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PAPER PRESENTATIONS

TOPIC I: FOREST, AGRICULTURE AND PEOPLE

PAPER A1 - Importance of Social Capital for Community Empowerment to Ensure Household Food Security of the Agroforestry Farmers in Wan Abdul Rachman Grand Forest Park

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ABSTRACT

Ensuring food security is a fundamental challenge facing the government. Empowering the local people to be able to secure access to food - as an important condition to ensure food security - is another challenge. Hence, the inherent power of the local communities to adapt and manage their own resources for their survival is important to be highlighted. In such case, social capital is an important concept that deserves attention and should become an emerging issue in community empowerment. This paper examined the potential relationship between social capital and food security. Research was conducted in the Villages of Sumber Agung, Batu Putu, and Talang Mulya within the Wan Abdul Rachman Grand Forest Park Protected Area of Lampung Province. Data was collected employing the methods of interviews, field observation and literature studies. Respondents were selected among agroforestry farmers using random sampling. Results of the research indicated that among the three elements of social capital studied, *i.e.*, trusts, norms and social networks, trust and social networks formed the two most crucial factors in determining the success of household food security for the agroforestry farmers of Wan Abdul Rachman Grand Forest Park. The presence of local leaders, maintenance of good relationship between the local people, with the manager of the Grant Forest Park as well as increased level of networking proved to enhance food security of the villagers. The results also indicated the necessity to provide enabling conditions where community could build social capital and using social capital to empower themselves.

Keywords: agroforestry, community empowerment, household food security, social capital, social network, trust

1. INTRODUCTION

Food is one of the factors that determine why the poor take decisions to spread risk and how they finally balance competing needs in order to survive. Many of the rural poor are subsistence producers, family farmers or landless agricultural workers, including fishermen, pastoralists, and forest-dependent peoples with limited access to productive means. Poor on-farm resources such as limited productive land and low access to agriculture inputs, have driven rural families to increasingly depend on off-farm incomes, which is their way out of poverty when the rural economy is thriving. Hence, it can be said that sustainable development in rural areas, is actually about food security (Sunkar, 2008).

Although food security in various literatures is often associated with the availability of local food production, Sen (1981) argues that a household's food security status would also be

dependent on the ability of the community to access food, not only from own production but also food purchased from the market using its own assets. In the same line, EIU (2012) states that food insecurity in Indonesia is not necessarily due to unavailability of food, but rather due to lack of affordability and vulnerability to food price shocks. High prices make food less affordable for consumers. Those, for whom food consumption makes a significant portion of household expenditure, are the most vulnerable to higher prices (EIU, 2014).

The ability to purchase food links to income. Most rural households' incomes in developing countries depend directly or indirectly on agriculture. Hence, for these households, income plays a very important means to secure food. A relatively small temporary reduction of income would mean that the household would consume less food than is required to maintain a healthy and active life (Zeller *et al*., 1997). This is one of the important condition enabling food security as stated in Rome Declaration on World Food Security at World Food Summit (1996), i.e., "Food security exists when people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life".

The nexus between income and food security is thus important for a rural community survival, specifically where local food crop production is not an option. Such condition can be found among the agroforestry farmers of Wan Abdul Rachman Grand Forest Park who are given the rights to practice agroforestry inside a state protected area. The agroforestry lands are only allowed to be planted with cash crops and cannot be planted with food crops. Thus, cash crops are an integral part of strategies to improve food security for the households in this area. By selling their cash crops on markets, the households generate income that improves their accesses to food. On the other hand, communities with increased specialisation in cash crops will face a drop in incomes during harvest failure, when prices fall, or lack or minimum access to market. Such income slump will have consequences for their food security status (Achterbosch *et al*., 2014), which could eventually lead to food insecurity.

Food insecurity is an indicator of poverty and social capital is said to be able to significantly alleviate poverty. Research by Dzanja*et al.* (2013) specifically concludes that social capital has positive influence on household food security. The linkage between social capital and food security, is however, has not been extensively studied. This paper will look at the importance of social capital in ensuring food security of the cash crops agroforestry farmers of Wan Abdul Rachman Grand Forest Park of Lampung Province in Indonesia, with focus on the contribution of agroforestry to the local income-generation.

2. EXPERIMENTAL METHOD

2.1 Time and location of research

The research was conducted in Wan Abdul Rachmad Grand Forest Park, Lampung Province of Indonesia from May-July 2014. Specifically, the research took place on the social forestry and reforestation block within the Grand Forest Park.

2.2 Sampling procedure and size

Sampling procedure involve a multi-stage sampling. Sample villages were selected based on the following criteria (1) directly adjacent to the Grand Forest Park; (2) the local population are practicing agroforestry within the social forestry and reforestation block; and (3) has the characteristic of developing, moderately developing and under developing economies. The villages selected were, Sumber Agung, Batu Putu and Talang Mulya Villages respectively. The

unit of population sampled selected was agroforestry household. A simple random sampling technique was used to select respondents out of all the agroforestry farmers. To determine the minimum amount of population that must be acquired, Paul Leedy formula (Arikunto, 2010) was used (Equation 1), while the total number of respondents within each village followed Walpole formula (Equation 2) as follows:

$$n = \frac{Z^2 .p\,(1-p)}{e^2} \quad (1)$$

Where:
n : size of sample
p : the estimated proportion of cases in the population
e : the proportion of sampling error in a given situation
z : the standard score corresponding to a given confidence level

$$n_{village} = \left(\frac{N_i}{N}\right) x\, n \quad (2)$$

Where:
$N_{village}$: number of individuals in each village
Ni : number of i^{th} population in a village
N : total population
n : population size

The use of Equation 1 and 2 gave the total number of respondents as shown in Table 1.

Table 1: Total number of samples

No.	Village name	Sub-district	No. of household	No. of household sampled
1.	Sumber Agung	Kemiling	499	43
2.	Batu Putu	Teluk Betung	251	22
3.	Talang Mulya	Padang Cermin	398	34
	Total		1148	99

2.3 Data Collection Technique

Both primary and secondary data were collected. Primary data included household income, social capitals comprised of trust, norms and networks elements, expenses from both agroforestry and non-agroforestry practices, and agroforestry plants composition, which were collected from direct observation and interviews. Secondary data included social-economic condition of the village samples collected through literature studies from periodic reports and publications from local authorities, institutions, government offices and websites.

2.4 Data Analysis

Data collected were analysed to determine agroforestry contribution on the farmers' household income. The total income was calculated as the sum of total income from agroforestry and non-agroforestry practices, whereas total expenses were calculated as the sum of total expenses for food and non-food.

3. RESULT AND DISCUSSION

3.1 Agroforestry Practice in Wan Abdul Rachman Grand Forest Park

Prior to its establishment as a Grand Forest Park, Wan Abdul Rachman Grand Forest Park was previously a protection forest. Due to the increasing pressure on expansion of local monoculture and settlement, the protection forest was converted to a Grand Forest Park. As a result, the increasing surrounding local population faced limited productive land. Population density followed by low ability to purchase land, have triggered them to occupy the productive land inside the Grand Forest Park. The transmigration programme to place these people to other areas has produced no results, due to low land productivity of the new place. Instead, they came back to occupy their old land and demanded that they were given the rights to work the land inside the Grand Forest Park under the Social Forestry Scheme. Responding to this, since 2000, the Provincial Forestry Office of Lampung in collaboration with NGO and local university has helped the local communities to work the land inside the Park, employing agroforestry practices on the Park's block that is intended for social forestry and reforestation development.

Agroforestry practice inside the Grand Forest Park was realized by lending a total of 2,304.03 ha of land or 10.45% of the total Grand Forest Park to the surrounding agroforestry communities, to be planted with forest trees and cash crops. Since it is a protected area, food crops are not allowed to be planted. Fruits were the main commodities for trade while forestry trees were used for reforestation and shades. The tree species planted were mostly comprised of jackfruit (*Artocarpus heterophyllus)*, durian (*Durio zibethinus)*, clove (*Cinnamomum burmanii*), tangkil (*Genetum gnemon*), petai (*Parkia speciosa*) and calliandra (*Caliandra* sp.), with durian and tangkilas the dominating tree species, while the dominating cash crops are coffee (*Coffea arabica*) and kakao (*Theobroma cacao*).

3.2 Agroforestry and Off-farm Contributions to Household Income

Dawson *et al.* (2013) observed that among the benefits that agroforestry supports is raising farmers' income. Similarly is the conclusion by Idumah & Akintan (2014) who urged the young to go into farming based on their study that agroforestry is very profitable and a ready source of food supply. In the studied villages, agroforestry also contributed to the household income as depicted in Table 2. Table 3 clearly indicated that Talang Mulya has the highest dependency on agroforestry, owing to a total of 62.79% of the total income and the least dependency on agroforestry for Sumber Agung Village with only 31.32%. Asmi *et. al.*, (2013), in their research, conclude that as much as 91.44% of the total income of the agroforestry farmers in Pesawaran Indah Village of Wan Abdul Rachman Grand Forest Park were attained from agroforestry.

Results on Table 2 were related to Figure 1. As much as 56% out of the total agroforestry farmers in the three villages had alternative income. Figure 1 portrays the number of agroforestry farmers with secondary jobs to be 62.79%, 54.55% and 47.06% in Sumber Agung, Batu Putu and Talang Mulya Villages respectively. Sumber Agung Village has the most population with secondary job as compared to Talang Mulya who had the least. The ability to have off-farm income puts an individual to spread their income from other sources. Since local food production is not an option in the Grand Forest Park, therefore food security within the area would depend on the power of the people to purchase food (food affordability power). The total land area leased to the community is fixed, meaning, it will not be expanded despite the local population increased. Therefore, as a strategy for survival, the people relied on non-farming (off-farm) jobs for additional incomes.

Table 2: Contribution of agroforestry on total annual household income

Village	Income from agroforestry [Rp/household/year]	Total income [Rp/houehold/year]	Agroforestry contribution [%]
Sumber Agung	9,592,732	30,632,848	31.32
Batu Putu	5,376,137	11,685,682	46.01
Talang Mulya	7,512,647	11,965,647	62.79
Average	**7,493,839**	**18,094,726**	**41.41**

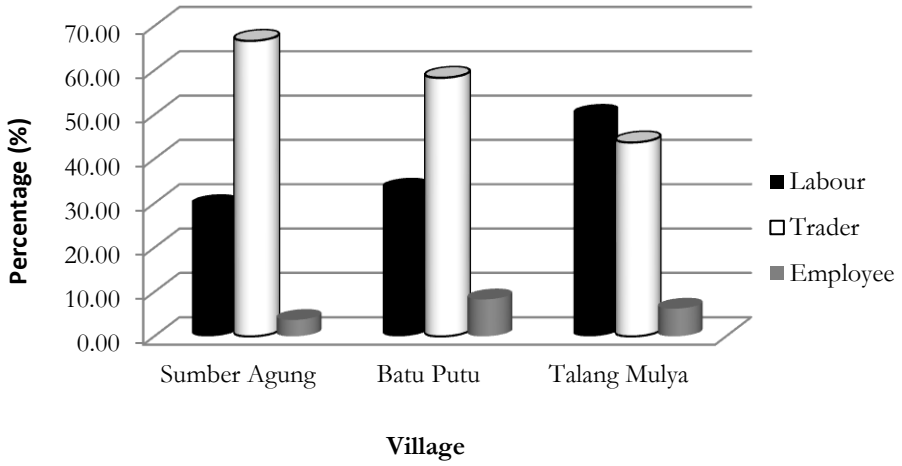

Figure 1: Distribution of non-agricultural occupation among the three studied villages

Figure 1 indicates that trading is the most common occupation found in Sumber Agung Village which suggested that Sumber Agung Village is the most accessible to markets. This is also justified by the fact that Sumber Agung Village received the highest total income, with significant non-agroforestry (Table 3) sources, and enjoyed the highest income from agroforestry as compared to Batu Putu and Talang Mulya Villages (Table 4).

Table 3: Total annual household income

Village	Total annual income from agroforestry [Rp/household]	Total annual income from non-agroforestry [Rp/household]	Total Income [Rp/household]
Sumber Agung	9,592,732	21,040,116	30,632,848
Batu Putu	5,376,137	6,309,545	11,685,682
Talang Mulya	7,512,647	4,453,000	11,965,647

As depicted in Table 4, it is clear as to the reason that Sumber Agung Village received the highest income from agroforestry practice. Unlike Batu Putu and Talang Mulya Villages, Sumber Agung Village has the most diverse cash crops with various harvesting periods. This would allow the households to be able to receive income. Table 4 also indicated that coffee and cacao are the two most main prime commodities in all villages. This was due to the fact that both commodities have good market prices. The close distance to the market that

Sumber Agung enjoyed, also provided other benefits such as easier access to education and less transportation expenditures (Table 5).

The results were in line with previous research on the contributions of off-farm incomes. Babatunde & Qaim (2010) showed that off-farm income contributes to improved calorie supply at the household level. Owusu *et al.* (2011) also showed that off-farm work can exert positive effect on household income and food security status. These views indicate that off-farm work is crucial to attain food security.

Table 4: Total annual household income from agroforestry crops in each village sample

Crop	Sumber Agung [Rp/household/yr]	Batu Putu [Rp/household/yr]	Talang Mulya [Rp/household/yr]
Coffee	3,278,488	1,677,273	3,518,382
Cacao	2,503,605	2,176,136	2,973,529
Tangkil	988,837	270,455	711,765
Rubber	2,180,640	1,161,364	128,824
Clove	362,791	-	180,147
Petai	50,930	90,909	-
Jackfruit	33,953	-	-
Durian	60,465	-	-
Duku	55,814	-	-
Avocado	77,209	-	-
Candle nut	69,767	-	-
Total	**9,592,732**	**5,376,137**	**7,512,647**

One important result depicted by Table 5 was that Sumber Agung people were able to have savings, implying that the total income exceeded the total expenses, signifying that Sumber Agung Village as the most prosperous among the three village studied. Table 5 revealed that most of the expenses were on food, suggesting that access to food is very important. Table 5 also showed that Talang Mulya Village has the highest expenses. Talang Mulya is located furthest from market which resulted in a higher transportation cost to sell agroforestry produces. Furthermore, such long distance has resulted in the increase of food prices and other commodities. This has made the population of Talang Mulya Village to spend of their income for food as seen in Table 5.

Table 5: Details of household expenses in the three villages studied

Type of expenses	Sumber Agung [Rp/household/year]	Batu Putu [Rp/household/year]	Talang Mulya [Rp/household/year]
Food	12,302,326	11,528,409	14,922,059
Clothing	856,977	477,273	538,235
Health	353,953	561,182	348,824
Education	1,051,093	40,909	194,412
Transportation	1,664,150	2,991,409	3,044,324
Electricity &water	877,195	1,084,636	633,618
Agroforestry maintenance	481,212	239,818	682,353
Savings	233,721	-	-
Recreation& social	83,333	-	-

matters			
Total	17,903,960	16,923,636	20,363,825

Markets and trade increased access to food thus contribute to achieving food security (Hebebrand *et. al.,* 2010). As illustrated by Simmonds (2006), one major causes of food insecurity in Malawi is long distances to markets. On the contrary, research by Tembo & Simtowe (2009) found that most of the rural households in Malawi that were food secure had no market access. Unfortunately, in the face of lacking food crop own production, one way to ensure food security in Talang Mulya Village is to increase access to market.

3.3 Social Capital and Community Empowerment to Enhance Food Security

There are two most obvious solutions to increase food security in the villages studied, i.e., to increase access to market through development of infrastructures and diversification of off-farm works. Both would require financial resources, which often not cheap. Tibesigwa *et. al.* (2014) suggest that an easier, cheaper and more accessible alternative to household coping strategy is to strengthen their social capital. Similar suggestion was also forwarded by Chen *et al.* (2013) that higher social capital in a farm household has significantly increases their adaptive capacity against environmental perturbation. Social capital is believed to enable households to gain access to needed supplies and allowing them to work together for increased efficiency and security. Therefore, social capital is an important concept underlying socio-economic and its broader context of food insecurity (Misselhorn, 2014). Various forms of collective action, as one form of social capital, have also been a central mechanism for improving market access and productivity of smallholder producers, (Ahuja & Staal, 2013).

Strengthening a community social capital would mean empowering the community, because social capital is about building community confidence of their own power to manage their environment. Community empowerment involves all efforts made by a group of people, with or without external support, to be able to continue to develop their capacity or potential for the improvement of their quality of life, independence and sustainability. It can be interpreted as a process that builds community through the development of human or community capacity. In order to be successful in empowering the community, it is important to have some basic understanding of the social organisation, social levels, and the community itself. It is also important to recognise the relationships between individuals, between individuals and community groups, and between communities (social capital).

In all the three village studied, trust, norms and social networks were observed. One of the most fundamental needs of human beings is development of the sense of trust—the belief that you can rely on and believe in others to do what is expected. In all the villages, trust is showed toward the manager of the Grand Forest Park (Provincial Forestry Office) as well as to the local leaders. Trust is the foundation of moral behaviour on which social capital is built. The trust that the communities in the three villages established has well taken them to function socially well. Building trust toward the manager of the Grand Forest Park started when the community were given the rights to work on the agroforestry land. So it was clear that economic motivations formed the level of trust. The community have since followed the rules given by the manager. In fact, the communities would conduct meeting in case of any regulations being violated. The ability to maintain trust has empowered social cohesion between the community members themselves. In addition, this is also due to the presence of local leaders, most of whom are religious leaders. In times of price falling or harvest failure, trust increases the possibility for exchange of resources, skills and knowledge.

Although maintenance of group norms will strengthen the communities' social capital, the norms found within the three villages were similar and thus insignificantly related with food security within each village. The social capital that showed the strongest effect was social networks. Although in all three villages, they have established certain networks, however, the location of Sumber Agung Village which is the most accessible, has given it more advantages. Trading of cash crops accelerated the building of local association and thus empowers the individual within the group. The trust toward outsiders proved to enhance the communities to develop networks, such as easier network for trading due to easy access to markets, networking with the University of Lampung were also more frequent. Social networks are indispensable for increasing food security. Strong positive relationships within and between social groups could significantly increase collective action. Hence, social capital would build on community empowerment, which in turn will increase food security.

4. CONCLUSION

Food security for local people with lack of productive lands and lack of land tenure would depend on the income of the people and their access to food, including affordability to purchase food. The results of the study showed that although agroforestry is practiced on the state land and intended only for cash crops, it has the potential to be a profitable activity that can help the local community to become food secured.

In all three villages, access to food determined the status of their food security. Cash crops like cocoa and coffee, and also vegetables, offer income and employment opportunities to the rural economy. In addition, cash crops accelerate the build-up of institutions that enable further commercialisation. It has been argued that local institutions functioning at community level and social capital have their role in maintaining food security at household level. As any farming activity, cash crop agriculture requires the management of various types of risk such as soil degradation and price variability. The agroforestry farmers employ several adaptive and risk reducing strategies, for instance in Sumber Agung Village, by diversifying crops to cope with risks of harvest failures, price slums or loss of market access.

Social capital has positive influence on household food security through strengthening of community empowerment. These are especially necessary to enhance the capacity of the villagers to stand against any environmental and economic changes. Apart from increased market access, off-farm work and incomes play crucial roles in enhancing food security for all agroforestry farmers of Wan Abdul Rachman Grand Forest Park.

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PAPER A2 - Effect Filter Cover of Seedlings in Direct Inoculation Screening of *Uromycladium tepperianum* for *Falcataria moluccana* Disease Tolerant

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ABSTRACT

Effectively of direct inoculation screening of *F. moluccana* to gall rust disease tolerance in nursery needs to be proved in un-cultured pathogen like *U. tepperianum*. This technique requires accurate simulation of natural environmental conditions for disease infection to host target. The aim of this study is to observed effect of filter clear poly bag cover in direct inoculation screening of *F. moluccana* by fresh *U. tepperianum* spores as inoculums. Three months old of *F. moluccana* seedlings were used as host target. This research was designed as four groups of cases, seedlings with cover and non-cover, gall rust from 400 m asl and from 800 m asl altitudes sites. Each group comprises three families with 10 individual seedlings as replication. There were significant differences in percentage of galled formation at all treatments among family 1 and total families, but no significant effect at family 2 and 3 on NC400 and NC800 treatments. The highest seedlings percentage of gall rust formation (94.2480 % ± 1.97468) was in Family 2 with source of inoculums from 400 m asl. *U. tepperianum* spores from lower altitude site source can more able to formed gall rust than the higher altitude site.

Keywords: F. *moluccana,* U. *tepperianum*, gall rust, filter paper, direct inoculation, screening

1. INTRODUCTION

Use of disease tolerant/resistant plants is the ideal method to manage plant diseases, if plants of satisfactory quality and adapted to the growing region with adequate levels of durable tolerance are available. The use of disease tolerance plants eliminates the need for additional efforts to reduce disease losses unless other diseases are additionally present. Tolerant plants are usually derived by standard breeding procedures of screening (Fry, 1982; Arneson, 2001; Maloy, 2005).

On a global scale, some of the most serious fungal plant pathogens are obligate biotrophic parasites (Brown & Hovmøller 2002). Obligate biotrophic *U. tepperianum* - *F. moluccana* interactions were the main obstacle of gall rust disease tolerant screening. The term obligate biotroph characterizes a specific lifestyle in which the host suffers only minor damage. The pathogen in turn is dependent on the living host plant to complete its life cycle (Staples 2000). *U. tepperianum* produces teliospores which have ridged longitudinal striations, with three spores on each head. The size of the teliospores ranged from 13-18 µm wide and 17-26 µm long. The teliospores cannot themselves infect the host; they have to germinate to produce basidiospores, which are formed at least 10 hours after inoculation. Then a penetration peg was formed by a matured basidiospore 16 hours after inoculation, penetrates the host cells directly through the epidermis. Seven days after inoculation, vegetative mycelia of this gall-

forming rust give rise to pycnia, recognized as small brown pustule which breaks through the epidermis. The typical symptom of gall rust disease on the seedlings is the bending of the stem or shoot, either with or without the formation of a dark red necrotic lesion (Rahayu, 2007).

Symptoms of the disease begins with local swelling (tumefaksi) in the affected part of the plant (leaves, branches and stems), further swelling turned into lumps which then became a small pimple or called gall. Arising galls have varied from round to form irregular diameters ranging from a few millimeters to greater than 10 cm. The galls can be grouped or spread on the affected areas. Young gall green light brownish covered by a layer of powdery slightly reddish color which is a collection of spores. Old gall reddish brown to black, usually the gall is porous or perforated, and is used as a nest of ants and other insects. When the diseased section of the petiole compound or canopy, that part a little bent because of thickening and swelling, then roll up the canopy leaves change shape (malformations) no longer leaves. If the plants have severe attacks, then the whole plant is filled by the gall, then the leaves dry up experiencing hair loss, followed by the trunk and branches of trees and plants eventually die (Anggraeni, 2008).

The germplasm screening methods can be classified into (i) direct intact or live plants, (ii) direct detached plant organs, and (iii) indirect approaches (Steadman *et al*., 1997; Olivier *et al*., 2008). Excised common inoculation of *F. moluccana* has been performed on direct inoculation using fresh gall rust spores suspensions (Morris, 1987; Kull *et al*., 2003). Effective screening for disease resistance requires accurate simulation of natural environmental conditions where plants are exposed to the inoculums (Porta-Puglia & Aragona, 1997). Optimum inoculation and incubation conditions should be established so that susceptible and resistant genotypes can be easily differentiated (Infantino *et al*., 2006).

Limited availability of space is often the major constraint to screening in environment control. Disease evaluation in controlled conditions is often used to identify resistant breeding material during non-crop periods, but may also be used to confirm the reaction of tolerant/resistant genotypes identified in the field or for characterization of pathogen variability (Infantino *et al*., 2006). Screening in the greenhouse or nursery without plastic cover allows challenging inoculums in interaction with other phytopathogenic organisms. Even though a major problem using plastic covers are high moisture, low respiration and the opportunity for cross-contamination via the wet surface (Narciso, 2008).

Filter papers were used for numerous laboratory applications filtration and exhibit such large proportions of bacteria and spores in air flow or liquid. Filter paper was first used as a scientific tool in 1815 by the Swedish chemist Jöns Berzelius. Over the last 50 years, filter paper has gained an increasingly important role as a substrate for the diagnosis and surveillance of infectious diseases (Smit *et al*., 2014). Efficiencies for air filtration are normally expressed as percent penetration or retention for a stated airborne particle size. Particle size for bacteria is between 0.22 μm – 30 μm and 3.3 μm for spores (General Electric Company, 2013). Filter paper on plant screening plastic cover can establish natural environmental conditions for disease target development like humidity, respiration and temperature, without interaction with other phytopathogenic organisms.

2. EXPERIMENTAL METHOD

2.1 Seedlings and gall rust spores material

Sengon seeds were collected from Wamena, Papua. Seedlings direct inoculations were observed in tissue culture nursery, Center of Forest Biotechnology and Tree Improvement at Kaliurang, Yogyakarta ($7^0$35'50.44" SL and $110^0$25'35.54" EL), 800 m asl. altitude, 21 ^{0}C daily average temperature, 85 % daily humidity, 28-9200 lux daily light and daily win speed 0-0.4 m/s. Gall rust as *U. tepperianum* as spores source collected from 2 site of sengon society forest, Kaliurang, Yogyakarta ($7^0$35'50.44" SL and $110^0$25'35.54" EL), 800 m asl, altitude and Tridadi, Yogyakarta ($7^0$41'83.28" SL and $110^0$21'97.82" EL) 800 m asl. Research activities were observed from 2012 until 2014.

2.2 Filtered nursery direct inoculation

Direct inoculation in this research was based on Morris (1987) and Kull *et al.* (2003) method with some modifications. Fresh spores were inoculated directly into all parts of healthy 3 months old seedling, two times for a week. Concentration of spores predetermined by haemocytometer at least $1x10^5$ spores/ml in sterilized water containing 0.2 ml/l Tween^{20} (polysorbate surfactant), stability and relative non-toxicity emulsifier. After inoculation, the seedlings covered by perforated clear poly bag with Watman^{20} filter paper for 14 days. During incubation, seedlings moisture was maintained by capillarity system with water in the beds. Pest prevention was maintained by spraying insecticides in nursery every 1 week (Figure1).

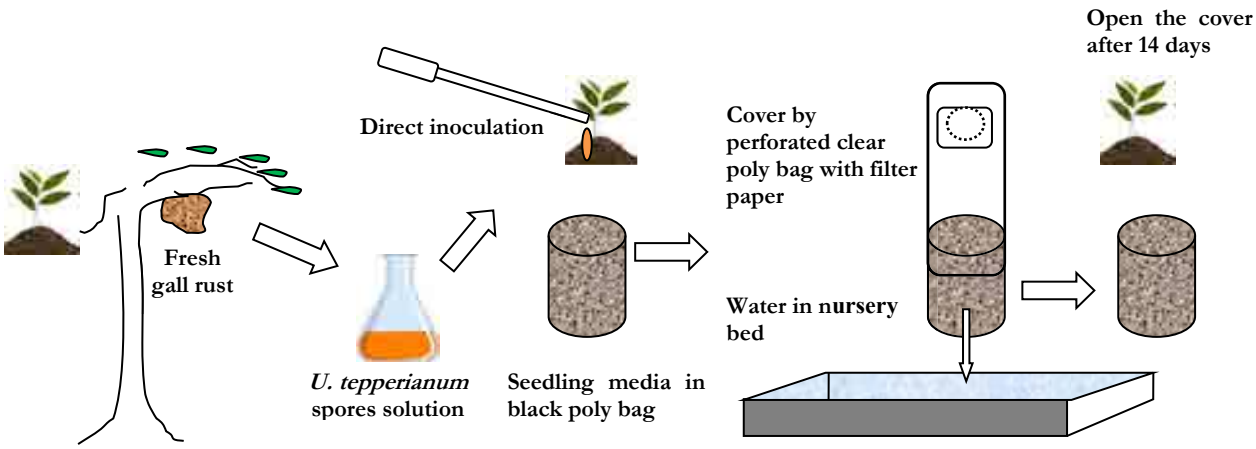

Figure 1: Direct inoculation in nursery of obligate biothropic pathogen

2.3 Design experiment

This research was designed as four groups of cases, seedlings with cover and seedlings with no cover, gall rust from 400 m asl and from 800 m asl altitudes sites. Each group comprises of three families with 10 seedlings as replication. Parameter of this observation was percentage of seedlings that attacked by gall rust. All treatments were compared with control. The group means data were analyzed using post hoc tests in the Analysis of Variance (ANOVA), if significant differences existed between the treatments, then groups will be analyzed using Duncan's multiple range tests.

3. RESULT AND DISCUSSION

Direct inoculation technique for each of the two sources of *U. tepperianum* spores was used to infected *F. moluccana* seedlings individually. Figure 2 illustrated calculated and inoculated the

fresh spores with filter poly bag cover and one month after the cover is opened. This directs intact inoculation application was modification technique for *U. tepperianum* live plants in nursery for screening disease tolerant. Successful screening for disease tolerant is based on the availability of precise and accurate screening technique (Infantino *et al.*, 2006).

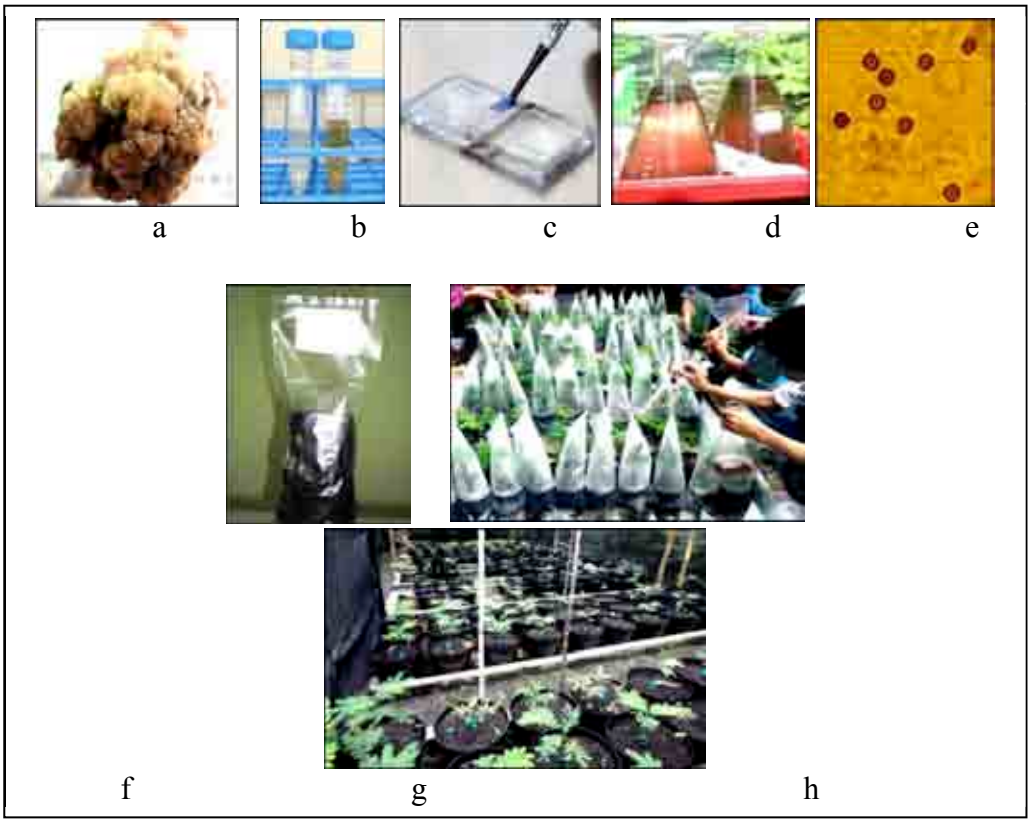

Figure 2: Gall rust of sengon with red-brown spores (a), fresh spores sampel in sterilized water (b), spore calculation with haemacytometer (c), sterilized water containing 0.2 ml/l Tween[20] and at least $1x10^5$ spores/ml (d), microscopic observation of *U. tepperianum* spores (e), seedling media polybag covered by perforated plastic bag with Watman[20] filter paper (f), seedlings inoculation and covered by filtered perforated plastic (g), sengon seedlings after one month inoculation (h).

Table 1: Descriptive statistic of each sengon family separately and the treatments

Factor	Treatments (%) ± SE*			
	C400	C800	NC400	NC800
Family 1	86.9590 ± 3.79931	52.0590 ± 2.23692	20.0250 ± 1.22679	10.1620 ± 0.42476
Family 2	94.2480 ± 1.97468	54.2720 ± 3.02714	15.9250 ± 1.78243	10.4530 ± 0.40555
Family 3	89.1140 ± 3.43941	54.3730 ± 2.66821	16.2350 ± 1.61897	10.4270 ± 0.42460

**Standard error of the mean*

The descriptive statistic for each family separately and the overall treatments were shown in Table 1. The result showed the highest percentage of seedlings that attacked by gall rust was in C400, followed by C800, NC400 and the lowest was NC800 treatments for all families. It is often difficult to achieve high and uniform pathogen pressure in the field year after year to permit adequate evaluation of plant germplasm for disease avoidance or physiological resistance because both are confounded under field conditions (Miklas & Grafton, 1992). The

micro environments like filter cover at nursery in this research can be expected to reduce the difficulty of plants disease screening to discriminate between physiological resistance and plant architectural avoidance of pathogen.

Table 2: Resume of ANOVA test results for percentage of seedlings that attacked with gall rust disease

Source of Variation		Degree of Freedom	Sum of Squares	Mean of Square	F	Sig.
Family 1	Between Groups	3	36186.910	12062.303	228.409	0.001**
	Within Groups	36	1901.165	52.810		
	Total	39	38088.075			
Family 2	Between Groups	3	45436.787	15145.596	369.303	0.001**
	Within Groups	36	1476.405	41.011		
	Total	39	46913.192			
Family 3	Between Groups	3	40323.551	13441.184	247.192	0.001**
	Within Groups	36	1957.521	54.376		
	Total	39	42281.072			
Control		3	0.001	0.001		

*** Significant at 95% confident interval level*

Table 3: Resume of Duncan's Multiple Range Test results for percentage of seedlings that attacked with gall rust disease.

Treatments	Subset for alpha 0.05			
	a	b	c	d
Family 1				
C400	86.9590			
C800		52.0590		
NC400			20.0250	
NC800				10.1620
Family 2				
C400	94.2480			
C800		54.2720		
NC400			15.9250	
NC800			10.4530	
Family 3				
C400	89.1140			
C800		54.3730		
NC400			16.2350	
NC800			10.4270	
Total Family				
C400	86.9590			
C800		52.0590		
NC400			20.0250	
NC800				10.1620
Control	0.000	0.000	0.000	0.000

Remarks: Numbers followed by different letters, a, b, c or d in the same column indicate significant differences (P<0.05) according to Duncan's Multiple Range Test.

ANOVA test, determine the effect of treatments to the percentage of seedlings that attacked with gall rust disease (Table 2), indicated the significant effect of filter cover, the inoculums sources and the combination of these treatments individually between sengon families.

More specific from the further test using Duncan's Multiple Range Test (Table 3), it was shown that all treatments at family 1 and total family had significant effect but at family 2 and 3 had no significant effect on NC400 and NC800 treatments. This result indicated that the site of inoculums source have a role of pathogen infection and gall rust formation. The severity of this disease depends on the interaction of the gall rust fungus, host response, and environmental conditions. The disease developed rapidly is probably due to favorable environmental conditions (Franje *et al.*, 1993; Braza, 1997; Old & Cristovao, 2003).

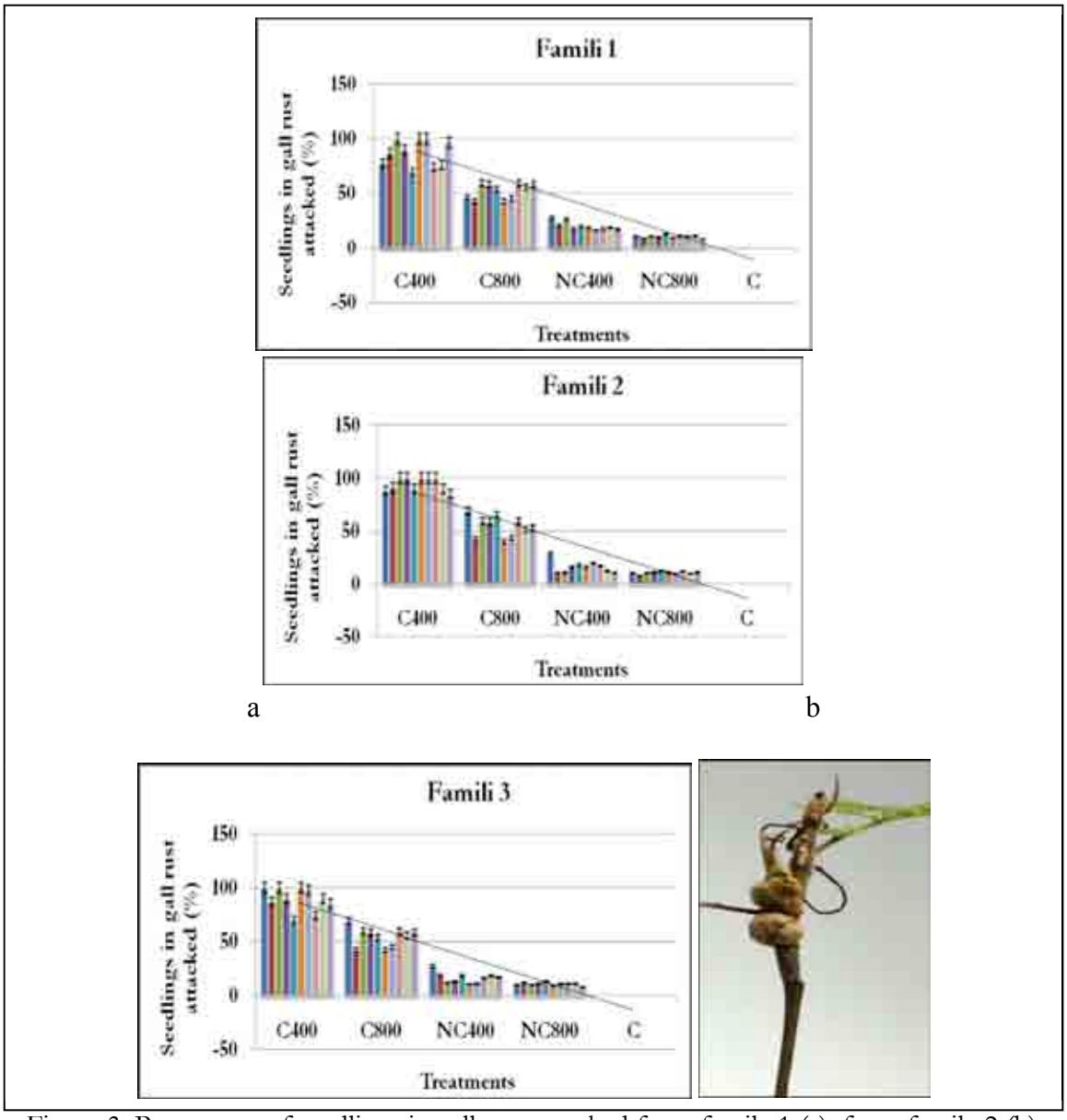

Figure 3: Percentage of seedlings in gall rust attacked from family 1 (a), from family 2 (b), from family 3 (c), stem of sengon seedling attacked by gall rust (d) and petiole of sengon seedling attacked by gall rust (e)

Fresh spores of un-cultured biotrophic pathogen from nature have a limited life time outside the host, thus the study of this technique is important to obtain accuracy of infection in fast incubation. This direct inoculation technique indicated that filtration through common filter paper (Whatman 40) on clear poly bag cover of seedlings have higher percentage of gall rust attacked. The inoculations technique led to gall rust formation during 9 months incubation for all families and treatments but there was no attacked at all in control. Figure 3 shown that percentage of seedlings in gall rust attacked has similar trend line in sengon family 1, sengon family 2 and sengon family 3. These similarity shows that the technique can be repeated in more than one population. Repetition is the requirements for the validity of new technique or modification technique. However, the technique must be observed for other un-cultured biotrophic pathogen in interaction with specific host plant.

Plants have the ability to continuously respond to various stimuli which alter their physiology, morphology and development. These range stimuli are from essential to toxic in their effects (Tugizimana *et al*., 2012). A clear and broader understanding of *F. moluccana* tolerant for gall rust screening that caused by *U. tepperianum* has not been fully investigated in all aspects, for it would open up possibilities of developing novel, more effective and sustainable strategies to control or eradicate fungal diseases in plants.

4. CONCLUSION

Filter cover of seedlings in nursery direct inoculation were effective as alternative technique for *Falcataria moluccana* gall rust tolerant screening that caused by *Uromycladium tepperianum,* the obligate biotrophic parasites pathogen.

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PAPER A3 - Social Capital Status on HKm Development in Lampung

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ABSTRACT

It is known that social capital in community empowerment activities in local level is clearly essential in maintenance and use of the commons so it needs to be preserved the existence by keeping trust among the members of local community groups. Thus it is very important to recognize conditions and factors in the social capital which influence development of Community Forestry (CF) or *Hutan Kemasyarakatan* (HKm) program in Lampung. Based on the results of research at CF Group of Binawana in Tri Budi Syukur village, West Lampung, and HKm Group of Mekar Jaya at Lebak Paniangan village in Way Kanan, it is known that the level of social capital of those HKm group members are affected by the institutional governance of HKm groups including commitment and participatory level of its management personnel and assistance facilitating from other parties. The different levels of social capital in these two groups could also be observed from background of the groups establishment, as well as the work program planned and implemented by the group, whether short-term (annual) or long term (5 years) programs.

Keywords: social capital, HKm, institutional governance, management personnel, Group establishment

1. INTRODUCTION

Community-based forest resources management has been proven to save the forest function in some regions in Indonesia or other countries (Marwoto, 2012). According to Keraf (2010), community-based forest management is also able to prevent the forest from extinction. This condition could happen because of the harmony and alignment of environment which prioritize the balance of the ecosystem rather than economic interests. This is what makes the basic reason why social capital becomes an important element in the community forest management in Lampung Province. The Government through the Ministry of Forestry (currently known as the Ministry of Environment and Forestry, MoEF) has been reorienting the policy of sustainable forestry development. The reorientation includes the policy of priority for rehabilitation and economic empowerment of the communities around the forest. This policy reorientation is seen as one solution of the social aspects which is able to make the communities around the forest to contribute actively in the program of sustainable forest development.

With community involvement in the program of sustainable forestry development means there is involvement of the institutions or community group institutions. According to Bourdie (1986), a concrete manifestation of a group institution resources is social capital. High and low of social capital within the group institution is dynamic, could be short term and long

term. In addition, social capital is a strategic investment either individuals or groups (Bourdie, 1986). Hauberer (2011) stated that Coleman emphasizes the concept of social capital in the context of rational choice theory to obtain benefits for all parties to the fullest. There is also other definition of social capital developed by Fukuyama (2007) that is as capabilities that emerge from general trust in the community or certain parts of it. Flassy *et al.* (2009) stated that trust is the key element in social capital, while other elements which is participation in the network, reciprocity, social norms, social values and proactive actions are the adequacy requirement of social capital. Based on the opinion of Flassy *et al.* (2009), then study of social capital in a community forest management will be observed on the aspects of trust, participation in the network, and the proactive actions of the board and members of community forest groups in managing forests which already obtain *Izin Usaha Pemanfaatan HKm* (IUPHKm or license on HKm utilization) from the government. This study was conducted because community based forest management factor is one of the determining factors in the sustainable natural resources management (Wulandari, 2013) and so far, there is still a few study on the role of human resources associated with the level of its social capital in the Community Forest Management in Lampung Province. The selected study sites are West Lampung District and Way Kanan District, because of the different background of HKm group formation.

