Impacts of Human Activities and Land Tenure Conflict on Fires and Land Use Change: Cases Study of Menggala-Lampung-Sumatra

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1. INTRODUCTION

Centre for International Forestry Research (CIFOR), International Centre for Research in Agroforestry (ICRAF), and United State-Forest Service are studying the underlying causes and impacts of land and forest fires in Indonesia. The main questions to be addressed in this project are ***what, who, where, how much burned, and why it burned.*** This study will apply three levels of spatial analysis: island-wide, province, and site. At the site specific level, we are focusing on the relationship between fire, land tenure and land use change.

The major causes of fire in Indonesia during the El Niño fire years in 1997/1998 and 1994 are still unclear. Reports of causes of fires include pointing the finger of blame at actors who deliberately set fires such as small-scale farmers and large-scale estates and the amount of land burned and impacts on vegetation and ecosystems are subject to continuing debate. In 1994, the Indonesian government blamed slash-and-burn activity by smallholders as the major cause of fire, and estimated it accounted for more than 90% of total area burned. Environmental NGOs, however, blamed activities by forest concessionaires and plantation owners as the major causes of fires. In contrast, taking advantage of data obtained from fire hot spot information and satellite imagery, all institutions including government agencies believe that large-scale land clearing for plantations of fast growing trees for pulpwood and oil palm were the major causes of fire in 1997 and 1998. Yet, fires occurred at multiple scales and for many reasons. Impacts on local communities and forest had a variety of complex causes.

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[1] International Centre for Research In Agroforestry (ICRAF) Southeast Asian Regional Research Programme.

Tomich *et al* (1998) argued that there are three main causes of fire in Indonesia. First, fire is used as a tool in land clearing. Farmers have long used fire for land clearing under the traditional shifting cultivation of food crops. The traditional shifting cultivation with long fallow periods, however, is sustainable only when land is abundant and at low population densities. As population densities increase the traditional shifting cultivation practices recede. Farming systems in Sumatra have changed from "traditional" shifting cultivation to more intensive, agro-forestry systems. Commercially important trees such as rubber (*Hevea brasiliensis*), cinnamon (*Cinnanomum burmannii*) and coffee (*Coffea canephora*) have been introduced into Sumatra where shifting cultivation has been practiced (Michon and Foresta, 1995). Fire, however, is still used in land clearing to establish trees-based farming systems by smallholder. The use of fire in land clearing or for slash-and-burn technique is common not only by smallholders but also by large scale establishment of industrial timber plantation concession and tree crops plantation (Tomich *et al*, 1998).

Second, fire is used as a weapon. During the "Orde Baru" (New Orders) period under the Soeharto regime, the policy of land allocation for large companies was often determined without recognizing the existence or rights of local people who already cultivated that land with no security of tenure. Large companies often used military power to intimidate and remove people from their land. Fires were often used to drive out local community. The feeling of perceived injustice by smallholders decreased incentives for them to control fire from land clearing activities prevent it from spreading to large-scale tree plantations. In most intensive land tenure conflicts, local communities frequently burned trees that were established by large companies. Since the *Reformasi* period (Mid 1998), evidence of land tenure conflicts between local communities and large companies has increased. Local communities have reclaimed land that was already planted by large companies.

Third, fires spread accidentally. Some fires occur because of carelessness in managing fires and then easily spreads during drought periods.

2. METHODOLOGY AND STUDY SITE

We conducted village mapping and rural rapid appraisal from August to November 1999. For our study site, we selected Menggala, located in Tulang Bawang district, Lampung Province (Figure 1). The elevation of this site ranges from 0 to 50 m above sea level. Soil is alluvial and red yellow podzolic. Average monthly rainfall during the dry season from July to October in 1993 and 1995 (normal season) was 53 to 59 mm/month. On the other hand, average monthly rainfall during the same period in 1994 and 1997 (long drought season) was only 5-6 mm/month (Agricultural Extension Office, Menggala, 1999).

Figure 1. Map of Study Site

This site covers various land use/cover types including swamp, forest and tree crop estates, smallholder agricultural land and transmigration resettlements (Figure 2). We divided the site into 6 sub-sites. The first sub-site is located in the northern part, along Way Buaya River. A local community of ethic Mesuji people live in this area. Mesuji people originally came from South Sumatra and have been living in this site since the

early 1900's (Sevin, 1989). This location is largely covered by swamp soil. The major farming system is called "*Sonor*". *Sonor* is a traditional shifting rice cultivation, which is only practiced during long drought seasons. It is obvious that activities of the *Sonor* system significantly contribute to fire problem in this area. The second, third and fourth sub-sites are transmigration settlements. The second sub-site is a transmigration settlement in a swamp area. The government established these settlements from 1993 to 1997. The utilization of swamp areas by transmigrants increases areas use for the traditional *Sonor* system. The third sub-site is a transmigration in dry land. This transmigration settlement has large area of *Imperata cylindrica* (*alang-alang*). Fire occurs almost every year in this site. The fourth sub-site is transmigration under a nucleus estate system (NES or PIR) scheme for the establishment oil palm. In contrast to the two other transmigration types above, we found less fire occurred in this area.

The fifth sub-site is located in the western part of the site. In this sub-site, industrial timber plantation (PT. Silva Inhutani Lampung or PT. SIL) that was established in 1989 is located. PT SIL has controlled 43,000 ha of land and has planted three major tree species: rubber (*Hevea brassiliensis*), acacia (*Acacia mangium*) and Albizia (*Paraserianthes falcataria*). Fire destroyed 8,450 ha of trees from 1997 to 1999. About 60% of this area burnt in 1997. The underlying cause of fire in this area was land tenure conflict and land clearing in 1997. Almost all fires that occurred in 1998 to 1999 resulted from land tenure conflict.

The sixth sub-site is located in the central part of our study site. Tree crop (coconut hybrid and oil palm) plantations (PT. Bangun Nusa Indah Lampung or PT. BNIL) are located in this sub-site. This area represents of the new social phenomena of land tenure conflict after *Reformasi* (Mid 1998). The area was burned from June to September 1999 ha resulting in the loss of 400 ha from the land tenure conflict. In contrast, there is very little fire in another tree crop plantation (PT.Sumber Indah Perkasa or PT. SIP). PT SIP is located in east part of our study site. PT. SIP has established oil palm plantation under nucleus estate smallholder scheme (NES) and has integrated with this development with a transmigration resettlement program.

