instead of being divided among the members, it was put toward MPSDH group activities (e.g. production activities such as raising cash crops for intercropping in the plantation, microcredit available to MPSDH members, educational activities, and vocational training), and toward infrastructure creation and maintenance (e.g. construction of an assembly hall, road improvement, and improvement of small water supply systems) in the local area based on decisions of board meetings and/or MPSDH meetings. To avoid member complaints about improper spending or lack of transparency, the group funds were carefully allocated, and in some cases, held in a bank account.

(d) Collection of non-timber forest products (NTFPs)

After initiation of the Madiun model, both members and non-members received official permission to collect and sell NTFPs. Details of the household survey on the collection and sale of NTFPs are listed in Tables 9 and 10. Among the surveyed households, about 93.0% of members and 95.9% of non-members collected some kind of NTFP, with most of the collection consumed at home or sold.

Table 6. Wage labor in the Madiun model (includes MPSDH members and non-members)

Wage labor in the Madiun model	Members of the MPSDH					Non-members of the MPSDH						
	Households earning wages of total households earning wages (HH)	Households earning wages (90HH) (%)	Number of households earning wages (HH)	Average earnings of households engaged in paid employment (thousand of rupiah)	Aggregate sum of earnings across all households (90HH) (thousand of rupiah)	Proportion of total earnings (%)	Proportion of total earnings (%)	Number of households earning wages (HH)	Households earning wages (20HH) (%)	Average earnings of households engaged in paid employment (thousand of rupiah)	Aggregate sum of earnings across all households (20HH) (thousand of rupiah)	Proportion of total earnings (%)
Wage labor opportunities available from the KPH (forestry activities)	32	35.6	356	126	11,378	84.8	84.8	5	25.0	27	136	26.6
<i>Thinning</i>	20	22.2	88	19	1,753	13.1	13.1	4	20.0	30	119	23.3
<i>Forest road construction /maintenance</i>	10	11.1	66	7	664	5.0	5.0	-	-	-	-	-
<i>Nursery work</i>	9	10.0	825	83	7,425	55.4	55.4	-	-	-	-	-
<i>Planting teak saplings</i>	6	6.7	12	1	69	0.5	0.5	-	-	-	-	-
<i>Final tree felling</i>	4	4.4	213	9	850	6.3	6.3	-	-	-	-	-
<i>Maintenance of teak trees</i>	3	3.3	55	2	165	1.2	1.2	-	-	-	-	-
<i>Other</i>	4	4.4	113	5	452	3.4	3.4	1	5.0	17	17	3.3
Wage labor opportunities available from the KPH (forest security activities)	9	10.0	171	17	1,535	11.4	11.4	2	10.0	188	375	73.4
Wage labor opportunities available from the MPSDH	1	1.1	250	3	250	1.9	1.9	-	-	-	-	-
Wage labor opportunities available from other members of the MPSDH	2	2.2	125	3	250	1.9	1.9	-	-	-	-	-
Wage labor in the Madiun model (all forms)	32	35.6	419	149	13,413	100.0	100.0	7	35.0	73	511	100.0

Source: Household survey (members: n = 90, non-members: n = 20)

Data are for the period between August 2003 and July 2004.

Some households engaged in several kinds of employment.