2. EXPERIMENTAL METHOD

The study was held from June to August 2014 in West Lampung District and Way Kanan District, Lampung Province. Respondent are the committee and members of Community Forest (HKm) Group of Binawana in Tri Budi Syukur village, West Lampung and HKM Group of Mekar Jaya in Lebak Paniangan village in Way Kanan. Questions in the questionnaire is a modified version of SCAT (Social Capital Asessment Tool) dan SC-IQ (Social Capital on Integrated Questionaire).

The member of *Gabungan Kelompok Tani* (Gapoktan or Farmer Group Association) Mekar Jaya is 687 people who are members of the 10 sub-groups (Mekar Jaya, 2011) and only 2 sub-groups that were chosen as research samples (144 people). They manage HKm which is located at Register 24, Bukit Punggur, Lebak Peniangan Village, Rebang Tangkas Sub District, Way Kanan. Based on the Decree of Minister No. 256/Menhut-II/2013, this Gapoktan obtained *Penunjukan Areal Kerja* (PAK or Working Area Designation) from the Ministry since April 19th 1993.

Gapoktan (Gabungan Kelompok Tani) or Farmer Group of Bina Wana is consisted of 493 people, who is member of the 7 sub-groups (Bina Wana, 2013). The 2 sub-groups has chosen as research samples or 161 people. The PAK permission of the Minister has been obtained since December 11th 2007 (Decree No. 434/Menhut-II/2007). Bina Wana got their IUPHKm No. B/1454/KPTS/III.05/2007 on December 13th 2007. The location of HKm which managed by this group is in Register 45 Bukit Rigis, Sumber Jaya Sub District.

The number of respondents who should take by the formula of Slovin (Wulandari, 2013) is:

$$n = \frac{N}{1 + Ne^2}$$

Where :

n = sample size
N = population size
e = desired margin of error (5% margin of error)

As results calculation, research conducted for 115 respondents of Gapoktan Bina Wana and 106 respondents of Gapoktan Mekar Jaya. Continue by qualitative descriptive analysis to explain the elements and levels of its social capital. The calculation of value interval to describe the characteristics based on the level of its social capital elements. The level of social capital is divided into four classes, namely minimum, low, medium and high. Lastly, calculation of Interval Value (Saputro, 2012) as follows:

$$\text{Interval Value} = \frac{\text{the total highest score - total lowest score}}{\text{number of classes.}}$$

3. RESULT AND DISCUSSION

3.1 Trust

Trust is one of the requirements in the strengthening of social capital, and trust means that there are mutual trust between the members with other members in Gapoktan (Fukuyama, 2007). Sidu (2006) states that the level of trust is affected by conditions and feelings experienced by a person, but it is difficult to be measured because of its very broad sense and subjective (Mayes and Lewis, 2012). The confidence interval is 6 with Xmin = 15, Xmax = 39 and n = 4. Interval value is 6 if Xmin= 15, Xmax= 39 and n =4. Based on the calculation, it will call as high level if scores ≥ 32, moderate 27 – 31, Low 21 – 26 and minimum ≤20. There are differences in the level of trust between the two Gapoktan, where Mekar Jaya is low and Bina Wana is high. Mekar Jaya has low trust level possibly due to the boards which appointed by the government and not by the members. That condition has influence to level of sense of belonging members to their Gapoktan or HKm institution. According to Mahareni (2011), managerial quality has impact to service quality of institution to members therefore needs high quality and appropriate management leader and staff which has chosen by members objectively. In detail, the trust level of Mekar Jaya (MJ) member on average 21.8 (low level) and Bina Wana (BW) is 35.2 (hight level) where details: trust to the people around, the same ethnic, different ethnic, government officials, forestry apparatus, community leaders,ç religious leaders, outside parties, trust in terms of lending and borrowing. While the category of trust level according to Uphoff (2000) is as follows: 79% of MJ members have low trust level and 89% BW members have hight trust level.

3.2 Social networks

The definition of social network is a relationship that is arranged in an interaction involving people, groups, communities, information and various social services therein. Social networks is strongly associated with the level of social capital as its multidimensional nature that allows collective action (Sidu, 2006). With value of Xmax=20 and Xmin= 6, with N = 4 is obtained the interval value of 3.5. It called as high level of social network if scores > 19, moderate if 18 – 14.5, low if 13.5 – 10, and minimum if < 9. Based on the score obtained, it is known that the strength of social networks in Mekar Jaya is moderate (16.1) and Bina Wana is high (19.3).

Differences of social network power between the two Gapoktan is very likely to occur because of the differences in the type of interrelation between group members as revealed because actually social network is emotion network as mentioned by Lendesang (2014). Details of the social networks level of two Gapoktan i.e. 87% of repondents of MJ have moderate level and amounted 90.5% of BW respondents have high level.

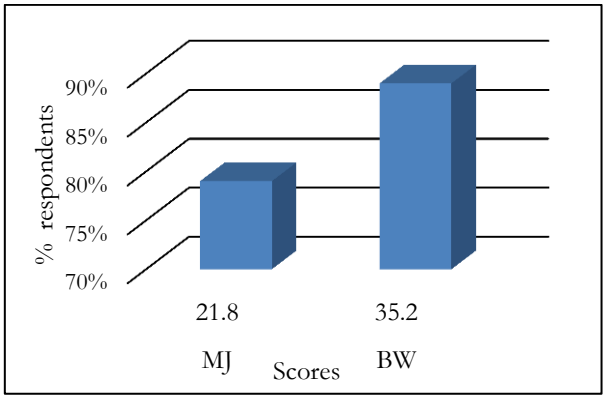

Figure 1: Trust Scores of MJ and BW

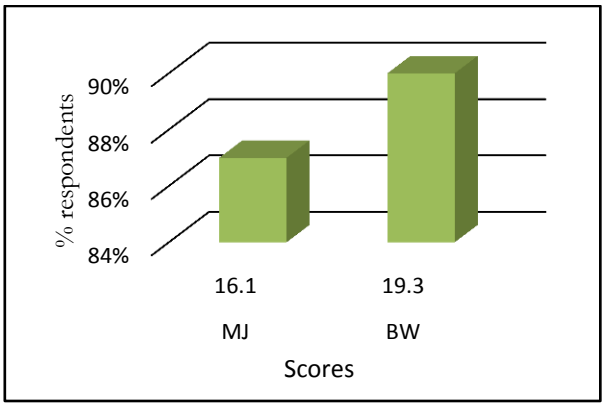

Figure 2: Social Networks Scores of MJ and BW

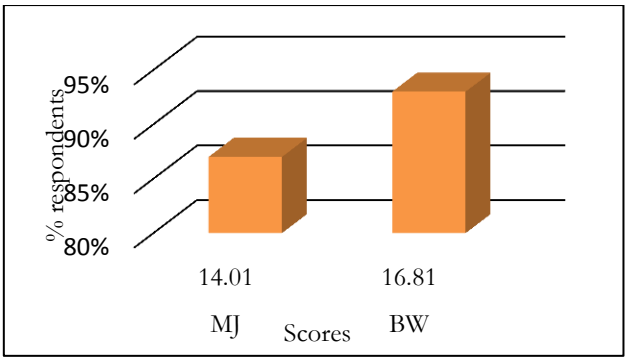

Figure 3: Social Norms Scores of MJ and BW

The level of social norms is minimum if the score≤ 9, low id 10-12, moderate 13-15 and high ≥16 Levels of social norms is based on the value of Xmax=20, Xmin=8, n = 4 (so that the interval value of social norms level is 3). Based on the average value, it is known that the score of social norms of MJ group memberis 14.01 so it can be said to fall into the moderate category while in BW is 16.81and fall into the category of high. According to Lendesang (2014) differences in the level of social norms can occur because of the high and low of interference or influence from outside in addition to the level of the group solidity. This is the same with the opinion of Hernandez and Jimenez (2013) that disruption to social capital values generally come from outside the region or outside the village. The distribution of social norms level based of the continuum Uphoff (2000) can be seen that 87% of MJ respondents have moderate level and 93% of BW respondents have high level.

3.3 Proactive actions

Proactive action is one important element in the social capital because not only mean participation but always find a way for their involvement in social activities (Hasbullah, 2006). Interval value of confidence level of proactive action is 4 with Xmin = 7, Xmax= 23 and n=4. So, the level of its proactive action is high if ≥ 21, moderate 20-16, low 15-11, and minim ≤ 10. Based on the analysis results it is known that the level of proactive action of MJ Gapoktan member is low or 15.05 and BW is high or 23.04.The distribution level of proactive action is 82% of MJ respondents at low level and high level of BW belong to 77% respondents.

The big difference in the level of proactive action is because both of these Gapoktan have different mechanisms and also intensity of coaching and mentoring from the government and outside parties. Moreover, because also the differences in the work plan clarity which has been arranged by the group either annual or five-yearly work plan. According to Menguc *et al.*, (2010), various causes of the differences mentioned will affect the proactive action of a group.

3.4 Caring

Rinawati (2012) stated that awareness is the pattern of exchange which is not done reciprocally instantaneous, but rather a combination of short-term and long-term in the spirit of helping and altruism.A community group will have a strong and tough social capital in dealing with various social problems if it has a high level of awareness (Hasbullah, 2006). Value interval is 1.5 because Xmax = 10, Xmin=4 and n=4 then the awareness level is high if the caring scores> 6.5, minimum jika ≤3.5, low: 3.6 – 5, and moderate: 5.1 – 6.5. It is known that the caring level of 89% of BW respondents is 7.6 (high) and 89% member of MJ respondents is 5.8 (moderate).

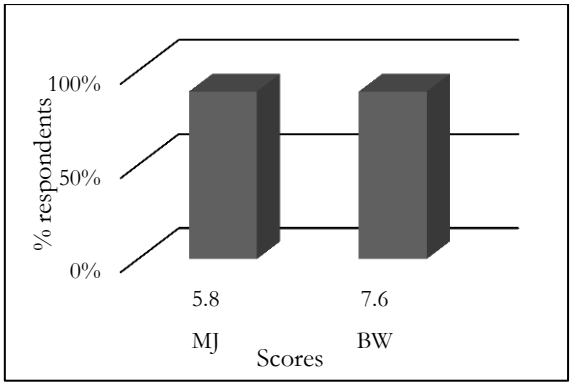

Figure 4: Caring Scores of MJ and BW

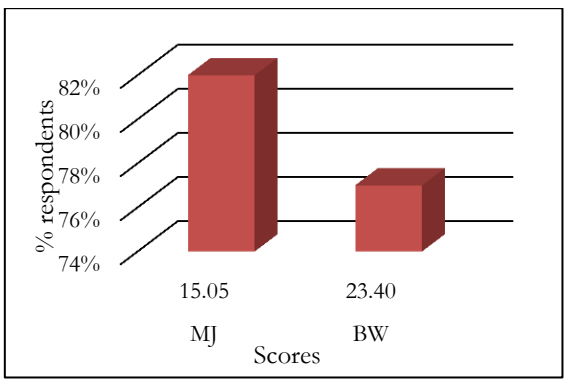

Figure 5: Proactive Actions Scores of MJ and BW

Clearly apparent differences in the caring level of the members in both gapoktan which can be caused by not gaining benefits of the group existence for the members of Gapoktan MJ; it is in contrary to what has been perceived by the members of BW. This proves the statement of Ssemakula and Mutimba (2011) that the benefit or advantage of grouping will affect to the group dynamics and caring of the members.

3.5 Social capital

Based on the scores of all the elements of social capital which analysed in this study, then obtained the scores of social capital as at the table 1. While the interval value is 18 with Xmin ≤40 and Xmax ≥ 112. It is said that the social capital is high if scores ≥94, moderate 75 -93, low 56-74 dan minimum if scores ≤55. If Gapoktan has high level of social capital it means HKm Gapoktan is very easy to be developed, if the social capital is mediumit means HKm Gapoktan is easy to be developed, on the contrary, if the level of social capital is low then it is difficult to be developed (Baliamoune, 2011). Based on the analysis results of social capital, then MJ has low level (72.76) and BW has high level (101.95).

Table 1: Capital Social Score of HKm Group of Mekar Jaya (MJ) and Bina Wana (BW)

No.	Capital Social Aspect	Total Score		Mean Acore		Value	
		MJ	BW	MJ	BW	Max	Min
1.	Trust	2,310.80	4,048	21.80	35.20	39	15
2.	Social Networks	1,706.60	2,219.50	16.10	9.30	20	6
3.	Social Norms	1,485.06	1,933.15	14.01	16.81	20	8
4.	Proactive actions	1,595.30	2,649.60	15.05	23.04	23	7
5.	Caring	614.80	874	5.80	7.60	10	4
	Total	**7,713.10**	**11,724.25**	**72.76**	**101.95**	**112**	**40**

Source: calculated primary data, 2015

Of the type of social interrelation that occur within the Gapoktan it is known that there tends to be the type of social capital that binding in MJ and bridging di BW. In MJ, it can be seen from the attitude of the members who tend to be cautious if there are other communities who want to join into the group. As a result, there will be a strong distinction between "insiders" and "outsiders" and will affect to the accommodative level towards initiatives from the outside. In contrast with the BW group that already has a strong social capital and bridging nature, then it is more accommodating with building initiatives provided by other parties. With strong social capital in the BW group, it means that this Gapoktan has a high collective action and this had a positive impact on the progress of HKm forest land they managed. Similar conditions also occur in the groups of community of people forest cultivators in Sukabumi (Rinawati, 2012) and community groups of HTR cultivators (Saputro, 2012).

Differences in the level and type of interrelation between the two Gapoktan can be understood based on the background of the group formation. Gapoktan Bina Wana formed because of the desire of the community members which is then facilitated by the government, while Gapoktan Mekar Jaya formed because of the government programs in order to achieve the extension area of HKm in Indonesia or especially in Lampung Province. In addition it is also apparent from the dynamics of the group between the two groups when there were conducted group meetings. During the meeting can also be seen the level of commitment and participation of the members based on the intensity of the presence and active involvement in the meeting.

4. CONCLUSION

The analysis results described that the caring level in MJ is 5.80 and BW is 7.60.The difference of social networks level also occur where the MJ: 16.10 and BW is 19.30. For the score of social norms also differ in both groups so that MJ has the level of social norms 14.01 and BW has 16.81. Especially for trust and proactive actions in both groups have same on level difference, that is MJ at the level low (21.80 and 15.05 respectively) and BW high (35.20 and 23.04 respectively). Based on the overall analysis on the level of social capital owned by the two Gapoktan, it is known that the human resources aspects and elements of social capital affects to the level of effort which required by the government and other parties in the development of HKm in a region.

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PAPER A4 - Value chain of smallholder's timber: Lessons from Indonesia

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ABSTRACT

The paper presents some key findings of smallholder timber value chain study recently completed in Indonesia. Focus of the study was on timber production practices and marketing strategies applied by farmer tree growers. The study collected value chain data on smallholder's timber plantation through interviews and focus group discussions with some farmer respondents and key informants at five districts in Indonesia. The study showed that the value chain of smallholder's timber involves many actors since farmer tree growers, middlemen, sawmills, wood based industries, and exporters. Smallholder timber generally undervalued by the industry due to its small size and low quality. Most of farmers are not implementing adequate silvicultural techniques on their timber plantations and less market oriented due to various factors. The supply of smallholder timber, however has been instrumental in the development of wood industry in Indonesia. Farmers need to be nurtured to increase their capacity, particularly in their market orientation, production techniques, and marketing strategy. Strengthening farmer's ability to apply better silvicultural techniques, collective marketing, and developing business link between farmers group with industry are among the required interventions by the governments or developing agencies.

Keywords: smallholder timber, value chain, profit distribution, middlemen, collective marketing.

1. INTRODUCTION

Timber plantation business plays an important role as a mean to improve farmer's livelihood. The business can also supply material for the timber industry and improve environment through the increased of land cover and forest area. Timber plantation activity has been part of farmer's culture in Indonesia where farmers have long been growing variety of timber together with their agricultural crops on their farmlands and widely known as *hutan rakyat* or private forest.

Government encourages this timber plantation business through various policies and development programs, such as by providing seeds/seedlings to farmers, micro credit assistance for timber plantation establishment and other technical assistances. Since 2006 the government provided access for farmers to use forest land for timber plantation development through community based timber plantation or *Hutan Tanaman Rakyat* (HTR) program. The Ministry of Forestry has allocated 5.4 million of production forest area for this purpose (Departemen Kehutanan, 2007). More recently the central government has increased the allocation of state forest lands into 12.7 million hectares to support various community based forest management programs, including HTR, Community Forest or *Hutan Kemasyarakatan* (HKm), Village Forest or *Hutan Desa* (HD) and Customary Forest or *Hutan Adat* (HA) (*Kementerian Perencanaan Pembangunan Nasional*, 2014).

Despite of these government efforts, it seems that timber plantation business is not yet attracting the majority of farmers in the country. The current total area of private forests in the country is about 4 million ha (Rohadi, 2012) and mostly is found in Java. The total area is far below the available potential land area for developing smallholder timber plantations. The total state forest areas that have been utilized by the community in various social forestry scheme is very low. By 2012, the total mapped state forests area allocated for HTR covered approximately 700,000 ha (*Kementerian Kehutanan*, 2013). However, the total area that have been granted to community or the issued license was only covered about 190,000 ha. Moreover within this granted area, the real plantation activities that have been taken place on the ground was only about 8,000 ha (*Direktorat Jenderal Bina Usaha Kehutanan*, unpublished).

Timber plantation provides important contribution on farmer's income structures (Rohadi *et al*, 2012), especially in the context of income diversification strategies that commonly practiced by farmers. However, the study showed that farmers generally receive relatively low price when selling their timber and they have low bargaining position when negotiating prices with middlemen. More study is required to understand smallholder timber value chain and seek some options to improve farmers' bargaining position in the system.

This paper presents some of the lessons from a study of smallholder timber value chain recently completed in Indonesia. The study was done as a research component under an action research project that funded by the Australian Centre for International Agricultural Research (ACIAR) entitled "Overcoming Constraints to Community Based Commercial Forestry in Indonesia" or the CBCF project. The study was conducted at five districts in Indonesia, namely in Gunungkidul, Pati, Sumbawa, Bulukumba and Konawe Selatan. The main objectives of this study were:
a. To identify market actors and their roles in the smallholder timber value chain system;
b. To analyse value chain model that best providing economic profit to farmer tree growers;
c. To find strategies to increase benefits for farmers in their timber plantation business.

2. METHOD

2.1 Research Approach

This study applied the framework of value chain analysis according to M4P (2008; 2012). Within this framework, value chain is defined as any activity carried out by various actors in the market (such as timber grower, market broker and industry) to produce timber and process it into a wide range of timber products that sold to consumers. The value chain is part of market system that consist of various functions and rules and is influenced by various market actors (ILO, 2009). Position of value chain in the market system is shown in Figure 1.

There are four timber value chain models were examined in this study. The four models were based on the preliminary results of the CBCF research in five districts of the study sites (van de Fliert, *et.al* 2012). These four models are:
- Model 1: In this model, the individual growers sell their timber to brokers who then resell the timber to processors (growers-brokers-processors);
- Model 2: In this model, the individual growers sell their timber to group of growers who then resell the timber to processors (growers-group of growers-processors);
- Model 3: In this model, the individual growers sell their timber to group of growers who then resell the timber to brokers, then the brokers resell the timber to processors (growers-group of growers-brokers-processors);

- Model 4: In this model, the individual growers sell their timber directly to processors (growers-processors).

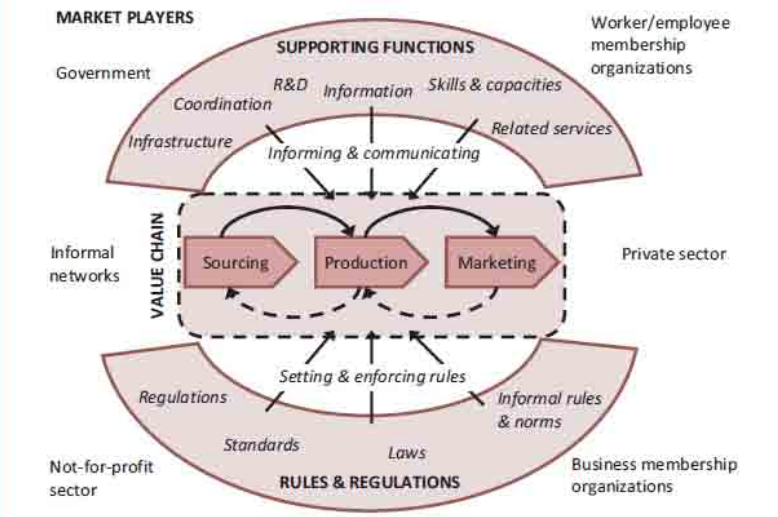


Figure 1: Value chain as a subset of market system

2.2 Data Collection and Analysis

Data collection was done by a Team of Researchers under the CBCF project. Team members come from various institutions that include the Australian National University (ANU), Centre for International Forestry Research (CIFOR), the Centre for Research on Climate Change and Forestry Policy - Forestry Research and Development Agency (Puspijak-FORDA), Forestry Research Institute of Makassar , University of Gajah Mada (UGM), Worldwide Fund for Nature (WWF) Nusa Tenggara, and Tress for Trees (T4T) Pati.

Data collection was done in 8 villages located in 5 districts and 5 provinces in Indonesia. The district names and province (in parentheses) were Gunungkidul (Yogyakarta), Pati (Central Java), Bulukumba (South Sulawesi), Konawe Selatan (Southeast Sulawesi), and Sumbawa (West Nusa Tenggara). Map of study sites is shown on Figure 2. Data collection activities in the field were conducted between July 2012 and April 2013.

Figure 2: Research Site of CBCF Project

Data collected through interviews with market actors consisting of 59 timber growers, 4 resource persons representing farmer groups, 19 timber merchants, and 23 resource persons representing the timber industries. Besides the interviews, we collected secondary data from

various government agencies and conducted field observations at the sites. Interviews were guided by a questionnaire containing open-ended questions. Some of the key questions that were asked to the respondents are presented in Annex 1.

In this study, information on value chain was collected and analysed according to the guidelines that have been developed by M4P (2008). The collected information includes:

- Activities of actors, i.e. identification of specific activities of different actors;
- Transformation of products at each stage along the value chain;
- Relationships and connections between actors;
- Volume of products and number of jobs at each stage along the value chain;
- Value at stages along the value chain, including the distribution of costs and profits;
- Geographical flow of products, both at local and regional markets;
- Supporting functions, such as knowledge and information flows;
- Rules and regulations that relate to different actors and stages along the value chain.

Not all of the information was reported in this paper however, as this paper more focus on information that directly relate to timber growers.

Data was analysed descriptively to explain timber value chain on actors that involved along the marketing chain, relationship and connection between actors, product transformation, rules and regulations that applied in the timber marketing. Quantitative analysis was used to calculate profit margin of each actor. The calculation process of profit margin was facilitated through table as presented in Annex 2.

3. RESULT AND DISCUSSION

3.1 Actors and their roles in smallholder timber value chain model

The study identified various actors among the timber growers, brokers and processors that involved in smallholder timber value chain system (Table 1). In some cases, the same actor may play more than one role in the system. For example, the wood depot can be seen as a broker as their main activity is trading the timber. However, they can also be classified into processor as they may also processing logs and selling sawn timber. The processors also vary widely, from small scale processors, such as sawmills that only processing logs into sawn timber, to more complicated wood industries such as furniture and plywood manufacturers. The study experienced that not all of market actors were always easy to be identified and interviewed as some of them were located outside the research area. For example, the timber processing industries in the case of Konawe Selatan were located in Java Island.

Table 1: The identified market actors in smallholder value chain system in research sites

Category of actor	Market actor
Growers	1. Individual farmers
	2. Farmers group
Brokers	1. Informant (e.g. *Blantik*)
	2. Middlemen (e.g. *Pengepul* or *Penebas* or *Pelele*)
	3. Wood Trader (e.g. Wood Depot)
Processors	1. Sawmill
	2. Wood Depot
	3. Industry (e.g. furniture manufacturer, plymill)

3.1.1 Tree grower

Timber grower is the first chain in the smallholder timber value chain system. Generally farmers plant different timber species on their land in an agroforestry system, either in form of woodlot or mixed with food crops and other commercial crops. Relatively few farmers who have undertaken intensive management on their timber plantations by applying good silvicultural techniques, such as by using good quality of seeds, applying regular spacing and pruning of branches. Most farmers do not apply thinning to let better trees to grow bigger and pruning of tree branches at the right age. This kind of business pattern tends to produce timber with small size and poor quality of logs.

In marketing, farmers usually sell their timber in the form of standing trees. Most farmers do not apply certain harvesting rotations but the harvest mostly was done when they have urgent need for cash (slash for cash). This habit tends to reduce farmers' bargaining position as most farmers more concern on the amount of money that they need to obtain and negotiating the numebr of trees that need to be cut than the potential higher price of their trees. Generally farmers sell their timber individually to middlemen. In some cases however, such as in Gunungkidul, Pati and Konawe Selatan, farmers sell timber collectively and got higher farm gate price. These were happened as their timber sold as certified timber according to Forestry Stewardship Council (FSC) or the Indonesian Ecolabelling Institute (*Lembaga Ekolabel Indonesia*/LEI) schemes.

3.1.2 The brokers

Broker was found in a variety of actors. Some brokers only serve as an informant (in Gunungkidul it is known as *Blantik*), who connect timber growers to middleman. Informants do not have their own capital to buy and harvest trees and then sell the logs. Informants only earn commission as rewards from the middleman.

Table 2: Middlemen operational cost on smallholder timber trade in Gunungkidul district

Cost components	Volume	Unit	Unit price (Rp)	Total cost (Rp)
Harvesting and transport costs				
				Costs per day
Wages	8	Worker days	50 000	400 000
Meals (including cigarettes)	1	Day	150 000	150 000
Fuel for chainsaw	8	Litre	5000	40 000
Chainsaw rental	1	Day	200 000	200 000
Timber transport documents	1	Package	150 000	150 000
Transportation	2	Trip	100 000	200 000
Miscellaneous	1	Package	50 000	50 000
Total				1 190 000
				Costs per cubic metre
Harvesting output = ~14 cubic metres per day, which was transported in two loads to the log yard				
Total harvesting and transport cost				85 000 Rp/m^3
Marketing costs at the log yard				
				Costs per cubic metre
Phone calls	Phone calls (1 month) cost Rp 75 000, 112 m^3 of logs marketed			670
Electricity	Electricity (1 month) cost Rp 53 000, 112 m^3 of logs marketed			473
Wages (unload, load)	Wages (1 week) cost Rp 400 000, 28 m^3 of logs handled			14 286
Permit	Single transaction for 28 m^3 of logs			3929
Transport (to Bantul district)	Single trip cost Rp 700 000 for 7 m^3 of logs			100 000
Total marketing costs at the log yard				119 357 Rp/m^3
Total costs for harvesting, transportation and marketing				204 357 Rp/m^3

Source: Stewart, et.al (2014)

Other brokers are known as middlemen (locally named as *Pengepul* in Gunungkidul, *Penebas* in Pati and *Pelele* in Sumbawa).These actors purchase trees from farmers, harvest the trees and sell the logs to the next marketing chains. Middlemen usually are farmers who own enough capital and knowledge to trade timber. The middlemen need capital to purchase the trees, hire labors to harvest and process trees into logs, transport the timber, and to cover the transaction costs in obtaining timber transport documents, i.e. the letter of timber origin or *Surat Keterangan Asal Usul Kayu* (SKAU) or timber exploitation license or *Izin Pemanfaatan Kayu Tanam Milik* (IPKTM).

The operating costs by middlemen include the costs for purchasing trees, wages for harvesting trees, transportation costs and the cost for obtaining the necessary timber transport document. An example details of the middlemen operational costs in Gunungkidul district is presented on Table 2. The table showed that the costs is approximately Rp 200,000 per m^3. The magnitude of middlemen operating costs based on the study ranged from Rp 135,000 to Rp 1 million per m^3 depending on timber species and research sites.

Middlemen are often perceived negatively as a bad guy who took advantage from timber growers. The study clarified that the profit margin of middlemen was not always greater than the timber growers. Furthermore, middlemen have also risk to experience losses in timber trading, as explained in the next section (see Figure 4). The middlemen play a very important role in the smallholder timber value chain in connecting timber growers with timber traders or wood industries. In some cases, as shown by the case no. 4 (Sumbawa), middlemen become the only access for farmers to sell their timber. Therefore, any intervention that aims to improve the economic benefits of timber plantations business for farmers must be done carefully so as not to remove the functions of middlemen. It would be more appropriate if middlemen can be involved in collective marketing efforts as their knowledge and skills are usefull in developing market access. Middlemen are generally farmers with advanced economic level. Profession as middlemen can be an alternative career for tree growers in the smallholder timber plantation business.

The last actors under the group of brokers were timber traders, such as timber depot who buy timber from middleman and sell it to timber industries. Some timber depot were also process logs into sawn timber, so that they could also be classified into processors.

3.1.3 The processors

Under the group of processors, we found sawmills, wood depots, and wood processing industries. Sawmills were only process logs into swantimber and the business scale varies from small to large enterprises (such as wood depot). Timber industries in general are big companies that produce wood products for export. There are also some home industries that process wood into specific products such as house frames and furnitures for domestic market. In some case studies, the timber industry is located far outside the study area, such as in the case in Sumbawa and Konawe Selatan, so that information related to the value chain in those cases were difficult to be collected.

3.2 Value chain models and profit margin among different actors

3.2.1 Value chain models

Smallholders timber value chain varies in their complexity based on the number of actors who are involved in the bussiness. This complexity indicates better market access. The value chain in Java is more complex than at outside of Java which illlustrated by more number of actors involved in the bussiness. Figure 3 shows the difference in the value chain model in

Gunungkidul and Konawe Selatan.The figure shows that timber value chain in Gunungkidul is more developed than in Konawe Selatan. This is indicated by more market actors and marketing channels that are available in the area.

The study identified that more than one value chain model could be found in one particular area. The model 1 (individual growers - brokers - processors) is present in all study sites. It shows that the model 1 is the dominant model in smallholder timber value chains. Other models are not always occur in each research sites.

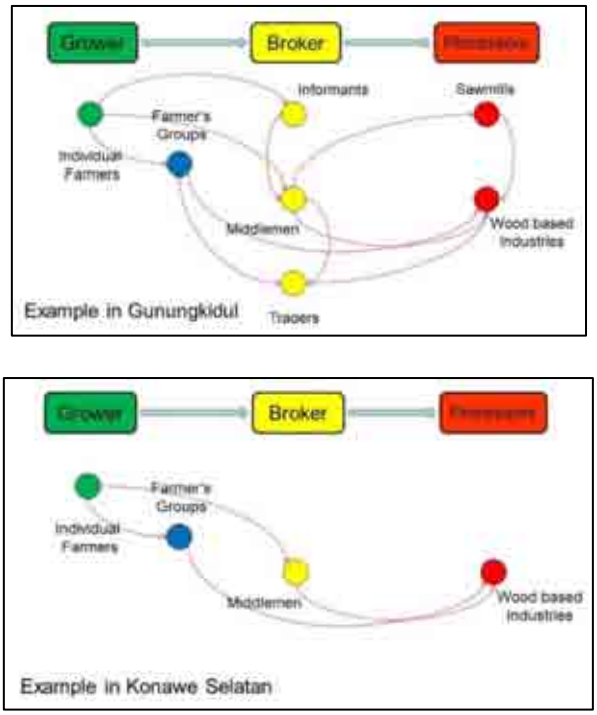


Figure 3: Smallholder timber value chains at district of Gunungkidul and Konawe Selatan.

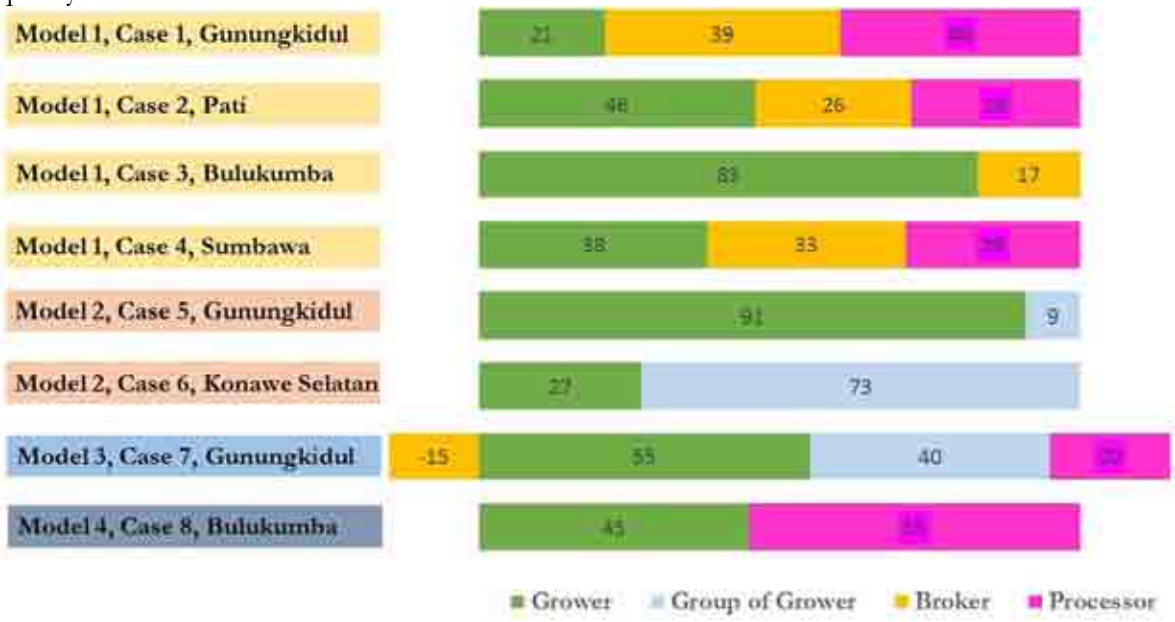
3.2.2 Profit margin of each actor

Figure 4 shows profit margin distribution among market actors on various value chain models. Some cost and revenue data on processors could not be collected during the interview process in cases 3, 5 and 6-due to various factors. These factors among others were the location of industries that was far outside the study sites and the reluctance of owners to provide financial data. In addition, due to complexity of the final product cost components, some assumptions and correction factors were applied in determining the profit margin of the processor in the case 1 and 7. This process however might create some errors in calculating the profit margin distribution.

The Figure 4 indicates that profit margin distribution among the market actors is relative. There were no consistent pattern of profit margin distribution that provide greater portion to growers. There was no ideal model of value chain that provide more benefit to growers. The figure shows that the profit margins received by broker is not always greater than growers and sometimes can even be negative, as shown by the case 7. However, the figure does not consider the time frame involved in the value chain. Growers may need at least 10 to 15 years to grow and sell their trees, while other market actors would only need few days in the trading or processing the timber.

3.3 Farm gate prices

Table 3 shows the farm gate price of timber at various value chain models. It shows that the price for teak is in the range of Rp 800,000 to Rp 850,000 per m3 by standing tree basis. Statistical data (District Forestry Office of Gunungkidul, 2012) showed that the price of smallholder teak logs at different grade or quality ranged from Rp 500,000 to more than Rp 5,000,000 per m3 by log basis (Table 4). Even if the harvesting cost by middlemen was included, the farm gate price of smallholder teak resulted by this study falls in the lowest quality class.



Remarks: The numbers on bar chart represent percentage of profit margin.

Figure 4: Profit margin distribution along the market actors of different value chain models.

On sengon, the price received by growers according to this study was Rp 385.766 per m3 by standing tree basis, while the prices at wood depot ranged from Rp 395,000 to Rp 1,125,000 per m3 by log basis, with a range of log diameters between 10 to 50 cm. Similar with teak, the farm gate price of sengon falls in the lowest price range of the available price differences. On bitti, farmers tend to sell small diameter trees with the farm gate price varies greatly between Rp 30,000 to Rp 200,000 per tree, while the price at processor level was between Rp 2 million to Rp 3.5 million per m3 by squared plank basis (Hayati *et al*, 2013_{ab}).

Table 3: Farm gate price of smallholder timber at different value chain models

Marketing chain model	Case Study	Location	Product	Farm gate price (Rp/m³)
Model 1 (Grower-Broker-Processor)	case 1	Gunungkidul	teak, standing trees	848,439
	case 2	Pati	sengon, standing trees	385,766
	case 3	Bulukumba	teak, standing trees	808,671
	case 4	Sumbawa	teak, standing trees	800,000
Model 2 (Grower-Group of Grower-Processor)	case 5	Gunungkidul	teak, standing trees	1,340,270
	case 6	Konawe Selatan	teak, squared plank	1,750,000
Model 3 (Grower-Group of Grower-Broker-Processor)	case 7	Gunungkidul	teak, standing trees	848,439
Model 4 (Grower-Processor)	case 8	Bulukumba	bitti, standing trees	664,451

Log diameter is the most important factor that determine price. The Table 4 showed that on the lowest grades log diameter ranged between 13 and 22 cm. The highest grade of teak with the highest prices (Rp 5 million per m3) has minimum diameter of 54 cm.

Beside of relatively small in diameter, smallholder timber generally are of low quality characterized by leaned bole and contains many branches that cause knot defects. This low quality were resulted by inadequate silvicultural techniques that applied by smallholders, especially by the absence of pruning and thinning on the plantation.

Table 4: Different grades and prices for smallholder teak at Gunungkidul district

Log grade and dimension	Price (Rp per cubic metre)
A1<13 cm diameter	500 000 – 700 000
A1 13–22 cm diameter	1 000 000 – 1 400 000
A2 23–30 cm diameter	2 000 000 – 2 400 000
A3 >30 cm diameter	3 000 000 – 3 500 000
A4 >45 cm diameter	>4 000 000
A5 >54 cm diameter	>5 000 000

Source: Dinas Kehutanan dan Perkebunan Kabupaten Gunungkidul (unpublished)

The case 5 and 6 show higher farm gate prices of teak. Under these cases farmers sell their timber through collective marketing (cooperatives). The teak that was sold were following FSC certification scheme. Through collective marketing, farmers were able to increase the added value of timber by complying with timber certified schemes.

3.4 Collective marketing

The study identified several farmers who sold their timber through collective marketing, either through farmer groups or cooperatives. They sold certified timber following FSC or the LEI schemes. These farmer groups were *Koperasi Wana Manunggal Lestari* (KWML) and *Jati Pandowo* at Gunungkidul, and *Koperasi Hutan Jaya Lestari* (KHJL) at Konawe Selatan. Another collective marketing model was also found at Pati were a farmer group called Sekar Ngelo Mandiri sold FSC certified sengon to a plywood industry company in Temanggung District, Central Java.

Table 5 shows these cases. Timber prices obtained by farmers were relatively higher, ranging between 5% and 33% as compared to the price of uncertified timber. In the case of Konawe Selatan, the study did not find the comparative uncertified price. On this case, all timber sold by the KHJL were following the FSC certification scheme.

Table 5: Collective marketing models of smallholder timber

Location	Product	Farmer cooperative / group	Farm gate price (Rp 1,000/m3)	Price different between certified and uncertified product		Certification scheme
				(Rp 1,000/m3)	%	
Pati	sengon, log	Sekar Ngelo Mandiri	495 - 1,325	100	15 - 30	FSC
Gunungkidul	teak, log	KWML	800 - 2,000	50 - 100	5 - 10	LEI
Gunungkidul	teak, log	Jati Pandowo	2,850 – 4,000	650 - 1,000	30 - 33	FSC
Konawe Selatan	teak, squared plank	KHJL	1,750	NA	NA	FSC

In all cases, the collective marketing initiated by outside interventions, such as government agencies, timber industry and Non-Government Organizations (NGO). For example, in Pati, the certification process was initiated by an NGO (Tress for Trees/T4T) and supported by a timber industry (PT. Albazia Bumiphala Persada/ABP). In Gunungkidul, many actors involved in the development of smallholder timber certification schemes. These actors consist of NGOs (Shorea and Arupa), *Pusat Kajian Hutan Rakyat* (PKHR) the University of Gajah Mada, government agency (District Forestry Office of Gunungkidul) and companies (PT. Jawa Furni Lestari and CV. Dipantara). In Konawe Selatan, an NGO (Jaringan untuk Hutan/JAUH and The Tropical Forest Trust/TFT) played major roles in the certification process.

In all of the collective marketing cases, the premium price on certified timber was provided by the industries as an incentive to farmer groups or cooperatives to supply the certified timber. A study (Stewart *et al*, 2015) reported that the industries did not received the premium price from buyers in the imported countries. These companies applied the certification process to gain better market access and improve corporate brand image.

3. CONCLUSION

Smallholder timber value chain study showed that community timber plantation business involves many market actors, and so the business provides employment opportunities for many people. The actors involved are among others tree growers, middlemen, timber traders, timber industries and consumers. Various models of smallholder's timber value chains were found in Indonesia, but the dominant model was the Model 1 where individual farmers sell their timber to middlemen who resell it to processors. The value chain were formed and adapted to local conditions. This study did not find value chain model that consistently provide more profit margin to timber growers.

Tree growers did not received optimal economic benefit from their timber plantation business. The farm gate price generally lies in the lowest range of prices as compared to the potential prices available in the market. The main factors contributing to low farm gate prices were: a) small diameter and low quality of timber due to inadequate silvicultural techniques; b) low farmer's bargaining position, as farmers often sell their timber for urgent need for cash. Middlemen play a very important role in smallholder timber value chain system as middlemen often is the only timber market access for tree growers. In contrast to the myth that middlemen always take great advantage in smallholder timber trade, this study indicates that the profit margin enjoyed by middlemen were not always greater than other market actors.

Tree growers need to be nurtured to improve their business orientation and more aware with market demand. They need to be equipped with practical knowledge and skills of silviculture (especially thinning and pruning) techniques to improve their timber quality. Government or development agencies need to provide supports to farmers' groups to increase their capacity in running their timber plantation business. External supports are also required to improve farmer's ability to meet market demand and collective marketing capacity.