Figure 2. Sketch Map of Study Site

3. FIRES ARISES FROM SMALLHOLDER ACTIVITIES

3.1. Local Farmers Activities

One of the largest fires in 1997/1998 in Lampung Province occurred in Mesuji-Tulang Bawang. Mesuji is located at an elevation less than 20 m, and dominated by swamp forest. Local communities called Mesuji people live along the river system. The livelihood of Mesuji people is mainly derived from traditional rice cultivation called *Sonor* System, fishing and harvesting of Gelam (*Melaleuca cajuputi*) trees from swamp forest for house constructions and charcoal product.

Under the *Sonor* system, farmers only plant rice during drought seasons. The system requires 5-6 month dry period to be able to burn the swamp forest for planting rice. Usually, Mesuji people burn the swamp in September or October. They burn as much swamp forest as they can without applying any effort to control escaping. They plant rice by broadcasting seeds. They use a special traditional local variety, (*Ampay)*, in this *sonor* system. The desirable characteristic of the *sonor* system is its extremely low labor demand. The farmer just abandon the field after planting the rice seed and return to the field after 6-month later for harvesting. They fallow the field for 3-4 years (depending the cycles of drought seasons). During the fallow period, swamp forests rejuvenate and Gelam trees dominate again (See Figure 3).

Mesuji people came from South Sumatra to Lampung in the early 1900's, when they already practiced *Sonor* cultivation. The last *Sonor* occurred in 1997 during with the El-Niño event in Indonesia. Within the last 10 years, farmers practiced the *Sonor* system in the very dry years of 1987, 1991, 1994 and 1997.

According to the chief of The Mesuji people, thousand's hectares of swamp forest were cultivated under the *Sonor* system in 1997. Most households cultivated more than 5 hectares of *Sonor* rice fields.

Figure 3. Regeneration of swamp forest after rice cultivation (*Sonor*)

We found Mesuji people live in five umbulan or hamlets along the Buaya River (See Figure 2 - subsite 1 and Figure 4). Until 1992, almost all people who lived in these umbulan were Mesuji. Since 1992, however, migrants, mostly Javanese, have moved into this Buaya River area. In 1999, there were 1,415 households in these umbulan (See Table 1). More than 80% of the households in Umbul Talang Gunung, Stajim and Sungai Cambai was Mesuji People. In contrast, the majority of households in Talang Batu and Tebing Tinggi were recent migrants. Recent migration to this area will be discussed in the section of overlapping land tenure between communities and large-scale plantations.

Except for Umbul Talang Gunung, more than 70 percent of the area was dominated by swamp soils (See Table 2). Farmers in Umbul Talang Gunung under *adat*[2] law claimed around 5,700 ha land, with about 85 percent being dry land. In fact, since 1990, an industrial timber plantation (PT. SIL) has claimed Talang Gunung's customary land. We will discuss the problem arising from these overlapping claims in next section.

[2] Traditional ownership or use rights recognized by local law

Table 1. Number of households of Mesuji sub-villages in 1999

Sub-Village/Village	Number of Households (HH)	Percentages of Mesuji And recent migrant	
		Mesuji	Recent Migrants
Umbul Talang Batu	250	20	80
Talang Gunung	130	80	20
Tebing Tinggi	500	40	60
Stajim	55	100	0
Sungai Cambai	480	100	0
Total	1,415	63	37

Source: Participatory Survey 1999

Figure 4. A Mesuji village is located along a river

Table 2. Total land area of Mesuji sub-villages in 1999

Sub-village/village	Total area (Ha)	Percentages of land type[a]	
		Non-Swamp	Swamp
Umbul Talang Batu	612	25	75
Talang Gunung	5,700	85	15
Tebing Tinggi	2,600	30	70
Stajim	400	10	80
Sungai Cambai	3,000	4	96
Total	12,312	48	51

a. According to farmer's perceptive.

Total swamp areas in these five umbulan is 6,334 ha. Not all swamp areas can be cultivated. Some swamp areas cannot be cultivated because water levels remain too high even in drought years. We asked communities leader to estimate the percentage of swamp areas that could be planted by rice under the *Sonor* system. Based on their estimation, except in Talang Gunung, more than 93 percent of swamp can be cultivated. Therefore, we roughly estimated that in 1997, around 5,400 ha swampland was burned for rice cultivation under the *Sonor* System (See Table 3).

On average, Mesuji People cultivated five ha of land per households and recent migrants cultivated two ha of land per household under the *Sonor* system in 1997. Using these data, we roughly estimated that the *Sonor* area in 1997 was 5,500 ha (See Table 4). The result is consistent with the previous estimation.

We interviewed one farmer who cultivated 20 hectare of *Sonor* rice field in 1997. He used labor from three family members for land preparation that took one month and it is very easy and simple. They just burned the swamp, slashed and burned again to get more cleared land. Lack of labor for harvesting is a problem. Fortunately, many seasonal labor migrants come from transmigration areas to harvest, using a contract labor system (*"bagi hasil"*). Land-owners and laborers receive half share in the harvest. The high cost of harvesting indicate a lack of labor in this area (and also probably harvesting rice under the *Sonor* system is difficult). Farmers said that in 1997, some rice field areas could not harvested because of lack of labor. Average yield per hectare under the *Sonor* system is 4 ton *gabah* (unhulled paddy). Yield under *Sonor* system is higher (almost double) than the yield under the non-*Sonor* system.

Table 3. Estimation of *Sonor* area in 1997

Sub-Village/Village	Total Swamp Areas (Ha)	Estimation of *Sonor* in 1997	
		Ha	%
Umbul Talang Batu	459	428	93
Talang Gunung	855	285	33
Tebing Tinggi	1,820	1,690	93
Stajim	320	300	94
Sungai Cambai	2,880	2,736	95
Total	6,334	5,439	86

Sources : Participatory Survey 1999

Table 4. Average *Sonor* area per household

Type of Population	Number of Households (HH)	Average *Sonor* Per HH (Ha)	Total *Sonor* (Ha)
Mesuji People	892	5	4,460
Recent Migrant	524	2	1,048
Total	1,416	3.9	5,508

Source: Participatory Survey

3.2. Transmigration Settlement

In this study, we characterized three different types of transmigration settlement. The first type of transmigration is transmigration in swamp forest which contributed greatly to the total area burned the drought season. The second type of transmigration is transmigration in dry land covered with *Imperata cylindrica*. The risk of fire occurred in the areas that were covered by *Imperata cylindrica* is high. The third type of transmigration is transmigration under a Nucleus Estate Smallholder Scheme (NES or PIR). We found there is less fire in this latter type of transmigration settlement then in other types of transmigration settlement.