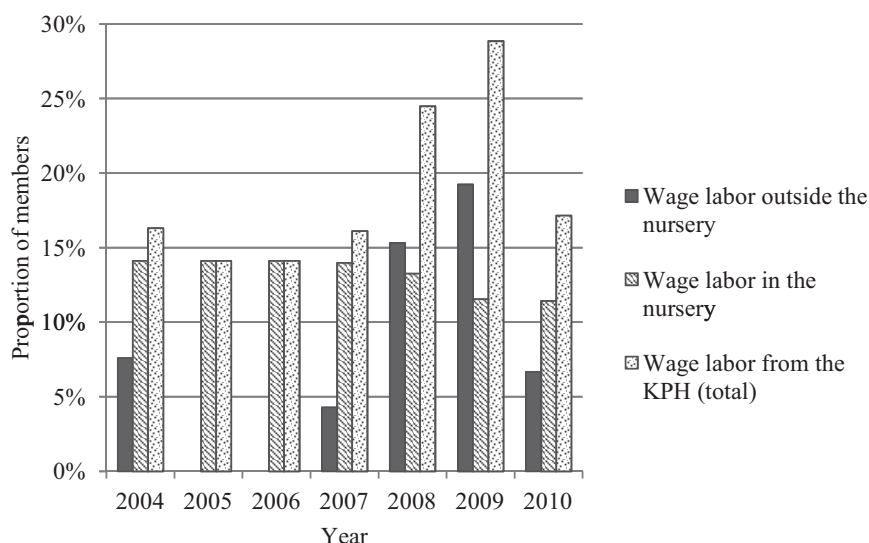


Fig. 5. Proportion of members earning wages from labor provided by the KPH

Source: Interviews with chiefs of working units (KKP)

Membership of the KKPs surveyed increased after 2003 (n = 92 in 2004, 2005, and 2006; 93 in 2007; 98 in 2008; 104 in 2009; and 105 in 2010).

Table 7. Distribution of benefit sharing

		Year							
		2004	2005	2006	2007	2008	2009	2010	2011 (Forecast data)
Benefit sharing distribution to villages surveyed (thousand of rupiah)	Da	0	899	0	0	0	0	20,959	0
	Ba	1,605	5,934	0	0	141	2,920	2,130	0
	Bo	0	4,364	0	45,346	19,388	0	1,801	311
Benefit sharing distribution in the north sub-KPH	Number of MPSDHs participating in benefit sharing (groups)	9	9	15	16	24	22	13	23
	Number of MPSDHs in the north sub-KPH (groups)	24	25	28	33	36	36	36	36
	Proportion of MPSDHs participating in benefit sharing (%)	37.5	36.0	53.6	48.5	66.7	61.1	36.1	63.9
	Total amount of shared benefits (thousand of rupiah)	15,477	163,993	204,746	283,792	337,099	195,168	346,622	292,060
	Average shared benefit (thousand of rupiah/group)	1,720	18,221	13,650	17,737	14,046	8,871	26,663	12,698

Source: KPH Madiun

Table 8. Proportional distribution of benefit sharing

Name of village surveyed	Proportion of distribution (%)				
	Members	Board members	Village budget account	MPSDH budget account	KKP budget account
Da	80	14	2	3	1
Ba	75	15	5	5	0
Bo	75	10	10	5	0

Source: Surveyed MPSDH

Table 9. Non-timber forest product (NTFP) collection and sale (gross income) (includes MPSDH members and non-members)

NTFP	Members of the MPSDH					Non-members of the MPSDH				
	NTFP collection		Sale of NTFPs			NTFP collection		Sale of NTFPs		
	Households collecting NTFPs (HH)	Proportion of total households (90HH) (%)	Households selling NTFPs (HH)	Proportion of total households (90HH) (%)	Average value of sales across all households (90HH) (thousand of rupiah)	Households collecting NTFPs (HH)	Proportion of total households (20HH) (%)	Households selling NTFPs (HH)	Proportion of total households (20HH) (%)	Average value of sales across all households (20HH) (thousand of rupiah)
Fuelwood	84	93.3	17	18.9	173	18	90.0	3	15.0	108
Fodder	28	31.1	0	-	-	3	15.0	0	-	-
Vegetables, herb, foods	28	31.1	18	20.0	25	6	30.0	1	5.0	15
Leave of teak trees	6	6.7	5	5.6	9	1	5.0	1	5.0	0.2
NTFPs (all)	84	93.3	29	32.2	206	19	95.0	5	25.0	123

Source: Household survey (members: n = 90, non-members: n = 20)

Data are for the period between August 2003 and July 2004.

Income data were calculated from information on unit prices and amounts collected in the household survey.