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Annex 1. Key Questions for respondent interviews

No	Group of Respondent	Key Questions
1.	Tree growers	Respondent identity
		Plantation activities
		Cost of plantation
		Timber harvesting and marketing
		relationship with middlemen
		Market knowledge
2.	Middlemen	Respondent identity
		Professional requirements
		Trading activities
		Cost components and revenue
		Market knowledge
		Timber trade regulation
3.	Farmers group	Respondent identity
		General information of the group
		membership and administration
		timber trading activity
4.	Timber trader	Respondent identity
		Scale of business
		timber trade activity
5.	Industry	Respondent identity
		Scale of business
		Production process
		Partnership

Annex 2. Calculation of costs, revenues, profits and margins in the value chain

Value chain actor	***Costs***		***Revenues***		***Profits***		***Margins***	
(= stage in the value chain)r	*Unit total cost*	*Added unit cost*	*% added cost*	*Unit price*	*Unit profit*	*% total profit*	*Unit margin*	*% retail price*
Forest grower (individual / group)	A	-	A/F	G	G-A	(G-A)/(K-F)	G	G/K
Harvest contractor	G+B	B	B/F	H	H-B-G	(H-B-G)/(K-F)	H-G	(H-G)/K
Broker	H+C	C	C/F	I	I-C-H	(I-C-H)/(K-F)	I-H	(I-H)/K
Processor	I+D	D	D/F	J	J-D-I	(J-D-I)/(K-F)	J-I	(J-I)/K
Retailer	J+E	E	E/F	K	K-E-J	(K-E-J)/(K-F)	K-J	(K-J)/K
Total		F=A+B+C+D+E	100		K-F	100	K	100

Notes: (1) Adapted from Table 28, p. 103, M4P 2008, 2012.
(2) Depend on the product transformation, some recovery factors may be applied to correct revenues.
(3) 'Unit margin' shows the distribution of revenue to the actors in the value chain and is calculated as the difference in the revenue received between successive stages in the value chain. The unit margin for a specific actor is the sum of the added unit cost and unit profit.

PAPER A5 - Forest and Women in Media Coverage: The study about Role of Women in Sustainable Forest Management News in News Reporting of *Kompas* Daily

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ABSTRACT

Media is one of the sources of information for the public. Through the news, the media has the potential to influence and shape knowledge, attitudes, and behavior of audiences. Function and role of the media is done consciously in order to achieve certain objectives, in accordance with the vision and mission of the media is concerned. This paper aims to identify the views and understanding of the media regarding the role of women in sustainable forest management in Indonesia. Through discourse analysis model of Social Knowledge Discourse Approach that develop by Keller in 2011, traces the process of formation of knowledge through media coverage of the problems of forests and the role of women in ensuring the maintenance and preservation of forests. Ecofeminism perspectives will be applied in the analysis of the results of this study to determine the extent to which the principles of ecofeminism are represented in the media. The results showed that news reporting of *Kompas* about the role of women in sustainable forest management is to demonstrate that women have the ability and capacity to participate actively in efforts to conserve forests. This effort is in accordance with the principle of gender equality and can be a way to applicant the ethics of ecofeminism in the media content analysis.

Keywords: Sustainable Forest Management, News, Reporting, Ecofeminism

1. INTRODUCTION

The main purpose of discussion in this seminar is to find ways to preserve the forest. Forests have a vital functions, namely the function of economic, environmental protective function, water function, the function of germplasm as well as aesthetic function. Forests can directly welfaring society by producing some commodities such as firewood, timber and industrial raw materials such as paper, household utensils and so on. Forest exploitation activities will also be jobs and generate income for the country. However, it is more important, the role of forests to ensure the long-term human survival.

Efforts to conserve forest or how it can be achieved in various ways. For academics, it can also be studied forest conservation efforts in accordance with the field of science; according to their ability and competence. For experts in forestry, forest conservation could be achieved by various physical effort which is might be hard for social scientists to understand those. However, the main point to note is that all parties (forestry or social scientists) can contribute energy, thoughts, expertise, and passion for great purposes conserve forests for the quality of human life in general.

One effort that can be done in order to ensure the sustainability of the forest is to lead people to realize that the forest should be preserved and that everyone can be involved in efforts to conserve the forest. At this point, the mass media has the opportunity and their potential.

The mass media can be a source for the knowledge society (Campbell, 1999). Through news coverage, media in shaping public knowledge about a particular issue or problem. Especially with regard to environmental issues, which includes forest issues, it is known that the media as a social force is included in the party that can use its power to contribute to ensure the preservation of nature around. Media can play an active role as a watchdog on the issue of the nature (Moore, 2001), connects the true reality experienced by people with concepts rather than scientists and political experts (Boykoff, 2009), linking the interests of the stakeholders (Jurin et al., 2010); become agents and agents of change to promote and defend the interests of human rights over the natural which are good and healthy (Friedman and Friedman, 1989). Also, Ader (1995) mentioned that the community requires journalists to convey the intimation regarding the nature. Thus, it is necessary to learn how to view and understanding of the mass media on the concept of role of women in sustainable forest management, because the view and understanding it to be delivered to the audience through their reporting.

In Social Construction Theory, it is known that the media do specific efforts in producing and delivering an issue or a problem through preaching to the public. These efforts, according to Keller (2011), can be traced through the process of news text, stripped to the configuration of knowledge, discourse production, and the effect of the power contained in the reports. Therefore, it is interesting and important to learn how the media shape public knowledge about the role of women in sustainable forest management.

Peran wanita dalam pengelolaan hutan diketahui sangat signifikan. Wanita adalah pihak yang paling rentan oleh akibat penyalahgunaan sumber daya alam. Media sudah seharusnya memberikan porsi untuk peliputan peran wanita dalam pengelolaan hutan. Lebih jauh, jika media telah memberikan porsi yang memadai, perlu juga diketahui potret wanita dan pengeloaan hutan itu.

The role of women in forest management is known to be significant. Women are the most vulnerable by improper use of natural resources. (Shiva, 1988; Widayanti, 2001; Stephani, 2009) Thus, media should provide a portion for women's role coverage of in forest management. Furthermore, if the media has provided adequate portion of it, need also known portraits of women and forest management.

2. SUSTAINABLE FOREST MANAGEMENT

Forest management meaningful human intervention on forests. Forests that were examined in this study is a forest that has been 'cleared' by humans, because these conditions can not be avoided. Limitations of the 'forest management' also means that there is interaction between the forest and the humans who use it; either exploitative or curative. Forest management programs include the social forestry program. Forest management activities are usually committed by men, as it includes in the category of heavy work. Women have only assessed as implementing reproductive activities such as cooking, taking care of the house, taking care of another child and so on.

Most women who live around the forest where her husband worked as a forest farmer, the status of women's work is also as a farmer, not a housewife, here is no indication that the

women not only become actors in reproductive activities but also participate in the technical activities of management of land and forests (productive activities). Women are often more dependent on forest resources than men to earn their needs (firewood, fodder, and food ancestry), and this dependence more so when the forest is damaged (Shiva, 1988).

Results of evaluation of the social forestry program shows that women play an important role (Kartasubrata, 1995). Land management activities contributed combined with the collection of firewood and food. However, women do not have a voice in the Kelompok Tani Hutan (Forest Farmers Group), because their names are not listed or they are unable to represent her husband in training activities and decision making. In fact, the proximity of women with the food sector and land resources make the position of women stronger in forest management activities based on community empowerment (Stephani, 2009).

Forestry investment projects can be managed with a maximum of involving women (Suharjito 1994 Stephani, 2009). Preferences and the type of product for women will improve morale and their cooperation to achieve the goals of the overall project. Schedules can also be adapted to the schedule of activities for women so that they have the maximum time to be involved in the project. Moreover, if in the project area there are more female-headed households. However, women often have a disadvantage in terms of access to decision-making, even concerning himself and his life.

According to Mahmud (2015), the discourse of gender and forestry discourse often walk on their own. This may be because of the attention and understanding in the community who also did not consider that the issue of gender and forestry related and very important as an effort to preserve forests for future ensure an adequate quality of life. Therefore, as already mentioned, the mass media have a role in providing knowledge to society through their news. News-not without value, however fostering social reality (Campbell, 1999), loading vision and mission rather than issuing media news coverage itself. Value loaded in the news media, which is corresponds to their interests.

3. FOREST AND WOMEN: ECOFEMINISM PERSPECTIVE

The role of women in sustainable forest management were analyzed using ecofeminisme perspective, as suggested by Suliantoro (2011) and Wiasti (2013). According Suliantoro (2011), ecofeminism moral struggle was essentially a struggle against a patriarchal culture which has robbed women's rights and damage the environment. Women who are victims of the patriarchal tradition should be able to be critical and pro-active to free themselves from the shackles of oppression. Women need to be given the ability to think rationally and instilled a sense of deep sensitivity to the phenomenon of injustice. Through education, the right of women to be able to act and think independently so that dependence on men can be avoided. Education that leads to gender equality and environmental concerns need to be implanted within the school education and school education from an early age while considering the psychological and intellectual maturity. The values of femininity need to be honed and nurtured continuously so that goes to the heart of society. (Suliantoro, 2011).

Wiasti (2013) examined the Ngawen activity, namely forest management activities in Bali. According to her, the activity Ngawen prove that women's role is relatively similar to the role of men, but in the context of overall household duties, women's workload heavier recognized. Nevertheless, the status of women remained at the position subordnat under the status of men. Benefits of Ngawen activity in social and economic life seem less significant, while

protected forests in conditions of severely damaged by Ngawen activity. The suggestion here is that the action would be necessary to the preservation of protected areas based on gender equality. Real activity in the action was to plant timber that the results will be distributed based on profit-sharing system between the government and pengawen. However, in addition to serving timber planting and maintaining forests, the pengawen should still be given the opportunity to gardening on the sidelines of the forest plants. Thus, the expected *pengawen* can still be gardening, while forest loss can be reduced slowly.

Ecofeminism perspective applied in the analysis of media coverage because it involves the concepts of women in relation to nature. Ecofeminism, according to Hannigan, found natural abuse reflects male dominance and insensitivity to natural tramp 'ecosystem abuse mirrors male domination and insensitivity to nature's rhythms (Hannigan, 1995: 37). While Brulle (2000: 98), states that "Ecosystem abuse is rooted in androcentric concepts and institutions. Relations of complementarily rather than superiority between culture and nature, between humans and nonhumans, and between the males and females are needed to resolve the conflict between the human and natural worlds ".

Furthermore, according to Brulle,

> Ecological degradation originates in the treatment of nature as an object to be Possessed and dominated rather than as a partner to be cooperated with. Thus, the cultural ties Ecofeminism treatment of nature to the development of a patriarchal society and the domination of women by men. Just as men dominate women, the argument goes, humanity dominates nature. The resolution of ecological problems entails a shift from a culture that manipulates and controls both women and nature to a culture of cooperation. (Brulle, 2000: 222)

According Suliantoro (2011), ethics ecofeminism trying to dismantle the patriarchal mindset and policies that oppress women's nature and lead to a more equitable system of life. Ecofeminism view of human existence with the entire cosmos is "no related". According to him, citing Gilligan (1993), an attitude which relies relation prominent part of the essence of the nature of women. Furthermore, citing in Suliantoro, Shiva (1993) states that the human presence in the world as a guest and not as an owner and not as a colonialist. A guest should be polite to all family members attended. He should always be grateful for all the gifts are received by him. Forests already provide a wide range of human needs whether they are primary, secondary or tertiary should be appreciated as a gift. Therefore, they must be respectful to him. While colonialism transformed from a role as a human being into a vicious predator (Shiva, 1993).

In connection with the principles of ecofeminism, the values of femininity is something amazing when explored in more depth. The values of femininity can be a basis for development of epistemology vision. Diassociation values as character inherent in women such as maintaining, keeping, caring, sharing, cooperation, relational, solidarity is something admirable if it can be used as a basis for the development of epistemology. Placement of these feminine principles in the development of knowledge by Shiva (1988) to create the character of science that are more environmentally friendly, gender, non-exploitative and not reductionist.

Furthermore, according to Suliantoro (2011), there are ethical principles developed ecofeminism in an effort to conserve forests, namely
1. Responsible for the integrity of the biosphere

2. Solidarity cosmic
3. Maintain harmony with nature
4. Establish a relationship similar
5. Concern
6. Simplicity

However, the problem is, whether these principles are reflected or represented in the media? If there is, the extent to which the principles of ecofeminism represented in the media? An analysis of media coverage of the role of women in the sustainable management of forests can be conducted to determine how the mass media understanding and attitudes related to this issue, as well as be able to browse the suitability of the principles of ecofeminism in the news media.

Assessment of the discourse of the role of women in sustainable forest management uses discourse analysis model of Social Knowledge Discourse Approach (Keller, 2011 and 2013). This approach rests above discourse formation, broadcasting, and social knowledge changes. In SKAD, there are three dimensions of analysis, namely the configuration of knowledge, discourse formation, and the impression of power. Discourse of the role of women in sustainable forest management reviewed to understand the views of the media and media workers on the role of women in sustainable forest management, so as to obtain an overview of knowledge- in this case in the news - on the role of women in sustainable forest management was presented to the public.

Discourse on the role of women in sustainable forest management be traced from the news coverage throughout 2013. Through the digital archives at *Kompas* Information Center, it is known that the keyword 'peran **perempuan** dalam pengelolaan hutan lestari' 'role of women in sustainable forest management' led to 104 entries, and after being read by one of the most relevant one is 11 entries. Keyword 'peran **wanita** dalam pengelolaan hutan lestari' led to 22 entries. Selection of the word **'perempuan'** is used more in news in *Kompas* than the word 'wanita' so that it can become a point of particular concern regarding the use of both terms of understanding among activists for gender equality. Eleven entries were chosen divided into three reporting back so that the most relevant to the concept of women's role in sustainable forest management, ie:

1. Aleta Baun, Tanggung Jawab Berat pada Lingkungan (Selasa, 30 April 2013) (N1)
   Aleta Baun, a Hard way to Environmental Responsibility (Tuesday, April 30, 2013)
2. Perempuan Indonesia, Mengasah Ketangguhan hingga ke Gunung Kinabalu (Jumat, 17 Mei 2013) (N2)
   Indonesian Women, Milling Toughness up to Mount Kinabalu (Friday, May 17, 2013)
3. Dwi Wahyuni Ganefianti, Dari Cabai untuk Anggrek (Kamis, 5 Desember 2013) (N3)
   Dwi Wahyu Ganefianti, from Chili to Orchid (Thursday, December 5, 2013)

Kompas not showing the conflict between men and women. Conflict more generally. The problems caused by the government, employers, and communities that exploit the forest without taking into account sustainability. Aleta Baun, who fought militantly, against the marble mining company that will damage water sources and forests of the identity of his tribe. Mentioned that Aleta:

> Six months of leaving her husband and three children in the town. Just meet at the corners of the city in order to eliminate hidden longing in children (*Kompas*, Tuesday, April 30, 2013, p. 16, paragraph 7).

Table 1: SKAD Analysis

Level of Analysis		Description
Knowledge Configuration	*Frame*	Women are tough in defending the preservation of nature
	Classification	Women are tough in defending the preservation of nature, in many ways (the militant struggle; conducting / adventure extreme; focus on the preservation of a particular species)
	Phenomena Structure	Causes : government, employers, and communities that do not take into account the preservation of forests Responsibilities : Government, people Need for action : Let's make an effort to preserve forests Self Position : defenders of forest sustainability (not positioned as a woman) Other Position: governments and employers who do not take into account the preservation of the forest (not positioned as a male) Culture of things: The topic of the role of women in the management of sustainable forest covered with empowerment standpoint, that women are capable of making various efforts to conserve forests Value: Indonesian women, with all the limitations and domestic duties, shown to play a role in sustainable forest management
	Narrative Structure	Women have the strength and toughness to preserving the forest. Women have a role in sustainable forest management, to ensure the resources and lives of indigenous identity preserved Women can perform activities / adventure extreme; has a tough physical and spirit and still have the traditional characteristics as female Women can conserve forests by involving the community to preserve the economic value of specific species (wild orchid)
Discourse Production		Two of the articles obtained from rubric figure (N1 and N3); N2 when a news event. N1 is a deepening of the material. Rubric figure is a story worth someone's personal side is newsworthy because it has significance for society
Effect of Power Ideology		The strength of government/politic and capital Physical limitations and domestic roles of women are not the limits or obstacles in the efforts to conserve forests

Source : adaptation from Keller (2011, 2012)

Implicitly alluded to nature and instinct as a mother and wife Aleta, with roles and tasks bears. In the news "Indonesian women, Milling Toughness up to Mount Kinabalu", stated that:

> Indonesian women have responsibility in all fields even in the midst of struggle still taking care of domestic problems (*Kompas*, Friday, May 17, 2013, p. 33, paragraph 6).

Both of the above news excerpts may represent the opinions and understanding *Kompas* that somehow women have limitations in accordance with the physical and social nature. However, the principle of 'equal establish relationships' can be applied here, because of the limitations explained that women are physically and socially not deter the woman has a significant role in sustainable forest management efforts.

4. CONCLUSION

Efforts to conserve forest can be achieved in various ways, including socialization of these ideas about forest conservation within news. These news can be lead people to realize that the forest should be preserved and that everyone can be involved in efforts to conserve the forest. It is interesting and important to learn how the media shape public knowledge about the role of women in sustainable forest management, because the proximity of women with the food sector and land resources make the stronger the position of women in forest management activities based on community empowerment. Ecofeminism perspective applied in the analysis of media coverage. An analysis of media coverage of the role of women in the sustainable management of forests can be conducted to determine how the mass media understanding and attitudes related to this issue, as well as be able to browse the suitability of the principles of ecofeminism in the news media.

An analysis towards *Kompas* news has resulted that somehow women have limitations in accordance with the physical and social nature, but those physical limitations and domestic roles of women are not the limits or obstacles in the efforts to conserve forests. Thus, the authors suggest that the media should be more concerned about the role of women in forest management, with more number of reports, more attractive presentation, and more in-depth information. For experts in the field of forestry, this study can add insight and knowledge that the mass media can be a tool to aid in forest conservation efforts.

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PAPER A6 - A Duration Model of Adoption of *Falcataria*-based Farm Forestry

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ABSTRACT

Integrating perennial plant, such as *Falcataria moluccana*, in farming system can provide economic and environmental benefits, especially in marginal areas. However, the establishment of farm forestry on private land is widely varied. While the farm forestry in some locations has been well adopted, the farmers or land users in other location are reluctant to adopt them, although the traits of farmers and farm land in both locations are similar. Most adoption studies have employed cross-sectional data in a static discrete choice modelling framework to analyse why some farmers adopt at a certain point in time. The static approach does not consider the dynamic environment in which the adoption decision is made and thus does not incorporate speed of adoption. The information of adoption speed of an innovation is important in designing extension policies as well as reengineering innovations in order to align with socio-economic conditions of the farmers. Based on data from a survey of a random sample of 117 smallholder households in Wonosobo Regency, Central Java, Indonesia, this study investigated determinants of time to adoption of farm forestry using duration analysis. Results revealed that factors that accelerate the adoption varied include age of household head, level of education of household head, off-farm employment and output price. Older farmers tend to adopt *Falcataria*-based farm forestry faster than the younger farmers. Other interesting findings, such as off-farm employment and membership to farmers group, are two most influential factors in speeding-up adoption of *Falcataria*-based farm forestry. The policy implications of this research are that government should design policies that promote farmers' participation in off-farm income activities and strengthening farmer groups to get access in to extension services and timber markets.

Keywords: Adoption, duration analysis, farm forestry, *Falcataria moluccana*

1. INTRODUCTION

On farm tree planting has been thought of as an integral part in sustainable rural development in marginal areas in Indonesia (van Der Poel & van Dijk, 1986). This farming system, if successfully carried out, seems likely to provide a number of financial as well as environmental benefits by ensuring an ecologically sound approach to land management. Falcataria-based farm forestry is a particular example of an innovative practice that is designed to enhance productivity of marginal land that in the same time contributes to climate change mitigation through enhanced carbon sequestration. According to the latest estimation conducted by Indonesian Ministry of Forestry, farm forestry in Java stored carbon for at least 40 million ton C (Balai Pemantapan Kawasan Hutan Wilayah XI Jawa Madura & Multistakeholder Forestry Programme, 2009).

As one of the world's largest greenhouse gas emitters, with 80% of its emissions originating largely from agriculture, forestry and other land use (Yumamoto & Takeuchi, 2012), Indonesian governments at all levels are promoting farm forestry for a number of economic, social and environmental objectives. A number of national movements of tree planting, such as re-greening program, national movement for land and forest rehabilitation, and many other programs, have been launched with huge budget allocation. During Suharto era, for instance, Indonesian government has spent in an average amount of US $ 100 -125 million annually for at least 250 re-greening projects (Mangundikoro, 1986). In 2003-2009, the government has spent at least US $ 300 million annually to run national movement for land and forest rehabilitation. Nonetheless, the establishment of farm forestry on private land in Indonesia is widely varied. While the farm forestry in some locations has been well adopted, the farmers or land users in other location are reluctant to adopt them, although the traits of farmers and farmland in both locations are similar (Irawan, 2011). This leads to a question regarding factors affecting smallholders to adopt farm forestry.

Studies of agroforestry adoption, including farm forestry, have been conducted for many years in many areas. Factors affecting decision to adopt agroforestry innovations have been reviewed comprehensively by Pattayanak, Mercer, Sills, and Yang (2003) and by Mercer (2004). Until recently, most of the studies of adoption of agroforestry innovations applied dichotomous choice model and thereby they cannot properly explain the individual timing of an adoption decision, meaning the time a farmer takes until he/she adopts an innovation (e.g. Boulay, Tacconi, &Kanowski, 2012; Gyau, Chiatoh, Franzel, Asaah, & Donovan, 2012; Kakuru, Doreen, & Wilson, 2014; Sabastian, Kanowski, Race, Williams, &Roshetko, 2014). This paper examines the information gap between static and dynamic nature of adoption studies by providing information on duration analysis of adoption of *Falcataria*-based farm forestry. The main objective is to seek determinant factors contributing on the speed of adoption of *Falcataria*-based farm forestry.

2. MATERIAL AND METHOD

2.1 Study area

The study was carried out in Tempurejo, a village located in Wonosobo Regency in Central Java Province, Indonesia. The location was selected purposively based on consideration that the village was one of the main producers of *Falcataria* wood (*Falcataria moluccana*) in Java and part of upstream area of Medono sub-watershed. The sustainability of forested areas in this village has very important role in watershed protection, especially for the downstream areas that includes Purworejo and Kebumen regency. In addition, the village is part of ring two of greenbelt zone of Wadas Lintang reservoir that is main provider of water irrigation for agricultural production, especially rice farming, in downstream areas of Medono sub-watershed.

2.2 Sampling and data collection

Data were collected through a cross-sectional survey, using structured questionnaires. A random sample of 117 respondents was selected from a sampling frame of ± 700 farmers. The questionnaire was designed to collect information on general socio-economic characteristics including respondent's age (AGET), formal education (EDUC), off-farm employment (OFFE), membership to farmers' group (FORG), family size (HHSZ), size of farmland (FARM), and relative prices of *Falcataria* log to coffee (*Coffeea robusta*) bean per kilograms at the farm gate (PRIC). In addition, information on the length of time a farmer took from the date he first introduced about farm forestry to the date he adopted was collected. This variable

was measured as suggested by Burton, Rigby and Young (2003) as the date at which the innovation was first made available or the date at which the respondent started farming, whichever is the latest, till the time the farmer adopted the technology. Since *Falcataria*-based farm forestry is a relatively new technology, firstly introduced in Indonesia, especially in Java in 1989 through 'Sengonisasi Program', the first entry date was chosen as the year the farmer first learnt about the technology.

2.3 Empirical model specification and data analysis

Duration analysis, which is sometimes referred as survival analysis or event history analysis, is a statistical technique used for modelling the time to an event. Three equivalent functions are commonly used to describe the distribution of duration data includes: survival function, hazard function, and cumulative hazard function. Suppose for a given farmer, define T as "failure" time, at which the household makes a transition from non-adoption to adoption. The probability that a farmer adopts *Falcataria*-based farm forestry at time t is defined by a conditional distribution function $F(t)$ as:

$$F(t) = \Pr(T \le t) \tag{1}$$

T is non-negative continuous random variable representing the length of time a farmer stays in the non-adoption state. Variable t is the actual time a farmer takes from being a non-adopter to being an adopter. Nevertheless, not all farmers had adopted *Falcataria*-based farm forestry system at time t. Therefore, the probability of not adopting at time t is defined as a survival function $(S(t))$, which is defined as:

$$S(t) = 1 - F(t) = \Pr(T > t) \tag{2}$$

In order to explore the relationship between explanatory variables to timing of adoption, it is necessary to specify hazard function $h(t)$, which is defined as the probability that farmer i adopts *Falcataria*-based farm forestry at time $t + \Delta t$, conditional on the fact that the adoption has not yet occurred by t and Δt is short interval of time. Hazard rate is formally given as:

$$h(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T < t + \Delta t \mid T \ge t)}{\Delta t} = \lim_{\Delta t \to 0} \frac{F(t + \Delta t) - F(t)}{\Delta S(t)} = \frac{f(t)}{S(t)} \tag{3}$$

To account for the influence of the allegedly determinant factors, the hazard function was redefined as follows(Box-Steffensmeier & Jones, 2004; Madlener & Schmid, 2003):

$$h(t \mid x) = h_0(t)\, g(x, \beta) \tag{4}$$

where $h_0(t)$ is the baseline hazard, that is the hazard rate that is solely a function of time and is independent of the covariates, x, β is a vector of parameters to be estimated and g is a non-negative function that acts multiplicatively on the baseline hazard. Following previous empirical adoption studies (Abdulai & Huffman, 2005; Burton, Rigby, & Young, 2003; Dadi, Burton, & Ozanne, 2004), $g(\cdot)$ is commonly expressed as:

$$g(x, \beta) = \exp(\beta' x) \tag{5}$$

According to Burton *et al.* (2003), the baseline hazard $h_0(\cdot)$ and the effect of covariates (x) on the hazard function $h(t)$ was estimated using proportional-hazards rate.

This present study applied duration analysis method, specifically Cox proportional-hazard regression model (Cox model), to estimate the influence of allegedly determinant factors on the time lag preceding adoption of *Falcataria*-based farm forestry. The Cox model does not

assume a particular parametric form the baseline hazard. In the model, $h_o(t)$ is assumed to be unknown and is left un-parameterized, thus minimizing the risk of functional misspecification and hence biased coefficient estimates. Cox regression models do not have an intercept term (Box-Steffensmeier & Jones, 2004). This study uses empirical Cox model as follows:

Model 1

$$ADOPT(i,t) = \exp\begin{pmatrix} \beta_1 AGET_{i,t} + \beta_2 EDUC_{i,t} + \beta_3 OFFE + \beta_4 PRIC_{i,t} \\ +\beta_5 FORG_{i,t} + \beta_6 FARM_{i,t} + \beta_7 HHSZ_{i,t} \end{pmatrix} \quad (6)$$

Model 2

$$ADOPT(i,t) = \exp\begin{pmatrix} \beta_1 AGET_{i,t} + \beta_2 EDUC + \beta_3 OFFE_{i,t} + \beta_4 (EDUC \times OFFE)_{i,t} \\ +\beta_5 FORG_{i,t} + \beta_6 FARM_{i,t} + \beta_7 HHSZ_{i,t} + \beta_8 PRIC_{i,t} \end{pmatrix} \quad (7)$$

Table 1: Description of variables used in the duration of statistical model analysis

Variable	Description of the variable	Mean	Std. Dev.	Min	Max
Dependent variable					
ADOPT	Number of years from the date of first hearing to the date of adoption (years)	11.026	5.149	1	19
Explanatory variables					
Age (AGET)	Age of farmer when he adopted farm forestry (years)	31.453	8.107	15	53
Education (EDUC)	Years of formal education (years)	6.231	2.339	0	12
Off-farm employment (OFFE)	Farmer has off-farm employment 1 = Yes, 0 = No	0.479	-	0	1
Member of farmers' group (FORG)	Membership to farmers' group 1 = Yes, 0 = No	0.393	-	0	1
Farm size (FARM)	Size of farmland owned by farm household at the time of adoption (ha)	0.807	0.675	0.018	3.023
Price (PRIC)	Relative price of Falcatarialogto price of coffe bean/kg at the time of adoption	11.054	2.620	7.619	20
Number of adults (HHSZ)	Number of adults in household with the age more than 15 years old (people)	3.504	1.119	1	8

Description of all variables is provided in Table 1. Human capital is represented by age (AGET) and education (EDUC) which reflects the social aspects of the farmer and their ability to obtain and evaluate information about innovation. Off-farm employment (OFFE) and household size (HHSZ) is linked to supply of farm labor since farm forestry is usually less labor intensive than that of staple crop and horticultural production (Irawan, 2012). Farm land size (FARM) isused as indicators household's wealth. Farmers' group membership (FORG) represents the effects of information of an innovation a farmer derives from group contact. Relative price of *Falcataria* log to coffee (PRIC) is linked to the incentives of adopting *Falcataria*-based farm forestry (Burton et al., 2003). In the Model 2 (Equation (7)), we introduced the interaction effect of variable FORG and OFFE on the duration of adoption in

order to examine whether the farmer who has off-farm employment and a member of farmers' group adopt more faster than those who do not have.

The method of estimation used to obtain the coefficients for Equation (6) is maximum likelihood (ML) estimation (Box-Steffensmeier & Jones, 2004). A multi-collinearity test was done using variance inflation factor (VIF). All of statistical analyzes was done using STATA 13.

3. RESULT AND DISCUSSION

Falcataria-based farm forestry is a relatively new innovation introduced to smallholders in Java through re-greening program, which is so-called *Gerakan Sengonisasi* (*Falcataria* planting movement). Re-greening program itself has been established in Indonesia since 1976 with main objective was to rehabilitate critical land areas outside state-declared forest areas, particularly upland farm areas (Nawir, et.al. 2007). Before *Sengonisasi*, the government introduced a number of re-greening programs using multipurpose fast-growing legume trees, such as *Sesbaniagrandiflora* and *Leucaena*sp. The promotion to farmers was undertaken through mass campaign so-called *Gerakan Nasional Penanaman Turi or Lamtoro* (national movement of *Sesbania* or *Leucaena* planting). This massive planting was fully supported by government by providing free seed or seedlings, extension services, planting wage etc. However, the massive planting of *Leucaena* induced infestation of Kutuloncat insect (*Heteropsylacubana)* in the late of 1980s and destroyed almost all of *Leucaena* trees, especially in Java. To secure re-greening program, the government replaced *Leucaena* with *Falcataria* as another prospective multipurpose fast-growing tree in 1989.

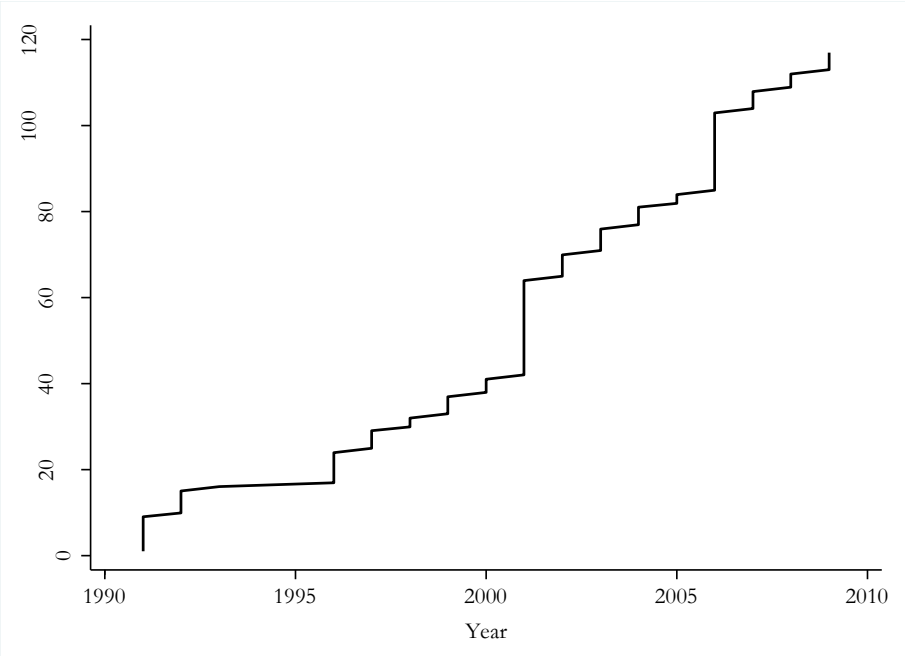

Figure 2: Adoption of Falcataria-based farm forestry in sample, 1990-2008

The same as in other areas in Indonesia, *Falcataria*-based farm forestry was introduced in Wonosobo regency soon after the launching of *Gerakan Sengonisasi* by Ministry of Forestry. At that time, the government provided free seedlings for farmers, especially smallholders. In addition, they also got technical assistance from forestry extension workers. Nevertheless, not all potential farmers were willing to adopt the *Falcataria* tree at that time. Some even threw away the seedlings freely provided by extension workers.Figure 2illustrates a graphical

presentation of the number of farmers by year of adoption of *Falcataria*-based farm forestry. From 1990 to 2008, the cumulative number of adopters increaseslinearly with rate 5.77% per annum on average.

Kaplan-Meier estimates of the survival function for adoption are plotted in Figure 3. The horizontal axis shows the number of years that elapsed from the date of the introduction of *Falcataria* tree to the year of first adoption. The function is falling gradually depicting slow adoption rate. This trend can be attributed to the nature of tree production that needs longer gestation period than that of staple or vegetable crops. Since most farmers are not a risk taker, this implies that to reach final decision whether to adopt the innovation, they must spend some time to have real example of *Falcataria* production. Overall, the minimum recorded time to adoption from the time of introduction of *Falcataria*-based farm forestry was 1 year, and a maximum of 19 years, with a mean of 11.026 years.

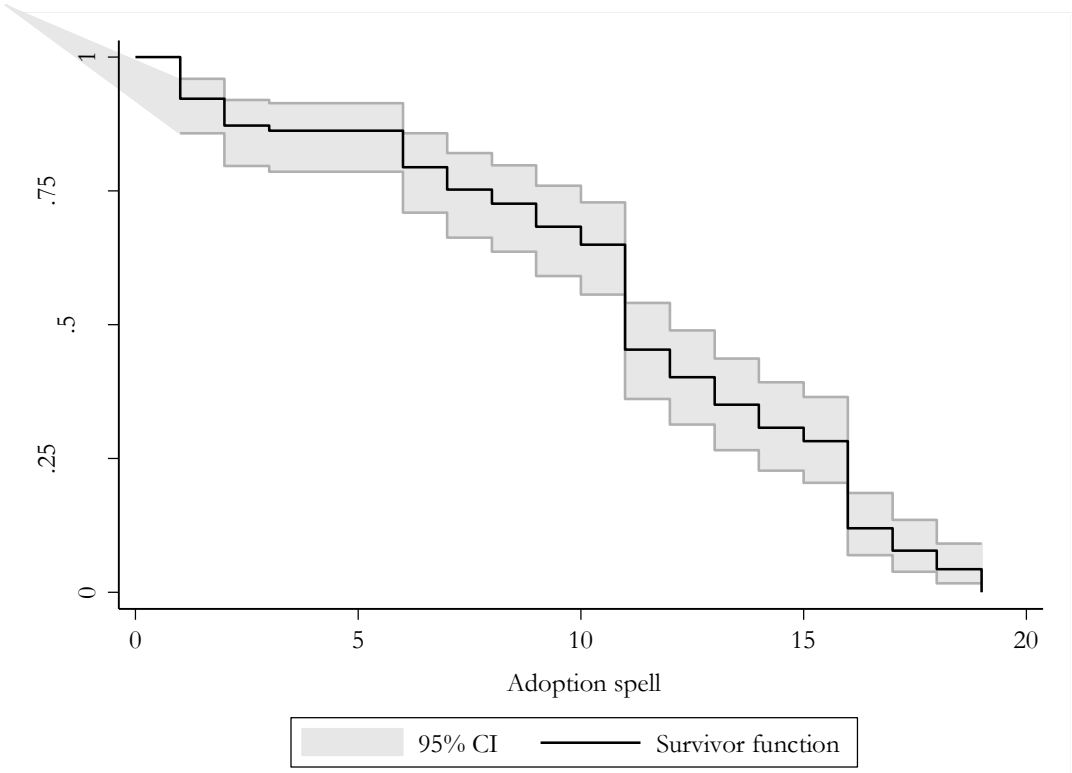

Figure 3: Kaplan-Meier survival estimate of adoption of *Falcataria*-based farm forestry

Turning to Cox model estimation, we first examined the existence of multicollinearity among variables included in the model using VIF. The results indicated that all variables fitted in the models had a VIF less than 10 which signify inexistence of multicollinearity(Greene, 2002; Maddala, 1993).

Table 2 displays the estimation results of the duration model. The measure of effect is represented by a hazard ratio. A ratio bigger (smaller) than one speeds up (slows down) the adoption process; subtracting 1 from the hazard ratio results in the marginal effect of the variable on the hazard rate of adoption.

The estimates of both models (Model 1 and Model 2) show that all of variables speed up adoption significantly, except the size of farm household (HHSZ).These results in part are consistent with findings from previous duration analyses with respect to other agricultural innovations(Abdulai & Huffman, 2005; Burton et al., 2003; Dadi et al., 2004; Matuschke & Qaim, 2008). Overall, variables in both models have similar effects on the duration of adoption.

Table 2: Cox proportional-hazard estimation of the coefficient and hazard rate of adoption

Variables	Model 1		Model 2	
	Hazard Ratio	Standard Errors (Robust)	Hazard Ratio	Standard Errors (Robust)
1. AGET	1.044 ***	0.013	1.042 ***	0.013
2. EDUC	1.325 ***	0.092	1.117 **	0.064
3. OFFE	2.920 ***	0.634	0.215 **	0.147
4. EDUC x OFFE	-		1.566 ***	0.170
5. FORG	3.570 ***	0.871	3.153 ***	0.762
6. HHSZ	0.952	0.089	0.974	0.085
7. FARM	1.297 **	0.146	1.300 **	0.153
8. PRIC	1.272 ***	0.069	1.205 ***	0.079
Log-likelihood	-398.183		-393.601	
Wald chi^2	192.84 ***		225.83 ***	

Notes:*, **, *** significant at the 10%, 5%, and 1%level, respectively

Age of farmer (AGET) in Model 1 and 2 are statistically significant at 1% level and have hazard ratio more than 1, signaling that elderly people are likely to take shorter time to adopt *Falcataria*-based farm forestry. One year of additional age increases the hazard rate of adoption byabout 4%. With advance in age, the farmer is likely to participate in less strenuous manual agricultural activities, such as farm forestry. This finding is consistent with Abdulai and Huffman(2005). They argued that elderly farmers may have accumulated capital and may be preferred by credit institutions, both of which may make them more prepared to adopt technology faster than younger ones.

Education variable (EDUC) has a positiveeffect suggesting an increase by one year increases the adoption hazard by 11 - 30%. This result supports the human capital theory which states that innovative ability is closely related to education level(G. Becker, 1964; G. S. Becker, 1985).More educated farmers are typically assumed to be better able to process information and search for appropriate technologies to alleviate their production constraints. The belief is that higher level of education gives farmers the ability to perceive, interpret and respond to new information much faster than their counterparts. This finding also consistent with the empirical studies of adoption of agricultural innovation using duration analysis (Alcon, de Miguel, & Burton, 2011; Burton et al., 2003; Dadi et al., 2004; Matuschke & Qaim, 2008)

As expected, off-farm employment (OFFE) and membership to farmers' group (FORG) have statistically significant speed up adoption of *Falcataria*-based farm forestry. Closer look at the

magnitude of hazard ratio in Model 1 and Model 2, it can be recognized that both variables have much higher hazard ratio than that of other variables. These imply that the farmers' group has important role in spreading information of farm forestry since extension service agents often use a farmers' group as a focal point. We can expect participationthrough groups and the support of a community network to mitigate some of the uncertainties associatedwith new technology. The groups and networks couldalso provide extension and training. The significance of off-farm employment on the speed of adoption can be attributed to the nature of farm forestry system, which are less labor-intensive and long gestation period. Thus, the farmers having off-farm employment are less dependence on farm income than those are not having off-farm employment.

In addition, Model 2 includes an interaction term which is generated from the multiplication of variable OFFE and EDUC. The reason to include this interaction term is that the farmers having off-farm employment are most likely those who are more educated as indicated in the previous empirical studies of adoption of on-farm tree planting (e.g. Boulay, Tacconi, & Kanowski, 2012; Gyau, Chiatoh, Franzel, Asaah, & Donovan, 2012; Kakuru, Doreen, & Wilson, 2014). The estimation result of Model 2 reveals that hazard ratio of interaction term (EDUC x OFFE) has a magnitude more than 1 and statistically significant at 1% level, indicating that the effect of EDUC subject to the presence of OFFE speed-up the adoption of *Falcataria*-based farm forestry.

The same as many previous empirical adoption studies of tree planting (e.g. Boulay et al., 2012; Gyau et al., 2012; Kakuru et al., 2014), the resource endowment, that is farm size (FARM), has significant influence on the speed of adoption. According to theory of adoption of innovation (e.g. Feder, Just, & Zilberman, 1985; Feder & Umali, 1993; Rogers, 2010)and empirical literature(e.g. Boulay et al., 2012; Hayami, 1981; Sabastian, Kanowski, Race, Williams, & Roshetko, 2014)its early adopters tend to be the better-off farmers who are better situated to take advantage of new innovations with uncertain prospects. These households are more likely to have the necessary 'risk capital', such as land, to facilitate risky investment in unproven technologies.

Agricultural and tree-product prices are well-known factors influencing land use decisions (Godoy, 1992; Pattayanak, Mercer, Sills, & Yang, 2003; Shively, 1999). The results of Cox model estimation (Table 2) indicate that relative prices of *Falcataria* increase the speed of adoption. An increase in price by one unit increases the adoption hazard by more than 26%. This result implicitly implies that the farmers require market incentive which is reflected from the prices for the tree to compensate long waiting time to adopt *Falcataria*-based farm forestry.

4. CONCLUSION

This study has demonstrated that duration analysis conveys information on the timing of the adoption decision, which cannot be provided by static discrete choice models. The study reveals that determinant factors that influence the speed of adoption were age of farmer, education, off-farm employment, farm size, membership to farmers' group and price. In addition, it is also found that the influence of off-farm employment and membership to farmers' group to the speed of adoption are much higher than any other factors. Furthermore, farmers who are well educated and have off-farm employment are among the earlier adopters. Policy insights derived in the context of this study suggest that speeding up *Falcataria*-based farm forestry requires policies that promote farmers' participation in off-farm income activities and timber markets in addition to access to extension services.

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PAPER A7 - Bringing Bush-meat Home: A contribution of NTFPs to local livelihood in West Papua

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ABSTRACT

Non-timber forest products (NTFPs) have long been an important component in the livelihood strategies of forest dwelling people. In West Papua, wild animal utilization was mostly done through hunting and it was significantly contributed to local livelihood. How bush-meat from hunting contributes to local livelihood was less understood. The contribution of bush-meat on local livelihood was analyzed by interviewing 702 hunters, collaborating with 21 hunters to record hunting returns and carrying out meal surveys of 400 households across seven villages at the Amberbaken District of Tambrauw Regency. Hunting was mostly done by using both active and passive hunting techniques. Hunting was conducted to obtain food for household consumption as well as gaining extra income for families. Most respondents actively conducted hunting (every week and fortnight) and hunting target across the sampled villages was almost the same. Introduced species – deer and wild pig was the most prey species killed by hunters at the last hunting excursion. An average hunting return within the sampled villages in seven month observations were ranged from 2.8 to 6.1 animals with a total of catch results were 29.7 animals. Meals contained bush-meat dominated the household consumption in the study sites. The reliance on bush-meat was significant for both food and income.