3.2.1. Transmigration in Swamp Areas

Close to the Mesuji villages, there are three transmigration settlements (F-SP1, FSP2 and F-SP3). These transmigration villages were established in 1993/1994 (See Figure 2-Subsite 2). Transmigrants are mostly Javanese who already lived in other parts of Lampung (Gunung Balak and Wonosobo). These three villages included 1,500 households and 6,297 people in 1993 (See Table 5). In 1997, the population had increased to 1,790 households (7,880 people). Each households received two ha of land, consisting of 0.25 ha for housing and home garden, 0.75 ha *Lahan satu*[3] for upland food crops and one ha *Lahan dua*[4] for multi-purpose crops. The Government carried out land clearing for *lahan satu*. However, *lahan dua* land was not yet cleared. Land cover of *lahan dua* was swamp forest and farmers are responsible for clearing that land themselves.

[3] Lahan satu is the first land to produce subsistence food and income for the family

[4] Lahan dua is the second land to provide an income beyond subsistence

Table 5. Number of Households and Population in Three Swamp Transmigration Villages

Name of Villages	Number of households (HH)		Number of Population (people)	
	1993	1997	1993	1997
SP1-Ekamulya	500	586	2122	2694
SP2-Dwi Karya Mukti	500	572	2154	2442
SP3-Wonosari	490	632	2021	2744
Total	1490	1790	6297	7880

Source: Monograpi Desa (Village Monograph)

Table 6 shows the transmigration village area by type of land use. Each village has between 1,150 to 1,400 ha of land with the allocation for housing, home gardens and public services (around 16-17%), *lahan usaha satu* (around 26-33%) and *lahan usaha dua* (around 51-57%). These three transmigration settlements are located in swamp forest. The housing and *lahan satu* areas were located in areas with low water levels. While *lahan dua*, areas were located in areas with high water level .

Figure 5 shows the development of transmigration settlements and the expanding cultivating of swamp areas for planting rice by transmigrants. In 1994, along with the rice cultivation under the *Sonor* system, they started to plant rice in *Lahan satu*. Farmers could already cultivate all *lahan satu* areas in 1994. Although the Government had already cleared *lahan usaha satu*, but the land was still covered by small bushes and rejuvenated of *gelam*, *purun* and *nipah* (swamp forest species). Transmigrants used fire to burn small bushy trees. At that time, it was easy to burn swamp due to the drought. In 1994, the total burnt areas for *Sonor* in these three villages was 1,118 ha (See Table 7). They planted high yielding variety (IR64) using the dig system (*sistem tugal*) and applied fertilizer. They harvested rice before the water level increased. They called this system TOT (*tanpa olah tanah*/ no tillage). Since most areas of *lahan satu* were located on dryer land, farmers could continue to plant upland rice in the following years.

Table 6. Transmigration Area by Type of Land

Name of villages	Total area (Ha)	*Lahan satu* (%)	*Lahan dua* (%)	Others (%)
SP1-Ekamulya	1,300	29	55	16
SP2-Dwi Karya Mustika	1,150	33	51	16
SP3-Wonosari	1,400	26	57	17
Total	3,850	29	54	17

Source: Monograpi Desa (Village Monograph)

Table 7. Cultivation Areas under the *Sonor* System

Name of villages	1994				1997			
	Total cultivation area under *Sonor* (Ha)	*Lahan satu* was Cultivated (L1) (%)	*Lahan dua* was cultivated (L2) (%)	Agricultural land (L1+L2) was cultivated (%)	Total cultivation area under *Sonor* (Ha)	*Lahan satu* was cultivated (%)	*Lahan dua* was cultivated (%)	Agricultural land (L1+L2) Was cultivated (%)
SP1-Eka mulya	375	100	0	35	588	100	30	54
SP2-Dwi Karya Mustika	375	100	0	39	934	100	95	97
SP3-Wonosari	368	100	0	32	559	100	24	48
Total	1,118	100	0	35	2,081	100	48	64

Source: interview with community's leader.

Lahan dua areas were wetter than *lahan satu* areas. Thus, it was more difficult to clear and to cultivate this land. The only opportunity to cultivate this land was to follow a *Sonor* system like that practiced by the Mesuji people. In 1997, along with the rice cultivation under the *Sonor* system, transmigrant began to cultivate *lahan dua* land. Transmigrants, however, did not follow all the techniques of a traditional *Sonor* system. They preferred to apply a TOT system using a high yielding variety (IR 64) rather than using a traditional variety. Transmigrants do not like the traditional varieties because these varieties do not taste as good to them.

The total area burned in these three villages for cultivating rice (*Sonor*) was 2,081 ha in 1997. Farmers only cultivated 48% of *lahan dua*. The highest proportion of *lahan dua* that was cultivated in 1997 was in SP2-Dwi Karya Mukti (95%). While in SP1-Ekamulya and SP3-Wonosari villages, the percentage of cleared *lahan dua* was very small. In SP-1 Ekamulya, most swamp areas had water, thus it was more difficult to clear the land. In contrast, the reason for the low proportion of *lahan dua* cleared in SP-3-Wonosari is because of land tenure conflicts between the local Mesuji people and transmigrants. The Mesuji people continued to claim the *lahan dua* that was allocated to transmigrants. Until now, there is no solution of the land tenure conflict. Therefore, the land has remained abandon.

Since *lahan dua* areas are wet, farmers could not keep all land to be cultivated continuously. Around 50% of *lahan dua* should be fallowed like in the *Sonor* system. They will re-cultivate this land in the next drought season.

In the eastern part of these three transmigration villages, 12 transmigration villages were also established from 1993 to1997. Transmigration villages were located in swamp areas at on elevations below 10 m above sea level. Topography in this site is very flat. The characteristics of these 12 transmigration villages are similar to the three transmigration villages already described.

If we assume the number of households per village remains constant, the estimate of total household in these 12 transmigration villages was 6,000 households in 1997. The average land per household that can only be cultivated during the *Sonor* period is one hectare per household. Therefore, we estimated that in 1997 about 6,000 ha of swamp forest were burned for rice cultivation by transmigrants in these 12 transmigration villages. The establishment of transmigration settlements in swamp areas increased the burning of swamp forest areas especially during the drought season.