Some households collected more than one kind of NTFP.

Table 10. Fuelwood collection and sale (includes MPSDH members and non-members)

Main location for collecting fuelwood	Members of the MPSDH			
	Fuelwood collection		Sale of fuelwood	
	Households collecting fuelwood (HH)	Proportion of total households collecting fuelwood (%)	Households selling fuelwood (HH)	Proportion of all households selling fuelwood (%)
In the forest	60	71.4	14	82.4
Outside the forest	20	23.8	3	17.6
Sites inside and outside forest that are equally important	4	4.8	0	-
Total	84	100.0	17	100.0

Main location for collecting fuelwood	Non-members of the MPSDH			
	Fuelwood collection		Sale of fuelwood	
	Households collecting fuelwood (HH)	Proportion of total households collecting fuelwood (%)	Households selling fuelwood (HH)	Proportion of all households selling fuelwood (%)
In the forest	9	50.0	2	66.7
Outside the forest	7	38.9	0	-
Sites inside and outside forest that are equally important	2	11.1	1	33.3
Total	18	100.0	3	100.0

Source: Household survey (members: n = 90, non-members: n = 20)

Data are for the period between August 2003 and July 2004.

Income data were calculated from information on unit prices and amounts collected in the household survey.

While the proportions of households collecting NTFPs were very similar between members and non-members, member earnings (206,000 rupiah on average) exceeded those of non-members (123,000 rupiah on average). Thus, members obtained many more benefits from the sale of NTFPs in the Madiun model than non-members.

Fuelwood comprised the bulk of NTFPs collected and was the primary source of fuel in the area; most of which obtained by hand-collection. Although fuelwood was also collected outside the forest, the main source was inside the forest.

(e) Additional cash income

Details of the household survey on income gained through the Madiun model are listed in Tables 11 and 12. Cash income from the Madiun model included earnings from the sale of farm crops grown on allocated land in the forest, sale of NTFPs collected in the forest, wages from Perhutani and MPSDH-related work, and other income, such as revenue from MPSDH group activities. About 83% of members earned additional income from the Madiun model, including the sale of agricultural crops and NTFPs, although the average amounts in these two categories were modest and the proportion of income from the Madiun model was about 12.1% of total income across all households. About 40% of non-members also earned additional income from the Madiun model, but the amount was very small (1.3%). For both members and non-members, income in category “other” (2,213 and 8,129 thousand rupiah respectively) far exceeded income in other categories; indeed, total income from the Madiun model (575 thousand rupiah and 129 thousand rupiah respectively) was much less than income in the category “other.” The category “other” included wage labor overseas, remittances from family members and/or relatives in urban areas, small shops in the villages, trading, etc. Because non-members had a much larger proportion of income in the category “other” than members, the additional income from the Madiun model did not bridge the gap between the two groups of villagers.

On a per-household basis, the proportion of member income from the Madiun model was 100% in 2 households, more than 50% in 11 households, and zero in 15 households. Although households with relatively small incomes from outside the Madiun model were necessarily more dependent on the Madiun model, some households derived no income from the model, even when only a small income was obtained from outside the model; other households derived income from the Madiun model even when they gained significant incomes from outside the model.

(2) Costs/negative impact

Two principal costs (hereafter, responsibilities) were borne by MPSDH members engaged in the Madiun model, viz., cooperation in Perhutani’s forest conservation and management activities, and administration of the MPSDH.

Board member responsibilities taken on by cooperating in conservation and management included participation in anti-illegal-cutting patrol activities, creating periodic reports on forest conditions, immediately providing information on illegal activities in the forest and forest damage, and arranging wage labor from the MPSDH for forest conservation activities. Ordinary members were not directly involved in anti-illegal-cutting patrol activities, but were engaged in extinguishing forest fires, gathering and reporting information on forest conditions, and cautioning others inside and outside the village against damaging the forest. According to the household survey, members believed that their activities helped prevent illegal cutting, and most members felt that the burden of responsibilities was light (Table 13).