Keywords: Bush-meat, NTFPs, local livelihood, coastal, West Papua

1. INTRODUCTION

Using wildlife for food varies between communities. Some people consume it because it is affordable, familiar, and (depending on cultural background) it is acknowledged as a high class meal. Others value wild meat for its taste and the fact that it offers variety in the household diet (Wilkie et al., 2005). The need for wild meat consumption for an animal protein source in rural areas is very important, because it is more easily accessible than cultivated meat, and is often the most available dietary protein (Rao and McGowan, 2002).

In tropical areas world–wide, wild meat has long been part of the staple diet of forest–dwelling peoples (Fa and Yuste, 2001), and is a major source of protein for many people living in or close to tropical forests today (Bennett and Robinson, 2000). Therefore, Prescot-Allen and Prescot-Allen (1982) suggested that people in as many as 62 countries are primarily dependent on wild animal meat as a protein source. This suggests that there is a strong relationship between hunting and wild meat consumption.

The preferences for different wildlife species are usually influenced by economic activity, access to domestic meat, ethnic origin, geographical isolation, local wildlife availability and the biological attributes of species that are hunted (Naranjo et al., 2004). In addition, other factors have influenced prey preference, such as the social, cultural and political characteristics of the ethnic groups that hunt (Fa et al., 2002).

Traditionally, hunting in Papua is conducted to supply meat for household consumption especially in the remote areas (Pattiselanno, 2006; Pattiselanno and Arobaya, 2013). However, the contribution of bush-meat from hunting on local livelihood was less understood. Research on the contribution of hunting for local consumption is therefore conducted in Amberbaken District of Tambrauw to determine the influence of bush-meat – NTFP to local livelihood along the coastal.

2. RESEARCH METHODOLOGY

Hunting surveys and household surveys were conducted to collect information on indigenous hunting practices and household consumptions along the coasts. Surveys were conducted between June and December 2011 at seven villages on the Amberbaken District of Tambrauw regency of West Papua Province (Figure 1).

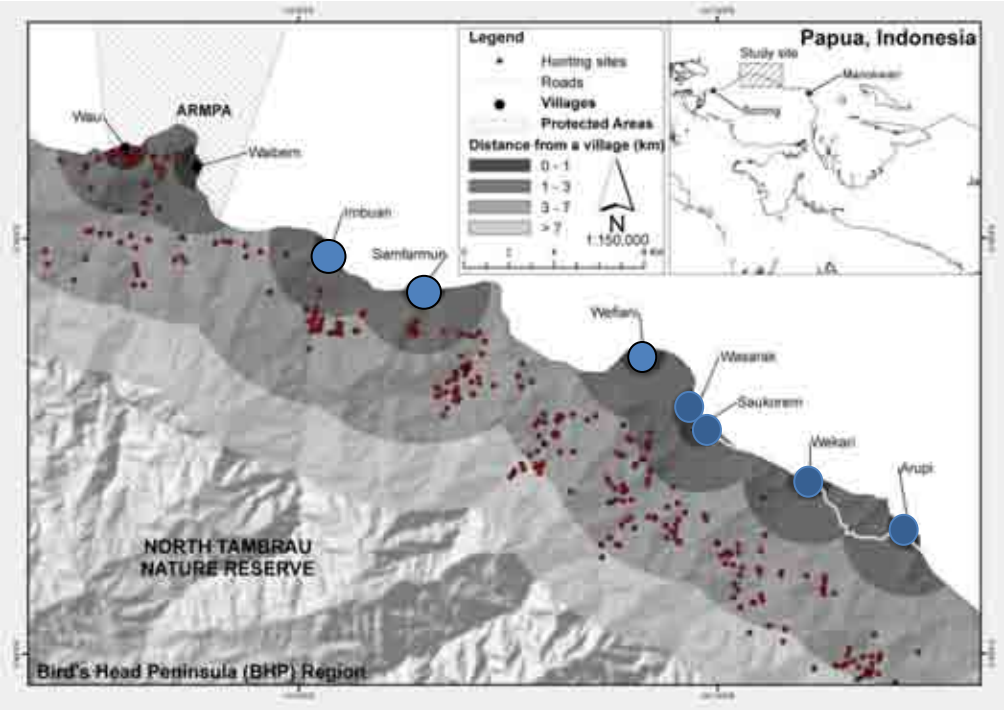

Figure 1: Location of the sampled villages at the Amberbaken District.
(Notes: smaller red dots represent the distribution of hunting grounds from each village recorded by GPS during accompanied hunting in 248 hunting episodes).

2.1 Hunting survey

Information about hunting was gathered through interviewing 140 focal hunters, those who were actively hunting and all men, using the Wildlife Conservation Society (WCS) hunting questionnaire (Rao et al., 2005). To gain an overall picture of hunting, we also distributed 100 questionnaires consisting of seven multiple choice questions modified from the WCS questionnaire, per village. Our target was people from different tribes and clans with different occupational backgrounds across the whole community in the sampled villages.

Questionnaires were distributed during the weekend and most were collected on Sunday, after church, because people tend to stay in the village to prepare themselves for religious and social activities. A total of 562 questionnaires were returned for analysis.

Three collaborative hunters from each village were recruited and trained to complete an information sheet about their weekly hunting take. This information included whether or not they were successful, and if so, how many individuals per species were killed, their common names and the different types of weapons that had been used (after Carpaneto and Fusari 2006; Fusari and Carpaneto 2000). Information was triangulated by having informal discussions and interviewing key respondents such as elders and community leaders during that time, so we had similar information from each collaborated hunter.

2.2 Household survey

Household meal surveys were conducted to determine the level of consumption of wild meat and other food items (e.g. fish, meat, eggs, canned meat and vegetables including noodles). These surveys consisted of interviews that were addressed to housewives or to the member of the household who was responsible for food preparation in the household (n= 400). People were asked about the kind of meals which were served each day and how often within a week those meals were consumed. This indicated the amount of meat consumed by the households.

2.3 Data analysis

All questionnaire data that could be quantified were entered into a database and analysed using log-linear model in S^+ package for the Analysis Biological Data (Jones et al., 2012). Data were displayed in graphs, figures and tables. Contextual approach was used to explain the situation in the field in order to complete description of the study sites.

3. RESULTS AND DISCUSSION

The key findings of this study are (1) hunting was conducted to obtain food and gain extra income for families, (2) both active and passive hunting techniques were used by hunters, (3) most respondents actively conducted hunting (every week and fortnight) with (3) hunting target across the sampled villages was almost the same and (4) meals containing bush-meat dominated the household consumption in the study sites.

3.1 Hunting patterns

Hunting was conducted for different purposes including obtaining meat for sale and consumption as well as other purposes such cultural events and pest eradication. Hunting for sale and consumption are just below 50% while hunting for other purposes are about 5%. Purpose of hunting varies among hunters (Figure 2, log-linear χ^2= 322.64, df= 2, p = 0).

Our finding is suitable with previous studies that have been conducted across tropical areas that acknowledged the reliance of the local communities on hunting because it was an important alternative source of family revenue. Results from hunting support all communities with different amounts of income. The contribution of hunting as a source of cash is important for the households living in extreme poverty with daily income less than US$1during the lean agriculture seasons (Shively, 1997; Mendelson et al., 2003; Hilaluddin et al., 2005).

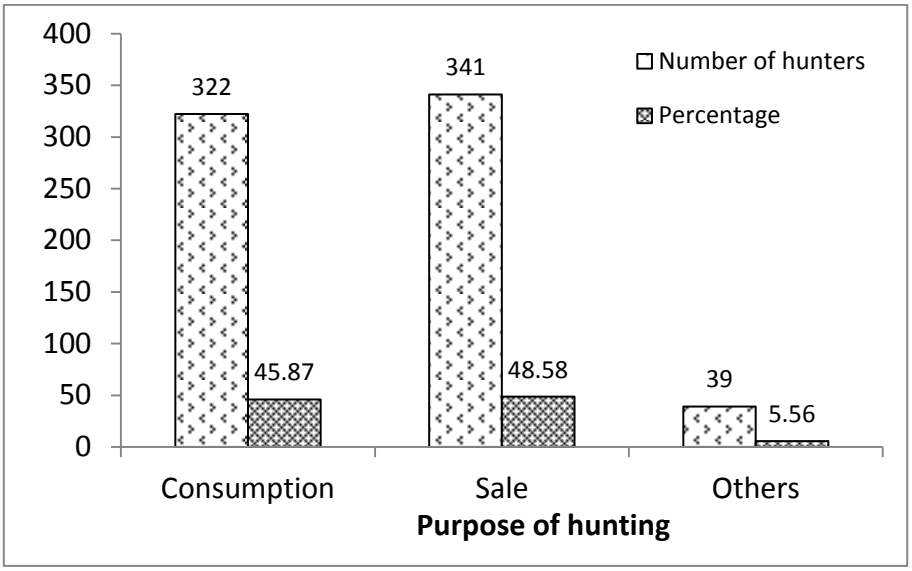

Figure 2: Purpose of hunting in the 7 sampled villages (N = 702), log-linear χ^2= 322.64, df= 2, p = 0

Many people in tropical forests rely on hunting because of the animal protein source to feed their families. Bush-meat is the most accessible animal protein especially for those in rural areas (Robinson and Bodmer, 1999). Fa and Yuste (2001) suggests that bush-meat was the staple diet of forest-dwelling peoples in tropical areas during ancient times and hunting was mostly done for subsistence (Fa & Brown, 2009; Milner-Gulland et al., 2003; Robinson & Bennett, 2000).

A variety of hunting techniques were documented in the study sites. They were bows and arrows, spears and machetes, hunting with dogs and using guns (active techniques) and setting nylon snare traps (passive technique). Each hunter typically used more than one technique. Thus we recorded each of technique that has been used by hunters in hunting. About 80% of hunters used both active and passive hunting techniques while hunting with dogs was almost 40%. The least common hunting technique used was guns which were only employed by 9% of hunters (Figure 3 log-linear χ^2= 602.98, df= 2, p = 0).

In this study, hunting with dog and using guns were separatedly analysis as other studies have found that hunting with those methods severely impacted prey population (Koster, 2008; Corlett, 2007; Robinson and Bennett, 2000).

The use of active techniques (bows and arrows, spears and machetes) applies to the previous study by Pattiselanno (2006), native Papuans commonly used traditional hunting weapons such as bows-and-arrows and spears made from forest materials. These methods were also widely practiced in tropical Asia and Papua New Guinea (Corlett, 2007; Mack and West, 2005).

Greater used of traps was also indicated the way hunters maximised harvest rates for trading purposes. Traps are one of the simplest and most effective devices to kill animals (Fa & Brown, 2009). Between 25 and 250 snare traps were set along the paths or trails the animals used in order to kill both species indiscriminately. Between 25 and 250 snare traps were set along the paths or trails the animals used in order to kill both species indiscriminately. Trapping is more affordable, and less time consuming (Lee, 2000). It can also be incorporated into a schedule based on farming chores and operated in most wide-ranging areas. Trapping

requires little or no money to build traps and snares because they can be built from forest materials and nylon, or ropes that can be reused (Fa and Brown, 2009).

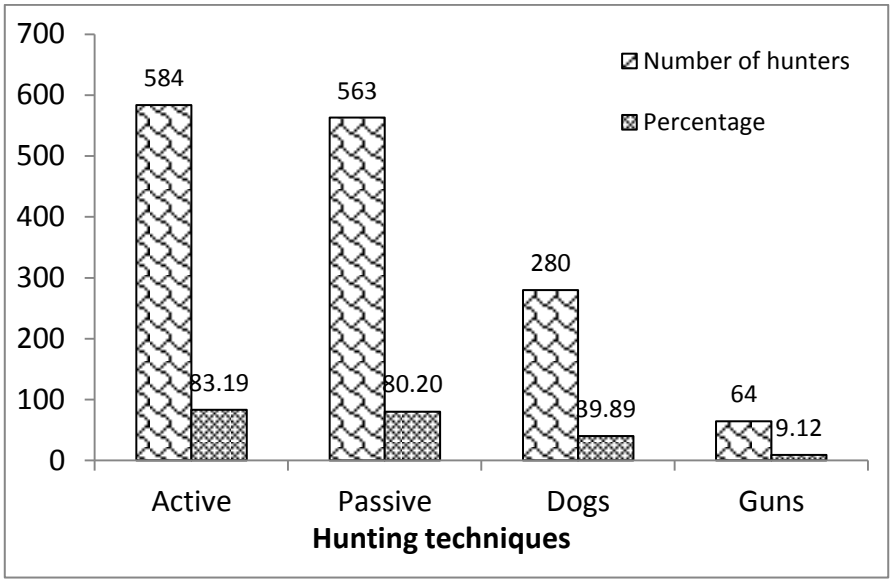

Figure 3: Percentage of hunters employing different hunting techniques within the sampled villages

Notes: Percentages do not add to 100 because typically hunters used more than one hunting technique, log-linear χ^2= 602.98, df= 2, p = 0

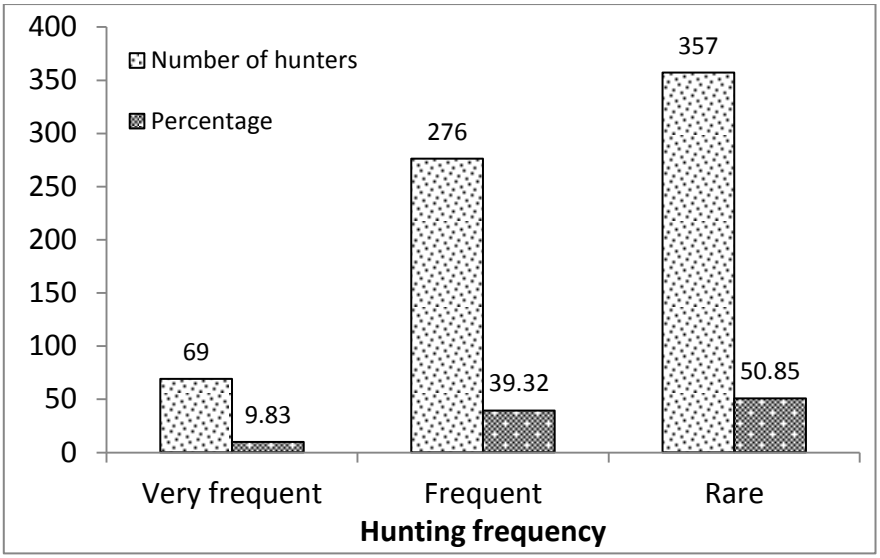

Figure 4: Number and percentage of hunters who involved in different hunting frequency.

Notes: Very frequent (daily and 2-3 days a week), frequent (weekly and fortnigthly) and rare (monthly), log-linear test χ^2= 224.20, df= 2, p = 0.

Half of the respondents conducted hunting at least once a month, while 40% hunted every week and every two weeks and 10% hunted between two and three days a week. Hunting frequency among hunters in the sampled villages was different (Figure 4, log-linear test χ^2= 224.20, df= 2, p = 0).

Our study showed that frequency in hunting was closely related to other livelihood activities they were involved in the villages. Hunters went hunting every month, every week and every two weeks because they had their own occupation and hunted when they were not working. This finding mirrored the indigenous Buglé hunters in Panama who went on hunting trips when they had free time because they were mostly engaged in agriculture and wage labour (Smith, 2005). Pangau-Adam et al (2012) reported that in the north-eastern area of Papua hunters went hunting weekly with different amounts of time devoted to hunting because hunting was a part-time activity only. In Arunachal Pradesh north-east India, there was no fixed hunting schedule and hunting was conducted when convenient (Aiyadurai et al., 2010).

3.2 Hunting returns

Larger numbers of deer 40%, followed by wild pig 35% brought home in the last hunting trips supported the practice of hunting which was mainly for sale. Native species was the least target hunted at 27% and individual prey species killed by hunters at the last hunting excursion was different log-linear test $\chi^2 = 18.76$, df= 2, $p < 0.0001$.

Table 1: Hunting returns (individual animals) during seven-month observation obtained from 21 hunters within the sampled villages

Villages	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Total
Wefiani	5	3	4	3	2	4	3	24
Imbuan	3	5	3	4	4	7	4	30
Samfarmun	5	3	4	4	3	8	4	31
Saukorem	3	3	5	4	1	4	5	25
Wasarak	4	2	4	3	3	4	2	22
Arupi	4	6	7	3	5	9	8	42
Wekari	3	4	6	5	2	7	7	34
Total	27	26	33	26	20	43	33	208
Mean	3.86	3.71	4.71	3.71	2.86	6.14	4.71	29.71
Std. Dev.	0.90	1.38	1.38	0.76	1.35	2.12	2.14	6.90

Throughout a seven-month observed period, a 208 animals were brought home by 21 collaborating hunters. Hunting returns in the period of observation was 49% deer, 39% pig and 12% native species (*Thylogale brunii* Dusky pademelon and *Dendrolagus inustus* Grizzled Tree Kangaroo). Dressed weights harvested (the weight of an animal after eviscerating, weight loss of 40%, see Albrechtsen et al., 2006)

Deer and wild pig are targeted because they provide a large amount of meat for both subsistence and sale purposes. In reference to reasons for hunting, in most cases, bush-meat markets mainly sell ungulates such as deer and wild pig. These species are the most important source of income where trade has been documented (Milner-Gulland & Clayton, 2002; Fa & Brown, 2009; Robinson & Bennett, 2000; Luskin et al., 2014).

A total of 7623 kg of dressed weight from deer and wild pig were harvested with the local price per kilogram being 25,000 Indonesian Rupiah (IDR) (equals to US$ 1.89) for venison and 15,000 IDR (or US$1.13) for pork. The hunting take was valued at IDR 154.125.000 (US$ 11,651). In contrast to studies from the Africa and South American, the bush-meat trade in this study was still a relatively small ecocomic activity. Estimates of the national value of

the bush-meat trade range from US$42-205 million across countries in West and Central Africa (Davies, 2002).

3.3 Consumption patterns

Bush-meat consumption varies between 29% in Saukorem and 44% in Wekari. Non-bush-meat consumption also varies between 56% in Wekari and 71% in Saukorem.

Table 2: Meal consumption across the sampled villages in Amberbaken District

Meals	Arupi	Wekari	Saukorem	Wasarak	Wefiani	Samfarmun	Imbuan
Bush-meat (n)	19	24	26	36	26	18	30
%	38	44.44	28.88	34.28	34.66	38.29	40
Fish (n)	15	14	28	23	19	7	14
Livestock products (n)	5	7	10	12	10	6	9
Vegetables + Noodles (n)	11	9	26	34	20	16	22
Non-busmeat (n)	31	30	64	69	49	29	45
%	62	55.55	71.11	65.71	65.33	61.70	60

Meals consumed by the households were categorised based on type diets consumed by the households during preliminary household surveys. They were meals containing bush-meat, fish, livestock products including meat, egg and canned meat and meals containing vegetables and noodles.

Almost half of the respondents conducted hunting to obtain meat to fulfil the household's consumption (Figure 2). Therefore, the percentage of respondents who had wild meat in their meals ranged between 29% and 44%. Bush-meat was predominantly consumed within the sampled villages indicating the high reliance of households on the NTFPs along the coast of the Bird's Head Peninsula.

The high proportion of bush-meat consumption by the respondents indicates that bush-meat is an important component of the diets in the villages studied. However, available alternative protein allows communities to select other forms of protein (fish, livestock products and vegetables and noodles), as it is also experienced by the communities in Asia and West Africa (Bennett et al., 2002; Rowcliffe et al., 2005; Brashares *et al.*, 2004).

Providing people with alternative livelihoods is important to reduce their dependence on wild meat for food and trading. Looking at the potential of fish and livestock and the available fodders to support their development, the first alternative is to establish programs to provide domestic animals or livestock to meet needs for rural households.

A national program to subsidize households with free health services and school fee for children may help to minimize the reliance of hunting to support medication payment and school fee as well. Raising people's incomes by providing alternative sources of revenue is important to lower their reliance on wildlife hunting.

4. CONCLUSION

Bush-meat played important roles to local livelihood along the coast of the Bird's Head Peninsula through hunting that conducted to obtain food for household consumption as well as gaining extra income for families.

Most respondents actively conducted hunting (every week and fortnight) and hunting target across the sampled villages was almost the same.

Introduced species – deer and wild pig was the most prey species killed by hunters at the last hunting excursion. An average hunting return within the sampled villages in seven month observations was ranged from 2.8 to 6.1 animals with a total of catch results was 29.7 animals.

Meals contained bush-meat dominated the household consumption in the study sites. Although the study sites were located along the coast, the reliance on bush-meat was significant for both food and income.

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PAPER A9 - Peat swamp forest management through community based participation: a case study of Kalawa village forest

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ABSTRACT

Participatory forest management, such as village forest, is a model of social forestry. Sustainable forest development, which includes community participation, aims to contribute to poverty alleviation. Community involvement in peat swamp forest management is important in the success of forest management. The objective of the research was to identify, describe and analyse participatory type of Kalawa village forest at PulangPisau district, Central Kalimantan province. Method applied in the research was a semi-structured interview to some villagers as respondents, in-depth interview to the key respondents of various stakeholders, and SWOT analysis. Kalawa village forest is managed under 'functional' participatory type and bottom up approach. In general, the villagers have less awareness on village forest and participatory forest management approach. Most villagers assumed that village forest limits their access to forest, and it does not give any tangible benefit for the community and the environments. Despite of lack understanding, the villagers have strong motivation in protecting the remaining peat swamp forest. The internal and external factors of participatory forest based management in Kalawa village forest were analysed using SWOT analysis; it is resulted five characteristics that can be used as a strategy on the development and management of Kalawa village forest in a participatory manner.

Keywords: SWOT, type of participatory, Kalimantan, village forest

1. INTRODUCTION

Peat swamp forest is a unique ecosystem, which has important values for ecology, hydrology, economic and social values. Indonesian Government, i.e. The Ministry of Internal Affairs, has taken special attention on the importance of peat swamp forests, by signing the National Strategy and Planning for National Action on Sustainable Peatland Management. Each province may take liberty on how implementation of the planning according to condition of each province (Ministry of Internal Affairs, 2006).

Currently, people have been considered as the most important actors in forest management. Social approach has been taken as integral part of the forest management, which is called social forestry. Participatory management is a part of the social forestry. Sustainable forest management includes people participation in the forest management, from the early process of planning, implementation, monitoring and evaluation. Reward mechanism for such participatory management may improve the success of forest management in sustainable manner.

Social forestry is one of the national government programme that consisted of several forms of implementation, such as community forest *(hutan kemasyarakatan*), village forest (*hutan desa*),

and community based forest plantation (*hutan tanaman rakyat*). Social forestry may be a significant contributor to alleviate poverty.

Objectives of the study aimed to identify, describe and analyse type of participatory management of Kalawa village forest.

2. METHOD

2.1 Study Site

The study was conducted in a village forest of Kalawa, in the sub district of Kahayan Hilir, Pulang Pisau district, Central Kalimantan province (Fig.1).

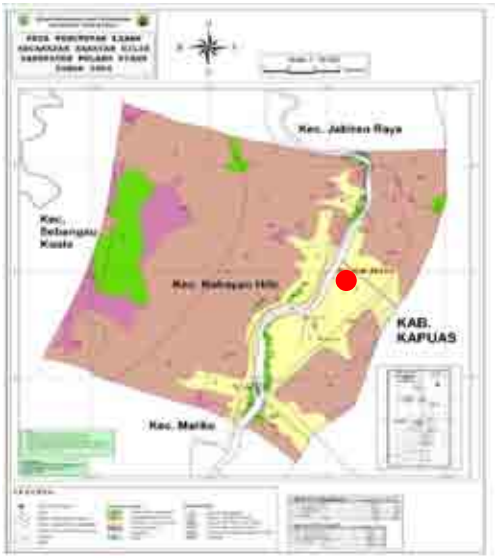

Figure 1: Kahayan Hilir sub-district, Pulang Pisau district,
Central Kalimantan Province (Kalawa Village)

2.2 Method

2.2.1 Selection of respondent

Respondent was selected purposively based on objective of the interview, which includes village leader and villagers. Twenty five villagers of the Kalawa village were selected as respondent. Expert respondents were selected from other stakeholders, consisted of Forest Service in the province and district level, Environmental Agency of provincial level, village leader of Kalawa, and chief of Kalawa village forest.

2.2.2 Data collection

Data collection was conducted in two approaches, e.g. a semi-structured interview, to get data from cultivation system, and perception on peatland management and village forest from the villagers. In-depth interview was used for asking open questions to the main factors of the village forest development.

Research parameters were consisted of: (i) characteristics and rules of the organization and social economy of villagers; (ii) involvement mechanism of villagers and other stakeholders; (iii) interests of stakeholders; (iv) level of local participation on each stage of the process; and (v) desktop study.

2.2.3 Data analysis
Data were analysed descriptively for:(1) biophysics and social characteristics, (2) institutional of peatland management; and (3) local perception. Quantitative analysis was used to quantify the level of participation, by putting score from one to five. The score implies rank of awareness on participation, e.g. high, moderate or low. Level of participation (viz. passive, moderate, or active) was also identified. SWOT (strength, weakness, opportunity and threat) analysis of forest village Kalawa was identified and mapped.

3. RESULT AND DISCUSSION

3.1 Kalawa Village Forest
The Kalawa forest is a peat swamp forest in the downstream of Kahayan River. In 2005, Kalawa forest was declared as a customary forest based on a decree of Customary Leader of Kahayan Hilir ('Damang Kepala Adat' Kahayan Hilir, 2005). The Kalawa peat swamp forest was managed by applying traditional knowledge, known as 'handil' system. 'Handil' system is defined a small ditch that is established to regulate hydrology of peat water, so that the peat land ecosystem can be used as agriculture-land. The 'handil' drained peat water to a river. 'Handil' is also used to get access into the forest. The leader of the 'handil' is selected democratically, and he has role in land division and ditch maintenance (Octora *et al.,* 2010).

The community surroundings Kalawa forest, which consisted of four villages, proposed a village forest to the Government, in order to get jurisdiction right of the customary forest. In 2012, the Minister of Ministry of Forestry launched a decree for each village on the determination of working area of each forest village. In total, the four village forests cover an area of 16.245 ha, which managed by four villages, viz. Buntoi, Kalawa, Gohong and Mentaren villages. Each village has received an official licence on the management of village forest management based on a decree of Central Kalimantan Governor no. 188.44/970/2013 on 27 November 2013. Each village manages different size of forest that is varied from 1,835 to 7,025 ha. Among three schemes of social forestry, the scheme of village forest was proposed and established by the local people of Kalawa, in order to preserve the remaining peat swamp forest from further degradation.

The peat swamp forest of Kalawa consisted of primary and secondary forest and degraded peat swamp forest. It has humid tropics climate, mean annual rainfalls is 2,940 mm (en.climate-data.org). The area somewhat flat; it has alluvial soil along the river banks. The forest reserves large carbon-content at above and below-ground that are varied from <300 to >1,877 tonne C ha^{-1} (IFACS, 2014). Despite of limited study about biophysics characteristics of Kalawa forest, a non-government organization (NGO) has reported and launched a planning of landscape conservation, which provides an overview of conservation target in Kalawa forest based on its high conservation value (HCV) (IFACS, 2014). More study on the ecosystem and social value of the Kalawa forest is necessary for further investigation.

3.2 Community characteristics of Kalawa village
Population of Kalawa village is 1,316 inhabitants, with population density of 235 people km^2, household number is 321. The population comprised of 705 men and 611 women (BPS Pulang Pisau, 2013b). Source of income can be grouped into four sources, e.g. agriculture, fishery, non-timber forest products and other sources.

3.2.1 Agriculture

Livelihood of local people of Kalawa village is mostly based on rubber cultivation. All respondents have rubber farm, which were planted as monoculture system or simple rubber agroforestry system. All farmers plant dry land paddy once a year. Productivity of the paddy is only 100 kg ha^{-1}, which is very low compare to the average productivity of irrigated paddy in West Java, e.g. 6.5 tonne ha^{-1} yr^{-1} (Sumarno & Kartasasmita, 2010). In 2014, paddy yield decreased owing to long drought and fire. Traditionally, dry land paddy cultivation in Kalawa village applies slash and burn practice, which induce wild fire in the drought season. Although prescribe burning has been prohibited by law, however it is still practiced occasionally.

Land holding of Kalawa's farmers ranged from 1 to 10 ha, with average of 3 ha per household (Fig. 2). Production of rubber latex of the sub-district was 13,222 tonne from 10,723 ha area of rubber farm. Rubber is planted both in monoculture and Agroforestry systems. Rubber monoculture farm generally are in young stands (age less than 4 years), while rubber agroforestry is older than 10 years. Rubber trees are planted with fruit and timber trees, such as durian (*Durio zibethinus*), cempedak (*Artocarpus champeden*), jackfruits (*Artocarpus integra*), stinky bean (petai, *Parkia speciosa*), sengon (*Albizzia falcataria*) and gaharu (*Aquilaria malaccensis*).

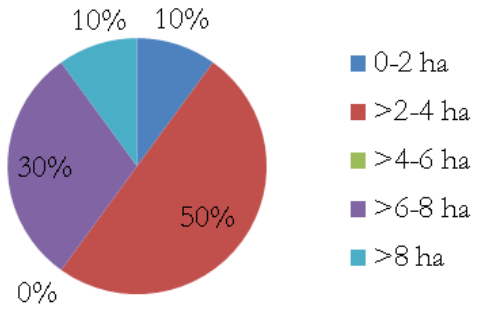

Figure 2: Land holding of Kalawa's farmers

3.2.2 Fisheries

Kahayan Hilir sub-district contributed in fresh water fish production amounted of 488 tonne in 2012 (BPS Kabupaten Pulang Pisau, 2013a). Fifty per cent of the respondents are fishermen. Fishing at the Kahayan River for domestic use is a common activity of Kalawa's community. Fish farming in the 'karamba' (i.e. a fish cage that is sub-merged in to the river) is not common in the Kahayan River of Kalawa village. 'Karamba' technique resulted high mortality of fish farm, since it highly depends on water quality. Rosemaria (2014) reported that mercuric (Hg) content of the Kahayan River's water was 0.006-0.007 part per million (ppm), which was more than standard quality 0f 0.001 ppm (Rosemaria, 2014).

3.2.3 Non timber forest products

People who are highly depend on natural resources usually have limited resources and physical capital (Kusel, 1996). Under a scheme of village forest, the community through an institution who responsible in managing the village forest (in Bahasa Indonesia known as '*Lembaga Pengelola Hutan Desa', LPHD*) may have access to the forest or natural resources. People usually collected latex of jelutong (*Dyera polyphylla,* a tree species belongs to Apocynaceae family) and bark of *Alseodaphne* sp. tree (a tree species belongs to Lauraceae family). It is locally known as 'gemor', that can be used as mosquito's repellent. The gemor's collectors spent about 3-4 weeks in the forest to find number of *Alseodaphne* sp. trees, cut the stems and collect the barks. The price of 100 kg bark of gemor was 1 million rupiah. Not only product of

trees, some animals were also collected from forest, such as various species of birds and pangolin (*Manis javanica).* Price of *Manis javanica* ranged from Rp 800,000 - 1 million per individu, depending on size of pangolin.

3.2.4 Other resources

Others informal occupation of the respondents consisted of daily labour, logger, working at gold mining, swallow bird farming, vendor, and civil servant services. It provides about one third source of income. Some of respondents were also had double income from different sources of livelihood.

3.3 Participatory management of the Kalawa village forest

According to Regulation of the Ministry of Forestry number P.89/Menhut-II/2014 about village forest; it aims to give access for community through the management of village forest to get benefits from the forest resources. In the implementation of community based forest management, the local government, i.e. Forestry Services (*Dinas Kehutanan*), plays an important roles. The Forestry Service Agencies (in Province and District levels) are responsible to facilitate the village management in order to improve the capacity of village institution in forest management. The facilitations include: (a) education and training, (b) institutional development, (c) guidance on the of work plan preparation, (d) preparation on work plan of community forestry, (e) technology guidance, (f) provide market information and financial capital, and (g) business development, as stated in the Regulation of the Minister of Environment and Forestry no. P.101/Menhut-II/2014. On the contrary, the management of Kalawa Village Forest complained that Forestry Service at the District level has provided very limited support tothe village forest. Yet, the organization has not received any financial support from the local government; all activity is self-funding from village treasury. The Forestry Service Agency at the district level stated that there is no budget allocation to support activity program of the village forest. The village forest management is assumed to get direct benefit from forest utilization, without considering any obstacles in conducting its regular activities. This is recognized as a challenge in the sustain-agility of village forest development in the future.

There are two approaches in the participatory-based forest management, e.g. top down and bottom up approach (Dewi, 2012). The management of Kalawa village forest is recognised as a bottom up approach, where various actors who are involved in the program implementation participate in a strategic interaction. Bottom up approach is a process from the bottom, where the community with or without facilitation from other party, such as Non Local Organisation (NGO), take active part in every steps of the process from the initiation, preparation of work plan, implementation, and monitoring and evaluation (Dewi, 2012).

Interview results on the understanding of respondents on the benefits, challenges and problems of Kalawa village forest showed that 50% respondents had low level of understanding about village forest, whereas respondent with high level of understanding was only 10% (Fig. 3). Therefore, awareness raising about village forest is necessary to be done more intensively at all level of communities, including villagers, the management of the village and village forest, NGO, the Forestry Service of Pulang Pisau District, and the leaders of the regency.

Community participatory is categorized into 7 levels participation, e.g. (a) manipulative participation, (b) passive participation, (c) consultation-based participation, (d) incentive-based, (d) functional participation, (f) interactive participation, and (g) independent movement

(Preety *et al.*, 1995). Participatory analysis that has been conducted on the Kalawa village forest case showed that community participation is classified in the level functional to interactive, where actors involved in the process of group establishment to determine the goals of the Kalawa village forest. A firm cooperation among stakeholders is needed to improve level of participation to interactive level and independent.

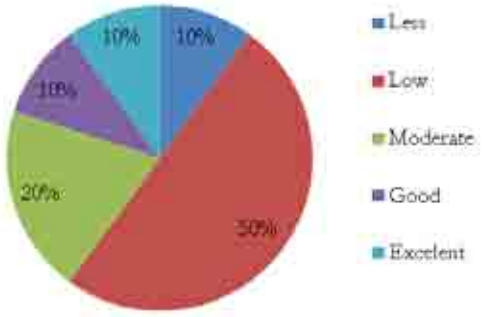

Figure 3: Level understanding of Kalawa's villagers on the village forest

At individual level, level of cooperation and people participation on village forest management is shown in Fig. 4. About 70% of respondents has passive participation, while on 10% has active participation. Level of activeness is grouped based on activity in a group, participation in the capacity building through technical training and/or seminar, and generating ideas for development of the village forest during the interview.

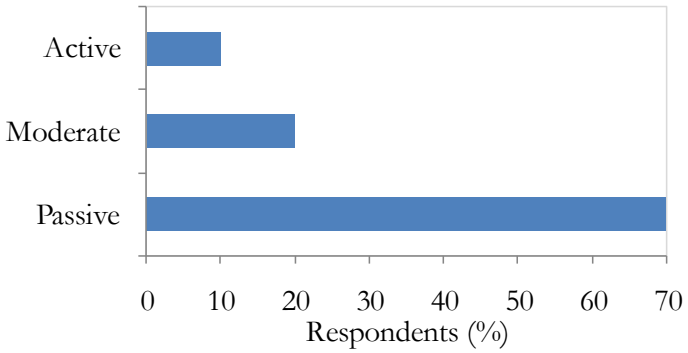

Figure 4: Level of people participation in management of the Kalawa village forest

Obstacle analysis showed that limited human resources and financial capital hamper the implementation of village forest. Support and facilitation from the Local Government, e.g. Forestry Service District, are crucial for improving capacity of the village forest. Capacity building program offers livelihood options for the villagers, such as fish farming integrated with cultivation of tree species producing non timber forest products. This is commonly known as an agroforestry system. On farm management as an alternative for livelihood may reduce dependency on forest resources. The Forestry Services should facilitate capacity building to the villagers through knowledge and technology transfer from a university or a research institute. The extension agency can take action in spreading the knowledge and technology on the ground. Such approach has been applied in Sebangau National Park to improve awareness and capacity of the villagers who live surroundings the Park (Tata *et al.,* 2014).

Economic challenge through eco-tourism was one option that was proposed by respondents. If it is going to be implemented, a work plan needs to be prepared in cooperation with private sectors, as it is high capital demanding. Eco-tourism in Sebangau National park has been established earlier, where a group of local community (*Forum Masyarakat, Formas*) in collaboration with a private company has an eco-tourism programs, such as a boat tour along the Katingan River for birds and orang-utan watching (Tata *et al.,* 2014; BTN Sebangau & WWF, 2009). The management of Kalawa's village forest can learn from Formas' experience to explore this opportunity to be developed in Kalawa forest.

The strategic of development and management of Kalawa's village forest is proposed as a matrix internal and external characteristic of the management of Kalawa's village forest. The characteristics were determined based on analysis of strength-weakness-opportunities-threats (SWOT) (Table 1).

Table 1: Characteristics of participatory peat swamp forest management of Kalawa village forest

Internal		**Eksternal**	
Strengths	**Weaknesses**	**Opportunities**	**Threats**
High motivation to preserve the forest	Villagers (farmers and fishermen) has low income	Support and facilitation from the Local Government should be improved	Canal establishment in the village forest
Many germ plasm of flora and fauna are available	Community has limited knowledge on culti-vation and domes-tication technique	High demand on fauna (pangolineand birds) and non-timber forest products	Weak regulation support on marketing of products that are derived from cultivation and domestication
High population	False perception on the management of village forest	Improvement on socialisation of village forest management and capacity building	Selling the (licensed) village forest-area illegally to investors
The community hold belief, social norm and cooperation	The village has few facilities and infrastructures	Eco-tourism	Illegal logging and poaching
High motivation on cultivation of fast growing woody-species, such as sengon (*Albizzia*)	Limited financial capital	Cooperation of multi stakeholders, particularly the Local Government and private sectors, for improving access to market	Forest and peatland fire

4. CONCLUSION

The Kalawa village forest is managed in a participatory based management type functional and bottom up approach. Level of understanding of the community on the management of Kalawa village forest was low. The village forest does not provide more benefits, e.g. economically, ecologically and social values, for the community. Government should work

closely with the community to improve the awareness. The Forestry Services should facilitate capacity building to the villagers through knowledge and technology transfer SWOT analysis showed that from a university or a research institute.

Kalawa village forest has five characteristics of external and internal factors, which can be used as a strategic for improvement of the sustain-agility of the Kalawa village forest.

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PAPER A10 - The Use of Silt-Pits for Erosion and Sediment Control in Sloping Agricultural Land

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ABSTRACT

Without applying proper technical measures, agricultural practices in sloping land accelerate soil erosion, removing nutrient-rich top soil and decreasing land productivity. In many cases, as the land productivity decrease, farmer clear more forest and the soil degradation cycle continues beyond the soil's capacity to restore itself. Actually, numerous soil conservation techniques have been implemented but in general were failed to solve the problems. Some of the reasons are: economically costly and technically not suitable with the local condition. Addressing such problems, the research was conducted in Gowa District, South Sulawesi to measure effectiveness of silt-pits in controlling erosion and sedimentation. The aims were to examine: 1) the capability of silt pit in controlling erosion and sedimentation and 2) the potential of silt pit as a learning tool for farmers to comprehend the risk of improper land management practices and how to solve the problems. Silt-pits are close-ended ditch, dug between plantation rows, to break the slope length and intercept run-off and sediments. The result of the research showed that the amount of sediment in slope of 8 % was ± 26 tons/ha/year, saving potential loss of 0.12 tons urea, 0.002 tons SP36, and 0.025 tons KCL. On slope of 15 % was ± 84 tons/ha/year, saving potential loss of 0.35 tons urea, 0.008 tons SP36, and 0.07 tons KCL. By applying slit-pits, farmers save expenditure on fertilizers equivalent to Rp. 440.000,-/year on 8 % slope and Rp. 1.280.000,- /year on 15 % slope.

Keywords: Low-cost, Runoff, Sediments, Nutrient Loss, Learning tool

1. INTRODUCTION

Soil is a non-renewable resource over the human time scale (Blanco & Lal, 2008; FAO, 2015). However its essential value for human well-being is often ignored until the production of food declined and its severe damage has reached the level exceeding the soil's ability to maintain itself (Blanco & Lal, 2008). In line with the acceleration of agricultural activity to meet increasing demands for food production and satisfy the needs of an increasing world population, management and conservation of soil and water resources are more important now than ever (Blanco & Lal, 2008; Dijk et al., 2004; Merten & Minella, 2013; Morgan, 2005). Without applying proper soil conservation measures, agricultural practices especially in sloping land accelerate soil erosion, remove nutrient-rich top soil, increase sedimentation and water pollution (Jie et al., 2013; Merten & Minella, 2013; Montgomery, 2007; Zhang et al., 2014). In many cases, as the land productivity decrease, farmer clear more forest and the soil degradation cycle continues beyond the soil's capacity to restore itself.

Addressing such problems, the research was conducted in Gowa District, the high rainfall intensity-district in South Sulawesi. Farming practices in Gowa mountainous area are dominated by horticulture farming with potato and carrot as the major plants. In general, farmers plow their land and develop series of ridges parallel to slope direction (perpendicular

to contour lines) by the aim to drain the excess of water and prevent the tuber/root plants decay. This pattern of land management is prone to erosion especially in the initial phase of farming practices.

A general rule of thumbs is that water flow is perpendicular to contour lines. As a consequence, when tillage is perpendicular to the contour lines, soil transport increase exponentially (Blanco & Lal, 2008). Thus, the challenges facing these farmers is how best to manage their land in order to minimize soil loss at an affordable cost. Actually, numerous soil conservation techniques have been implemented but in general were failed to solve the problems. Some of the reasons are : economically and socially not feasible, and technically not suitable with the local condition (Critchley, 1991).

Addressing the problem, the research was conducted by implementing silt-pits to control erosion and sedimentation in sloping land. Silt-pit is close-ended ditch, dug between plantation rows, to cut the slope length to smaller catchments, collect run-off and nutrient-rich sediments and redistribute eroded nutrients back into the soil (Bohluli et al., 2014; Moradi et al., 2015; Ping et al., 2012). This research was aimed to examine: 1) the capability of silt pit in controlling erosion and sedimentation and 2) the potential of silt pit as a learning tool for farmers to comprehend the risk of improper land management practices and how to solve the problems. In their research in Malaysia, Bohluli et al. (2014) and Murtilaksono et al. (2011) concluded that silt pit reduced overland flow and soil erosion effectively. However, although silt pits have been implemented for several decades, there have been only a few information determining the effectiveness of silt pits, particularly in high rainfall areas (Bohluli et al., 2014).

2. METHODOLOGY

2.1 Site description

The study sites were situated in two sub village in Tinggi Moncong Sub District, the District of Gowa, South Sulawesi Province. The first location was in Bulubalea Sub Village, The Village of Bulutana, and the second was in Datara Sub Village, The Village of Gantarang. Geographically the research site were located in 119°50'00" E – 119°54'00" E and 05°14'00" S – 05°18'00" S. Meanwhile, in the watershed system, the research sites were located in the upper part of Jeneberang Sub Watershed. The average precipitation was 3.000 mm/year.