3.2.2. Transmigration in Dry Land with Imperata Problem

In the northern part of our study site, we found a transmigration settlement, Muara Tenang village that was established in 1983/1984 (See Figure 2 - Sub-site 3). About 600 households resettled to this area. The majority of households are Javanese. Each household received two ha land. By 1999, the number of households had increase to 876.

Farmers in this village also have *Imperata* sp covering the site.. *Imperata cylindrica* (alang-alang) is the main land cover, and it accounts for around 467 ha or 32% of The total agricultural land. During the dry season, fire occurs in this grass land every year. A high proportion of *Imperata cylindrica* indicates a vast degraded land area or poor soil nutrient in this village. It is a fire climax vegetative community and indicate annual fires.

This village covers 1,085 ha land and consists of 80% dry land and 20% swampland. The swamp area is located on the border of an industrial timber plantation. Swamp is less important in the agricultural livelihood of the villagers. They can only cultivate the swamp during the drought season under the *Sonor* system.

Cassava and upland rice are the most important crop. Since the beginning of village's establishment farmers have relied on cassava and upland rice cultivation. According to farmers, however, after two to three cultivation cycles, the production declined. Imperata invaded the site and become a serious problem (See Figure 6).

Since 1994, farmers began to plant rubber. The rubber areas reached 350 ha in 1999. In 1997, they also planted approximately 50 ha of oil palm. All tree crop areas were planted by self-support. However, all of these tree crops are still immature. Therefore, farmers still rely on cassava and upland rice production for their livelihood.

In 1997, farmers in this village rented out 200 ha of land that was covered by *Imperata cylindrica* to tapioca factory. The tapioca factory plans to rent this land for three years and to pay Rp.100,000.- per ha per year. In 1999, after two cassava harvests, the tapioca factory did not harvest the cassava because the cassava price declined significantly. On the other hand, farmers were angry because they received rent for only one year. In September 1999, farmers burned 200 ha of cassava land.

Figure 6. *Imperata cylindrica* grass land a high risk to fire

There are another 11 transmigration villages located around Muara Tenang village, with similar characteristics. They have an *Imperata cylindrica* problem, and have relied on cassava and upland rice production, and do not participate in the Nucleus Estate Smallholder Scheme (PIR).

4.2.3. Transmigration in Dry land under NES Systems

In contrast to the two case studies of transmigration settlements, we found less fire occurred in 1997 in transmigration settlements located in the southern part of our study site. In Gedong Aji Baru sub-district, eight transmigration villages were established in 1985/1986 (See Figure 2 - Subsite 4). These "Translok" (local transmigration) villages were designed to accommodate people who were removed from other parts of Lampung. Most of the transmigrants are Javanese who were removed from The Gunung Balak Protection Forest (*hutan lindung*).

Each transmigrant household received two ha of land consisting of 0.25 ha of land for housing and home garden, 0.75 ha of land for upland food crops (*Lahan usaha satu*) and one ha of land for tree crops (*Lahan usaha dua*). Most of the farmers planted cassava in *Lahan usaha satu*.

These transmigration villages are adjacent to an oil palm plantation, owned by PT. Sumber Indah Permai (SIP), which was established in 1990. PT. SIP implemented a nucleus estate smallholder Scheme (NES). Under the NES system, the company was supposed to establish two types of oil palm plantation: nucleus and plasma. Nucleus are the area of oil palm that owned by company. Plasma is the oil palm area that allocates to the smallholder under a credit scheme.

During 1991 and 1993, PT. SIP established 9,700 ha of oil palm plantation for its nucleus estate. Starting in 1994, PT. SIP began to establish plasma for smallholders who lived in and around the plantation areas. The Government arranged around 15,000 ha land for establishing plasma. Most of the land for establishing plasma was *lahan usaha dua* that was owned by Transmigrants.

Table 8 shows the trend of smallhoder oil palm establishment under NES system in eight transmigration villages in Gedong Aji Baru. The establishment of smallholder oil palm commenced from 1994 to 1998. The total oil palm area is now 3,779 ha. About 70

percent of smallholder oil palm area was established in 1994 and 1995. In 1997, they only established 315 ha or 8 percent of total smallholder oil palm area.

Fire in this area was a consequent of smallholder oil palm planting. Fire use in land clearing in this area was well controlled. There was no uncontrolled (accidental) fire in this area. Before clearing by burning, land was mostly covered with bushes, or agricultural crops. Therefore, there was less residue burning.

Table 8. Establishment of smallholder Oil Palm under NES System in 1994-1998

No.	Name of Village	Village area (Ha)	Number of Household (HH)	Area of smallholder oil palm by planting year(Ha)					Total smallholder oil palm (Ha)	Total household participated in NES (HH)
				1994	1995	1996	1997	1998		
1	Sido Mulyo	2,020	1,118	0	291	29	299	66	685	835
2	Trijaya	1,732	626	0	317	0	0	0	317	423
3	Sido Harjo	1,962	1,025	0	268	212	16	372	867	932
4	Trirejo Mulyo	1,750	947	170	101	33	0	6	310	411
5	Bogatama	1,791	837	456	9	0	0	112	577	732
6	Makartitama	1,802	1,127	14	225	0	0	0	239	319
7	Sido Mukti	1,800	1,043	0	192	0	0	31	223	297
8	Wiratama	1,822	1,050	562	0	0	0	0	562	749
Total		14,679	7,773	1,202	1,403	274	314	586	3,779	4,698

Sources: KKPA (Cooperate Credit for Members)

4. FIRES ARISING FROM LAND TENURE CONFLICT

4.1. Case study of Overlap of recognized land tenure between local community and Industrial Timber Plantation.

The policy of land allocation for large-scale plantations in Indonesia is often carried out without recognizing rights local people who already cultivate or occupy that land without official security of tenure. As a result an overlapping claims for "use right" land between local community and large scale-company occurred in almost the entire country of Indonesia. Fire is often used both by smallholders and large-scale companies for a number of reason in these land tenure conflicts.

We undertook three cases studies, investigating overlapping land tenure between local communities and industrial timber plantations. The first two case studies involved a land

tenure conflicts between local Lampung people (*Orang Mesuji* and *Orang Menggala*) with industrial timber plantations. The third case study involved land speculation. Transmigrants burned and cleared log over forest area belonging to PT. SIL, expecting to get land use rights.