Board members performed various tasks in the administration of the MPSDH, including communicating and negotiating with Perhutani, communicating and coordinating within their group, and fund management. Ordinary members were only involved in meetings and small enterprises conducted through voluntary group activity, such as producing seedlings, fertilizer, and cash crops. In addition, member meetings were held in such a manner as to minimize burdens, e.g. by incorporating them into conventional or religious meetings organized by the community. In the village of Da, meetings were incorporated into meetings of the mutual financing association (*arisan*) to increase member attendance.

Among negative impacts, the costs of time and labor were cited by two members, but for most members, no perceived economic disadvantages existed.

Discussion

At the time of our survey, MPSDH members were enjoying both financial benefits and social infrastructure improvements provided by the Madiun model. Among 90 MPSDH member households surveyed, 45.6% had more than 50% of their arable land in the forest, while 10.0% had arable land only in the forest (Table 5). Furthermore, most NTFPs (mainly fuelwood) were collected in the forest (Tables 9, 10). Eleven of the households (12.2% of the total) earned more than half their cash income from the Madiun model, while for two households, this was the only source of cash (Table 12). The Madiun model was not a source of economic disadvantage in the opinion of most households, and for some householders that gained farmland, fuelwood, and most of their income from the Madiun model, the mechanism helped significantly improve their livelihoods (Tables 5, 12). The members could obtain many more benefits through the Madiun model than non-members (Tables 4, 6, 9, 11). Although the income from benefit sharing had not yet been redistributed to individual households at the time of the survey, allocations had been made to group

Table 11. Cash incomes (gross) of MPSDH members and non-members

Income source	Members of the MPSDH														
	Aggregate income					Income from outside the Madiun model					Income from the Madiun model				
	Households earning income (HH)	Average income across all households (90HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (90HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (90HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (90HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (90HH) (thousand of rupiah)	Proportion of income from the Madiun model
Agricultural crops	79	1,070	66	73.3	858	61	67.8	212	19.8	4.4					
From paddy fields	36	721	36	40.0	721	-	-	-	-	-					
From other lots of land	70	349	45	50.0	138	61	67.8	212	60.6	4.4					
Livestock	32	382	32	35.6	382	-	-	-	-	-					
NTFPs	29	206	3	3.3	3	26	28.9	203	98.5	4.3					
Wages	65	875	60	66.7	724	32	35.6	151	17.3	3.2					
Other	51	2,222	47	52.2	2,213	8	8.9	9	0.4	0.2					
Totals	90	4,755	88	97.8	4,180	75	83.3	575	12.1	12.1					

Income source	Non-members of the MPSDH														
	Aggregate income					Income from outside the Madiun model					Income from the Madiun model				
	Households earning income (HH)	Average income across all households (20HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (20HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (20HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (20HH) (thousand of rupiah)	Households earning income (HH)	Proportion of households with income (%)	Average income across all households (20HH) (thousand of rupiah)	Proportion of income from the Madiun model
Agricultural crops	15	818	14	70.0	800	2	10.0	18	2.1	0.2					
From paddy fields	11	681	11	55.0	681	-	-	-	-	-					
From other lots of land	7	137	6	30.0	119	2	10.0	18	12.8	0.2					
Livestock	6	92	6	30.0	92	-	-	-	-	-					
NTFPs	5	123	1	5.0	40	5	25.0	83	67.6	0.8					
Wages	15	650	14	70.0	624	7	35.0	26	3.9	0.3					
Other	13	8,132	12	60.0	8,129	1	5.0	3	0.0	0.0					
Totals	20	9,815	20	100.0	9,686	8	40.0	129	1.3	1.3					

Source: Household survey (members: n = 90, non-members: n = 20)

Data are for the period between August 2003 and July 2004.

Income data were calculated based on information on unit prices and amounts collected in the household survey.