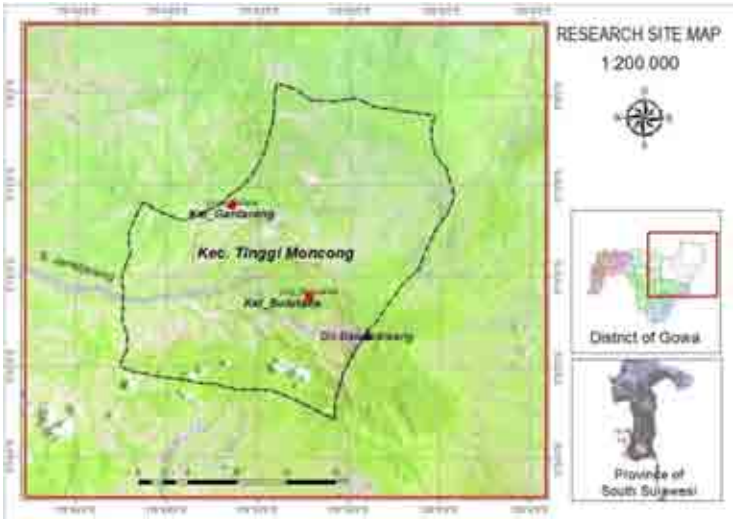

Figure 1: Map of the Research Site

2.2 Method

2.1.1 Measurement of rainfall, erosion and sediment

The small plots-based research was conducted to measure the effectiveness of silt-pits,- low-cost soil and water conservation instrument, easily implemented and maintained by small farmers employing local resources-, in controlling erosion and sedimentation. The area of plot (measurement unit) was 2 x 5 m^2. In this research, silt pits were implemented in horticulture plantation area in two slope levels: 8% and 15%. There were six plots and six silt-pits with sticks in each slope. The dimension of the silt pit was 2 x 0,5 x 0,3m of length, width, and depth respectively. To measure the trapped sediments, eight painted white sticks were embedded in every silt pit perpendicular to silt pit floor. The diameter of each stick was 1cm and the height was 1 meter. The stick was drawn with scale to enable easy measurement. The placement of silt pits of each slope and sticks are presented in Figure 2 and Figure 3.

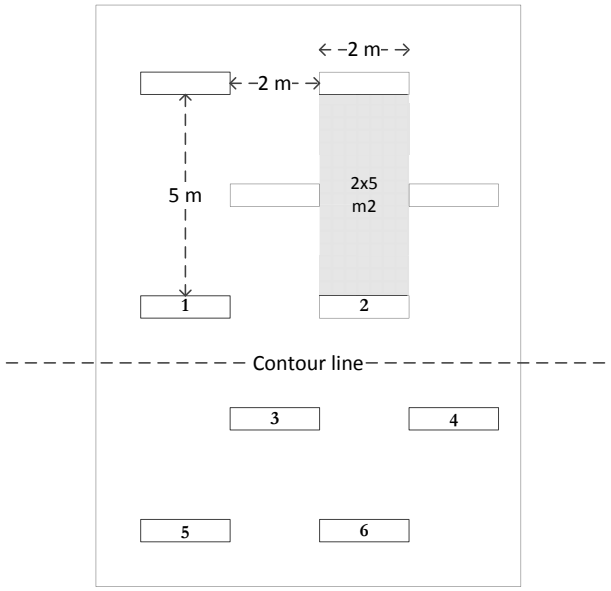

Figure 2: Pattern of Silt-pits placement

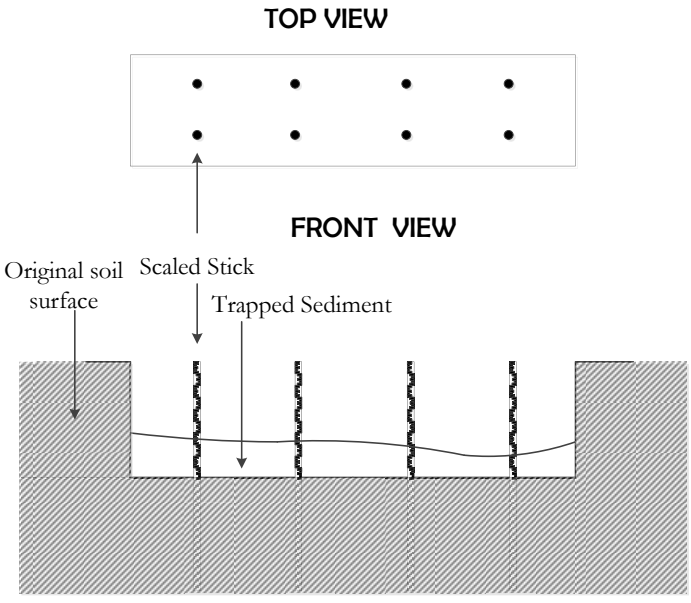

Figure 3: Stick Placement

The data collected in this study were rainfall, erosion, and nutrient content of the sediment. Rainfall was measured by a rain gauge unit, an automatic rainfall recorder (ARR) installed closed to the plots. The magnitude of erosion was approached by measuring the trapped sediment in the silt pits. The observations of rain and sediment were done at 7.00 am every day after rain day. The sediment volume was calculated by measuring the average height of sediment heap on sticks. The extent of the plots was relatively small, thus to the erosion occurred in the plot was considered equal to the amount of sediment deposited in the silt pit. To determine the nutrient content in the sediment reflecting the nutrients loss, certain amount of sediment samples were analyzed in the laboratory.

2.1.2 The use of silt-pit as a learning tool

Since three decades ago, soil management and conservation efforts have been moving toward a more Participatory Approach (FAO, 2000). There were evidences that the most effective way to enhance farmers understanding of complex issues is 'learning by doing', 'action learning', 'experiential learning' and 'discovery learning' (Hagmann et al., 1997). Those such participatory approaches have been designed to enhance farmers´ inherent skills, knowledge and capability to develop and disseminate their own technologies (FAO, 2000). In many region, experiment-based participation was developed to generate farmer participation on soil conservation effort (Hagmann et al., 1997). However, participation will be generated only if the activities will produce clear and significant benefits within a short time in return to their investment of time, effort and other inputs (FAO, 2000; Morgan, 2005)

In this research, plots with silt-pits were functioned not only as a tool for controlling and measuring erosion and sedimentation as well, but also employed as a learning tool for farmer to comprehend the phenomena of erosion, sedimentation and how to control. Using this tool, the knowledge of farmers will be enhanced. Learning processes were started from the development of silt-pit, stick installment, every day silt-pit observation, and sediment heap measurement. Instead of being taught theoretically with conservation techniques, farmers are challenged to observe their situation, to simply analyze the cause and effect of observed phenomena, and try to develop their own ideas.

3. RESULT AND DISCUSSION

3.1 Silt-pit as a tool for controlling erosion and sedimentation

The result of measurement of trapped sediment for each day with rain is presented in Table 1. Meanwhile, the result of laboratory analysis on nutrient content for each slope is presented in Table 2.

The result of measurements showed that the sediments trapped in silt pits after 769.4 mm of rainfall in slope of 8% was 6.77 tons/ha. Meanwhile in the slope of 15% was to 20.09 tons/ha. With annual precipitation of 3,000 mm, the total sediment in the slope of 8% was estimated ± 26 tons/ha/year and in the slope of 15% was ± 84 tons/ha/year.

Typically, nutrients are concentrated in the top few centimeters of soil (Xu et al., 2015). The major component of nutrient loss is nutrients loss carried by runoff and sediment (Jie et al., 2013). As all transported sediments were trapped in silt-pits and redistributed back to the soil, using silt-pits the potential losses of soil fertility as well as economic losses can be prevented.

Based on samples analysis, the potential of nutrient loss in the slope of 8% were estimated 0.056 tons of Nitrogen (N)/ha/year, 0.0004 tons of Phosphate (P)/ha/year, and 0.01 tons of

Potassium (K)/ha/year. Based on percentage of N content of Urea (46%), the P content of SP36 (36%) and K content of KCL (53%), the nutrient content of the trapped sediment were estimated equal to 0.12 tons of Urea, 0.002 tons of SP36, and 0.025 tons of KCL. Assuming that the prices of each fertilizer was Rp. 3,000,- the application of silt-pit in horticulture farming in the slope of 8% was capable of controlling an economic loss equivalent to Rp. 440,000, -/year for every hectare of horticultural farming area. The three type of fertilizer mentioned above were the most frequent fertilizers applied in the research location.

Table 1: Average of Trapped Sediment in Silt Pit in Slope of 8 % and 15 %

Number of observation	Rainfall [mm]	Intensity [mm/hour]	Average volume of trapped sediment [m3/ha]	
			Slope of 8 %	Slope of 15 %
1	0.5	1.4	0.12	0.31
2	66.1	10.52	0.58	1.43
3	80.6	6.7	0.58	1.72
4	157.9	26	1.05	4.29
5	5	1.7	0.27	0.87
6	1.6	1.6	0.14	0.41
7	36.1	4.5	0.59	1.38
8	98.9	18.9	0.99	2.44
9	97	10.3	0.55	1.99
10	97.7	12	0.73	2.07
11	122.5	21.4	0.84	2.35
12	5.5	5.5	0.31	0.85
	769.4		**6.77**	**20.09**

Table 2: Nutrient Content of Sediment in Each Slope

Slope	Rainfall [mm]	Sediment [tons/ha]*)	Nutrient Content [tons/ha]		
			N (Total)	P_2O_5	K_2O
8 %	769.4	6.77	0.0141	0.0001	0.0021
15 %	69.4	20.09	0.0412	0.0004	0.0070

Note *) 1 m^3 of sediment is equal to 1 tons

In the slope of 15%, the amount of nutrient losses were higher compared to the slope of 8%. Nutrient losses were equal to potential loss of fertilizer of 0.35 tons of Urea, 0.008 tons of SP36, and 0.07 tons of KCL causing an economic loss equivalent to Rp. 1,280,000, -/year/hectares.

Compared to the area of slope 8%, sedimentation, nutrient losses as well as economic loss in the slope of 15% are almost three times higher. This result is in line with previous research mentioning that the greater the slope gradient, the higher the potential for run off and soil loss (El Kateb et al., 2013). Being exposed to severe erosion, to restore the soil productivity of their land, for the next plantation farmers must allocate money for fertilizers expenditure at least equal to the amount of fertilizers losses. However, the result of this research showed that by applying slit-pits farmer was capable of saving money for fertilizers expenditure for the next year plantation equivalent to Rp. 440,000,-/year on slope of 8 % and Rp. 1,280,000,-/year on slope of 15 %. Erosion is still occurred, but runoff energy and velocity as an energy source for detached soil transportation was decreased due to the shortened slope length.

However, the effectiveness of silt-pit is depended on its size. It is commonly regarded that the larger and deeper the silt pit, the more effective the pit would be to conserve soil water (Bohluli et al., 2014). Nevertheless, in determining the most appropriate size of silt pit should not only based on the effectiveness but also considering how much area will be left unplanted. The bigger the size of silt-pit, the narrower the area available for plantation.

3.2 Silt-pit as a tool of participatory learning

Traditionally, agriculture practices are based on ploughing and tilling in land preparation which are destructive to the soil (Dumanski & Peiretti, 2013; Jie et al., 2013). Compared to others civil techniques soil conservation, silt pits has been considered as easier and cheaper effort. Different with bench terrace, silt-pit application leave the landscape and the nutrient-rich top soil intact. Furthermore, silt pit development reduced sediment delivered to the downstream by cut the slope length and intercepting overland flow. At the time the sediment fulfill the silt-pit, sediment containing eroded nutrients can then be returned and distributed back to the field above.

The effectiveness of silt-pit plots in opening the farmer's insight and perception of physical process of erosion was demonstrated by these studies. Ordinarily being taught through merely oral teaching, using this plots, farmers explored by themselves the causes and effects of soil erosion in their own fields, and came to an understanding of erosion and sedimentation processes. Observing the increase of trapped sediment amount daily by reading the scale of the stick, farmer easily understood the correlation between precipitations, the way they managed their land, and the rate of erosion and sedimentation. Being knowledgeable, farmers replicated the techniques and modified them using their own creativity. *This result has similar result with previous research. Experiment-based participation research in Southern Zimbabwe has shown that land literacy stimulates the farmers to practice soil conservation creatively (Hagmann et al., 1997).*

4. CONCLUSION

The effectiveness of silt-pits to break overland flow, reduce erosion and trap the transported sediments and thus preventing potential of economic loss was demonstrated by this research. In the slope of 8%, application of silt-pit was capable of controlling fertilizers losses equivalent to 0.12 tons of Urea, 0.002 tons of SP36, and 0.025 tons of KCL. Meanwhile in the slope of 15%, the controlled fertilizers losses equal to 0.35 tons of Urea, 0.008 tons of SP36, and 0.07 tons of KCL

The result of this research showed that by applying slit-pits farmer was capable of saving money for fertilizers expenditure for the next year plantation equivalent to Rp. 440,000,-/year on slope of 8 % and Rp. 1,280,000,- /year on slope of 15 %.

The effectiveness of silt-pit plots as a tool for participatory learning in opening the farmers insight and perception of physical process of erosion was demonstrated by these studies. Being knowledgeable, farmers replicated the techniques and modified them using their own creativity. However, because this experimental period was relatively short, the effectiveness of silt pit in various size of silt pit, various slope gradient, and various rainfall intensity needs further observation and in depth study.

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PAPER A11 - Constraints to exercising forest tenure rights by forest adjacent communities in Indonesia

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ABSTRACT

Customary and formal forest tenure regimes in Indonesia offer a varied bundle of rights and tenure security for forest adjacent communities. In practice, however, these communities face a number of constraints while exercising those rights. Based on our research in seven customary communities in Maluku province and in 10 communities that are implementing formal forest tenure reforms in Lampung province, we identified a number of constraints in customary systems and statutory tenure regimes that hinder the effective exercise of local people's rights. The customary systems survived for decades despite perpetual penetration of formal regulatory instruments without recognizing existing customary institutions. While exercising forest rights, the customary communities are constrained by limited recognition of their traditional rights by State institutions, restrictions imposed by the government on the use of their territory and overlapping claims of rights over land territory or forest resource between clans within the same territory, with other villages, and with private companies such as mining, forest concessions and oil palm plantations. The constraints related to exercising rights secured through formal tenure reform implementation are largely associated with: the deviance of formal, statutory arrangements from local practice; limited capacity and resources among both communities and implementing agencies for more collaborative governance of tenure; and macro-level economic prioritization of extractive activities that concentrate benefits in the corporate sector.

Keywords: constraints, forest adjacent communities, forest tenure reforms, Lampung, Maluku, tenure security

1. INTRODUCTION

Customary and formal forest tenure systems characterize Indonesia's community-based forest management system. However, both customary and formal forest tenure regimes offer different bundles of rights to forest adjacent communities. An estimated 50–70 million people in Indonesia are made up of customary communities; many of them have practiced land and forest tenure systems since time immemorial (AMAN 2012; ITTO 2014). The colonial authority imposed existing customary institutions on land and forest governance and they were substituted with modern homogenous structures in the form of district or village level government. In the process of State occupation of customary territories, the government in post-independence Indonesia allocated the vast majority of the land to private concessions for logging, mining or plantation activities. The customary institutions for land and forest management and use survived in many parts of Indonesia, although government interventions such as land classification, concessions, conservation initiatives and land conversion for other land uses have posed considerable challenges to these traditional systems (Fay and Sirait 2002). Strong penetration of formal laws and institutional structures for local governance and the influence of the market, are threatening existing customary institutions. Despite the

persistence pressures exerted from various corners, customary rules and norms are still the dominant instruments of governance in large areas of rural Indonesia.

While the State promoted centralized forest governance since the 1870s,[1] post-colonial governments and the New Order regime in particular, strongly exerted its authority and issued forest and mining concessions throughout Indonesia. Since a large part of these territories were *de facto* under the control of local communities and customary authorities, they had confrontations with concession holders on the ground. The conflict between local communities with concessions and government authorities often resulted in violence and casualties (Barr et al. 2006). The conflict also had a negative impact on the status of forests because the historical stewards of the forest territories (i.e. customary and other local communities) felt that their traditional access and rights over their territories had been taken away from them.

As part of abating the discontent of local communities and ensuring their support in forest development activities, government-owned companies started sharing some benefits of forest enterprises, mainly in plantation projects, as a reward for supporting forest development activities. However local people were not given rights in terms of participation and a voice in forest management and use. Amidst growing conflict between local communities and companies, as well as the evolution of stronger discourse for participatory governance globally, the government issued a decree in 1995 on community forestry but it was not implemented on the ground, i.e. no community forestry permits were issued. However, with the collapse of the Suharto regime in 1998, the awareness of and struggle for more devolved rights increased throughout Indonesia. By then, worldwide experience of community-based forest management demonstrated considerable promise for attaining forest conservation while offering economic contributions to local people. At that time, the Indonesian Government took a number of policy initiatives for forest tenure reform and offered substantial rights to local communities for forest management and use along with substantial devolution of central authority to sub-national level entities through decentralization.

By definition, forest tenure refers to who owns or controls forestland, and who uses and/or manages forest resources (Sunderlin et al. 2008; Larson et al. 2010; RRI 2014). While Forest Law 41/1999 was a strong legal basis for community-based forestry in Indonesia, the subsequent Ministry of Forestry Regulation P.01/Menhut-II/2004 on the empowerment of people living in and around forests through social forestry set the mandate for developing the guidelines for issuing social forestry permits. Subsequent regulations and institutional arrangements made provision for at least three types of social forestry schemes in State forest areas: *hutan kemasyarakatan* (HKm or community forest), *hutan tanaman rakyat* (HTR or community plantation forest), and *hutan desa* (HD or village forest). HKm is the State forestland handed over to local people's cooperative for management and use for 35 years. The main purpose of HKm is community empowerment including supporting the livelihoods of local people. The communities can extract timber and NTFPs if the area falls under a production forest category but are allowed to harvest NTFPs only if the 'forest' falls under protection zone categorized based on composite factors such as slope, soil erodibility, rainfall, etc. An HTR permit is given to farmers' cooperatives in production forest zones only for plantation of timber species, which the communities can harvest once they are mature. A village forest is similar to HKm but the permit is issued to the village government or other village institutions such as the customary authority.

[1] The first Forestry Law of 1865 explicitly brought 'forests' under the central control of the State (Peluso, 1992)

In many places, companies with concessions reached agreements with local communities. As a result, schemes such as *kemitraan* (partnership between a government owned or a private forestry company and a local community) and PHBM (*pengelolaan hutan bersama masyarakat*/joint forest management) are also sharing part of benefits of forest management with local people.

Current tenure reform in Indonesia shows that the total area under social forestry schemes is expanding over time. The data show that while the total area under community management was about 0.22% in 2002, it reached 1.05% in 2014. However, the pace of issuing permits to local communities is extremely slow. For example, only 0.6 million ha out of a target of 5 million ha could be realized during 2009–2014 for HTR. There are many HKm or HTR groups that have secured permits but are yet to implement the schemes.

Customary systems are also increasingly recognized by the national policy system. For example, Constitutional Court Ruling 35/2013 has mandated the government to recognize customary territory and give customary forest permits to the respective communities. The subsequent regulations have defined the procedures for identifying territories and issuing permits. However, the challenges of implementing reform and ensuring that local communities can exercise their rights are multi-faceted – while some have more structural character such as policy provisions and institutional arrangements, others have more locally situated problems of capacity and attitude. In this context, the Center for International Forestry Research (CIFOR) is conducting a study on the emergence, current implementation status, outcomes and constraints of exercising forest rights and tenure security both in customary forest tenure regimes and in formal tenure reform regimes in Indonesia. Building on the concept of tenure security with a specific focus on threats to tenure security and constraints to realizing tenure rights by local communities, this paper identifies the key threats that exist in both customary and official forest tenure systems.

The section that follows presents the key approaches and tools employed in collecting empirical data, particularly the use of key informant interviews (KIIs) and focus group discussions (FGDs) with the communities. Section Three provides a brief overview of study sites located in Maluku and Lampung provinces that represent the customary and formal tenure regimes respectively. Section Four elaborates the key constraints of exercising tenure rights by local communities with specific reference to constraints in enjoying forest rights in customary system and formal tenure systems separately. Finally, we summarize the key findings and suggest a way forward based on the research.

2. METHOD

The paper primarily uses the comparative case study methodology. A case study offers an unique opportunity for an in-depth understanding of the specific case as a "complex social phenomena" (Yin 2009). The comparative case study essentially involves two or more cases and aims to make comparisons across the cases possible (Goodrick 2014). Supplemented by the careful examination of the contextual factors such as socioeconomic, political and regulatory environment, case studies and cross-case comparisons offer an additional analytical framework for a fuller and nuanced understanding of why some forest tenure regimes are more effective and efficient than others. In the research on various forest tenure regimes in Indonesia, we selected six customary communities in Maluku province and 10 communities implementing formal forest tenure reforms in Lampung province. This paper is based on the data collected in these communities through participatory methods such as KIIs and FGDs along with observation and document reviews. Interviews with authorities from district,

province and national level have also substantiated the results. Similarly, two workshops organized at the sub-national level (one in Maluku and another in Lampung) and a workshop organized at the national level also contributed significantly to exploring the perspectives of different actors on the constraints of exercising forest rights and the tenure security of local communities.

The practice of how local communities are exercising forest rights was assessed. For the purpose, the interaction of the rules, institutions and actors in a specific local and external context was carefully studied. An assessment of the institutions and actors also helped us to understand how the reform interventions are negotiated at local and sub-national level.

Through in-depth interviews, we obtained information from the current and previous leaders in the participating communities. Between two and three key informants from each group were selected. The KIIs were instrumental in gathering in-depth information on local perceptions and knowledge of regulations, existing tenure reform implementation practices, gender disaggregated rights realization, relationship between different actors and the key constraints of tenure reform implementation.

In addition, information gathered through KIIs and FGDs was useful in understanding the changes in rights held by women and men in relation to land and forest resources prior to reform and after reform (up to the time of the interview). Similarly, in the indigenous communities, KIIs and FGDs allowed us to explore the extent to which customary forest tenure systems have influenced management and land use practices in the villages and how these customary regulations have changed or been formalized. They also helped us to explore the changes at the village level in terms of conflict resolution, local norms and management practices of forestlands, how livelihoods have been affected by reforms and how the villages engaged in these processes.

The FGDs were conducted in order to gather information about the perception of men and women as separate groups in understanding the extent of the rights granted, implementation processes of those rights, benefits they could generate, challenges in exercising the rights and strategies adopted for improving local rules and practices. The FGDs were also useful in apprehending whether and how different tenure regimes attended the specific interests of men and women. The focus groups were identified based on gender and age, i.e. separate groups of men and women of different ages were involved in the FGDs.

3. STUDY SITES

The two regions selected for the study are Maluku and Lampung provinces. Maluku province and Lampung province have unique features of customary and formal tenure systems respectively. The demographic dynamics, i.e. ethnic composition, history of human interaction with land and forest in the region, interaction of local and non-local populations, government initiatives, remoteness of the regions from political center of Java Island and private sector dominance, all have a bearing on how the tenure systems are historically constructed and evolved over time.

3.1 Lampung

Lampung province is located in the southeast of Sumatra Island. Geographically, Lampung province is located at 103º 40'–105º 50' East and 6º 45'–3º 45' South. It was officially formed in 1964 and covers an area of 34,624 km^2 (or about 3.46 million ha) (Brown 2009).

The population density of the province is highest in Sumatra Island and the third highest after Java and Bali Islands (Brown 2009). The territory is largely occupied by the people that came during the official transmigration program launched by the Dutch colonial government in the early 20th century, as well as in the 1950s after independence (Brown 2009). The State-sponsored transmigration program was eventually abolished in 1984 due largely to the high population pressure on existing forests and other natural resources. However, voluntary migration of customary communities from other parts of Sumatra Island happened before that as well. These communities developed complex agroforestry systems and grew cash crops (e.g. oil palm, rubber, rice, cassava, cocoa, black pepper, coffee, corn, sugarcane, etc.) in some parts of Lampung more than a century ago (Kusters et al. 2007). To date, about three-quarters of the population of Lampung originates from Java Island, of which about 85% are Javanese descendants. Many people from Java Island were brought to the Lampung area to work in timber logging and planting cash crops. In some areas, such as in West Pesisir district, customary communities established *damar* agroforests well before Dutch interventions in planting cash crops and sustained them for generations.

The total forest area of Lampung province is 1,004,735 ha and is divided into conservation, protection, limited production and production forests (MOF 2014) (see Table 1 for area under each functional category). However, about two-thirds of the 'forest area' has either no forest cover or is highly degraded (Kaskoyo et al. 2014).

Table 1: Forest area under different forest functions in Lampung province, Indonesia (in ha)

Conservation forest	Protection forest	Limited production forest	Production forest	Total
462,030	317,615	33,358	191,732	1,004,735

Table 2: Study sites in Lampung province

Village name	District	Total area of village (ha)	Households	Population		Total area social forestry scheme (ha)
				Female	Male	
1. Tribudi Sukur	Lampung Barat	727	517	936	875	IUPHKm 645 (Bina Wana)
2. Sukapura village	Lampung Barat	770	1,028	1,694	1,648	IUPHKm 550.80 (Srimulya)
3. Pura Mekar	Lampung Barat	12,239	904	1,510	1,482	IUPHKm 320.16 (Sido Makmur)
4. Gunung Doh	Tanggamus	415	1,046	1,971	2,246	PAK 382 (HKMHutan Lestari)
5. Atar Lebar	Tanggamus	36,197	761	1,104	2,699	PAK 1,388 (Tunas Jaya) (HKm)
6. Rata Agung	Pesisir Barat	11,764	848	885	1,356	1,460 (Koperasi Jaya Bersama)
7. Gunung Kemala	Pesisir Barat	5,000	872	1,932	2,023	700 (Koperasi Krui Sejahtera)
8. Karya Agung	Way Kanan	1,000	368	641	651	747.3 (Koperasi Berkah Tani)
9. Sidoharjo	Way Kanan	575	550	1,388	715	797.1
10. Pahmongan	Pesisir Barat	2,600	247	484	450	NA

In Lampung province, we selected 10 villages for the study (see Table 2). These villages have had some experience of implementation of social forestry schemes. As the permits for village forest, one of the social forestry schemes that offers forest management rights to village institutions, have been given in 2014 only, we have not included the schemes in this study since one of the main objectives of the study was to examine the outcomes of the forest tenure regimes. Out of a total of 10 villages selected for the study, five of them (first five in Table 1) are HKm groups. HKm groups within protection, production and a mix of production and protection zones are included in the study. Two groups selected with HTR scheme (both are in Pesisir Barat district) and an equal number of *kemitraan* (or partnership) schemes (both in Way Kanan district). The final one (i.e. Pahmongan village) is the first group in Indonesia, the territory of which was legally recognized as customary territory and was invited to claim for the special use and management permit for their 'forestland'. The pioneering scheme granted rights of forestland management and use through the special zone decree called KDTI. The former KDTI area is now allocated for HTR scheme.

3.2 Maluku

Maluku province consists of 1,412 islands covering a total of 54,148.48 km^2 land area. Maluku probably witnessed the earliest European traders in Indonesia, who exploited the rich forest products such as nutmeg and clove from the area. With increased market for these species together with coffee, cocoa, coconuts and durian, local communities transformed a large part of natural forest areas into plantations. The forest cover in Maluku is 3,919,701 ha, which is divided according to forest function as following:

Table 3: Forest area by function in Maluku Province

Forest function	Total area (ha)
Conservation forest	429,543 (10.96%)
Protection forest	627,503 (16.00%)
Limited production forest	894,153 (22.81%)
Production forest	641,603 (16.37%)
Conversion production forest	1,326,899 (33.86%)

Source: Forestry Agency Maluku

The conversion production forest also includes 364,149 ha for other land uses (*areal penggunaan lain* or APL). Local government considers the allocated APL inadequate for infrastructure development and satisfying local communities' demand for additional land for economic development. There are four major islands within Maluku province: Seram, Buru, Yamdena and Wetar. Among them, Seram is the largest island with an area of 18,625 km^2, and is divided into three districts: East Seram, Central Maluku and West Seram.

Maluku province is also known for its customary system of local governance including regulation of forest use and management. Within Seram Island, the West Seram district (Seram Bagian Barat or SBB), formed in 2003, has a strong customary system. Therefore, SBB was selected for this study to provide us with an insight on the customary systems of forest management and use. The district has been recently formed and has a limited presence of NGOs and other external actors. In addition, the province and district level governments have recognized the customary authority in their local governance.

In West Seram district, the study sites were selected in order to gain an understanding of the customary forest tenure system and compare it with the forest tenure systems promoted by the government in other regions. The specific villages were selected to unfold the diversity of exercising tenure rights in socio-culturally diverse communities, primarily selecting the communities with or without the significant presence of an immigrant, non-indigenous population. For the purpose, we selected villages of predominantly customary communities and those of mixed villages, i.e. villages with a significant population of immigrants (Table 4). Waesala and Murnaten villages have a significant population of immigrants who came into the area through the transmigration program and by voluntary migration.

Table 4: Sites in West Seram district, Maluku

Village name	Number of households	Population	Main products	Total area (ha)
Hunitetu	328	1697 (M=866; F=831)	*damar* (Agathis resin), *gaharu* (eaglewood), sago	Customary forest is approx. 60 km², Village area is approx. 10 ha, Protected forest, production forest (total area unknown)
Kamariang	1,209	5,899 (M=2,653; F=3246)	clove, coconut, nutmeg, *damar, meranti, gufasa, lenggua*	Includes customary forest, protected forest and production forest
Lokki	302	1,200	*lenggua, gupasa, meranti,* rattan, *sago*	Customary forest and production forest
Murnaten	334	1,768 (M= 875; F= 893)	*coconut, clove, cocoa, nutmeg, clove and eaglewood*	Customary forest, migrants territory, protected forest, production forest
Uwen	84	345 (M=181; F=164)	*eaglewood, coconut, clove, cocoa, and banana*	Customary forest, production forest, protected forest
Waesala	1,495	7,802	*kayu putih,* rattan, *lenggua, makila, kayu besi*	Customary forest, protection forest, production forest

4. RESULT AND DISCUSSION

In this section, we provide the historical overview of the forest tenure regimes in Lampung and Maluku provinces followed by the specific practice of tenure rights at the study sites. Then, key constraints of exercising rights over land and forest resources by the forest adjacent communities are discussed.

4.1 Historical overview of land and forest tenure system

Lampung and Maluku provinces went through different trajectories in terms of how local people enjoyed rights over land and forest resources. Over the last century, immigrants (people from Java in particular) made up a sizeable proportion of the population of Lampung province whereas customary communities dominated the population of Maluku province. Most of the villages in West Seram district in Maluku province are customary villages. The nature of the population and presence of government institutions in the area resulted in a different trajectory of land and forest management. Although Dutch colonial influence was significant in both regions, Lampung was more affected largely because of its proximity to the political center Jakarta and the large population of Java who were looking for opportunities on other islands. The migrants brought their agricultural technological skills with them and converted the forest into agricultural land mainly for growing cash crops. The intervention of central government institutions was higher in Lampung than in Maluku, which had an impact

on the exercise of forest rights by local communities. The history of land and forest tenure systems in Lampung and Maluku provinces is presented below.

4.1.1 Lampung Province

Two contradicting policies of the government triggered conflict between local communities manipulating land for their livelihoods and the forest government service mandated for forest development and regulating forest extraction. While the government's transmigration schemes incentivized for forestland conversion for settlements and agricultural use until 1984, the forest regulations related interventions including Basic Forestry Law 1967 and subsequent forest regulations established government control over the large "forest area" of Indonesia. Policies and regulations related to land classification; forest and mining concessions revoked some of the rights exercised by local communities. Due to unclear boundaries and limited ground verification before issuing concession permits to private companies, there were many overlapping claims between existing populations and new permit-holder companies. Another source of conflict was the government policy of *tumpangsari* (intercropping) implemented in the 1960s and 1970s. The *tumpangsari* allowed local people to grow agricultural products within the forestland for a period of 1–2 years for the purpose of tree plantation and development with reduced costs against a contribution to the protection of planted seedlings (Siscawati et al. In press). Once people started carrying out agricultural practices within a forestland, they reportedly were reluctant to leave the area largely because they had invested their time and resources in land development. However, field observations showed that forest destruction in Lampung during that period was due to intercropping permits as well as the increased number of permits granted to forest concession companies (HPH) for timber extraction (Siscawati et al. In press).

In the past, local people often experienced changes in tenure security i.e. sometimes the government encouraged the farmers to covert the forest area into land for settlement or agriculture, while at other times they evicted them from the area. At times, the government agencies gave permission to local people to expand their cultivated land, while at other times these extensions were made "illegal".

In Tri Budi Syukur village in West Lampung district, for example, the first generation of the village came to the area in the early 1950s when the government offered an area of 2.5 ha to each family. At that time the government also allowed them to extend their area if they could afford the required labor and other resources. In particular, slash-and-burn (shifting cultivation) was allowed in the village between 1964 and the mid-1970s. Meanwhile, the government gave 127 ha to the local communities in 1965, which was the basis for the current community forestry permit. The government repelled slash-and-burn area in 1975 and asked the people to vacate the area. However, the local people resisted this decision and continued their activities in the area. During 1992–1994, the government carried out an eviction program of local communities who continued to occupy the area even after the government declared slash-and-burn as illegal. The eviction decimated the local economy and villagers faced severe livelihoods threats. The communities exerted pressure on the government (e.g. protests, sit-ins, media mobilization, etc.). As a result, the *bupati* (the head of the regency or district) informally allowed them to continue their activities but they had to agree not to further extend the land they were on. Then after the ousting of the New Order regime and national reformation moves, HKm regulation was passed in 1999 before Forest Law 41/1999 was passed. Local leaders formed a cooperative and pushed for HKm permits, which they secured in 2000. During 1982–1991, the government launched a massive reforestation program in the area.

Similarly, people have lived in Sukapura village in West Lampung district since 1951, mainly as a result of the transmigration program. Initially, each family got 1 ha or less in land but they soon started opening additional forest areas for cultivation. Similar to Tri Budi Syukur village, they had always been living in fear of expulsion from the government as they "encroached" on the forest area for their living. Unfortunately, in 1995, the government evicted them from the area and destroyed their coffee farms. After reformation, they benefited under a socialization program of the government and eventually got a HKm permit in 2010.

In some villages such as Sidoarjo in Way Kanan district, the influx of people happened primarily on two occasions. The first group came in 1965 as part of the State-sponsored transmigration program and the second wave happened in 1993 when many came in to work as laborers for a logging company. When the concession was there, people worked for the company. However, amidst political changes in Indonesia in 1998 the company left the area, and local people started cultivating the land 'illegally'. Currently, Inhutani V, a State-owned forest company, has started working in the area, and has reached an agreement with the communities on a benefit-sharing mechanism; it is planning to introduce tree species into the area after some time in addition to the current practice of cultivating cassava and maize.

However, communities in Pahmongan Dalam village in West Pesisir district has a very long history as evidence suggest the existence of a complex agroforestry system in this area as far back as the 1880s. Customary communities inhabited the area and practiced customary system of land and forest use. There were many instances when government attempted to undermine customary rights but communities resisted the government policies and continued to observe their traditional rights practices. In the meantime, the Ministerial Decree on Special Purpose Zone (KDTI) in 1998 recognized the customary rights over their *damar* agroforests, which provided them tenure security against any external intervention.

As discussed above, while instrumental use of local people in forest development as part of *taungya* system (*tumpangsari*) has a long history, the recognition of local people's traditional rights over forestland and resources was formally introduced in 1998 through the unique KDTI decree in West Lampung district.

Currently, three social forestry schemes exist in Lampung province: HKm, HTR and *hutan desa*. Among them, HKm is the most advanced scheme in the province. The first HKm permit was issued in 2000. By 2014, about 193 groups had secured an area of 26,396.09 ha as HKm, which is slightly over one-quarter of the area allocated for HKm by the Ministry of Environment and Forestry (MOEF) (Table 5). HTR and *hutan desa* schemes started recently and are in the early stages of implementation; HTR permits have been issued since 2013 and *hutan desa* permits have been issued since 2014.

Table 5: Area under different social forestry schemes in Lampung as of 2014 (in ha)

Schemes	**HKm**	**HTR**	***Hutan desa***
Allocated area	110,139.61	24,835.00	-
Permit area	58,222.57	16,651.00	2,197
Community groups	138	8	22 (60 villages)

4.1.2 Maluku Province

The history of forest use, management and control in Maluku province dates back to the Dutch colonial era, when forest and land tenure were subjected to colonial interests especially associated with spices (cloves and nutmeg). In West Seram district, during the Dutch colonial era, it was estimated that 75% of the total land area was used by the Dutch Government for plantations (*tanah eprah/opstar*). The remaining 25% of land was used for raising cash crops such as clove, nutmeg and coconut.

The district government as well as the district land agency argued that the area should be kept out of MOEF's jurisdiction so that they could make more rational decisions about the use and management of land and forest resources in the district. However, based on the current legal categorization of the land, most of the forest area in the SBB is protection or production forest. In some of the villages, the categorization of forests area (*kawasan hutan*) overlaps with the settlements (Lokki village and some other villages).

During the New Order regime (1966–1998), five logging companies (under Jayanti Group and Barito Pacific Timber Group) extracted timber from the forests of West Seram. After the 1999 reform, all logging concessions were terminated and no new permits for concession (IUPHHK) were granted. There were also a few mining concessions during that period but the local government stopped their permits after the 1999 reform. During their full operation, none of the logging companies recognized the rights of traditional communities. They instead extracted *damar* trees[2] without considering its contribution to local livelihoods. The resin of *damar* trees has been the key source of income for the communities in the mountainous regions. The companies didn't even ask permission from local communities when they conducted the activities in their customary territories.

While the Dutch colonial government had little respect for customary communities and institutions, the main challenge from the State to the local traditional authority came from Village Government Law No. 5, 1979. This law created a new structure of village head to implement formal rules and programs of the government, bypassing the traditional structure of the kingdom in the region. Under the new regulations, the kings lost their authority over governing the customary territories such as in the case of Lokki village. When government support for local development was channeled through the formal village structure of the government, it compelled local people to accept the dual authority of local king and the village leader. In many cases, the kings also played the role of village leaders (as in the cases of Hunitetu and Murnaten villages).

With the increased presence of government agencies and programs, together with market exposure, a new generation of people is increasingly attracted to "modern" State institutions and hence is increasingly challenging customary institutions. Nonetheless, customary institutions thrived in many communities and continue to be the main basis for local forest governance up to now.

In Maluku, there are two types of land territory including land territory that has been registered since the colonial era (*tanah dati*) and unregistered land territory or customary land (*tanah adat*). The landowner of a *dati* has authority to sell her/his land without giving any compensation to the village, but if the owner passes away without a legitimate claimant, the land belongs to the village. The landowner needs to obtain permission from the customary

[2] Local people extracted resin from *damar* trees every 2 months, which provided a major part of their household income.

leader to sell customary land. The cadastral survey of the land categorized as *tanah dati* in Maluku has not been conducted yet, except for Central Maluku district where the land survey has been done and the data is available in Masohi.[3]

In 2005, the Government of Moluccas province published Government Regulation No. 14 on the re-establishment of the traditional village (*negeri*) in support of traditional communities. This law recognized and reinvigorated customary systems of local governance.

Since 2013, traditional communities are now recognized by the enactment of Constitutional Court Ruling No. 35/2013 on customary forest, and subsequent Ministerial Decree 32/2015 that has defined customary forest as a separate category of forest – others being the State forest and private forests.
In the studied communities, customary communities still have two customary institutions: one that regulates the individual rights and one for collective rights, particularly owned by the clan or the entire village. However, in some communities with a majority immigrant population, the customary system is fading away, as immigrants are challenging the existing traditional authority over local governance. We observed this in two out of the six studied communities.

4.2 Current practice of forest tenure systems at local level

This section deals with how local communities are exercising tenure rights under formal social forestry schemes and customary systems.

4.2.1 Current practice of formal forest tenure system in Lampung

In almost all the HKm groups studied, local people are cultivating coffee, cocoa, sweet palm (*Arenga pinnata*), candlenut (*Aleurites moluccanus*) and some fruit trees. After their involvement in the HKm scheme, they have also introduced other species such as *champaca* (*Michelia champaca*) nutmeg (*Aleuriteus mollucana*) and *damar* (*Shorea* spp.). Some groups also have initiated conservation activities including plantations on public land, conservation awareness for students and patrolling for protection of wildlife species.

Out of the five HKm groups included in this study from two districts, three of them are fairly active. The active groups, known as *tribudi sukur* and *sukapura* HKm groups, have strong support from external agencies. The groups received external support for HKm plan preparation and implementation; they were able to increase their income through access to better technology and market linkages. Other poorly performing groups also asked external groups for information on better markets and new technologies for increasing productivity and value addition. In one of the most advanced groups, international organizations such as ICRAF and ILRI, University of Lampung, WATALA (an NGO) and provincial- and district-level government forestry agencies have supported them and this has shown results. Support from ICRAF, WATALA and government forestry agencies is ongoing in most areas.

The HKm and HTR groups got a permit of 35 years, which can be renewed for another 35 years. For the partnership scheme (*kemitraan*) in Inhutani V villages in Way Kanan district, the agreement between the company and local people is made for 5 years subject to further renewal. In partnership schemes involving private companies and local people, the duration of the agreements can be made for the period of the concession, which is usually around 40 years.

[3] Interview with a senior official of BPN, West Seram district.

In some HKm groups, for example in Tribudi Sukur village, the initial temporary permit was issued for 5 years before issuing a permit for 35 years. In terms of bundle of rights, HKm groups get exclusive rights to forest management and use. However, if the area falls under a protection forest zone, the groups can only collect NTFPs from the area and are required to identify environmentally fragile territories and undertake conservation activities. In the HKm groups, key activities included nursery development and plantation, marketing and value addition, training, capacity building and institutional development.

Since the HTR permits are issued only in production forest zones, the communities have full authority to develop plantations and harvest timber from the area. They are also entitled to access credit facilities. However, in practice, they could not access any funds up to now despite their efforts to secure credit from financial institutions over the years. Leaders of HTR in Rata Agung informed us that the financial institutions are not convinced that the plantation development in the HTR area has the potential to pay back a loan. Therefore, the group could not even start the plantation activities although they got the HTR permit back in 2013.
In terms of internal allocation of land, the HKm groups have pre-existing individual parcels of land that fall under "State forest" area. After the HKm permit, the individuals continue to manage the land, which is *de facto* owned by them. However, the group must ensure that their individual members follow the rules and standards included in the HKm management plan. There is also collective land where people can access the area and extract forest products with the permission of the group leaders based on the HKm management plan.

In KDTI area, i.e. in Pahmongan village, the land collectively belongs to the *marga* (or clans) but in practice the *marga* land is also parceled out to each household and inheritance of the land follows the customary system. Normally, the biggest chunk of the land goes to the eldest son of the household, who also holds the responsibility for taking care of the rest of the family. When there are more children in a family, other members of the family normally leave the area and go to other places to open up a forest area to establish an agroforestry system. In Karya Agung, for example, many families have ties with Pahmongan village as they moved there after the 1980s in search of productive land suitable for their livelihoods.