4.1.1. Industrial Timber Plantation (HTI)- PT Silva Inhutani Lampung

Industrial timber plantation (HTI)-PT Silva Inhutani Lampung (PT SIL) was established in1989 with 32,600 ha. In 1994, PT. SIL obtained another 10,500 ha. Thus, the total area concession in 1999 of PT SIL is 43,100 ha. The area of PT SIL is located in a former logging concession belonging to (HPH)-PT. BG Dasaad Joint Venture (PT. BGD) (See Figure 2 Subsite 5 and Figure 7).

Around 30,000 ha, or 70% of the total concession area is allocated for tree planting areas (effective areas for tree planting). The remaining area (30%) is allocated for infrastructure and conservation. From 1989/1990 to 1997/1998, PT. SIL planted around 22,666 ha or about 75% of the total area for tree planting. Table 9 shows the distribution of planting areas by planting year. In the first two year of the operation, PT SIL was able to plant 2,600 ha of land. In the next three to six years, the planting area per year has increased that was between 1,865 ha and 4,520 ha per year. In the last three years, the planting area per year was between 1,800 ha to 2,800 ha per year.

PT. SIL planted three major tree species: rubber (*Hevea brassiliensis*), Acacia (*Acacia mangium*) and Albizia (*Paraserianthes falcataria*). The biggest areas of tree planting are rubber (43%), acacia (35%) and albizia (22%).

During the first 4 years from 1989/1990 to 1992/1993, albizia was a major tree in this industrial timber plantation because of a government recommendation. Government recommended industrial timber plantation to plant Albizia, a fast growing species, to fulfill a supply of raw material for pulp industries. Albizia, however, did not grow well in this area and is less suitable for pulping than other fast growing species such as acacia. Therefore, after 1993/1994, PT. SIL stopped planting albizia. They substituted albizia with acacia and rubber.

Figure 7

Table 9. Planting Areas by Planting Year and Type of Trees (Ha)

Planting Year	Type of Trees			Total
	Albizia *Paraserianthes falcataria*	**Akasia** *Acacia mangium*	**Rubber** *Hevea brassiliensis*	
1989/1990	1,100	0	0	1,100
1990/1991	1,600	0	0	1,600
1991/1992	500	0	2,800	3,300
1992/1993	1,865	0	0	1,865
1993/1994	0	0	3,550	3,550
1994/1995	0	2,320	2,200	4,520
1995/1996	0	1,620	500	2,120
1996/1997	0	2,200	600	2,800
1997/1998	0	1,810	0	1,810
Total	5,065	7,950	9,650	22,665

Source: PT. Silva Inhutani Lampung.

We could not obtain land clearing for all years. In 1994, 1995 and 1997, PT. SIL cleared around 2,000 ha of secondary forest per year by using fire. In the first two years, PT. SIL planted a monoculture cassava. They began to plan forest trees in the third year. However, they can still plant cassava intercroped with forest tree for one year. Therefore, during our survey period, we found around 2,000 ha of land in industrial plantation-PT. SIL was still planted with cassava[5].

During 1997 to 1999, fires destroyed around 8,450 ha of PT. SIL areas (Table 10). The major underlying cause of fire in this area was land tenure conflict. In some cases, however, it is difficult to identify a cause of fire is it related to land tenure conflict or was it an accident or an escaped fire. For example, farmers said that the cause of fire was an accident. In fact, land tenure conflict occurred over much of that area. Therefore, although we could not prove it, land tenure conflict cause the probable of fire. Thus, we separated the unclear causes of fires that resulted from tenure conflict, and categorized them as mixed causes from land tenure and accidental burning.

5 Law does not permit timber concession permitted to plant cassava. However, since this timber plantation is a joint venture with one private company who own cassava processing industry, they planted cassava in this timber plantation areas to supply raw material for the cassava processing industry (Tapioca).

In 1997, fire occurred in 5,031 ha of PT. SIL areas. Around 40% of the burned areas were caused from land clearing activities. Around 56% of the burned areas came from uncontrolled fire use for land clearing activities by smallholders. These smallholders are Mesuji people who live in the areas of overlapping land tenure between local people and industrial timber plantation; and transmigration farmers who cleared land in the border areas of PT. SIL. Farmers did not control the fire during land clearing activities. They did not care if the fire escaped to the standing trees of PT. SIL. The incentive to control fire is weak because PT. SIL has taken their customary land. In addition, if the fire from the smallholder activities escaped to tree of plantations, there is no rule that farmers should pay compensation. With this situation, it is easy to see reasons why fire escaped during a severe drought season such as in the El- Niño Year in 1997.

The burned area was 773 ha in 1998 and 2,646 ha in 1999. In 1998 to 1999, the effect of land tenure conflicts on burned area more direct and clear. Farmers directly burned the areas of PT.SIL, including trees that were established by PT. SIL. They did this for establishment a new settlement and new agricultural land. These cases may be considered arson. In the next three sections, we will discuss in more detail the effect of fire on overlapping land tenure.

Table 11 shows distribution of burned areas by vegetation types and causes of fires. It was obvious that land cover of burned areas for land clearing were log over forest area. On the other hand, the vegetation of burned areas where fires were caused by land tenure conflict was not only log over forest and primary forest (39%) but also standing trees planted by PT. SIL (61%) (See Figure 8). During 1997 to 1999, fires started from land tenure conflicts destroyed 2,405 ha of albizia and 1,370 ha acacia plantation

Table 10. Area of fire by cause of fire in PT. Silva Inhutani Lampung (SIL) in 1997-1999

Year	Land Clearing	Land Tenure Conflict		Accident	Total
		Land Tenure	Mix with Accident		
1997	2,000	0	2,796	235	5,031
1998	0	400	363	10	773
1999	0	2,100	546	0	2,646
Total	2,000	2 500	3,705	245	8,450

Source: PT. SIL and RRA Survey

Table 11. Percentage of area by cause of fire and type of tree/land cover in 1997-1999

Vegetation	Land Clearing (%)	Land Tenure Conflict (%)		Accident (%)	Total (Ha)
		Land Tenure	Mix with Accident		
Albizia *Paraserianthes falcataria*	0	0	64	0	2,385
Akasia *Acacia mangium*	0	18	25	51	1,495
Rubber *Hevea brassiliensis*	0	0	0	45	110
Primary Forest	0	4	5	0	300
Log over Forest	100	78	5	4	4,160
Total (Ha)	2,000	2,500	3,705	245	8,450
Total (%)	24	30	44	3	100