Table 12. Proportion of cash income from the Madiun model by income from outside the Madiun model (MPSDH members)

Income from outside the Madiun model (thousand of rupiah)	Number of households (HH)	Average income from outside the Madiun model (thousand of rupiah)	Income from the Madiun model			Proportion of income from the Madiun model						
			Households with income (HH)	Proportion of households with income (%)	Average income (thousand of rupiah)	0% (HH)	0-25% (HH)	25-50% (HH)	50-75% (HH)	75-100% (HH)	100% (HH)	Average proportion (%)
0-625	22	375	19	86.4	579	3	6	5	2	4	2	43.1
625-1,250	16	903	14	87.5	207	2	10	3	1	-	-	15.8
1,250-2,500	12	1,868	8	66.7	647	4	4	2	2	-	-	17.9
2,500-5,000	20	3,475	19	95.0	416	1	16	3	-	-	-	10.0
5,000-10,000	9	6,916	6	66.7	697	3	5	1	-	-	-	7.1
10,000-	11	18,122	9	81.8	1,210	2	9	-	-	-	-	5.0
Total	90	4,180	75	83.3	575	15	50	14	5	4	2	19.3

Source: Household survey (n = 90)

Data are for the period between August 2003 and July 2004.

Table 13. Burden of forest protection borne by MPSDH members

Burden	Large burden		Small burden		No burden	
	Households (HH)	Proportion (%)	Households (HH)	Proportion (%)	Households (HH)	Proportion (%)
Forest protection activities	17	18.9	6	6.7	67	74.4
Issuing warnings to illegal loggers	2	2.2	4	4.4	84	93.3

Source: Household survey (n = 90)

Data indicate statuses at interview in the period between August 2004 and January 2005.

activities and funds for improving local infrastructure.

Limitations existed on the extent to which the model improved livelihoods. In *Tumpang Sari* farmland, for example, observable constraints, including those imposed by reduced sunlight exposure after teak crown closure, inconsistency in *Tumpang Sari* opportunities, limitations in the extent of the land provided (Fig. 4), and infertility of allocated land were noted. The benefits derivable from the land available for intercropping under planted trees were similarly limited by decreased sunlight and inadequate soil fertility. Both the benefit-sharing scheme and opportunities for wage labor within the Madiun model suffered from a lack of continuity and availability (Table 7, Fig. 5). Moreover, the additional income from the Madiun model was modest and did not bridge the gap between the incomes of members and non-members (Table 11). As we have indicated, the benefits derivable from the Madiun model were negatively influenced by issues of quality, quantity, and continuity, as previously pointed out by Maryudi & Krott (2012) and Fujiwara et al. (2012). Thus, within the current configuration, it is not possible for all members of the

MPSDH to depend solely on the Madiun model for their livelihoods. Some must seek means other than those provided by the model to sustain their livelihoods. Moreover, the opportunities for obtaining farmland in the forest or cash income via the Madiun model were not significantly weighted toward small-scale or impoverished farmers (Tables 5, 12). However, unlike the circumstances described by Shiga et al. (2012), we found that the restrictions on opportunities were not a consequence of the monopolization of information and profits by board members, but resulted merely from an effort to provide equal opportunity, and avoid burdening members unable to afford to engage in activities in the forest. At our study site, the MPSDH supporting system strove to prevent such inequalities.

Major causes of limitations on the benefit of the Madiun model on the livelihoods of villagers engaged in the enterprise included the age composition of the forest sector in the environs of each village and long-term teak forest management, both of which were responsible for inconsistencies in the provision of benefits at the village level. Measures to deal with the issues would entail changes in

Perhutani's long-term forest management planning system itself and such changes are not easily effected. However, even under present circumstances, the benefit of the system may be increased by modifying the manner of administration, for example, providing preferential opportunities to access farmland in the forest and/or cash income to small-scale or impoverished farmers, whose livelihoods are clearly in need of improvement. This might be done by enhancing the use of intercropping land to increase income from cash crops and promoting small businesses as group activities to create job opportunities for households with a shortage of family labor, disability, reduced physical strength, old age, or lack of funds on which to live.

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