Three important changes in local practice of tenure rights are observed across different types of social forestry schemes such as HKm, HTR or partnerships. First, the groups have established linkages with external actors. For example, groups received support from the provincial forestry office and the district forestry office in obtaining a HKm permit and strengthening HKm group institution, BPDAS (Watershed Management Agency) in nursery establishment, animal husbandry and plantation, Watala (NGO) in HKm field facilitation and community empowerment. There is also a government community empowerment program, which helps to strengthen cooperatives and community institutions through training and mentoring. In Rata Agung village, the HTR group received support from the Ministry of Forestry to establish a community nursery; ITTO helped in nursery management and strengthening of community institutions; Production Forest Utilization Monitoring Center (BP2HP) facilitated in mapping and setting up the boundary; and West Lampung District Forestry Office helped in cooperative establishment and provided 10,000 seedlings to the group. Some groups have received more support from external actors than others, which has direct implications for additional income accrued by managing the social forestry area. With the fund, the external agencies also helped the groups to connect with markets and empowered them to better negotiate with otherwise powerful market players.

Second, after social forestry schemes, the communities are now administering some conservation activities such as introducing multiple species inside otherwise monoculture of cash crops (e.g. coffee or cocoa), prohibiting cultivation around water sources or geologically vulnerable areas, and raising community awareness about endangered plant and animal species and encouraging them to protect these species.

Third, market-related factors such as accessing better market information, market for products, getting reasonable prices for products, access to technology such as seeds and value addition is poorly developed in most of the villages. Nevertheless, local people report it to be improving over time. Most of the communities have now better access to markets for their products compared to the past. This might be because of their increased access to market information, increased negotiation skills, increased support from external agencies for better market access, and better access to new technologies and value addition.

4.2.2 Exercise of tenure rights in customary territories in Maluku

In Maluku, the customary communities claim most of the forest areas as indigenous forests territories (*petuanan*) but have not yet been officially recognized. Official recognition is considered crucial for communities to secure better access to and benefits from the forests. In addition, there is an intrinsic value attached to recognition, i.e. traditional communities need to feel they are the beneficiaries and there is justice, which is important for them.[4]

In West Seram district, which is primarily a customary territory, land tenure of the customary (*adat*) communities is defined as individual, clan and collective land. In collective land, tenure rests with the entire *adat* community. Clan land belongs to the respective clan group and individual parcels belong to individual households. The land under a collective is normally regulated by the king (or *raja*). That means if anybody needs to extract forest products from collective forest areas, he or she should first obtain permission from the king. Normally, NTFP collection is permitted by the king for certain species. High value NTFPs such as *damar* resin, cloves, nutmeg and fruits require the king's prior approval. In our study villages, immigrants are also allowed to collect NTFPs from the collective forest territory, with the permission of the king.

In some areas, the immigrants have a better political nexus than the customary inhabitants and do not respect customary institutions. As a result, in those villages such as in Lokki, the immigrants use forest products without consulting the king.

Inheritance of rights over land and forest in customary communities also varies according to the land tenure type, whether it is individual, clan or collective. Individually owned land is inherited by the same family from generation to generation based on their family system of inheritance. Similarly, the clan land remains with the clan. For forest area under clan jurisdiction, only the member households of the clan can access the area with the permission of the clan head. Individual land is exclusively under each household. Nonetheless, the land within a customary territory cannot be sold to outsiders; it can only be traded within the customary community. In most of the customary communities, the land titling has not been completed yet. But in communities with strong political connections with parliamentarians such as in the case of Murnaten village, settlement areas have already been titled and they are

[4] Personal communication from an officer of BPKH in Ambon, April 2014.

also in the process of titling gardens. In Hunitetu, about 30 households got land certification from BPN.[5]

Some of the kings of customary communities such as from Hunitetu and Murnaten villages, have actively engaged with other stakeholders, e.g. *bupati* (the district government head), parliamentarians, and forestry agency. They also have a better understanding of State forest regulations. Local people in general are aware of their customary territory. However, they do not have a clear understanding of the formal categorization of the forests based on their function and conditions of use and management attached to each forest category, i.e. production forest, protection forest and conservation forest.[6]

4.3 Constraints of exercising tenure rights

There are various challenges constraining to an effective exercise of rights by forest landscape-dependent communities. However, as the socio-cultural and legal context is different, the constraints to exercising tenure rights are also different in customary and formal tenure systems. Based on information gathered through the study sites and interview with actors at district, province and national level, this section captures the existing constraints in Lampung and Maluku provinces in relation to statutory tenure and customary tenure systems, respectively.

4.3.1 Constraints of exercising statutory tenure rights in Lampung

Generally there is support for HKm in Lampung province. For example, there is a strong commitment of the government forestry agency at the provincial level in support of promoting social forestry schemes; communities are also aware of the program and there is enormous demand for social forestry schemes compared to other provinces; the province also has a strong presence of NGOs working in community development and empowerment.

In terms of exercising rights, local people generally feel secure once they obtain a social forestry scheme, particularly in the HKm and HTR schemes. In the case of *kemitraan* groups, local people perceived that what they do within forest areas is now considered legal once they have reached an agreement with Inhutani-V (a State-owned company). The activities they are doing within the forestland is almost the same as they were doing before, although it was considered illegal in the past with the risk of punishment from the government.

For the communities who experienced eviction from the land they were using, the formalization of social forestry scheme legalized their activities, which eventually became a strong legal basis for the security of their rights.

The process of HKm is lengthy and requiring clearance from various actors from different governance levels, and involves negotiation between the parties sharing the land borders. Therefore, once they obtained the permit after passing through so many negotiation processes, local people have truly perceived the sense of tenure security. They had confidence that all the potential claim makers had respected their territory; so, according to them there

[5] At present, the land agency (Program Larasati) has been proactively conducting individual land certification for the land categorized as other land uses (APL). The authority of the district level land agency for certification of agriculture land is only up to 2 ha, beyond this is under the authority of land agency at the province level. However, the land agency could give land certification for forest gardens of size up to 20 ha. Until now, the agency could provide the land certificate to 14,000 parcels of land in urban and non-urban areas in Maluku province, and the information on cadastral survey and certification is available in BPN Ambon.

[6] Personal communication from an officer of BPN in West Seram district, Maluku, April 2014.

was almost no chance that other parties would claim part of the HKm area. In addition, the process applied before issuing social forest schemes also involved conflict resolution, which helped to resolve in some cases the enduring land and forest related conflicts in the area. This is in conformity with other research that showed social forestry schemes such as HKm as instrumental in resolving existing conflict of tenure within a community (Herawati 2012).

However, there are a number of constraints in social forestry schemes in Lampung or in formal tenure reform implementation in Indonesia. The constraints related to exercising rights secured through formal tenure reform implementation are largely associated with a complex permit application process, the deviance of formal, statutory arrangements from local practice, limited capacity and resources among both communities and implementing agencies for more collaborative governance of tenure and macro-level economic prioritization of extractive activities that concentrate benefits in the corporate sector. These constraints are discussed below.

Process is too complex for local communities

In all the communities, and during interviews and workshops at the district, provincial and national level, the local people and implementing agencies invariably maintained that the process of obtaining a permit for any social forestry scheme is too complex, demanding high level of technical skills and resources and taking extremely long time (normally more than a year). Because of numerous formalities and demanding technical expertise, local people often feel reluctant to initiate the process of obtaining a social forestry permit. Individual farmers who are managing their own parcels of land must form a cooperative in order to be eligible to apply for a social forestry permit. It is almost impossible for local communities to fulfill the requirements without external support.

Reforms not reflecting local practices

Social forestry schemes such as HKm and HTR allow most of the activities of local communities but restrict others. For example, HKm or HTR groups are not allowed to cultivate paddy in the HKm area or to build houses. In some groups such as in Tribudi Sukur, paddy fields and fishponds formed a large part of their livelihoods since they had inhabited the area in the 1950s. They now were told that paddy cultivation or fishpond farming was illegal and felt the threats to their tenure security. They are in a precarious situation, as they have already gone through a life changing eviction implemented by the government during the 1990s. In Gunung Doh village, people who live inside the HKm area reported their fear of eviction or losing out if the HKm permit is note taken seriously by the government authorities. Some communities are more worried as their land is not included in the HKm map at all because the map approved by the MOF doesn't fully match with the local reality.

The previous KDTI area in Pahmongan village is now allocated to the HTR scheme, which is for managing timber. However, agroforestry is the existing practice in KDTI area and cash crops and *damar* resin (NTFP) are the main products from the territory. The farmers mix the species to utilize the vertical space in an optimal way rather than promoting timber alone; in fact timber is a by-product of their complex agroforestry system. For example, they cultivate coffee as lowest canopy, plant clove and other fruit trees as medium height species together with very tall *damar* and durian trees, which are mainly used for resin and fruits, respectively. In Inhutani-V areas such as in Karya Agung in Way Kanan district, local communities are now allowed to cultivate cassava and maize crops but the next strategy of the company is to persuade local people to plant tree species.

Limited capacity and resources

Many communities such as Sukapura have not been able to harness the benefits from the HKm largely because they do not have necessary technical skills, technology, market information, capital and external support. The high performing groups also had in common was the local leadership, i.e. where there were committed and capable leaders in the villages such as in Tribudi Sukur or Pahmongan, the communities could pull the resources from external sources, and could perform well compared to other communities. There is limited human capacity and resources within government agencies to support these groups. There is limited staff within the government forest service to support social forestry groups. The assigned staffs also have limited training and exposure to social mobilization skills. The permit obtaining process is also high resource and skill demanding, which is beyond the capacity of most local communities. To implement the HKm plans, the groups require technical support for seedling production, plantation management and canopy maintenance. Management of identified conservation areas also requires technical expertise. For value addition and market access, communities need different skills and capital, which most of the communities lack. The communities also need to develop their skills in cooperative management, marketing and group governance.

4.3.2 Constraints of exercising tenure rights in Maluku

In Indonesia, customary systems survived for decades despite the persistent penetration of formal regulatory instruments, without any recognition or integration of existing customary institutions into the State system. While exercising forest rights, the customary communities are constrained by limited recognition of their traditional rights by State institutions, restrictions imposed by the government on the use of their territory, and overlapping claims of rights over land territory or forest resource between clans within the same territory, with other villages and with private companies such as mining, forest concessions and oil palm plantations.

Limited recognition of traditional rights of customary communities

The government has failed to adequately recognize the traditional rights of customary communities. There are several laws and regulations on the village governance system; two of them have tried to accommodate *adat* community's rights (UU No 32/2004 (Regional Autonomy) and UU No 6/2014 (Village Law). In the past, State regulations on forestland allocation were largely ignorant of or not supportive of the rights of customary communities. Law No 1/1967 on Foreign Investment, Law No. 6/1968 on Domestic Investment, and Regulation No. 21/1970 on Forest Concession largely overlooked the rights of customary communities.

In many cases, their rights with regard to their use of forestland is not clear. So, these communities expressed the threats to tenure security. Almost all the communities in the study reported that formal regulations grossly overlooked the local people's intimate relationship with their land and forest resources. The communities looking for title for their cultivated land including forest gardens and intensive agriculture have not been granted yet. In addition, most of the communities lacked information about social forestry or customary forest schemes. Therefore, they have not initiated any process for securing a permit for any kind of social forestry scheme.

Restrictions imposed on the use of the territory

The categorization of customary territories by the government as production forest, limited production forest, protection forest and area for other land uses now means that the

traditional local practices are classed as illegal. The communities cannot extract timber from the protection forest zones. However, people have always traditionally collected timber from these areas; this now contradicts with new legal provisions. In Waesala and Hunitetu villages, for example, most of the forest territory falls under protection forest zone from where the communities are not allowed to extract timber. Moreover, some of the forest gardens of the communities are also located in the protection forest zones. This is a very difficult restriction for the communities to comply with.

While local communities support the idea of conserving forests in the areas prone to soil erosion or in areas with certain protected species, they resent having to comply with restrictions formed without field verification and community consultation. In the past, when most of the territories in West Seram district were under concessions, access of customary communities in these territories was largely denied. There are no clear boundaries, at least for them to recognize, between the production forest and protection forest zones, making it difficult for the communities to comply with government rules.

Pressure for competing land uses

In West Seram district, about 95% of the area is under forest (*kawasan hutan*). That means there is limited land area available for infrastructural development, or other development including expansion of land-based economic production. The increased demand for land for infrastructural development has exerted pressure on land-use changes in customary territories, which contradicts sharply with customary land use, which has less destructive agroforestry systems. Similarly, the forest area that has been officially delineated as *kawasan hutan* overlaps with existing settlements or agricultural land. Lack of accuracy of the delineation process has created problems in defining and exercising land rights and in managing the resources (Liswanti et al. 2014).[7] Communities such in Uwen village are facing threats from oil palm companies and mining companies because they feel too weak to defend their rights when the company expands its activities into their customary territories.

Overlapping claims over land and forest resources

Currently, there is no forest concession in the area. In the past, for example in Hunitetu, the local communities had problems with a logging company as the company started logging inside the traditional territory of the customary communities. The company did not get permission from customary authority, and did not verify whether other overlapping claims existed. As local communities were in conflict with the company activities and the company was reluctant to protect the area, rapid forest destruction in the area took place. The customary communities also faced the problem of internal boundary conflict because of the overlapping claims of land territory or forest resource between clans/ethnic groups within the same territory and with other villages (unclear boundary). The people from the villages under study also reported the challenges of enforcing customary system because of the tendency of some members to encroach collective territory for more products.

Contestation between customary communities and migrants

In SBB district, there are pockets of migrant communities in the southern, northern (Taniwel) and the western part of the district; and practices of these communities often contradict with the culture and tenure system of the customary communities. The migrant communities in the west of SBB district (e.g. in Lokki village) have been present since the Dutch colonial era and claim their rights over part of the customary territories, thus fuelling conflict over resource use

[7] Interview with the Head of the Forestry Agency Maluku in 2014 in Liswanti et al. 2014.

and access rights. In addition, these migrants have secured a strong and influential position in local politics.

At present, due to the long history of the presence of the migrant community, the land tenure system in Maluku is no longer an exclusive domain of the indigenous peoples, i.e. they also need to attend to the needs and interests of the immigrant communities who have lived for many years in the customary territory. When they arrived in West Seram area a long time ago, the customary leader granted them some land to manage and use. There was no formal allocation of land by the government; local customary leaders provided the land to the immigrants and the land ownership passed subsequently to the new generation of the immigrant communities. These migrants even claim to be a traditional community as they have stayed there for more than one generation. There was no provision for formal land ownership earlier, and therefore, permission for use and passing of the inheritance along the family line defined the *de facto* ownership of land at that time. However, the new law and constitutional court ruling on recognizing customary territories have redefined property rights arrangements. Immigrants perceive that their existing rights over the land and forest resources could be overturned. In order to have secured tenure, immigrants are making hereditary claims over land in the customary territories.

Some of the customary authorities (e.g. the kings) of West Seram district have better exposure to external agencies and are aware of the formal legal systems in relation to land and forests. They can anticipate the threats to their traditional rights over land and forest resources. Therefore, they would like to explore the opportunities for reducing those threats. For example, the King of Hunitetu is concerned about the threats and has been exploring options. He is considering obtaining a permit for HKm or a similar social forestry scheme. He is gathering information on the extent of rights he can get and the process for obtaining a social forestry permit. His main concern now is to protect the customary territory from other potential claim-holders such as forest concessions or claims from other communities.

5. CONCLUSION

The customary system of local governance has been a constant issue in the local governance discourse in Indonesia. In the forest sector, the rights of local people including customary communities and forest landscape dependent communities have been overlooked until the late 1990s. The reformation movement after the deporting of the Suharto regime has garnered wider political support for granting more rights to local people over land and forest resources, as well as acknowledging the rights of customary communities over their traditional territories. Recent policy developments in Indonesia mean that more rights and areas are being offered to local communities. There is increasing interest in understanding how local people exercise these rights and in exploring the challenges of effective implementation of new policy changes. We have taken Lampung and Maluku provinces and the selected 16 villages as research sites. Our results demonstrate that after granting permits to HKm or HTR, people feel secured of their rights; although many local people argued that they deserved title of the land they have been managing for several decades. In these groups, the main challenges are now to gather skills, expertise and capital from various sources to increase the benefits from the management of HKm and HTR areas. In places where people have already established some sedentary agriculture or settlements, the reforms have yet to recognize the practices.

In customary territories, the constraints are more severe. They don't yet know whether they could get the secured rights after the constitutional court ruling of 2013, as there are many

difficult conditions that have been included by the MOEF to justify "customary" institutions. Land categorization also doesn't reflect local situations. There are conflicts within and between the communities as well as with external companies. The powerful mining, concession and oil palm companies represent other threats to local communities. However, they have not perceived these new threats as yet in West Seram district as the local government has stopped issuing the permits.

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PAPER A12 - The Role of Mollo Women in Preserving Plant Genetic Resources to Achieve Food Self-Sufficiency

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ABSTRACT

Food security closely relates to agriculture, yet agriculture is underperforming in many developing countries, in part because the women do not have equal access to the resources and opportunities to work in a more productive way. Although women are often neglected, they accounted for nearly half (43 %) of the world's famers and highly contributed to agricultural labour force (FAO 2011b). This research was conducted to identify the role of Mollo women of East Nusa Tenggara Province in agriculture and to analyse its relevancy with self-sufficiency in food. Data had been collected using in-depth interview, observation, and literature study from February to March 2014 in Fatumnasi Village of East Nusa Tenggara Province. The results were analysed using Gender Framework Analysis and qualitative descriptive analysis. The Results of the study indicated that Mollo Women had very significant contribution to agriculture as seed selector, seed planter, and post-harvesting manager. The in seed management would ensure the quality of the seeds that closely links to the preservation of genetic resources. The genetic resources are vital to food security and sustainable agriculture as it ensure the best quality of seeds as well as sustainability of local food diversity. Preserving local food diversity is very important in achieving self-sufficiency in food as it is adaptable to the changing environment. Thus, the conservation of genetic resources and the used of crop diversity could contribute more sustainable agriculture to achieve food sufficiency.

Keywords: East Nusa Tenggara, food self-sufficiency, genetic resource conservation, Mollo Women, sustainable agriculture

1. INTRODUCTION

Women have an important role in agriculture and food security, but their work usually unrecognized as productive work. Food security closely relates to agriculture, yet agriculture is underperforming in many developing countries, in part because the women do not have equal access to the resources and opportunities to work in a more productive way. Although women are often neglected, they accounted for nearly half (43 %) of the world's famers and highly contributed to agricultural labour force (FAO 2011b). Shiva (1988) considered women as the world's original food producers, and continue to be central to food production systems in terms of the work they do in the food chain. However, the lack of recognition of women's work in agriculture will impact on their access to the resources.

Men and women have a different role in agriculture, but women have historically been the primary food providers in natural farming (Shiva 1988). Women have same important role in agriculture in several places in this world such as Guatemala (Lara and Azurdia 2002), Tana Toraja Indonesia (Dungga 2007), and Pakistan (Samee *et al.* 2015). Mollo community has the

same characteristics with those places where agriculture is the main production sector. Mollo community lives in Gunung Mutis area with a more fertile land than the other area of Timor Island, so that the area is the main supplier of agriculture products in Timor Island (Farram 2004). Thus, the study of the role of Mollo women in agriculture is important to be done. This research was conducted to identify the role of Mollo women of East Nusa Tenggara Province in agriculture and to analyse its relevancy with food self-sufficiency.

2. METHOD

2.1 Time and Location

Data collection was performed from February-March 2014 in Fatumnasi Village of East Nusa Tenggara Province.

2.2 Data Collection and Analysis

The instruments that used to obtain and analyse primary data were interview guideline and Harvard Gender Analysis tool that used to see a gender profile of a community and the role of gender in development projects that emphasize the importance for interrelation among components of activity, access, and control profile (Overholt *et al.* 1986 in Handayani and Sugiarti 2008). The activity profile is described through activities list that were done by community in three sectors: domestics, production, and social. Meanwhile, access and control profile divide to access and control to the resources and access and control to the obtainable utilization. The profile was made in table form filled with some values based on criteria below:

1. Nothing (0) : If one of the both sides (men or women) does not do any activity both in domestic, production, or social activity, also does not get any access and control to the resources neither the obtainable utilization.
2. Low (1) : If one of the both sides intensively do domestic, production, and social activity, also get the access and control to the resources neither the obtainable utilization <50%.
3. Average (2) : If the both sides do domestic, production, and social activity with the same intensity, also get the access and control to the resources neither the obtainable utilization 50%: 50%.
4. High (3) : If one of the both sides intensively do domestic, production, and social activity, also get the access and control to the resources neither the obtainable utilization >75%.
5. Very high (4) : If domestic, production, and social activity is always be done by one of the both sides, also the access and control to the resources neither the obtainable utilization is only achieved by one of the both sides.

The data was collected through in-depth interview, observation, and literature study. The respondents of in-depth interview are 16 women of Mollo that picked by convenience sampling. Beside personal interview the data collected through focus group discussion (FGD) with 14 women member of Tourism group and Tenun group of Fatumnasi village. The results were analysed using Gender Framework Analysis and qualitative descriptive analysis.

3. RESULT AND DISCUSSION

3.1 The Role of Women in Fatumnasi Village

Gender roles is the role that is created by the community for men and women that are formed through various systems of indigenous values, education, religion, politics, economics, and so on (Wiliam de Vries-2006). The Division of gender roles in Fatumnasi was created based on the values that apply to the Mollo Community Customs (table 2) that also found in the indigenous peoples of Toro in Central Sulawesi (Pelea and Toheke 2005). Table 2 shows that

the Mollo community's activities can be divided into three i.e. domestic activity or activities related to activities of households, production activities, and social activities.

Table 2: Mollo community activity profile

Activities	Adults		Childs	
	M	F	M	F
A. Domestic Activities				
Washing	0	4	0	2
Water supply	1	3	0	0
Fuel wood collection	1	3	3	3
Food preparation	0	4	0	2
Child take care	0	4	0	0
Housecleaning	0	4	4	1
Lopo reparation	4	0	0	0
Keep in family good health	0	4	0	0
B. Production Activities				
Agriculture				
Soil management	3	1	0	0
Seed plantation	0	4	0	0
Plant maintenance	2	2	0	0
Harvesting	2	2	1	1
Land cleansing	3	1	1	1
Seed selection	0	4	0	0
Field fencing	4	0	0	0
Post-harvest management	0	4	0	0
Animal husbandry				
Feed the large livestock	3	1	0	0
Feed the small livestock	0	4	1	1
Monitor livestock in forest	4	0	0	0
Non wood forest product				
Honey	2	2	1	1
Tenun	0	4	0	1
C. Social Activities				
Conservation movement	1	3	0	0
Community development	3	1	0	0

There are eight types of domestic activities that identified was conducted by Mollo community in Fatumnasi village. Five of the eight domestic activities are only done by adult women. This shows that in the division of gender roles in Fatumnasi, the main task of women as housewives who specifically work in the domestic sector or households. It is also shown by the role of a daughter who is also has more tasks than boy's. According to the theory of social learning (social-learning theory) based on the concept of nature — nurturer difference of gender roles is the result of the demands and expectations of the environment (Sadli 2010).

Thus girls in Mollo directed to become a housewife as demands and expectations from the environment by granting different tasks with the boys.

Mollo women also involved in almost all production activities at Fatumnasi. In addition of the two activities in the social field, women contribute more in the conservation movement and less involved in the community empowerment program. Thus, Mollo women have a lot of activity with high intensity. However it does not close the male role that looks a little bit in the table 2. The men has important role in agricultural production and animal husbandry, their time was running out for both those activities because it usually is done at a location away from home. Mollo women and men work together in each activity depending on the time they have to work on these activities.

3.2 Role of Women in Agriculture

Production activity in Fatumnasi is divided into 4 main activities, namely agriculture, livestock, processing of forest products honey, weaving and handicraft. Agriculture is the main product in the increased income of the Fatumnasi village. Agriculture is carried out by the Fatumnasi villagers is food crops agriculture include vegetables such as carrots, potatoes, leeks, and garlic, and corn.

The activity of cultivating, starting from the selection of seed up to harvesting results. Mollo women have the main task in the selection of seeds, planting seeds (Figure 1), and post-harvest processing, while other work is carried out together with the men. The role was not much different from the role of women in agriculture in Guatemala (Lara and Azurdia 2002), Tana Toraja (Dungga 2007), and Pakistan (Samee et al. 2000). It can therefore be concluded that the role of women in agriculture is closely associated with the management of seeds.

Figure 1: Seed was planted by Mollo women

Mollo women usually harvest vegetables such as carrots, potatoes, and onion for cooking during harvesting time. The community which has extensive gardens produces more harvest results so many sold to markets outside the city, while having extensive tidal will sell the gardens in the local market or simply the subject of bartering with the neighbors. Produces to be sold to the market should be in a uniform shape and size, while larger size are separated for further planting seeds. The selection of the seeds according to Lara and Azurdia (2002) was the role of women in agriculture which is also a key role in the conservation of genetic resources. The corn harvest is done once a year and each of the crops used for food supplies for one year. The selected seed corn-corn is that has a uniform green and Nice in one cob. They do the same way in corn harvesting, their main role is in seed management.

3.3 Relevancy between Genetic Resource Preservation and Food Sufficiency

Women's knowledge about seed may also be owned by the men but according to Shiva and the mies (2005) knowledge possessed differently by women, because of the diversity of the resources produced and preserved through reproduction and preservation of culture by women. This occurs in Mollo women. They produce seeds with planting until harvest, and make use of the seeds for cooking needs. The knowledge of women is so beneficial to the conservation of the local superior cultivars. According to Faesal and Suryawati (2011) local corn cultivars that can still be found in some places means the corn type have been conserved in nature in a long period of time at a particular location. The cultivar can be sustained into the local superior cultivars because it has high adaptation resources to the environment and has a unique character which endeared the farmer. Thrupp (2000) explained that incorporation of farmers' local knowledge, practices and experimentation is advantageous in efforts to encourage agro-biodiversity and sustainable agriculture. Mollo people have all of the elements that Thrupp (2000) has explained including local knowledge, practices, and experimentation. Therefore, the future of their agriculture is the sustainable agriculture that can provide their food sufficiency.

4. CONCLUSION

Results indicated that Mollo women had very significant contributions to agriculture as seed selector, seed planter, and post-harvesting manager. The role in seed management would ensure the quality of selected seeds that were closely linked to the preservation of genetic resources. Genetic resources on the other hand are vital to food security and sustainable agriculture as they ensure the best quality of seeds as well as sustainability of local food diversity. Preserving local food diversity is very important in achieving self-sufficiency in food. Thus, the conservation of genetic resources and the use of crop diversity could contribute to sustainable agriculture in achieving food sufficiency.

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PAPER A13 - Role of forest in livelihood strategy in the peat land of Central Kalimantan ex-mega rice project area

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ABSTRACT

Overexploitation of natural resources leading to forest degradation has occurred due to increased human populations and economic pressures. Politics also plays an important role, for example, in the conversion of forests to rice fields on peatland in the ex-mega-rice project in Central Kalimantan. Yet, forests are important sources of livelihoods for local communities. The degradation of forests as a result of the ex-mega-rice project had considerable impact on local communities. We carried out a study in Block A (southern part) and Block E (northern part) of the project area in Kapuas district, Central Kalimantan, to assess the role of forests for local communities. The sites were chosen to represent both degraded and functional forested areas. Focus-group discussions and household surveys were conducted to collect data. The results were showed that forests were less available in Block A, since accessing forests far away was costly, not many villagers in Block A were interested in extraction of forest products. However, forests remained an important resource for poor people who had limited access to other income sources. In contrast, the forests in Block E were more available and accessible. About 35.5% of income in Block E came from *gemor* (a forest product) and about 57% of respondents collected it. Forest extraction reduced the inequality of income in Block A but increased it in Block E.

Keywords: ex-mega rice project area, forest, livelihoods, poverty and equity.

1. INTRODUCTION

Current international negotiations on incentive systems for reducing emissions from deforestation and forest degradation in developing countries (REDD) have yet to clarify the scope of the intended rules and the relationship with other types of land use change emissions (previously deforested peatlands, agriculture and trees outside forest). However, the landscape-scale relationships between rural livelihoods, economic development and conservation and enhancement of above and belowground carbon stocks need to be understood for any of the institutional mechanisms currently discussed.
Within Indonesia, the peatlands of Central Kalimantan are a recognized hotspot of emissions, with a complex history of planned and spontaneous land use change as their cause, within a peat dome environment that provides strong linkages between water tables and associated fire risk and requires the integration of management on a scale considerably above the village level. This article details a livelihood assessment that included an analysis of land management, land tenure, livelihood, poverty, and equity for the area known as the Ex-Mega Rice Project' in Central Kalimantan, focusing on Block A (strongly affected by the Rice Project) and Block E (relatively intact) that cover parts of the major peat dome and adjacent rivers.

2. METHOD

2.1 General description of the study area

Land use intensification has generally progressed from more accessible peat sites to more remote ones and from downstream (south) to upstream (north) in this peatland ecosystem. The Block A site was settled and logged out much earlier than the Block E site. The Block A site has been subjected to substantial development activities, which have included the Mega Rice Project and oil palm plantations. The Block E site is still largely under forest vegetation closely allied to the conservation of the orangutan.

The area represents these villages belong to two sub-districts (*Kecamatan*) of the District (*Kabupaten*) Kapuas: Mantangai sub-districts and Timpa sub-districts. Overall, there are 14 settlements along the Kapuas River. For the in-depth study and households survey, eight settlements were selected, involving six villages and two hamlets. Block A contained Desa Mantangai Hulu, Desa Kalumpang, Desa Sei Ahas and Desa Katunjung. Block E contained Desa Tumbang Muroi, and Dusun Tanjung Kalanis (Kecamatan Mantangai); Desa Petak Puti and Dusun Kanjarau (Kecamatan Timpa). Sample villages were purposefully selected based on size of settlement area. Consequently, villages rather than hamlets were selected in order to sample a larger population spread over a greater area.

Figure 1: Location of study area in Central Kalimantan

2.2 Data collection

Focus group discussions were used to gather information on sources of livelihood, demography, poverty, land tenure, and commercial activities. Focus groups discussions were conducted in four settlements/villages in each block. Around eight people representing the formal and informal leaders were invited to attend two days of discussion.

Following up on issues raised at the focus group discussions, more quantitative data were collected through a survey at household level. A total of 30 respondents for each block (60 for the whole study) were randomly. As much as possible, both the husband and wife in each household were interviewed together.

3. RESULT AND DISCUSSION

3.1 Livelihoods: from past to present

3.1.1 Forest extraction

Logging

In the study area, the Dayak people perceived up to this day that forest are an open access resource, implying that anyone from their community along the river can access the forest without being restricted by any territorial ties. People from the study area currently look for gemor in areas upstream, for example, as more accessible supplies are depleted. As further detailed in the tenure report, the Dayak claim on forest access is not accepted by forestry authorities. Rules for forest access or management defined externally are not accepted by the Dayak villages. The Dayak people stated that the forest was occupied by a mystic spirit. To access and exploit the forest, the villagers needed to ask for the permission of the spirit (rather than obtaining government permits).

Before the 1970s, people used timber for their own consumption, such as for housing and boat (*Klotok*) construction. In this period the non-timber forest products, such as *getah jelutung* (*Dyera costulata*), *getah hangkang* (*Palaquium leiocarpum Bl.*), *getah nyatu* (*Palaquium javense*), *getah katiau* (*Ganua motleyana*), *dammar* (*Shorea sp.*) and *rattan* were more important. Since the 1970s, timber commercialization commenced and reached a peak in the period 1990-1995. Local people called that period "*Jaman Ramin*" (the ramin era). *Ramin* (*Gonystylus bancanus*) was the most sought after species. Others valuable timbers were *kayu ulin* (*Eusideroxylon zwageri*), *meranti* (*Shorea* sp.), *jelutung* (*Dyera costulata*), *belangiran* (*Shorea belangiran*), *kemedang* (*Litsea* spp.), and *kruing* (*Dipterocarpus* sp.).

Since the Mega Rice Project in 1995, it became difficult to source valuable timber species. Thus, non-timber forest products, such as rattan and *gemor* (markets emerged in the 1970's, see below) became more dominant than timber. In recent years (2007-2008), logging of timber species such as *meranti*, *kruing*, *benuas*, and *kemedang* has occurred again, but it is of lower importance than the non-timber forest products.

The reduction in forest area in the period 1970–1995 was due mostly to illegal logging, agricultural land clearing and logging activities by concession companies. In the period 1996 - 2009, the Mega Rice Project, forest fires, land clearing for agriculture, and establishment of oil palm were the main causes of a reduction in forest area. Continuous deforestation caused the forest to become more distant from the villages. The distance to the forest in Block A is farther than in Block E.

Gemor (Alseodaphne coriacea)

Farmers became aware of the value of the bark of *gemor (Alseodaphne coriacea)* in the 1970's from traders from the Banjar, where the bark had an established commercial value. The bark of *gemor* plants can be used to effectively repel mosquitoes (Zulnely and Martono, 2003) The traders asked farmers to collect *gemor* bark, which the traders then purchased. Initially, not many farmers were involved in collecting *gemor*. However, now *gemor* collection has become important in many livelihoods, especially for villagers around Block E.

The collection of *gemor* involved felling the big trees and removing the bark. *Gemor* bark could be sold fresh as well as dry. Dry bark fetched a higher price than fresh bark. In the past, only dry bark could be sold and it is only recently that both fresh and dry bark have been sold, probably reflecting resource depletion across the supply zone. In the past, big trees of *gemor*

with a diameter of around 90 cm were available in the forest, producing around 5-7 quintal (1 quintal = 100 kg) of dry bark. Now, *gemor* trees are limited to a diameter of around 5-15 cm that produces only around 10-20 kg of dry bark.

Figure 2: Drying of *Gemor*

3.1.2 Fishing

Fishing provides a main source of income as well as local consumption. Initially, fishing was part of the daily life of most villagers but it has gained a more commercial purpose because of increasing law enforcement regarding illegal logging activities. Fishing thus became more important to villager livelihood as a source of cash income. This situation was supported by a better price for fish and an increase in the many traders who came to the villages to buy the catch. Four types of fishing were identified in the study area : *Fishing in the river, Fishing in peat areas, Fishing in canals, beje.*

3.1.3 Labor in gold mining

Working in gold mining was also an important livelihood. People, who worked in gold mining, migrated for a maximum of one year, mostly to *Kecamatan* (sub-districts) Mentangai and Kecamatan Timpa, two neighbouring sub-districts within *Kabupaten* (District) Kapuas. Gold miners normally sent home their money to their village while they were still working out of village.

Villagers started gold mining using spray machinery in the study area in the 1980's. The technique was adopted from similar activity in Palangkaraya. The current popular practice for gold mining along the river was to use suction machinery. Villagers were no longer attracted to gold mining inland using spray machinery. Most villagers became paid gold miners in a group. One group had a team of four laborers. The investors behind the gold mining activities by the villagers were gold traders from Balikpapan (the capital of East Kalimanta province). Gold miners sold their gold to these traders/investors. Farmers calculated the gold production based on the amount of fuel they used. They estimated that for 1 drum of fuel (approximately 200 l) they could get 8-9 gram of gold. The current price of gold was IDR 200 000 per gram, while the price of fuel varied between IDR 600 000 to IDR 1 000 000 per drum. Mercury was used in the gold mining process, polluting the Kapuas river. Intensive gold mining also caused bank collapses along the river, increasing turbidity and sedimentation in the river. The hazardous impact of gold mining to the environment and the health of the people were not fully understood by the villagers.

3.2 Relative importance of components of the livelihood portfolio

A sample of villagers was used to qualitatively assess the relative importance of livelihood (top five values). There was a different pattern in the relative importance of livelihoods within the villages and between the blocks. In the villages of Mentangai Hulu and Katunjung (lower part of Block A), agriculture (rubber and swidden-rice cultivation) was more important than fishing and forest extraction. In Mentangai Hulu village, rubber was the most important source of livelihood followed by swidden-rice cultivation and fishing, with a small contribution from forest extraction and working in gold mining. Kalumpang village was similar to Mentangai Hulu, except that the extraction of rattan was important (ranked third).
In the middle of the lower part of the study area (Sei Ahas and Katunjung villages), both agriculture (rubber and paddy) and forest extraction were equally important sources of livelihood. Logging of timber was second most important in Sei Ahas village and *gemor* was the most important livelihood in Katunjung village. Rubber and rice were also important. In block E, contrary to the Block A results, the major livelihoods were fishing and forest extraction of *gemor*.

3.3 Change in the relative importance of livelihood source over time

In this section the change in relative source of livelihood over time is analyzed using four time periods: prior to 1970, before the Mega Rice Project (1970-1995), after the Mega Rice Project (1996-2006), and 2007-2008. The time classification was draw based on policies changed that affected of local livelihoods. Those policies were (1). Policy on forest concessions in 1970's; (2). Mega rice project in 1995/1996; (3). Combating of illegal logging since 1995 and (4). Banning of using fire for land clearing since 2007. There were six important sources of livelihood: swidden-rice cultivation, smallholder plantations, forest timber extraction, non-timber forest products, fishing and labor.

3.3.1 Prior to 1970

In the period prior to 1970, local people were not yet logging timber for commercial purposes. Timber was used for their own consumption, such as for house construction and boats (*klotok*). Non-timber forest products such as rattan, *dammar*, *jelutung*, *gaharu ramin*, *katiau*, *kalanis*, *ehang*, *nyatu* and animals (snake, bird and deer) were very important sources of livelihood. Swidden-rice cultivation was practiced both in Block A and Block E. Fishing for local consumption was a very important source of livelihood. Smallholder plantations were not yet being actively developed.

3.3.2 Before the Mega Rice Project (1970-1996)

The relative importance of the means of livelihood changed dramatically in the period 1970-2006 before the Mega Rice Project, in association with the commencement of commercial logging. Large-scale commercial logging in Indonesia started in 1967, when the government of Indonesia took control of forest management in the country. They initiated a mechanism of concessions that allocated forest management to privately owned companies. The distribution of forest under the control of private logging companies made Indonesia the world's largest exporter of tropical timber, shipping nearly 300 million m^3 to international markets during the 1970's (Barr, 2001). The timber concession companies: PT. Mangkatib Raya I, PT. Mangkatib Raya II, PT. Jayanti Jaya, PT. Sumber Alam and PT Sumber Usaha operated in the study area in the early 1970's logging commercial timber in the original mature high forests. The logging of commercial timber became the most important source of villager livelihood. Respondents said that in that period, villagers became rich from the logging. The non-timber forest products became less important.

3.3.3 After the Mega Rice Project (1997-2006)

After the Mega Rice Project, the relative importance of logging timber began to decline. Smallholder plantations (mostly rubber and rattan) and swidden-rice cultivation were very important in Block A, while in Block E, non-timber forest products and fishing were more important sources of livelihood. One exception was labor/working in gold mining that was important in Tumbang Muroi village in Block E.

3.3.4 The current situation (>2007)

After 2007, in the lower parts of the study area (Mentangai hulu and Kalumpang villages), smallholder plantations and swidden-rice cultivation became the most important sources of livelihood, followed by fishing. Timber and non-timber forest extraction were of lesser importance. In the middle part of the study area (Sei Ahas and Katunjung villages), the forest was still an important source of livelihood, especially for *gemor*. In the upper streams of the area (Block E), livelihood from agriculture (rice and smallholder plantations) became less important, although there had been a tendency to develop rubber plantations in recent years. Non-timber forest products (*gemor* and rattan) and fishing were major sources of livelihood.

3.4 Poverty and equity

3.4.1 Land holding

Based on our survey of 60 households and within the local concept of land tenure (see companion report), the average land holding of Block A villagers was larger (10.73 ha) than that of Block E villagers (4.14 ha). Villagers in Block A were more dependent on agriculture land especially on rubber plantation. The average rubber plantation land in Block A and E were 5.49 ha and 2.37 ha per household, respectively. This accounted for more than 50% from total land holding in both blocks; this does not include the fallow parts of the swidden cycle and other forest areas that the villagers consider as under their control. Currently cropped swiddens with rice in Block A were 0.7 ha/household, while in Block E it was almost none (0.03 ha). Bush fallow Rubber accounted for 3.9 ha/ household for Block A farmers and 2.2 ha/ household for Block E farmers (Table 1).

Table 1: Average land holding by land use in study site

Land use	Block A		Block E		Total	
	Average plot per household	Average land holding (ha)	Average plot per household	Average land holding (ha)	Average plot per household	Average land holding (ha)
Swidden-rice cultivation	0.7	0.86	0.1	0.03	0.7	0.45
Rubber plantation	2.2	5.49	1.5	2.37	3.7	3.94
Rattan plantation	0.2	0.48	0.1	0.25	0.3	0.36
Bush fallow	1.5	3.90	0.7	1.49	2.2	2.69
Total	4.6	10.73	2.4	4.14	6.9	7.44
Number of respondent	30		30		60	

3.4.2 Poverty indicators: participatory assessment

The poverty indicators discussed by the villagers were not only based on income, but ranged more widely including: education, health, jobs, and quality of the house. These indicators are

similar to the components of the human development index (HDI). The HDI provides a composite measure of three dimensions of human development: living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at the primary, secondary and tertiary levels) and having a decent standard of living (income). The HDI for Indonesia in 2005 was 0.728, which gave the country a rank of 107 out of 177 countries. Life expectancy was 69.7 years, with the adult literacy rate (for age 15 and older) 90.4%, and the combined primary, secondary and tertiary gross enrolment ratio was 68.2%. (Human Development Index Report, 2008). From a sub-sample of 60 respondents, two poverty indicators were calculated (Table 2). The adult literacy rate in the study area was 98.7%, being slightly higher than at the provincial and national levels. However, the school dropout rate for ages 7-12 years and ages 13-15 years were higher than the provincial and national figures. The school dropout rate for ages 13-15 year was very high (24%). This indicated a problem in education at the junior high school level. It seems that the *Program wajib belajar 9 tahun* (the compulsory education program) in the study area had not been a success. Others poverty indicators are BLT (*Bantuan Langsung Tunai*) and Raskin (*Bantuan Beras Untuk Keluarga Miskin*) (Table 13). BLT represents the government's effort to anticipate the effect of the increase in fuel price on poor households. Under this program, poor households receive IDR 200 000 per month. Raskin is also a government program for poverty alleviation. Under this program, poor households receive 20 kg rice/month. In the study area, however, rice from this program was distributed equally to all members of the village.

Table 2: Poverty indicators in education

Indicators	Study Site	Central Kalimantan (2007)	National (2007)
Adult literacy rate (%)			
Ages 15 -55 years	98.7	98.05	88.07
School Dropout (%):			
Ages 7-12 years	3.0	0.81	0.67
Ages 13-15 years	24.0	4.30	4.21

3.4.3 Income analysis

The calculation of income included the value of commodities consumed, with 95% of income from swidden-rice cultivation and 37% of income from fishing in Block A being consumable income. In Block E, 56% of income from swidden-rice cultivation and 13% of income from fishing made up the consumable income. Other sources of income, such as from smallholder plantations and forest extraction were mostly cash.

While the average total income per year per household in Block E was slightly higher than in Block A, the composition of income sources was very different. Agriculture was the major source of income in Block A, while forest extraction was the major source of income in Block E.

In Block A, the highest source of income was from rubber (31%), followed by fishing (17%), entrepreneurial activities (12.6%) and professional work (11.0%). Swidden-rice cultivation was also important (9.0%). Income from forest extraction was low (8.40%) (Table 3).