Figure 8. Fire destroyed acacia trees

4.1.2. Overlapping Land Tenure between Local Mesuji People and Forest Industrial plantation

Under the traditional Mesuji *adat* law, swamp forest is owned jointly by members of community. Each member has a right to cultivate the swamp forest. If the land was not cultivated in two succeeding *Sonor* periods, then by *adat* law, other people could cultivate that land. When land is abundant and low population, shifting cultivation can

work efficiently and private land rights issues are seldom very important. Land tenure conflicts almost never happened in the past. At present, however, there is evidence that land conflict has arises. Members of the community try to keep their rights to land that they previously prepared for cultivation. Once they cleared swamp forest for *Sonor* cultivation, they maintain rights to cultivate this same land for every *Sonor* period. The effort to continue their land rights has increased since establishment of oil palm plantation, transmigration and spontaneous migrant settlement.

In 1998/1999, many spontaneous migrants came to this area. Village leaders or chiefs of local people arranged land allocation for these spontaneous migrants, following an official-style transmigration scheme. By paying Rp. 300,000.00 to a village leader or chief of local people, each household of spontaneous migrant received 2 ha of land. At present, total spontaneous migrants account for 37% of the total households in this area.

With the expansion of individual land rights and declining land availability, communities who live on the border of the large-scale plantation have tried to reclaim their customary land from the large-scale plantations. Since 1990, PT. SIL has claimed 5,700 ha of land already used by Talang Gunung people (local Mesuji people). Then, PT.SIL prohibited the people Talang Gunung from using the land for agricultural activities. Talang Gunung People, however, have been holding out in that area and they have continued to cultivate the land (See Figure 7, Subsite 1).

Around 350 ha in this conflict area is swamp land. In 1997, Talang Gunung People and transmigrants in Muara Tenang village cleared the swamp area for cultivating rice under the *Sonor* system. The fire from this land clearing activity spread to trees belonging to PT. SIL. PT. SIL reported that this type of fire destroyed 2,112 ha of albizia and 384 ha of acacia (See Figure 9).

In 1998, PT. SIL asked the Indonesian military to remove Talang Gunung people from that area. This effort, however, did not succeed. In fact, the Talang Gunung people kidnapped 12 soldiers. These soldiers were released after their commander apologized to Talang Gunung people.

Since that time, PT. SIL has allowed Talang Gunung people to cultivate in the conflict area. PT. SIL, however, requested farmers to inform them, if they want to cultivate the land. During land clearing, PT. SIL wishes to inspect and to request that farmers make a fire break.

Figure 9. Fire destroyed Acacia and Albizia Plantation in 1997

4.1.3. Overlapping Land Tenure between Local Menggala People and Forest Industrial plantation

Local Menggala people in *Desa Labuan Batin* have claimed about 4,000 ha of land that is currently designed within PT. SIL's industrial timber plantation. In 1997/98 PT SIL planted around 1,000 ha of acacia in this area. The distance between Desa Labuan Batin and the claimed area is about 30 km, but they argued they had already used that land before PT. SIL was operating and according to *adat* law, they owned that land (See Figure 7 - Subsite 2).

In 1998 to 1999, Menggala and migrants burned around 1,560 ha of land within the industrial timber plantation to clear land for new villages and agricultural. Some 450 ha of the burned area contained *Acacia mangium* one year old (Figure 10). Another 1,110 ha of the logged over forest (secondary forest) was also burned.

Villagers from Desa Labuan Batin proposed to have the village formerly recognized by the Government. One condition for formal recognition of the village is it contains more than 500 households. Therefore, Menggala people encouraged outside people to move to this area.

Since early 1998, the Menggala people have invited migrants to cultivate this area. Everybody is allowed to cultivate this land free of charge. The owner of the land, however, is Menggala. Migrants only have a temporary right to cultivate.

By November 1999, the population increased to 650 households. The majority of migrants were ethnic Javanese (50%), Balinese (20%) and Menggala (30%). They called this area Umbul Labuan Indah. Umbul Labuan Indah is under the administrative of Desa Labuan Batin (Sub-village).

The village leaders of Labuan Batin organized a committee to draft a master plan for this new settlement. They planed to sell parcels of land consisting of 0.25 ha for housing and home gardens and one hectare of land for *ladang* (upland food crops).

In 1999, the Bupati of Tulang Bawang was rumored to proposed to excise 10,500 ha of PT. SIL land (the second phase of additional land for PT. SIL) for community housing and smallholder agricultural production. This rumor encouraged Menggala people to claim more land. In the future, one may expect increasing conversion of log-over and secondary forest, as well as planted acacia areas in PT. SIL's plantation.

Figure 10. Young acacia trees in industrial timber plantation was burned for establishing new village and agricultural land

4.1.4. Land Speculation

In the northern part of the Labuan Indah areas (See Figure 7 -Subsite 3), approximately 3,000 ha of land remains to be planted by PT. SIL. The vegetation in this areas is secondary forest. However, since the end of 1998, farmers in two transmigration villages (Desa Gedong Boga and Desa Buko Poso) that are located with in the border of PT. SIL have burned and cleared these areas. They call this newly opened land Umbul Sumber Rejeki.

By the end of 1999, conversion of secondary forest land to agricultural land was approximately 940 ha (Figure 11). Farmers from other villages also cleared the forest in these areas. By the 1999, 390 households occupied this area. The majority of the households are Javanese (80%) with minorities of Balinese (10%), and other (10%). Most of them come from the transmigration villages.

Figure 11. Establishment of agricultural land by farmers in industrial timber plantation

The major motivation for clearing this land is land speculation. The people do not know or pretend not to know that these lands are within PT. SIL's concession. They thought they could cultivate the land as it was uncultivated. If these land belongs to the state, people thought they could borrow the land for mostly planting cassava and rice. They expected that if many people cultivated this land, the government would recognize their right to use this land. Even though, nobody has recognized their rights, they still benefit from cultivating cassava on this free land. They also realize that there is a potential conflict with Mesuji people who may claim the land under Mesuji customary law.