In contrast, fishing (39%) and *gemor* extraction (35.3%) were the major sources of income in Block E, with their total income share being 74.3%. This indicated a high dependency on open access to natural resources. Other sources of income from open access to natural

resources were timber logging (5.2%) and rattan extraction from the forest (3.4%). Income from working in gold mining represented 6.5%. Although there was a tendency for rubber plantation establishment in Block E, its contribution to income was relatively low (4.3%), as was that from rattan gardens (3.4%). Swidden-rice cultivation was not common, accounting for just 0.4%.

Table 3: Sources of income in Block A and Block E in 2008

Sources of Income	Income per Household				Income per Capita	
	Block A		Block E		Block A	Block E
	Rupiah	%	Rupiah	%	Rupiah	Rupiah
1. Agriculture						
Swidden-rice cultivation	1,447,083	9.0	73,500	0.4	364,811	16,705
Rubber plantation	5,023,573	31.1	899,680	4.3	1,266,447	204,473
Rattan plantation	162,167	1.0	11,000	0.1	40,882	2,500
2. Forest Extraction						
Timber	1,071,333	6.6	1,081,667	5.2	270,084	245,833
Gemor	215,200	1.3	7,413,167	35.3	54,252	1,684,811
Rattan	70,500	0.4	704,000	3.4	17,773	160,000
3. Fishing	2,737,967	17.0	8,173,533	39.0	690,244	1,857,621
4. Worker (laborer)						
Gold mining	120,000	0.7	1,363,633	6.5	30,252	309,917
Sawmill	238,000	1.5	-	0.0	60,000	0
Other	717,000	4.4	423,333	2.0	180,756	96,212
5. Firewood	238,000	1.5	242,667	1.2	60,000	55,152
6. Entrepreneurship	2,031,333	12.6	388,333	1.9	512,101	88,258
7. Professional	1,781,333	11.0	-	0.0	449,076	0
8. Other	294,133	1.8	207,950	1.0	74,151	47,261
9. Total Income Per Year	16,147,623	100	20,982,463	100	4,070,829	4,768,742
10. Income per day					11,153	13,065

Daily income per capita of respondents in Block A was IDR 11 153 (USD $1.09)[8] and in Block E was IDR 13 065 (USD $1.28), while the average family size ranged from 3.97 to 4.4 members at both sites. Using the international poverty line standard of USD $1 a day, the percentage of respondents living below the international poverty line in Block A (53%) was higher than in Block E (33%).

3.4.4 Equity analysis

In order to analyze the equity of income, decomposition analysis was applied using the Gini coefficient that ranges from 0 (equal distribution of income) to 1 (total concentration of income). Gini decomposition is commonly applied in economic analysis (Alderman and

[8] Average exchange rate in June 2009 was USD 1 = IDR 10,215.

Garcia, 1993) using the Gini decomposition formula that was developed by Fei, Ranis, and Kuo (1978) and Pyatt, Chen, and Fei (1980).

The computation results of the decomposed Gini ratios for income are shown in Table 4. The overall Gini ratios for income in Block A (0.26) and Block E (0.22) were relatively small. This indicated that incomes in both areas were equally distributed.

Nonetheless, the income from fishing reduced the overall inequality of income distribution at both sites, as the concentration coefficients were less than unity. This suggests that the income from fishing was relatively equally distributed, making this income important in reducing poverty and increasing income equality. In addition, about 97% of respondents engaged in fishing.

Forest extraction reduced the inequality of income in Block A but it increased the inequality of income in Block E. Since less forest area was available in Block A, with additional forest far away and thus costly to access, not many villagers in Block A were interested in working in forest extraction. However, the forest was an important income source for poor people who had limited income opportunities. In contrast, the forest areas in Block E were more available. *Gemor* was an important and valuable forest product. About 35.5% of income in Block E came from *gemor* and about 57 % of respondents collected *gemor*.

The coefficient concentration for smallholder plantations (0.95) was almost unity in Block A, thus the impact on inequality was not very clear. In Block E, smallholder plantations reduced income inequality but the share of income was low (4.34%).

Income from growing rice was more evenly distributed at both sites. However, in Block E only 7% of respondents were growing rice that only produced a very small share of income (0.35%). Thus, the impact analysis on income inequality in Block E was not relevant.

Table 4: Income inequality in Block A and Block E in 2008

Source of income	Block A			Block E		
	Income Share	**Coefficient Concentration**	**Pseudo Gini ratio**	**Income Share**	**Coefficient Concentration**	**Pseudo Gini ratio**
1. Agriculture						
Swidden-rice Cultivation	8.96	0.82	0.21	0.35	1.52	0.34
Tree plantation	32.11	0.95	0.24	4.34	0.28	0.06
2. Forest Extraction	8.40	0.22	0.06	43.84	1.79	0.40
3. Fishing	16.96	0.15	0.04	38.95	0.76	0.17
4. Worker (laborer)	6.66	0.84	0.22	8.52	0.87	0.19
5. Firewood	1.47	0.43	0.11	1.16	0.43	0.10
6. Entrepreneurship	12.58	3.38	0.87	1.85	0.37	0.08
7. Professional	11.03	2.19	0.56	0.00	0.00	0.00
8. Other	1.82	0.6	0.15	0.99	1.53	0.34
Total Income			**0.26**			**0.22**

Working, especially in gold mining, made up a very important share of total income (6.7-8.5%) and the concentration coefficient was lower than unity for both sites, which implied a distribution that was equal. It is important to note that for poor farmers selling their labor is a very important income source.

Collecting firewood also reduced income inequality at both sites. About 93-97% of respondents were involved in collecting firewood that was all used for household consumption.

Non-farm income (entrepreneurship and professional work) was more unequally distributed in Block A. Income from entrepreneurship accounted for 12.58% and income from professional work was 11.03% of total income. Most non-farm income came from professional work requiring higher skills, higher education and large amounts of capital, such as teaching, government positions, trading, rubber and rattan collecting, and commissioners. Therefore, non-farm income widened the income disparities between individuals and households in the community. However, in Block E, there were no professional workers among the respondents. Non-farm income came from one type of intrepreneurship only, namely *warung* (small shops). The income share from non-farm income was very low (1.85%). This suggests the use of non-farm income to decrease income inequality in Block E was low.

3.5 Profitability analysis (gemor extraction)

In the past, big trees of *gemor* with a diameter of around 90 cm were available in the forest, producing around 5-7 quintal (1 quintal = 100 kg) of dry bark. Now, *gemor* trees are limited to a diameter of around 5-15 cm that produces only around 10-20 kg of dry bark.

Every villager had free access to harvest *gemor* in the forest. No local ownership existed for *gemor* trees. Farmers usually went to the forest for 7-14 days to harvest the bark. Non-labor cost approximately IDR 525 000/person for food, levy to enter tatah and gasoline for 13 person-days in the forest. In one trip a farmer could harvest 430 kg of *gemor* bark. The current price for dry *gemor* in study site was IDR 4 000 Kg^{-1}. The price for dry gemor in area close to palangkalaraya was 6 500/ kg (Kompas, July 13, 2009). The return to labor was high (IDR 89 179). It was higher than the daily wage for agriculture (IDR 30 000), even it was higher than the return to labor for smallholder rubber (IDR 65 365).

Table 5: Revenue, cost and return to labor of *gemor* collection

Total Gemor collection (Kg dry Bark)	**430**
Price (IDR Kg^{-1})	4,000
Revenue (IDR)	1,720,000
Cost (IDR)	525,000
Levy to enter tatah (IDR)	108,333
Meal (IDR)	316,667
Gasoline (IDR)	100,000
Income (IDR)	1,195,000
Labor use (person-day)	13.4
Return to labor (IDR)	89,179

However, villagers did not feel confident about the future of *gemor* harvesting. This was based on the difficulties they encountered when carrying out *gemor* harvesting in the forest, such as:

(i) Trees were increasingly farther away from their settlements and more difficult to reach
(ii) *Gemor* trees were difficult to find and those that they could find were small.
(iii) Farmers would harvest *gemor* of any size, thus there was no chance for a tree to reach a large diameter.
(iv) High competition, as more and more farmers were embarking on *gemor* harvesting.
(v) Forest fire and over harvesting threatened the growth of *gemor* trees.

4. CONCLUSION

Based on our survey of 60 households and within the local concept of land tenure, the average land holding of Block A villagers was larger (10.73 ha) than that of Block E villagers (4.14 ha).

In Block A, the highest source of income was from rubber (31%), in contrast, fishing (39%) and *gemor* extraction (35.3%) were the major sources of income in Block E, with their total income share being 74.3%. This indicated a high dependency on open access to natural resources.

Forest extraction reduced the inequality of income in Block A but it increased the inequality of income in Block E. Since less forest area was available in Block A, with additional forest far away and thus costly to access, not many villagers in Block A were interested in working in forest extraction. However, the forest was an important income source for poor people who had limited income opportunities. In contrast, the forest areas in Block E were more available. *Gemor* was an important and valuable forest product. About 35.5% of income in Block E came from *gemor* and about 57 % of respondents collected *gemor*.

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PAPER A14 - Mangrove Management as Source of Food Alternative by the Women Fishermen Group in Sei Nagalawan, North Sumatra, Indonesia

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ABSTRACT

One of the immediate benefits of mangrove forests is a source of food. This paper aims to inform the potency of mangrove as a source of alternative food in Sei Nagalawanan and to assess its organization's management system. The study was conducted in Muara Baimbai Mangrove Region and Sei Nagalawan Village, North Sumatra, Indonesia in June to December 2014. Data were collected through interviewing, field observations, testing on nutrition components in a laboratory, and collecting supporting documents. Data were analyzed descriptively to describe the potential of mangrove food management, historical analysis to determine the community's history, functional analysis and social maps to describe the community relationship with other communities. The results of the study are: (1) management of mangrove food in Sei Nagalawan is potential for development because it is integrated with the mangrove eco-tourism that is being developed by the community and the Serdang Bedagai Government, nutritional content of six mangrove species processed meets the standards of nutritional adequacy, and women's groups have the processing and managing skills. (2) Food management system is based on the activity of women who are members of the community of Muara Baimbai Business Multipurpose Cooperative already operating independently. A common vision and mission of the community, human and natural resources, established institutions, active cadres, and the extensive network that already possessed of various types of institutions both government and non-government becomes factors that encourages the self-reliance on women community in managing mangrove food in Sei Nagalawan Village.

Keywords: mangrove, food alternative, women fishermen group, management.

1. INTRODUCTION

Mangrove ecosystem is wetlands resources located in coastal areas that are experiencing the pressures of rapid development, both directly and indirectly (Kustanti et al. 2014). This has resulted in a very rapid degradation of the mangrove forest area in some countries. According to an analysis conducted by FAO(as cited in Kustanti, 2011), about 5 million hectares of mangroves have been reduced over a period of 20 years, or about 25% of mangrove area had decreased from 1980 to 2003. In a national scale, a reduction in mangrove area also occurred in Indonesia. During at period of 11 years, the degradation of mangrove forests was 47.92% from 1982 to 1993. Mangrove forest degradation occurs due to the lack of proper utilization of areas such as conversion to shrimp farming areas as well as the utilization of mangrove wood as raw material for charcoal and firewood (Acharya, 2002; Farley et al. 2010; Kustanti, 2011).

The main cause of mangrove ecosystem damage is caused by the low income of the population around the mangrove forests. Low income can increase extractions of mangrove forests, illegal logging, and land conversion to increase household economy. Kordi (2012)

stated that group of fishermen or coastal communities that depend on fisheries resources are the poorest among the poor. They are generally small fishing groups, traditional fishermen and fishing workers. Increased revenue is one of efforts that can be done to reduce the dependence of fishing communities into mangrove areas when they are not sailing.

One of national policy in mangrove management is the management of community-based mangrove ecosystem to improve and preserve the value of important ecological, economical and socio-cultural community in order to increase revenue and support sustainable development (Ministry of Forestry, 2013). Community participation is an important issue that can not be taken lightly because they are coexist with mangrove ecosystems every day. Optimisation on ecological, economical and social functions on forests to reduce dependence on wood products can be done with the utilization of non-timber forest products (Baharuddin & Taskirawati, 2009). This can be done with the utilization of mangrove material as food alternatives.

Mangrove food products can be prepared from the fruits, flowers and leaves of mangrove. Sei Nagalawan is a coastal village which is now utilizing various mangrove species as food products. Food items are processed by fishermen's women group named Muara Baimbai who has started since 2005. In general, their products are the kind of snack manufactured by community independently for their own consumption and for sale. This indicates that the community self-reliance has been implemented in the management of group. It is an interesting thing that can be studied deeply because from various experiences, many public institutions established by the community itself or by foreign parties both government and non-government are not successfully doing well or only temporary. Therefore, this paper intends to study the women's group management system in Muara Baimbai Community and to inform potential of mangrove as a source of food in Sei Nagalawan Village.

2. METHOD

This study is a descriptive study with qualitative approach. This study intends to present the situation of mangrove food management, social institutions, and the relationship between social aspects with natural resource management. The location of research is in the mangrove area Muara Baimbai and Sei Nagalawan Village, District Perbaungan, Serdang Bedagai Regency, North Sumatra Province, Indonesia. The study was conducted in June through December 2014.

Types of data collected in this study were primary and secondary data. Primary data were the result of interviews with respondents, field observations, and laboratory test results on the nutrient content of mangrove raw materials. Secondary data consisted of supporting documents and maps. Respondents, as many as 35 people, consisted of a group of women who are members of Muara Tanjung Women's fishermen joined in Muara Bambai Multipurpose Cooperative Enterprises. Laboratory test was held in The Food and Nutrients Laboratory in Agricultural Faculty of North Sumatra University in Medan.

Data were analyzed on the premises of qualitative analysis. Institutional system of food management mangrove analyzed with historical analysis, functional analysis and social map. Historical analysis was conducted to determine the history of the development of public institutions (Soekanto, 1982). The next stage was functional analysis and analysis of social maps for mapping the relationship between a set of people, organizations, events or places

(Neuman, 2011). Network theory is the kind of theory using emphasis on relationships within a network of interrelated on the shape or the overall pattern of networking (Neuman, 2011).

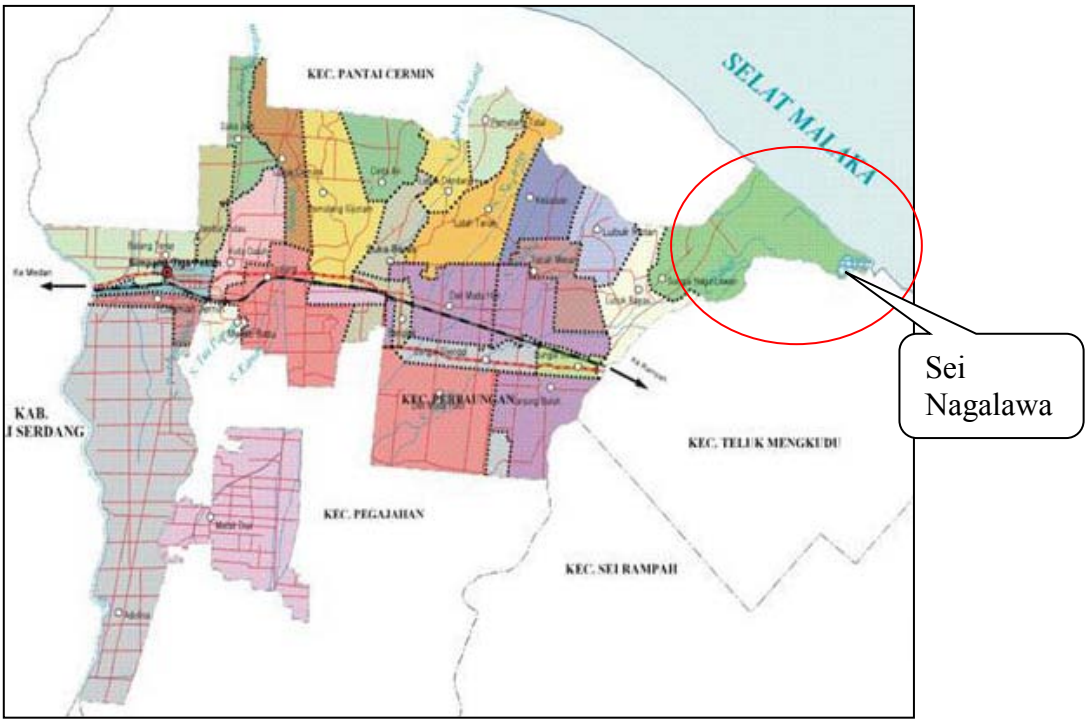


Figure 1: Sei Nagalawan Village with an area 8.161 km2

3. RESULT AND DISCUSSION

3.1 Mangrove potential as alternative food

Muara Baimbai Mangrove region in Sei Nagalawan is one of the coastal areas that have mangrove ecosystem that is currently being developed into a tourist area by the community itself and with the support from the Government of Serdang Bedagai Regency. This area became a tourist area due to frequent tourist visits especially from academic such as students, researchers and environmentalists. The objective of tourism development is an effort to conserve mangrove ecosystems which are vulnerable of human destruction, to raise the potential of the region through education and tourism, and to improve the economic conditions of the population around the area. Figure 2 shows the site map of the study area.

Management of food products made from mangrove was initiated by a group of women named Muara Tanjung. The group is collaborated with mangrove forest conservation groups in Sei Nagalawan Village. The women assumed that the processing of products from mangrove has potential to be developed because food and beverages are usually sought when doing travelling. Special culinary in certain areas considered to have a special attraction so its needs will increase in line with increasing number of tourists.

Communities in Sei Nagalawan have utilized various mangrove species traditionally for long time. Training on food processing gotten from various facilitators from both government and non-government agencies has enabled them to process various foods from mangrove in semi-technical processing. From the various types of mangrove vegetation and underneath plants, fisherman women's group in Sei Nagalawan has developed seven species of mangrove (Table

1) that have been well managed, has trade license, and has marketing up to outsiders of the area.

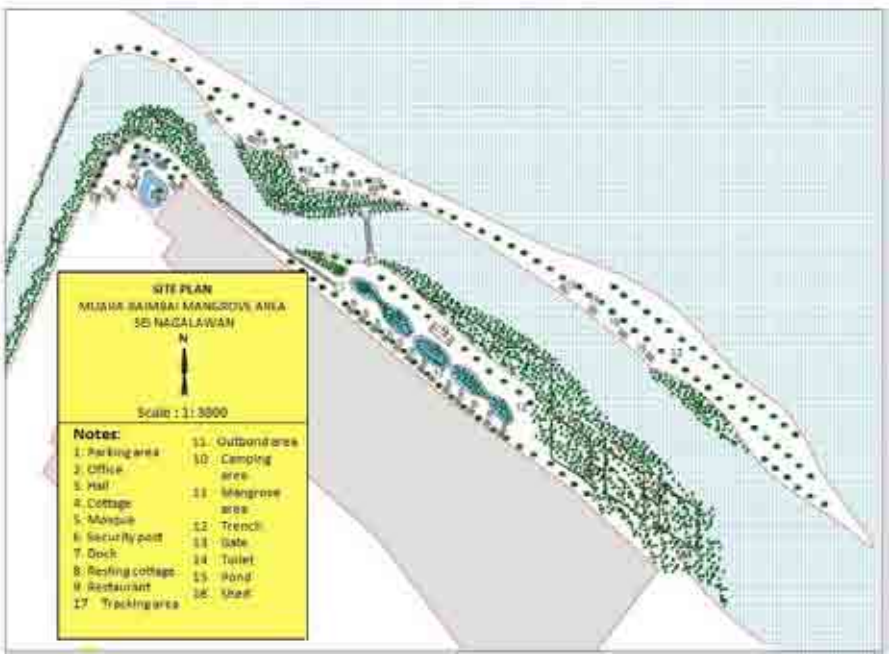


Figure 2: Site Map of Muara Baimbai Mangrove Area - an area 56 Hectares

Table 1: Mangrove species used as food

Species of Mangrove (Common name/Indonesian name/Scientific name)	Utilised parts	Food and beverages product
Holy Mangrove/ *Jeruju/ Acanthus ilicifoliu* Grey mangrove /*Api-api/Avicennia marina*	Leaf	Tea and chips
Mangrove apple/*Berembang, pedada /Sonneratia caseolaris* Orange mangrove/ *Mata buaya/ Bruguiera gymnorrhiza*	Fruit	Cake and cookies
Silted Mangrove (*Rhizophora stylosa)* Glory bower/*Keranji/ Clerodendron inerme*	Fruit	Juice, syrup, and jam various of cake
Nypa palm /*Nipah / Nypa fructicans*	Fruit	Flour and various of cake
	Fruit	Flour and various of cake
	Leaf	Material of beverage (coffee mangrove)
	Fruit and sap	Syrup, fresh drink, alcoholic drink, and brown sugar

Various types of mangrove are potential to be developed into varieties of food products because some of mangrove's fruits and leaves contain nutrients that can be consumed by humans as food alterative. According to Food and Drug Monitoring Agency of Indonesia (2009,) imposed standard to determine the quality of the food is the availability of the nutrients in foods. Here are the nutritional contents of some mangrove species from Sei Nagalawan Village.

Satuhu (2004) stated that fruits utilized as a food product should have the carbohydrate content greater than 1%, protein greater than 1%, fat greater than 0.1% and vitamin C greater than 0.01%. However, in addition to those requirements, there are other requirements prescribed based on consumption needs. Measurement results on nutrient content of various

mangroves products in Table 2 can be seen that the types of mangrove have nutritional content that meets the minimum value as recommended by Satuhu (2004). Raw material requirements of various food products are generally based on the nutrient content of the raw material. For example, energy needs can be met from food products that contain high carbohydrates such as cereals and tubers, proteins can be obtained from meat, fish, eggs and milk, and vitamins can be obtained from various fruits and vegetables.

Table 2: Nutritional value of some types of mangrove

Species	Tested parts	Water (%)	Ash (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Vitamin C (mg/ 100 g material)
Holy Mangrove (*Acanthus ilicifolius)*	leaf	39,66	12,51	3,33	0,59	42,16	35,11
Mangrove apple (*Sonneratia caseolaris*)	fruit	58,52	3,75	1,55	2,21	33,97	34,52
Glory bower (*Clerodendron inerme)*	leaf	84,38	5,34	8,25	3,79	0,99	34,55
Glory bower (*Clerodendron inerme)*	fruit	74,23	16,23	5,50	1,37	3,65	52,62
Silted Mangrove (*Rhizophora stylosa)*	fruit	53,29	2,84	1,63	0,87	41,38	87,90
Orange mangrove (*Bruguiera gymnorrhiza)*	fruit	55,94	7,16	1,61	0,24	35,06	38,56
Nypa palm (*Nypa fructicans)*	fruit	68,51	4,58	1,36	2,42	21,17	35,07

Source of data: Nutritional testing in a laboratory

Mangrove products processed by women' groups in Sei Nagalawan Village are becoming syrup, tea, crackers, cakes, and jams. These products require sufficient carbohydrate, acids and vitamin so that these mangrove' products can compete with other food products derived from agricultural products. Mangrove fruit which has been consumed by many people and processed into various types of food is mangrove apple (*Sonneratia caseolaris*). *Sonneratia (pedada)* is called mangrove apple because its fruit has a structure and flavor which are similar to apple. According to Jayatissa et al (as cited in Baba, Chan & Aksornkoae, 2013), *pedada* syrup is also rich in dietary fiber, calcium and phosphorus. Bunyapraphatsara et al. (as cited in Baba, Chan & Aksornkoae, 2013) also stated that *pedada* fruits have potent ability to scavenge free radicals and to inhibit lipid peroxidation (2002). Out of 20 mangrove plant species screened, fruits of *pedada* ranked second in radical scavenging and first in lipid peroxidation inhibition. Thus the fruit juice of *pedada* can be consumed as a natural health drink with cardiovascular protective properties. From Table 3 it can be seen that *pedada* has a high content of vitamin C (34.52 mg / 100 g) and its vitamin C content is higher than apple's vitamin C at 5 mg / 100 g of material (Health Department of Republic of Indonesia, 1972). Based on this result, it can be stated that *pedada* is potential to be developed as food alternative.

Fruit of grey mangrove (*Avicennia marina*) is processed as food by meshing them into flour. Mangrove flour can be processed into various types of food such as *dodol* (kind of soft cake cooked by mixing them with coconut emulsion and brown sugar), cakes, chips, and syrup. Holy mangrove leaf (*Acanthus ilicifolius)* also can be processed to be tea powder and chips. Holy mangrove leaf is believed to have efficacy as a medicine for lowering blood cholesterol level. Food product such as holy mangrove chip is the most produced product due to high demand

and available of raw materials which are available all the time. Chips can also be stored longer which makes them suitable as souvenirs when visiting.

The processing of food products by the women groups is still relatively modest, however the processing equipment is considered complete. Food packaging has also been designed for home business households and SMEs that have the name/type of food, a precursor composition, and a permit of production from industrial and trade institutions. Some of the problems faced by women' groups in Sei Nagalawan Villages in processing of mangrove food product are a license from the National Agency for Food and Drug that has not been owned, and the limited raw materials. A license that has not been owned shows that the products produced by the community has not been in accordance with Standard Operational Procedure (SOP) from the National Agency for Food and Drug of Republic of Indonesia so that cannot be marketed nationally. While limited raw materials are effected by the mangrove planting area which is limited and the fruit production which is seasonal. Some mangrove species such as grey mangrove and mangrove apple, their fruit production are largely determined by the fruiting season.

3.2 Mangrove food production system based on community

Management of mangrove food production in Sei Nagalawan is now independently managed by members of women group Muara Baimbai Community. Self-reliance group is assessed based on their ability in preparation of production plans, organizing group, implementation, and capitalization which are entirely done by the community independently. This self-reliance is obtained from the processes of maturation group since they were involved in mangrove conservation activities. History of community formation and maturation is shown in Table 3.

Table 3: History of Muara Tanjung Women Group and Muara Baimbai Multipurpose Cooperative Enterprises

80's	1992	1994	1998
- mangrove land use change to be shrimp and fish pound - lowering and loosing of mangrove ecosystem	- damaged mangrove area had attention from NGOs - Formation of rural development program for strengthening the capacity of communities	- Planting mangrove massively - introduction of *mina bakau* to community (mix fish farming in mangrove area) - The rising of conservation cadres and women cadres	- Arising of self-reliance in forming community - Community got support from the NGO for operating and training activities
2005	**2007**	**2009**	**2012**
women group MuaraTanjung was formed. It aimed to encourage women to be active in supporting the fishing economy and active in environmental conservation	- Formation of Nelayan Kayuh Bambai community to increase fishermen productivity - Women' groups actively produced mangrove food	Incorporation of Muara Tanjung women groups and Nelayan Kayuh Bambai fishermen groups named Farmers Community of Muara Baimbai Mangrove Conservation	Strengthening on community capacity in capital and economic through improvement and establishment of the Muara Baimbai Business Multipurpose Cooperative. One of the cooperative business is to manage Muara Baimbai ecotourism and mangrove food processing.

Table 4: Elements of community self-reliance of women group

Elements of community self-reliance	Result of observation and interviewing
Common need	Most members realize that the management of mangrove products is to increase members' income.
Potency and natural resources	56 hectares mangrove area currently managed as ecotourism is the result of the community hard working on mangrove rehabilitation program in previous years. Group of women also have the ability in managing group and in food production. The group has sufficient capital to govern the operations of small-scale businesses.
Knowledge and local wisdom	Communities that coexist with in the mangrove area during their lifetime produce local knowledge in identifying and processing mangrove as source of food.
Social institutions and networking	Women have joined in the organizations that already have a legal basis. In a small scope, they are organized in Muara Tanjung Women Group, while in a large scope they have joined in Mangrove Farmers Group Muara Baimbai and The Muara Baimbai Business Multipurpose Cooperative. The Organizations have the good network in government and non-government scope.
Social Energy	Development of the mangrove conservation area as ecotourism have risen positive impact in socio-economic to the community. This encourages people more actively to develop good neighborhood in replanting area, extending on mangrove replanting, improved facilities, and increased promotion to encourage increased tourist arrivals, demand, and production of processed food mangrove.
Processing and mechanism	Food processing management system is not contained in the document, but the group members comply with the rules set by agreement of members such as sharing food production schedules, promotion schedule on ecotourism, and training, job descriptions, and profit sharing.

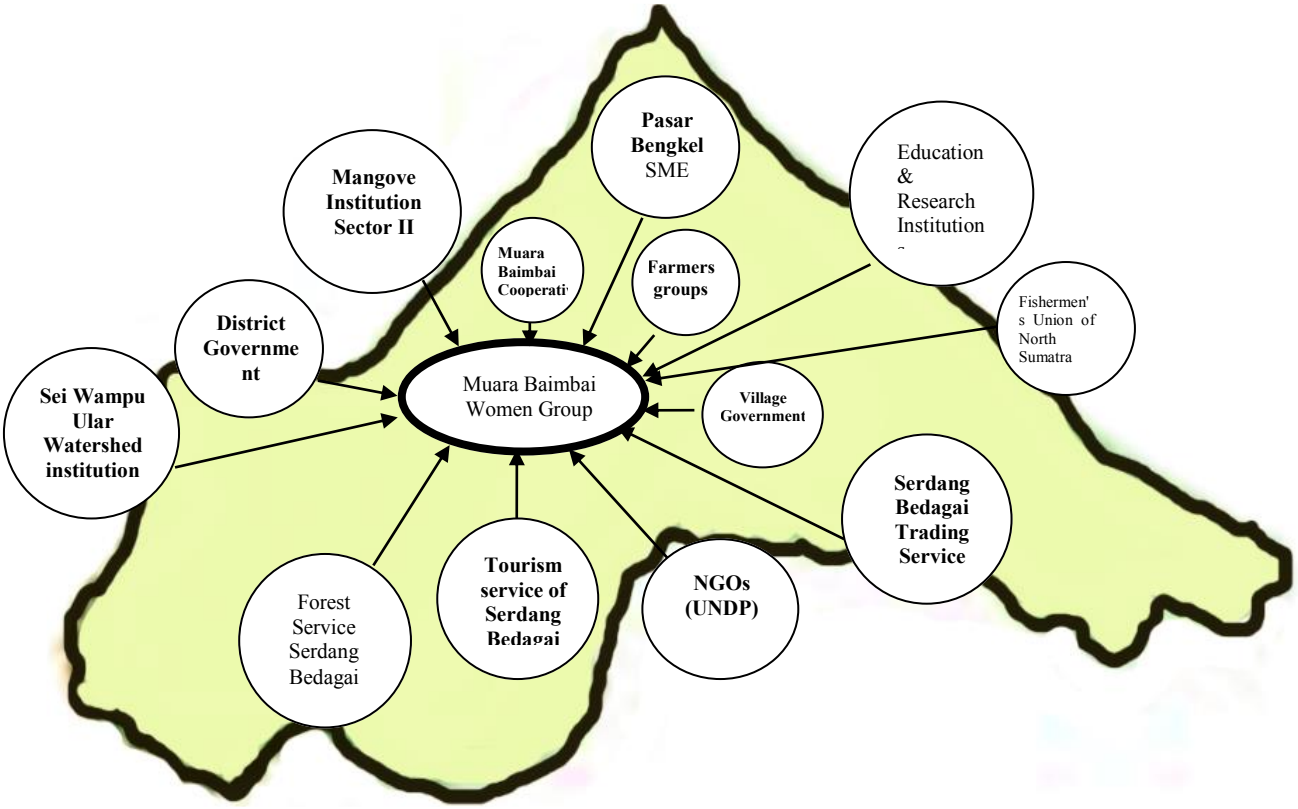
Based on Table 3, it can be seen that the process on achieving self-reliance of women group in Sei Nagalawan Village has been through the long process and has changing the organizational structure several times especially between the period 1998-2005. One factor that greatly affects the survival of the Muara Baimbai Community until today is the role of conservation cadres. They became the motivators for other members to actively conserve and manage mangrove to improve the community's economy. According to Soekanto (1982), a person who performs an active role and prominent ability in a group is a forerunner to the rise of a leader. Similarly happened in Sei Nagalawan Village, the rising of conservation cadres that have the ability to overcome the encountered difficulties can bring the integration of the group members so that the organization can still run as expected. They have become role models in the community because they are active and care about the organization. Vision and mission of organization also can be transferred well due to member's acceptance and listening to their leaders.

Another factor that leads to the existence of the community is because of the fair treatment to each member. Community members are given equal opportunity to improve organizational and technical skills through various training, seminars, and comparative studies. In terms of profit sharing, the leader gives the community's profit in accordance with the participation of each member. Such condition is in accordance with the Macionis's opinion which stated that community will thrive when there is suitability in group created by leaders to the members that result in the strong sense of ownership of member (Macionis, 2008).

Development group of women in rural communities in Sei Nagalawan Village is considered as a strategic action. Commonly, women are seldom expected to play a public role in community, less likely to have well-paid jobs, and frequently discriminated against in customary law (for

example, with regard to inheritance). Greater confidence on women and youth participation in community development projects especially in developing countries will strengthen development programs, establish the programs to a wider base, and ensure the long-term expansion (Conyers, 1993; Facio & Morgan, 2009; Nasdian, 2014).

Based on the above explanation, the self-reliance of the women group in managing mangrove food products can be assessed based on the elements conveyed by Soetomo (2012). These elements are common need, potency of local resources, local knowledge of community, institutional and its network, social energy, and processes and mechanisms within the organization. There are further explained in the Table 4.



Notes:
1. The map is the administrative area of Seinagalawan Village
2. The diameter differences of circles indicate the size of institutions.
3. Differences in the size of the arrows indicate the level of the relationship of the group organization
4. The layout of the circles shows the linkage of organization's work area to village

Figure 3: Social network map of The Muara Baimbai Women Group

Table 4 shows that the self-reliance of women groups in mangrove food processing is not in doubt. It can be seen from the current system of group work is determined by the members. They can identify their own needs and do the work both in production and promotion done by themselves. Production activities are no longer dependent on outside assistance. To reach this stage, they previously received support from government and non-government agencies. The activities such as mentoring groups in recognizing the potentials around them, financial management, training on mangrove food production, comparative studying, equipment supporting and capital supporting. But today, the government and NGOs only act as facilitators. According to Soetomo (1992), self-reliance can be seen from the role of

community and external parties. The community is the main actor, while external factors are needed as a stimulant to develop the resource potency. While NGOs are the autonomous power that have critical awareness to encourage people to keep their visions and missions.
The importance of the relationships that occur outside of defined groups in networks and the patterned relationships connect us with those outside of our established groups (Stolley, 2005). Network is the one of the social capital, and that social network has value if there are interactions and connections to develop shared norms, trust, and reciprocity in turn foster to achieve common goals (Jones, 2005). The social network of the women group Muara Baimbai in processing mangrove food can be seen in Figure 3.

Network map in Figure 3 shows the interaction of the community with the variety of stakeholders both government institutions and non-governmental. This shows that the Muara Baimbai women group in managing mangrove food products already has adequate networks. However, although the community relationship has ideal structurally, mangrove development as a food product by women fishermen community still has many obstacles that its solution requires the support as stakeholders especially government agencies. The obstacles are the issues of management rights unassigned area to date, the lack of land which legally can be planted to increase food raw materials, and the lack of management on marketing.

4. CONCLUSION

The mangrove food management in Sei Nagalawan Village is potential to be developed because it is integrated with mangrove ecotourism which is being developed by the community and the Serdang Bedagai Government Regency. Nutrition contents such as vitamin C, carbohydrate, fat, and protein on various of mangrove vegetations, i.e. holy mangrove (*Acanthus ilicifolius),* grey mangrove (*Avicennia marina),* mangrove apple (*Sonneratia caseolaris),* orange mangrove (*Bruguiera gymnorrhiza),* silted mangrove (*Rhizophora stylosa),* glory bower (*Clerodendron inerme),* and *nypa* palm (*Nypa fructicans)* have nutritional adequacy standard so they can be developed into an alternative food source and can improve the local economy around the mangrove forest. Food management system is based on the activity of women who are members of the community of Muara Baimbai Business Multipurpose Cooperative already operating independently. A common vision and mission of the community, human and natural resources, established institutions, active cadres, and the extensive network that already possessed of various types of institutions both government and non-government becomes factors that encourages the self-reliance on women community in managing mangrove food in Sei Nagalawan Village.

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PAPER A16 - Livelihood assets mapping of the farmer on managing forest

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ABSTRACT

Livelihood asset is an important factor to be revealed and understood precisely because every resource has carrying capacity and different support to the community. Through asset mapping farmers in forest management can describe the dynamics between individual and collective assets at a specified time and contribution to livelihoods. The purpose of this study was to mapping the livelihood assets (human, natural, physical, financial and social assets) that used by farmers based class welfare in managing community forests. This research is parts of ACIAR project FST/2008/030 "Overcoming constraints to community based commercial forestry in Indonesia". This study was conducted on community forest farmers in Gunungkidul by taking three villages of three zones in Gunungkidul, Katongan village represent northern zone/Baturagung, Dengok village represent middle zone/Ledok Wonosari and Jepitu village represent the southern zone/pegunungan seribu. Each village was taken 30 respondents randomly so that the total respondents are 90 respondents. Data analysis was performed by the method of multi-criteria analysis (MCA). Research finding was illustrated by pentagon diagram. The combination of the asset determines the pentagon form, so through livelihood asset mapping, it can determine the access of the asset in the livelihood activity. Access level of asset will determine the action to arrange the livelihood strategy so the livelihood outcome will obtain. The farmer with different wealth class (high, medium and low wealthy) has priority to used different asset. The high and medium wealthy farmer tends to use financial and physical asset, while low wealthy farmer tend to use social asset to manage community forest.

Keywords: community forest, farmer, Gunungkidul, livelihood assets, wealth classes

1. INTRODUCTION

Farmer in managing community forest needs several capitals i.e. human capital, natural capital, physical capital, financial capital and social capital. (Chamber & Conway, 1992; DFID, 1999; Ellis, 2000). These capitals constitute farmers' assets to create sustainable livelihood for them. The farmer capital allocation in managing community forest is different; it is influence by their wealth classes. The wealth classes could divide into high, medium and low classes. Measurement of famer capital allocation in managing community forest is important to identify the livelihood strategy of the farmer.

Based on sustainable livelihood framework (SLF) livelihood asset influence the livelihood strategy (DFID, 1999). The consequence of that the livelihood outcome will be change. Livelihood framework of the communities with external influences such as geography, general economic conditions, social relationships and organizations in the community will determine the people's livelihood strategies (Tesfaye *et al.*, 2011). Livelihood assets allocation in community forest management is influence the intensity of community forest management

and the intensity of community forest management determine the productivities and sustainable of community forest.

Recently, community forest is an alternative of industrial raw material beside state forest. Community forest in Indonesia is one of strategy to attract capital investment, generate employment in rural areas, and increase the livelihood benefits for farmers and the rural communities (Indonesia Ministry of forestry, 2009). Community forest is also a transition strategy to optimize the benefit of plantation forest yield and to decrease a reliance of using natural forest a source of wood. For the farmers, community forest has so many important roles in social economic and livelihood aspect (Fillius, 1997; Simon, 2006 and Awang, 2007). The objective of community forest management is to get benefit from the forest, but the management should be appropriate to the characteristic of the resources and the social economic condition in the regional area (Davis, 1987). The development of community forest management should be dynamic based on some factors that influence them (Kimmins, 2004; Simon, 2006). The consequence of different objective of community forest management (i.e. to utilize non-productive land, for soil and water conservation, and for community income) is the pattern and intensity of community forest become different.

The community forest orientation has been change from conserving the critical land into economic orientation. Farmers tend to plant trees in community forest as economic purposes. There are a number of reasons for farmers to plant trees, among others are savings, soil erosion control and soil fertility improvement, changes in labour supply, changes in demand for forest products and government policies (Fillius, 1997; Awang 2001; Rohadi 2011). Transformation orientation planting trees in community forest affected the farmer livelihood strategies and outcome and finally the livelihood asset has been change.

Related to the concept of assets is economic outcome from these assets. The distribution of the capitals varies across different wealth groups. Wealth groups can be divided into three: high, medium and low. The farmers' wealth class determines the utilization of livelihood asset in managing community forest, which leads to the livelihood outcome of the farmers. Measurement of farmer capital allocation is important to the understanding of livelihood strategy choices they have. This study was answer the research question how farmer livelihood asset allocation based on wealth class in managing community forest?

2. METHOD

2.1 Study Area

This study was conducted on community forest farmers in Gunungkidul by taking three villages of three zones in Gunung Kidul, Katongan village represent northern zone/ Baturagung, Dengok village represent middle zone/ Ledok Wonosari and Jepitu village represent the southern zone/ pegunungan seribu.

2.2 Data Collecting and Analysis

The data were collected using several techniques, namely focus group discussions (FGD), household survey and in-depth interviews with key person. The conversation used during data collection process was a mix of local language and Indonesian. A process of triangulation was used to verify the consistency of data from FDGs, household surveys and in-depth interviews. Each FGD was framed by the topics and objectives described in Table 1.

The output from FGDs was used to determine respondents for the household survey. Each village was taken by 30 respondents randomly so that the total respondents 90 respondents. Data analysis was performed by the method of multi-criteria analysis (MCA). Research finding was illustrated by pentagon diagram.

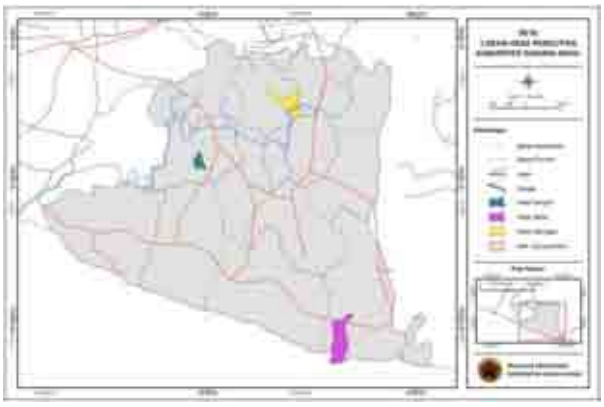

Figure 1: Research location

Table 1: Topics and FGD objectives

Topic	Objective
Community's wealth categories	Identify criteria of wealth for 3 categories: high, medium and low. Community to determine the wealth criteria via FGD. The criteria to reflect the local context.
Community samples based on wealth indicators	Allocate the community members based on wealth categories and select respondents proportionally to that of the wider village population.
Rank the community's assets related to CBCF	Identify and rank the community's assets (human, physical, natural, financial and social) as they relate to CBCF.

Data analysis of livelihood assets was conducted using a descriptive statistic method, with tables and diagrams used to explain the data to the community members. A simple scoring technique was used to measure the dominant assets used by the community in community forest and then visualized using pentagon diagrams. The scoring technique involved ranking every wealth criterion at the beginning, followed by a FGD to ensure the ranked criteria was generally considered to reflect the real conditions of the community. Each criterion was given percentage weight, with individual answers in the questionnaire given a score. The total score was calculated by multiplying the scores with the weighted criteria, and then expressed as a percentage. The method to analyse the livelihood assets followed a standard approach for multi-criteria analysis (MCA) (Mendoza, 1999). MCA is a decision-making approach developed for complex multi-criteria problems that include qualitative and/or quantitative aspects. By using a pentagon diagram to illustrate the results the relative strength of each asset can be easily identified

The mid-point of the pentagon indicates no use of an asset, while the outermost point reflects the maximum use of an asset. Asset mapping can describe the dynamics between individual and collective assets at a specified time and the contribution to livelihoods (Jakobsen, 2013). The combination of assets that are used will determine the shape of a pentagon. By knowing the level of access to, or use of, assets used by farmers in community forest, it can then be

determined what further action or support might be needed to strengthen the assets of a community that contribute to community forest, thereby enhancing the development of community forest and the subsequent livelihood benefits.