4.2. A case study of land tenure conflict between tree crop plantation and local community

4.2.1. Fires Areas and the Causes of Fires

One of the social phenomena that has arisen in the post "*Reformasi*" period (mid 1998) is the increasing trend in land tenure conflict between local communities and tree plantation companies throughout Indonesia. Fire is used as a weapon directly or indirectly in these land tenure conflict areas. In the study site in Lampung, besides evidence of arson we

also found that there is little or no incentive to control fire in land clearing in land tenure conflict areas. Therefore, the spread of fire from land clearing by farmers to standing trees established by a large company often occurs. Along with increasing land tenure conflict in Indonesia, it is likely that the area of fires as an manifestations of land tenure conflict will increase in the future.

From June to September 1999, fire destroyed almost 400 ha of hybrid coconut plantation belonging to PT. BNIL, as a result of land tenure conflict between PT. BNIL and the local community. Since the end of 1998, around 700 households have claimed 7,000 ha of PT BNIL's areas. They rebuilt houses in between hybrid coconut in the former areas of seven villages. In surrounding their houses, they also cultivated crops such as cassava, corn, and other crops (see Figure 2-Subsite 6, Figure 12, and Figure 13). Farmers used fire in clearing land for cultivation. With no incentive to control fires, fire from land clearing spread to the company's hybrid coconut. The spread of fire destroyed about 55% of total burned areas in this site. Another 45% of the area burned occurred through arson. A community that lives on the border of PT. BNIL area is suspected of setting the fires.

The clashes between tree crop companies (supported by military and private guards) and local communities are continuing. The biggest clash occurred in April 1999. During that time, the local community burned the office of the company. It was also reported that 7 people were killed. According to Kompas, December 13, 1999, a similar clash occurred again on December 12, 1999 and one farmer was shot and killed. A couple of days before the last clash, the local community demonstrated against the Bupati Tulang Bawang. At that time, demonstrators destroyed the Bupati's Office.

By contracts to the post-*Reformasi,* the total area burned in PT BNIL during El-Niño 1997 were very small (only around 20 ha). These fires were located along the road and burned oil palm and coconut hybrid trees. According to the respondents, these fires resulted from careless (accident) people who passed on the road.

Figure 12

Figure 13. Farmers rebuilt house in hybrid-coconut plantation (land tenure

4.2.2. From Shifting Cultivation to logging the forest

The local people, called "Orang Menggala", have lived in this area for a long time ago. The chief of the Menggala is called *Penyimbang Bumi*. Orang Menggala are divided into four Marga (Clan): Buay Bulan, Suway Umpu, Buay Tegamo'an, and Buay Aji.

Like other local Lampung people, the people from Menggala established early settlements along the rivers. The main livelihoods of Menggala people were shifting cultivation and fishing. Natural forest was still abundant and the forest belonged to the communities under the customary (*adat*) law. Generally, groups of farmers that consisted of up to 10 people cleared forest for cultivating upland rice (shifting cultivation). In the areas of shifting cultivation called "umbulan", the people build houses. People usually stay in the umbulan for 1 to 5 years. If the fertility of the soil decreases, they move to open new umbulan. Some umbulan could develop to become new villages. In 1981, there were two umbulan named Umbul Bujuk and Umbul Sutan Jimat.

From the 1970's to 1985, in the northern part that have umbulan, a logging company logged the forest within the PT BG Dasaad Concession (HPH). In the southern part, three transmigration settlements were established. First, the government established Unit I and Unit IV Transmigration Settlements in 1977 and to 1978. Second, the government established *Translok* (local transmigration) Ringin Sari in 1982.

Along with the logging activity by the HPH, Menggala people have also logged the forest in their communal forest, and also in concession areas. Some rich Menggala operated a small-scale sawmill and they sold the logs to Java. During the period from the 1970's to 1990's, the logs produced from this site were well known, especially Merbau, Laban, Nangi, Ingas and Meranti. Since logging very profitable, the logging activity reduced the activity of shifting cultivation in this area.

4.2.3. Transforming Umbulan to Village and Development of New Spontaneous Villages

Learning from the official transmigration settlement-sponsored program, Menggala communities adopted similar schemes to develop their villages and to establish new settlements. People of Umbul Bujuk organized by the chief, invited the Javanese who already lived in others part of Lampung to move to their areas. Migrants would receive 2 ha of land by paying Rp. 300,000 in early 1982. Although this land transaction was very informal (without any formal letter or land title), it attracted migrants to this area to buy land. By 1984, the population had reached 300 households. The majority of the households were Javanese (60%), followed by Menggala people (20%), Balinese (10%) and other (10%).

Umbul Bujuk is officially under the administration of Banjar Agung Village (the old local village) that located in near of Umbul Bujuk. In 1986, however, Umbul Bujuk became a village separate from Banjar Agung village (Governor Degree no G/070/B/III/HK/86). Since becoming a formal village, land tenure security has increased. Price of land also increased from Rp. 300.000 in 1982 to Rp. 600,000 in 1987. In 1987, the total numbering households in this village to increased to 690, and occupied about 1,500 ha of land.

Following a similar process to establish the Umbul Bujuk Agung village, Umbulan Sutan Jimat also became a formal village (named Indraloka Village) in 1986. Around 810 households with mixed ethic origin live in this village.

On March 1, 1986 the government issued degree (SK BAPPEDA No. G/058/Bappeda/HK/86) to allocate 10,000 ha of land for the establishment of tree crop plantations (mostly coconut hybrid and oil palm trees) to three companies: PT. Bangun Nusa Indah Lampung (BNIL), PT. Rimba Lampung Abadi (RLA) and Trimulaya Adi Kencana (TAK). Some 7,000 ha of that land was logged over forest land. However, 3,000 ha of that land was already occupied by two new villages (Desa Umbul Bujuk and Indraloka Village). Such overlapping land allocations would surely be a source of conflict between local communities and the tree crops companies.

As a result of the success in getting money from selling the land and learning from releasing of their communal land for tree crop plantation and transmigration settlement, Menggala people tend to sell more communal land before the land could be allocated to tree crop plantations or transmigration settlement. Menggala people realized that the 7,000 ha located to their village would be used for tree crop plantation. Before the companies began to plant this area. Menggala people, with organized by the Banjar Agung Village leader sold a total 7000 ha to migrants. The price of the land was Rp. 600,000 per a 2 ha parcel of land. In a very short time, seven informal (illegal) villages were established. In early 1992, about 3,547 households occupied these seven villages. The majority of households were Javanese (60%), followed by Balinese (30%), and Other (7%), with Orang Menggala a tiny minority (3%).

4.2.4. Land Tenure Conflicts, Resettlement and Establishment of Tree Crops Plantation

At the end of 1989, *Dinas Agraria* and *Dinas Perkebunan Propinsi Lampung* declared that two villages (Indraloka Village and Bujuk Agung Village) were located on 3,000 ha of land that had been designed for the establishment of tree crop plantations on the west part of the main road . Eight villages were placed in 7,000 ha of land established as tree crop plantations in east of the main road.

The ten villages defended their land. They protested against the government to guarantee a strong tenure for their land. In June 1990, the military arrested the leader of these communities. The military forced him to sign a letter of agreement. In this agreement, the area of 3,000 ha west of the main road was allocated for local communities and the area of 7,000 ha in eastern part of the main road was allocated to tree crop companies. All residents who occupied the 7,000 ha east of the main road had to move to Bujuk Agung Village or Indraloka Village. Each household was to receive one ha of land. However, almost all communities rejected that agreement. They remained on the land designated for the commercial plantations.

The government again implemented an inconsistent land policy. In February 1991, the Governor of Lampung decided to implement an intensification program for soybean production (*Opsus kedelai*) in Dewa Agung village, one of the villages that has a tenure conflict. The Governor of Lampung at that time came to this village and proclaimed an the intensification program. This government policy was surprising to the communities. People thought that The Government would recognize and the legitimize their land claim. Unfortunately, the Government announced that the selection of Dewa Agung Village for the intensification program of soybean was mistake and the program was cancelled.

On October 28, 1991, the Governor of Lampung issued a decree (No.300/5342/G.Sospol/91) containing guidelines for solving tenure conflicts between tree crop plantations and communities. According to that decree, each household who already lives on the 10,000 ha of land allocated for the tree crop plantation will received 2 ha of land. The land was to consist of 0.25 ha for the house and home garden, 0.75 ha for upland food crops and 1 ha for tree crops under a nucleus-estate smallholder Scheme (PIR). The resettlement of the villages would follow the transmigration scheme. During the first four months, PT. BNIL was to provide 40 kg of rice per month and for 3 months the Dinas Transmigration was to provide 50 kg rice per month. The government was also to establish public infrastructure such as a market, a clinic (*Puskesmas*), a Mosque, and other public facilities. The resettlement area is located on 3,000 ha of land on the western side of the main road. However, if farmers who had already lived on the 3,000

ha of land had more than 2 ha of land then they should release their extra land. They received compensation of Rp.100,000.00 per ha.

In 1992, 1,570 households from seven villages were reallocated to Bujuk Agung Village (621 households) and to Indraloka Village (949 households). (While the original number of households in Bujuk Agung Village was 690 households and in Indraloka Village was 810 households). On January 6, 1993, the Governor of Lampung formally recognized the villages of Bujuk Agung Village and Indraloka Village and granted 6,717 ha of land to the tree plantation company (PT.BNIL). In 1992/1993, PT. BNIL started to clear the land and planted hybrid coconut and oil palm. To date, PT. BNIL has established 3,500 ha of coconut hybrid and 2,700 ha of oil palm.

4.2.5. Land Tenure Conflict Post Reformasi Period

In fact, the problem of land tenure conflict has not yet been solved. Not all households who lived in the seven villages received land. The tenure conflict committee categorized about 1,970 households as not being eligible to receive compensation for the 2 ha of land. Most of household who lost land, went back to their original home places. Farmers, who should have received 2 ha of land, in fact only received 1 ha of land. PT. BNIL refused to give 1 ha of land under the nucleus-estate system because they argued that the company had already paid Rp. 100,000.00 per ha to 1,500 farmers. However, farmers denied that they sold the land. They admitted that they received Rp. 100,000.00 and they signed a signature on a blank receipt. They believed the money that they received was a substitute for the rice grant.

Farmers feel or perceived injustice and loathed tree crop companies because during the process of resettlement, the company used the military to intimidate them. The "*Reformasi*" in Indonesia in mid 1998 provided a chance for communities on this site to claim their land and to reap revenge for their perceived injustice.

On September 1998, local communities claimed the land of the tree crop plantations. About 200 people built houses between the rows of hybrid coconuts. The people who built houses and claimed the land in the areas of tree crop plantation increased by 500

people in early 1999. Beside the former resident of 10 villages, there are also other people (about 55%) who came from other sites of Lampung came and claimed the land in the study site. Some of the people are relatives of the former residents of the 10 villages and some of them purchased that land from the former resident of the 10 villages.

The plantation company used military and private guards (PAM Swakarsa) to burn the illegal houses built by local communities and to protect the areas of tree crop plantation. On April 14, 1999, around 7,000 people attacked and burned the office of this tree crop plantation. The battle between local communities and military plus PAM Swakarsa resulted in seven deaths. Local communities again rebuilt houses in the areas between coconut hybrid. More people claimed and rebuilt houses. They planted cassava, corn, and ground nut around their houses. The land tenure conflict is still continuing.

5. CONCLUSION

This study revealed that there are two main underlying causes of fire on this site. Firstly, fire resulted from land tenure conflict between local community and large companies. The evidence of fire due to land tenure conflict has increased since mid-1998, with the "*Reformasi* period". The study found more evidence that smallholders not only has weak incentives to control fire from spreading out into tree plantation belong to large companies, but they also used fire as a weapons. This includes acts of arson against large-scale plantations. In addition, farmers also used fire in agricultural activities in land conflict and for land speculation. It is likely that as land tenure conflicts increase in Indonesia, the areas of land affected by resulting fires will increase in the future in areas where plantation was allocated and maintained with force under the Soeharto regimes.

Secondly, fire used as a strategy in "traditional" land management in rice cultivation in swamp areas. This rice farming system is called *Sonor* and to practiced by local Mesuji people only during the drought season. Establishment of transmigration settlements in swamp areas has expanded swamp burning under *Sonor* system. Fire due in this traditional land management system will repeated every drought season.

ACKNOWLEDGMENTS

This research is supported by USFS, CIFOR and ICRAF. We thank Mufti Mubarak Akhmad, IPB student, for his excellent field works in the swamp area in our site. We would like to thank Grahame Aplegate, Judith Meyer and Ronna Dennis for providing insightful comment and edited the manuscript.

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