3. RESULT AND DISCUSSION

3.1 Community forest and Livelihood

In this research, the term of 'community forest' refers to a forest managed by the local community as a mix of individuals or a group. Community forest in Indonesia has developed as an important livelihood strategy for many farmers due to the close proximity of rich forest resources and the desire to move beyond poverty (Palte, 1989; Awang, 2006). For farmers, community forests fulfill so many important roles in their socio-economic condition (Fillius, 1997; Simon, 2006; Awang, 2007). Some contemporary factors that are influencing the development of community forest in Indonesia are the increasing commercial demand of forest products, the improvement of infrastructure at the village level (e.g. better roads so there is easier access to processing centers and city markets), and a succession of government policies that encourage farmers to plant trees (Fillius, 1997).

The general objective of community forest is to obtain benefits from forests, but the management should be appropriate to the characteristics of the resource and the socio-economic condition of the local area (Davis, 1987). The development and ongoing management of community forest should be dynamic and adjusted to the prevailing conditions in the local area (Kimmins, 2004; Simon, 2006). Sabastian, *et al.,* (2014) identified some patterns among the mix of designs of community forests to meet the varying socio-economic and farm conditions: home-gardens (*pekarangan*) and dry land farms (*tegalan*) with hedgerow timber, intercropping and woodlots. Home-gardens is managed to serve the subsistence needs of a household for timber, fruits and medical plants products, and often developed in an area next to the home. Combining trees and agricultural crops develops the dry land farm. The dry land farms are located at some distance from the home, while woodlots grown by smallholders may comprise just even-aged singletree species. However, frequently smallholder's forest systems evolve into highly complex, uneven-aged mixed species grown in a variety of configurations, including block planting, woodlots and agroforestry.

Famers involved in community forest often face challenges, such as: 1) limited land size, 2) limited access to high quality of planting material, and 3) lack of silvicultural skills leading to problems of irregular spacing, inappropriate pruning and limited fertilizing (Sabastian *et al.,* 2014). Beside these 'internal' factors, Awang (2007) identified constraining external factors, namely the pressure of industry for timber as raw material and little formal recognition from the government of the local community's forest management. Van de Fliert (2013) identified three main constraints related to CBCF, namely those related to timber production, timber marketing and farmers' organization.

Community forest in developing countries has been considered as a viable option for combining poverty reduction, enhancement of local economies and biodiversity conservation (Adhikari *et al.,* 2004). Agroforestry as an integration between agriculture and forestry is also a common feature of sustainable livelihoods by small-scale farmers in Indonesia (Irawanti *et al.,* 2014). Farmers involved in CBCF in Indonesia usually do not rely on forestry as the only source of income. In addition to forestry, farmers usually have other side jobs or income sources such as rice fields, livestock and off-farm service jobs. Community forest has a variety

of important roles as it can improve farmer's income, expand employment opportunities, and support the daily needs with agricultural crops or forage. In addition, community forests also have a number of important functions for ecology, hydrology and land conservation services. Tesfaye *et al.* (2011) identified the livelihood strategies of farmers, which are based on livestock and crop production, forest production and private businesses. Among them, income derived from forestry was an important source, particularly for low-income groups.

Community forest has been reported to increase the income and welfare of farmers throughout the world. For example, in South Africa the contribution of community forest is often about 20% of the total farm income (Shackleton *et al.,* 2007), while in Bangladesh is reported to contribute up to 32% of the total income of the rural community (Miah *et al.,* 2012). Similarly, a report on the situation in Ethiopia showed that community forest had contributed about 27% to the total farm income (Bobulo *et al.,* 2009). In Indonesia, Rohadi *et al.* (2011) reported that teak harvested from community forests in Gunungkidul contributed about 12% of the household income. The detail contribution of community forest to the farmer livelihood in wealth category in Gunungkidul is for high wealth category community forest can contribute 5,5-40% to total income. Community forest can contribute 2-34% for the medium, while for low wealthy community forest can contribute 6,5-30% to total income (Oktalina *et al.,* 2015). The capacity of community forest to enhance the welfare of farmers, specifically to increase their income, is important to understand. While community forest is not the only source of income for farmers, it is one of a range of income sources and is commonly used as a 'savings account' for the family. For example, the income from community forest is often relied upon when relatively large amounts of funding are required such as for school tuition, weddings or health cost (Fillius, 1997; Rohadi *et al.,* 2011).

Figure 2: Community forest in Gunungkidul

3.2 Wealth Criteria

Community forest farmer have different assets that influence the wealth classes. The wealth classes will influence the livelihood strategy of the farmer and the intensity of farmer to manage community forest. In this research each community decided the wealth criteria in a focus group discussion participatory based on the indicators of wealth that developed by the government. The criteria of each village show in Table 3. The criteria of each village is different, it is caused by the local condition and cultural of each village. Generally, the criteria for every village to decide the wealth classes are land ownership, house and vehicle. The proportion of the respondents based on wealth categories shown in the Figure 3. Most of the farmers involved in this study were classified as of 'medium' wealth about 64% of the total.

In Dengok village the farmer classified into high wealth class if the land ownership more than 2 ha, the house made from stone or teak wood, having car or truck, the number of cows more than 2 and the number of teak trees more than 50. While in Jepitu the farmer classify into high wealth class if the land ownership more than 6 location, the house made from stone, having car and motorcycle, the number of cows more than 5 and the children education minimum is graduate from university. In Katongan village the farmer classified into high wealth class if the land ownership more than 1 ha, the house made from stone, having car or truck and the income from more than 1 sources. Land ownership was the criterion to be nominated by the local community in all the study sites, reflecting the importance of land as an asset for farmers. The land ownership according to wealth class can be seen in Table 4. In the north part of Gunungkidul the average land ownership is 0,54 ha, in middle part of Gunungkidul the land ownership of the farmer is 0,5 ha while in southern part of Gunungkidul the average land ownership of the farmer is 1,53 ha. In the southern part of Gunungkidul is wider than the other part of Gunungkidul but the topography of the land is mountainous and the soil fertility is low. So the southern part of Gunungkidul is very favourable for community forest.

Table 3: Wealth criteria used at each village

District	Village	Criteria
Gunungkidul	Dengok	Land ownership, house, vehicle, livestock, number of trees
	Jepitu	Land ownership, house, vehicle, livestock, occupation, saving, children education
	Katongan	Land ownership, house, vehicle, income

Source: Focus group discussions, 2013.

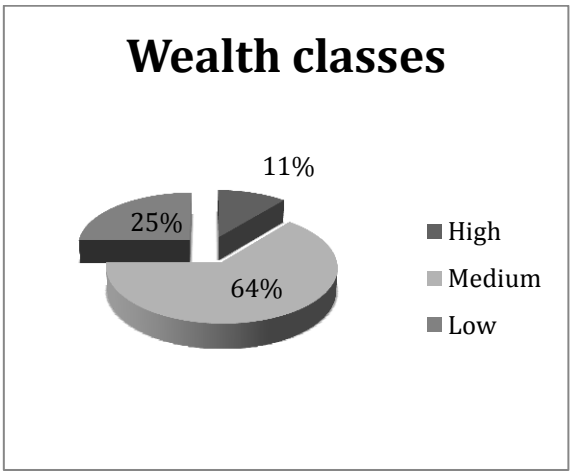

Figure 3: Proportion of farmer based on wealth criteria

Table 4: Land ownership of the farmer

Location	Land ownership according to wealth class (ha)			Average land ownership (ha)
	high	medium	low	
Gunung Kidul				
Dengok	1.04	0.52	0.25	0.50
Jepitu	1.70	1.60	0.60	1.53
Katongan	0.72	0.65	0.28	0.54

Source. Primary data, 2013

3.3 Livelihood Asset

Famers use a range of assets for managing community forest, such as land, tools and mechanical equipment, knowledge and skills, infrastructure and financial support. Depending on the activity or enterprise, a farmer may different assets to achieve their livelihood objectives. Even within a single location, different farmers may not use all of their assets is exactly the same way when developing community forest.

In this research, the livelihood assets of the community were measured and then illustrated in a pentagon diagram. The pentagon diagram shows the strength of each broad asset used in community forest by farmers in the different wealth categories, in each study location. In each wealth category, the dominant assets used for community forest were different, but generally the social and physical assets were more prevalent across all of the wealth categories. 'High' wealth farmers mostly used their physical and human assets in community forest (e.g. production tools and equipment, high level of education and skills). In contrast, 'medium' wealth farmers tended to use more of their physical and financial assets in community forest. While 'low' wealth farmers relied more heavily on their social asset in community forest, for example mutual cooperation (referred to as *gotong royong*) to help each other benefit from community forest. Social asset is power for the people livelihood through network and social connection such as mutual cooperation, trust and mutual cooperation (Scoones, 1998).

An assessment of the strength of assets available to individual farmers, or farming groups, can be helpful in determining what intervention or support might be most helpful for developing community forest. For example, 'low' wealth farmers have limited financial assets than 'medium' or 'high' wealth farmers (Mahdi *et al.,* 2009). As such, community forest that generates commercial and/or subsistence products in the short-term may have greater appeal to 'low' wealth farmers than forest systems that require a long-rotation before tangible benefits are generated. The dominance or importance of the different assets used by farmers in community forest in each study location is illustrated in the pentagon diagrams (Figure 4).

The assets used by farmers in Gunungkidul across the different wealth categories differ. The financial asset was most notable as the strongest asset in Katongan village, followed by the physical, social, natural and human assets. Financial assets in this village included: income, family savings, access to credit and a degree of financial sufficiency. The 'high' wealth farmers did not just rely on community forest for their income, but also derived income derived from self-employed activities and other revenue sources. This is indicated by the low value attributed to their natural asset compared to other assets. In Dengok village, physical assets were the most owned by the community, followed by social, human, financial and natural assets. People in Dengok are basically a farming community and manage community forest themselves, thus almost all members of the community have a strong physical asset, such as housing, vehicles, means of production and easy to reach/acquire the means of production in the community forests management. Physical asset is priority in this village because the farmers in Dengok already aware the importance of marketing. For supporting the marketing the infrastructure is very important. On the regional context physical asset could be road, irrigation and access for information and communication (Sccones, 1998).

The social asset is considered as the strongest asset for the community in Jepitu village in relation to community forest, followed by their physical, financial, human and natural assets. In this village, the strength of the social asset was vital for making community forest successful for them. The extent and strength of their networks, high level of trust and the social norms, and adherence to agreed governance arrangements (e.g. regulations) are generally

considered important for the success of community forest. Social asset have important role to sustain the natural resources and livelihood (Jele, 2012). People of 'medium' wealth dominate most of the population in the three villages. However, the ownership and use of assets for community forest is different in each village.

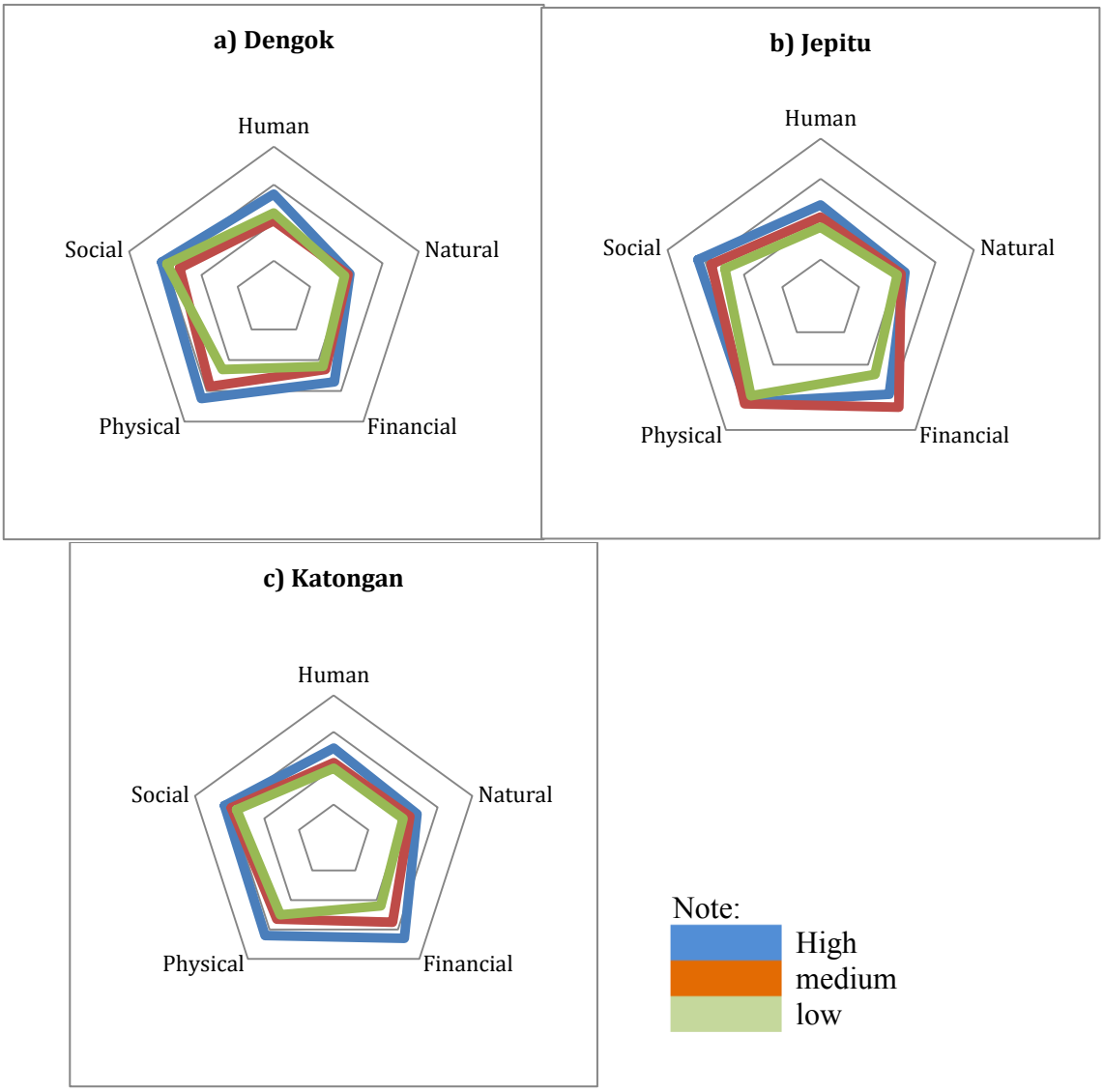

Figure 4: Livelihood assets in Gunungkidul district:
a) Dengok village; b) Jepitu village; c) Katongan village

The implication of the community forest farmer livelihood assets on managing forest is to know the access level of the farmer on managing forest based on the wealth classes. Livelihood asset mapping is also useful to design the kind of intervention to manage the community forest based on level of access.

4. CONCLUSION

Community forest in Indonesia has emerged as a relatively new strategy for farmers to improve their livelihoods. This research explored the experiences of farmers with community forest across different wealth categories in 3 villages. The farmers involved in this research were mostly of 'low' and 'medium' wealth, representing 89% of the sample population. This

research documented the relative importance of different livelihood assets for community forest, as illustrated in a series of pentagon diagrams. For each wealth category of farmers, different assets emerged in terms of relative importance, but social and physical assets were generally of high importance in all wealth categories. 'High' wealth farmers mostly utilized their physical and human assets, and 'medium' wealth farmers were more reliant on their physical and financial assets. 'Low' wealth farmers tended to rely more on their social capital for managing their involvement in community forest. Mutual cooperation in Indonesia (referred to as *gotong royong*) is a traditional approach where farmers help and work with each other. This kind of social capital is used mainly by farmers of 'low' wealth and is well-suited to community forest.

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PAPER A17 - Increasing Women Participation in Forest Management Program in Gondoriyo Village, Central Java

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ABSTRACT

Planting trees with food crops is a common practice in Central Java, both in private land and state forestland. In managing a state forestland, Perum Perhutani launced a program called *Pengelolaan Hutan Bersama Masyarakat* (PHBM) in order to induce communities' participation in forest management. Not only men, women are also have eagerness to participate in this program. This Research aims to observe the intensity of women's participation in forest resource management of a state forestland. In addition, this paper also identify the number of areas where women's involvement could be improved. A combination of field observation and household survey through interview was conducted to understand women participation in the forest resource management in Gondoriyo Village, Central Java. Data was analyzed descriptively and qualitatively. Of the Households surveyed, 40% of the women actively participate in the forest resource management. As much as 30% of them participated along with her husband and 10% are single participant. Most of the women participate in planting the food crops, cleaning the grass and other plants that interferes the main plants (weeding), collecting fodder, and also gathering and handling non timber forest product. Rarely, women attend the meetings and speak up in public. Women also have no influence over many important decisions related to forest resource management, even though in many cases women access to the forest is more intensive than men. Women's participation can be improved by inviting them to attend the meeting, express their opinion, and decide something that is related to better forest management.

Keywords: Forest resources management, Central Java, woman participation

1. INTRODUCTION

Perhutani lauched Community Collaborative Forest Management Program (known with acronym PHBM) in 2001 and together with the communities has been working to rehabilitate the forest. When communities participate in this program, they will get a certain plot to cultivate. Most of them grow rice, corn, peanuts and cassava. At the boundary between land, they planted banana and medicinal such as galangal and lemongrass. Moreover, they have an obligation to protect the main trees in the plot and participate in some activities organized by Perhutani, such as nursery, trimming, pruning, and felling, with or without payment depending on the agreement (Damayanti, *et all.,* 2012). Not only men, women also participated in this program, both active and passive. They participate as a single participate or participated along with her husband. For the single participants, they get a plot on behalf of her, while those who participated along with her husband, they get a plot on behalf of her husband.

According to Verma (2013) *in* Verma (2014) "*Gender refers to the socioculturally and politicaleconomically constructed roles and responsibilities ascribed to women and men that change over time, are contex-and historically specific, and are inseparable from power relations. It also refers to domain of*

characteristics that shape the value, status, and access to resources of women and men within different societies". Women as a farmer who actively participate in PHBM program will engage in accessing the land. In the morning, after finishing their household chores, they went to work to the fields and cultivate the land. While the men, sometimes they work as labourers elsewhere to supplement their income. This condition was in line with the statement of Mishra (1994) *in* Najafabadi (2014) that "*women are the primary natural resources managers, and they possess an intimate knowledge of the environment*". Therefore, women had higher levels of concern for the environment. Moreover, Yavari and Saremi (2014) explained that gender equity and equality between women and men was an essential tool, so that the presence of women was a necessity for the preservation of the environment, sustainable development and human security.

ICIMOD (2014) revealed that gender transformative change can help to ensure sustainable environments, increased well-being of communities, and equal sharing of development and decision making benefits among woman and men. Women's participation in the implementation of organic farming practice in Iran are varies depends on cultural region, type of crop grown, farm size and migration pattern. In this area, women's involvement in planting operations decreased, but in terms of processing food and animal products, women's opportunities increase (Najafabadi, 2014). In general, in developing countries like Indonesia, women's participation in the management of forest resources is lower than men. This Research aims to observe the intensity of women participation in forest resource management of a state forestland. In addition this paper also seeks to identify the number of areas where women's involvement could be improved.

2. RESEARCH METHOD

This research was conducted in Gondoriyo Village, Semarang District, Central Java Province, Indonesia. This site was located in the area of Perhutani State Enterprise, KPH Kendal. Data used in this research is primary data that is collected using observations and interviews to the households and stakeholders in the village. As much as 49 respondents were selected randomly from the villages for the interview. Woman participation was identified through discussion with the respondents and also key persons in the village. Not only men, woman are also interviewed to gather comprehensive information. Data was analyzed descriptively and qualitatively to observe the intensity of women participation in forest resource management of a state forestland and also to identify the number of areas where women's involvement could be improved.

3. RESULT AND DISCUSSION

3.1 Characteristics of the Respondents

Gondoriyo village is located close to the downtown of Semarang district. Therefore, there are many factories that provide jobs for local communities. Some people from Gondoriyo village, particularly young people, prefer to work other than farmer, for example as drivers, vendors, Perhutani employees, or factory workers. Data analysis shows that from 49 respondents, 37% of them are farmers and 63% of them are not farmers who work outside the agricultural sector. The limitations of land and the need for cash income become the main reason why they choose not to become farmers.

Table 1 explains that the range of age for the respondents is between 25 and 75 years old, in which the average is 46 years old. Compare to the younger people, older people will more intensive to access the land and the forest (Lestari, 2014). In contrast, younger people prefer

to go outside the village to find a job other than farmer because according to them work as a farmer is less prestigious. They also hope that by working outside the agricultural sector, they can improve the family economy, because their families have hereditary become farmers and their lives remain poor. Table 1 also describe that the land owned by the respondents range between 40 to 13,084 square meters, in which the average was 2,622 square meters. People who are farmer that have limited land will have great eagerness to involve in Perhutani program, so that they can access the land to cultivate and earn more income. In this plot, people planted rice, corn, peanuts and cassava. Figure 1 indicates the land cultivation by the farmers who involved in PHBM Program.

Figure 1: Farmer's plot in the area of Perhutani which is planted with agricultural crops

Based on the level of income, the respondent's income varies from 340 thousand to 4 million rupiah per month and the average income of the respondents was 1,3 million per month. People who have low income will be more enthusiastic to join the program of Perhutani so that they can get more land to fulfil their needs. For farmer's households, the more the number of family, they will need more land to cultivate because they have more resources to access the land. The research result showed that the number of family of the respondents range between 0 to 6 persons with an average of 3 persons.

Table 1: Characteristics of respondents based on age, land holding, income level, and number of family

Variables	Min	Mean	Max
Age (year)	25	46	75
Land holding (m^2)	40	2,622	13,084
Income level (thousand rupiah)	340	1,300	4,000
Number of family (person)	0	3	6

Figure 2 explains the characteristics of the households based on education level. From this figure, we can explore that most of the respondents have no school (47%) and 4% not finish elementary school, therefore they do not have ability in writing and reading. Since Perum Perhutani launched Community Collaborative Forest Management Program, there was a program in which the community can learn about how to write and read without any charge. Both male and female could participate in this program. The time and schedule was adapted to the availability of time owned by the community. Moreover, the result shows that 25% of the

respondents have education level up to elementary school, 8% of the respondents could complete their education until Junior High School, and 16% up to High School. None of the respondents have chance to finish their undergraduate level. Education level will affect the way of thinking of the community. Most of the women in this area have low education level and limited access to the information. Therefore, it affects the type of involvement of the women to the resource management program.

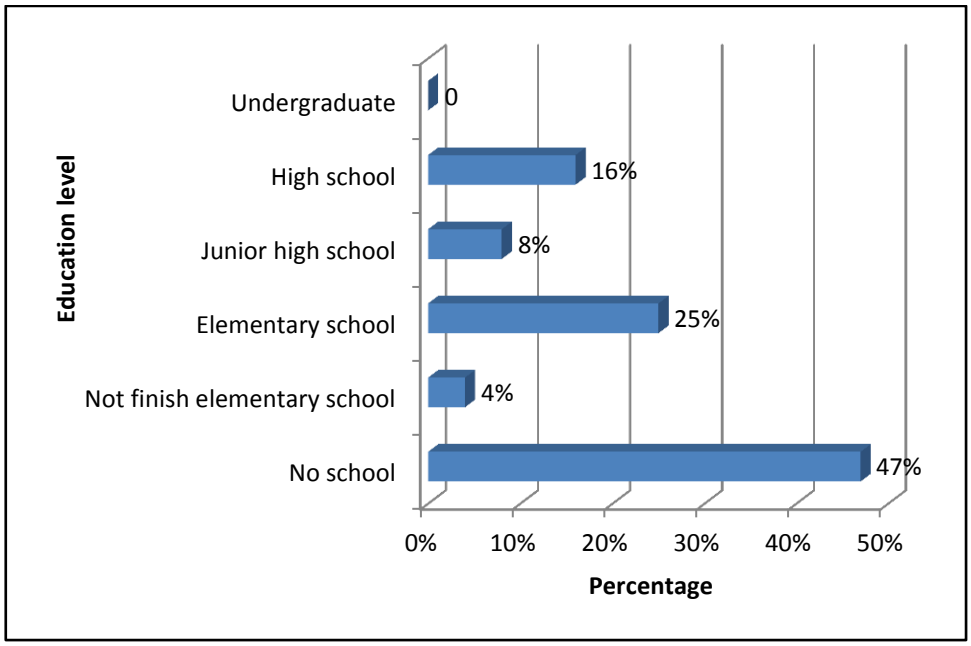

Figure 2: Education characteristics of the households

3.2 Women's Involvement in Forest Resource Management

Women's participation in forest resource management varies from planting to harvesting the forest product. The research result explained that 60% of the respondents who participate in PHBM program were men, while 40% of them were women. This reflects the dominance of men in forest resources management in Gondoriyo village, Central Java. Similar finding were reported by Adeoti et al. (2012) in which in Accra, the southern part of Ghana, 92% of market-oriented vegetable producers were male and 8% were females. From 40% of the women who actively participate in the forest resource management through PHBM program, as much as 30% of them participated along with her husband and 10% are single participant. Head of the family who has a job as a farmer is often trying to find additional income by working as a laborer on other people's land. Therefore, after planting on their land is completed, the remaining work will be done by the wife. Woman who participated along with her husband will share the work with her husband. Heavier work, such as land preparation, will be done by the husband and lighter work will be completed by the wife, such as planting and harvesting. For single participant, heavy works were hired and the rest will be done by the women themselves. This condition also confirmed by Mulyoutami et al. (2012) in which in South and Southeast Sulawesi, the involvement of women in farming system activities was mainly in post-harvesting and marketing, while other activities such as land preparation, planting and crop care were dominated by men.

Most of the women participate in planting the food crops, cleaning the grass and other plants that interferes the main plants (weeding), collecting fodder, and also gathering and handling non timber forest product. Therefore, women are considered to be key players in the land cultivation. As Enete and Amusa (2010) *in* Balogun et al. stated that women becomes key

players in the agricultural sector of most developing countries of the world. Women involved in a range of productive activities that is crucial to household welfare, agricultural productivity and economic growth. Umaerus (2013) mentioned that in Swedish Farmers, both male and female of family farm forestry have the main task in traditional forestry, however, the intensity of woman engagement more often than men in service-oriented business activities. Figure 3 shows the engagement of woman in forest resource management and accessing the forest of Perhutani in Gondoriyo village.

In the research location, rarely women attend the meetings and speak up in public. Women also have no influence over many important decisions related to forest resource management. When perhutani held a meeting with the community, most of the participant was men. The women only try to find out about the results of the meeting to the men who attend the meeting. The women assumed that they were not invited to attend the meeting because as usual, only men were present at the meeting. In addition, women have never been involved in training activities related to the forest resources management. These gender inequalities also happened in rural communities of Akwa Ibom State, Nigeria, in which women have limited access to the resources, credit facilities, extension services, education, information, technology, decision-making and socio-cultural practices. The main responsibilities of the women were supplying water and fuel wood for cooking, as well as providing food for family (Ekpo and Agu, 2014).

Figure 3: Woman participation in gathering and handling non timber forest products and also collecting fodder.

Since women have a major role in forest resources management in Gondoriyo village, their participation should be improved. Women's participation can be improved by inviting women to attend the meeting, express their opinion, and decide something that is related to better forest management. Policy and management of Perhutani, local government, and also Ministry of Environment and Forestry should address the women's role to include the interests and needs as well as environmental impacts of their existence. Therefore, Perhutani should also provide an opportunity for women to engage in training activities related to the management of forest resources. According to Rad et al. (2012), when women's education level increased, the income-earning skills of the women also increased. Women's participation in decision-making processes should also increase because women who participated in PHBM program more intense in accessing the fields.

4. CONCLUSION

The research result shows that women involved in a range of productive activities in the land that is crucial to household welfare. Based on field observation, 40% of the women actively participate in the forest resource management. As much as 30% of them participated along with her husband and 10% are single participant. Most of the women participate in planting the food crops, cleaning the grass and other plants that interferes the main plants (weeding), collecting fodder, and also gathering and handling non timber forest product. Rarely, women attend the meetings and speak up in public. Women also have no influence over many important decisions related to forest resource management, even though in many cases women access to the forest is more intensive than men. Women participation can be improved by inviting women to attend the meeting, express their opinion, and decide something that is related to better forest management. Perhutani should also provide an opportunity for women to engage in training activities and decision-making processes.

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PAPER A18 - Current Situation of Land Grab in State Forest Area (*Kawasan Hutan*) in Indonesia

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ABSTRACT

Large-scale land deals, investments, and acquisitions, known as 'land grabs', are rapidly increasing. The positive aspect is that they can serve as opportunities for development. Conversely, there are concerns that privatisation and accumulation of land devastate small-scale farming and rural livelihoods. The recent land grab is characterised as taking the form of long-term concessions or leases. This study investigates the current situation around land grabs in the state forest area (*kawasan hutan*) through analysis of forest and wood products utilisation licences (IUPHHK). The most licensed areas were designated for logging natural forests (HA) and establishing industrial tree plantations (HTI). There was a tendency for HA licences to decrease, whereas HTI licences increased. While foreign capital can enter HTI business through investment in Indonesian private companies, there are also concerns that transnational and intra-national capital flows are less than optimal for land tenure and land-based production systems. The licences for holdings of less than 100000 hectares represented a large percentage of HA and HTI licences. However, few companies have been holding large-scale forest lands, and some have been holding plural licences as a group. 112 licences and approximately 0.7 million ha were allocated for community plantation (HTR) between 2008 and 2012. The number of HTR licences exceeded HTI ones (87 licences). However, the area was only about 16% of the total allocated area. Equitable and optimal allocation of state forest area for production, conservation, and livelihood among government, companies, and local communities remains a big challenge for forest policy in Indonesia.

Keywords: land grab, state forest area (*kawasan hutan*), forest and wood products utilisation licence (IUPHHK), logging natural forest (HA), industrial tree plantation (HTI), agrarian reform, equitable and optimal allocation

1. INTRODUCTION

About 80% of world's forests are under public ownership (FAO, 2010). However, whereas forests administered by governments have decreased, forests designated to be used by local communities and indigenous people and/or owned by local communities, indigenous people, individuals, and firms have been increasing (Sunderlin *et al.*, 2008; ITTO, 2011). At the same time, large-scale land deals, investments, and acquisitions, known as 'land grabs', are also rapidly increasing (GRAIN, 2008; Anseew *et al.*, 2012; White *et al.*, 2012). The land grab is not a new phenomenon. For example, enclosure in Britain, dispossession of native people in North America and Australia, and occupation by colonial governments in many regions of the Global South, are given as examples of historical land grabs (White *et al.*, 2012). As against historical land grabs, current land grabs are characterised as large-scale deals, investments, acquisitions of land and resources, and/or land-related rights by corporate entities (e.g., businesses, non-profits or public companies), which are in the form of long-term concessions or leases rather than outright purchases (White *et al.*, 2012).

Many studies and reports (e.g., GRAIN, 2008; von Braun and Meinzen-Dick, 2009; Anseew *et al.*, 2012) pointed out that the current land grab trend was triggered by the food crisis between 2008 and 2009. In addition to the food crisis, some scholars pointed out that speculative investments in new market opportunities for food crops, industrial cash crops, and bio-energy production, as well as Reducing Emissions from Deforestation and Forest Degradation and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD+) through the advent of energy, food, and climate crises have also triggered recent land grabs (Deininger, 2011; De Schutter, 2011; McCarthy *et al.*, 2012). White *et al.* (2012) marshalled six trends, which promote various mechanisms of land accumulation through land investments: (1) global anticipation of food insecurity; (2) new forms of resource extraction for fuel security; (3) new environmental imperatives and tools; (4) extensive infrastructure corridors and Special Economic Zones; (5) creation of new financial instruments; and (6) rules, regulations, and incentives provided by the international community.

Some governments and international organisations take a positive view that current land grabs can be harnessed as opportunities for development, and problems caused by land grabs can be subject to regulation (White *et al.*, 2012). By contrast, there are strong concerns about negative impacts of land grabs, for example: (1) land grabs deprive indigenous people and local communities of their rights to land and resources (von Braun and Meinzen-Dick, 2009; Anseew *et al.*, 2012); (2) transnational and intra-national capital flows are less than optimal for land tenure and land-based production systems (Anseew *et al.*, 2012); (3) privatisation and accumulation of lands devastate small-scale farming and rural livelihoods (GRAIN, 2008); and (4) extensive conversion depletes ecosystem services and biodiversity in forests, grass lands, and marshlands (Anseew *et al.*, 2012).

Hall (2011) pointed out that land grabs in Southeast Asia are characterised as crop booms directed at export-oriented crop production rather than domestic demand (e.g., cocoa, fast-growing trees such as acacia and eucalyptus, palm oil, rubber, and farmed shrimp). McCarthy *et al.* (2012) reported on enclosure and acquisition of lands for rice, oil palm, and jatropha cultivation, as well as REDD+ in the Outer Islands in Indonesia. Obidzinski *et al.* (2013) discussed the impact of large-scale land acquisition through case study analysis of Merauke Integrated Food and Energy Estate in Papua province in Indonesia.

Indonesia is the largest country in Southeast Asia with extravagant and new market opportunities of food crops, industrial cash crops, bio-energy production, and REDD+ (McCarthy *et al.*, 2012). According to Land Matrix (2014), Indonesia is the world's second-largest target country for international land deals. Those investments come from Thailand, Singapore, Malaysia, Sri Lanka, India, Hong Kong, China, British Virgin Islands, the United States, France, Belgium, and the United Kingdom, mainly for food crops, biofuels, and non-food agricultural commodities. The total area in which those countries have invested is about four million ha. Thus, Indonesia can be described as one of the more active countries for land grabs.

With the rapid increase in land grabs after 2008, many related studies have been published. Moreover, land grabs have been spotlighted as they influence implementation of REDD+ (Pacheco *et al.*, 2012). However, while many earlier studies focused on cases of land grabs in agricultural lands such as foods, industrial cash crops, and bio-energy production, few focused on land grabs in forest lands. On the other hand, about 70% of Indonesia's national territory (approximately 130 million ha) is State Forest Area (*Kawasan Hutan*) (Kementerian Kehutanan, 2012a). Companies are carrying out logging in natural forests and/or establishing industrial tree plantations based on the Forest and Wood Products Utilisation Licence (IUPHHK: *Izin Usaha Pemanfaatan Hasil Hutan Kayu*).Therefore, a focus on the state forest area, to clarify the holding situation of IUPHHK, leads to further interpretation of the current situation around land grabs in Indonesia. The objective of this study is to clarify the current situation around land grabs in the state forest area in Indonesia.

2. METHODS

This study analysed the current situation around land grabs in the state forest area through analysis of statistics and related law on IUPHHK. Statistics on 'Forest Utilisation Data and Information' (*Data dan Informasi Pemanfaatan Hutan*) (Kementerian Kehutanan, 2012b) published by the Ministry of Forestry provide much detailed data on IUPHHK. Thus, these statistics provide informative material to understand the current situation around land grabs in Indonesia. In addition to statistics on Forest Utilisation Data and Information, this study employed 'Indonesia Forestry Statistics' (*Statistik Kehutanan Indonesia*) (Kementerian Kehutanan, 2012a) and 'Progress Report on Production Forest Use and Utilisation' (*Laporan Perkembangan Pemanfaatan dan Penggunaan Hutan Produksi*) (Kementerian Kehutanan, 2010).

3. RESULTS

3.1 Overview of State Forest Area and Forest and Wood Products Utilisation Licence

In Indonesia, all forests were placed under the control of government by the Basic Forestry Law (Law No. 5 in 1967) (Resosudarmo, 2004; Wollenberg *et al.*, 2009). Forest zoning in the early 1980s caused many land conflicts because these forest policies incorporated a large part of the Outer Islands into the state forest area and overrode the customary rights of local people despite the fact that many people lived in those areas (Fay and Sirait, 2002). Furthermore, those forest enclosures involved violence and enabled government and companies to accumulate huge profits under the Suharto regime (Peluso, 2011). Currently, about 70% of the national territory of Indonesia is 'State Forest Area' (*Kawasan Hutan*), which is a specific territory designated by the government as permanent forests (Article 1, Law No. 41 in 1999 about Forestry). Therefore, Peluso (2011) called the state forest area a 'political forest'.

The state forest area is classified into three categories: (1) Conservation Forest (*Hutan Konservasi*), (2) Protected Forest (*Hutan Lindung*), and (3) Production Forest (*Hutan Produksi*). The production forest is further classified into three categories: (1) Limited Production Forest (*Hutan Produksi Terbatas*), (2) Permanent Production Forest (*Hutan Produksi Tetap*), and (3) Convertible Production Forest (*Hutan Produksi Yang Dapat Dikonversi*). Although the state forest area is under the jurisdiction of the Ministry of Forestry, some management rights in a part of production forests and protected forests are granted to state forest companies (Perhutani in Java and Inhutani in Outer Islands).

Firstly, in terms of classification by function, conservation forest is 16.2% (approximately 21 million ha), protected forest is 24.5% (approximately 32 million ha), and production forest is 59.3% (approximately 78 million ha) of total forest area. More than half of the state forest area is designated for production forest. Secondly, in terms of classification by region, about 30% of state forest area is located in Papua region (particularly in Papua province). Collectively, Papua region, Kalimantan region (particularly East Kalimantan, Central Kalimantan, and West Kalimantan province) (29.0%), and Sumatera region (particularly Riau and South Sumatera province) (26.1%) account for about 80% of total state forest area. A lot of convertible production forests, which can be converted to other land use such as palm oil plantation, are located in Papua province (about 9.3 million ha) and Riau province (about 4.8 million ha). The percentage of state forest area occupied by provincial area is very different in each region. Whereas, in Papua and Maluku regions, more than 90% of provincial areas are state forests, the percentage is low in the Bali and Nusa Tenggara regions (39.0%) and Java region (23.5%).

There are six types of IUPHHK: (1) Logging Natural Forests (HA: *Hutan Alam*), (2) Industrial Tree Plantation (HTI: *Hutan Tanaman Industri*), (3) Ecosystem Restoration (RE: *Restorasi Ekosistem*), (4) Community Plantation (HTR: *Hutan Tanaman Rakyat*), (5) Community Forestry (HKm: *Hutan Kemasyarakatan*), (6) Village Forest (HD: *Hutan Desa*). Basically, IUPHHK are issued to production forests, whereas IUPHHK of HKm and HD are issued as both belong to protected forests. Table 1 shows the grant situation of IUPHHK based on classification by types and regions. As of November 2012, 736 IUPHHK licences (approximately 35 million ha) were issued, of which: (1) 296 were HA licences (approximately 24 million ha); (2) 234 were HTI licences (approximately 98 million ha); (3) five were RE licences (approximately 0.2 million ha); (4) 112 were HTR licences (approximately 0.7 million ha); (5) 50 were HKm licences (approximately 0.19 million ha); and (6) 40 were HD licences (approximately 80 thousand ha). By category of licences, HA was 40.2% (296 licences); HTI was 31.8% (234 licences); and HTR was 15.2% (112 licences). In contrast, by area, HA licences were 68.6% (approximately 24 million ha) and HTI licences were 28.0% (approximately 10 million ha). Thus, HA and HTI licences collectively accounted for 96.6% of the total IUPHHK area. Therefore, it was found that almost all IUPHHK areas were designated for HA and HTI licences.

In terms of a regional breakdown, many HA licences were issued in Kalimantan region (46.7%) and Papua region (36.8%). The area of HA licences in East Kalimantan (23.7%), Papua (21.5%), Central Kalimantan (16.7%), and West Papua (15.3%) regions collectively accounted for about 80% of the total HA licence area. HTI was actively practised in Kalimantan and Sumatera region. Collectively, East Kalimantan (17.9%), West Kalimantan (17.7%), Riau and Riau Islands (16.7%), and South Sumatera (13.7%) provinces accounted for about 70% of the total area in which HTI licences were issued. Therefore, it was found that the area of HA and HTI licences was concentrated in some regions.

Table 1: Grant situation of IUPHHK based on classification by types and regions

(ha, %)

Types of IUPHHK	HA		HTI		RE		HTR		HKm		HD		Total	
	No. of License	Area	No. of License	Area	No. of License	Area	No. of License	Area	No. of License	Area	No. of License	Area	No. of License	Area
Java [1]	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	328 (0.0)	2 (4.0)	1284 (0.7)	0 (0.0)	0 (0.0)	3 (0.4)	1612 (0.0)
Sumatera [2]	28 (9.5)	1,331,150 (5.5)	110 (47.0)	4,513,320 (46.1)	3 (60.0)	118,820 (54.2)	44 (39.3)	314,205 (44.8)	14 (28.0)	54,997 (29.4)	28 (70.0)	63,961 (76.7)	225 (30.6)	6,396,453 (18.3)
Bali and Nusa Tenggara [3]	0 (0.0)	0 (0.0)	3 (1.3)	68,590 (0.7)	0 (0.0)	0 (0.0)	8 (7.1)	21,488 (3.1)	18 (36.0)	33,856 (18.1)	1 (2.5)	3,041 (3.6)	30 (4.1)	126,975 (0.4)
Kalimantan [4]	172 (58.1)	11,222,548 (46.7)	105 (44.9)	4,515,039 (46.1)	2 (40.0)	100,530 (45.8)	12 (10.7)	84,480 (12.1)	4 (8.0)	83,455 (44.6)	7 (17.5)	15,205 (18.2)	302 (41.0)	16,021,257 (45.8)
Sulawesi [5]	21 (7.1)	1,158,420 (4.8)	6 (2.6)	120,720 (1.2)	0 (0.0)	0 (0.0)	41 (36.6)	226,860 (32.4)	12 (24.0)	13,340 (7.1)	4 (10.0)	1,194 (1.4)	84 (11.4)	1,520,534 (4.3)
Maluku [6]	26 (8.8)	1,485,945 (6.2)	7 (3.0)	131,658 (1.3)	0 (0.0)	0 (0.0)	4 (3.6)	24,120 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	37 (5.0)	1,641,723 (4.7)
Papua [7]	49 (16.6)	8,840,393 (36.8)	3 (1.3)	440,250 (4.5)	0 (0.0)	0 (0.0)	2 (1.8)	29,350 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	54 (7.3)	9,309,993 (26.6)
Indonesia	296 (100.0)	24,038,456 (100.0)	234 (100.0)	9,789,577 (100.0)	5 (100.0)	219,350 (100.0)	112 (100.0)	700,831 (100.0)	50 (100.0)	186,931 (100.0)	40 (100.0)	83,401 (100.0)	736 (100.0)	35,018,546 (100.0)
Percentage in Total	40.2	68.6	31.8	28.0	0.7	0.6	15.2	2.0	6.8	0.5	5.4	0.2	100.0	100.0

[1] Yogyakarta
[2] Aceh, North Sumatera, West Sumatera, Riau, Riau Islands, Jambi, South Sumatera, Bengkulu, Lampung, Bangka Belitung
[3] Bali, West Nusa Tenggara, East Nusa Tenggara
[4] West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan
[5] North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi
[6] Maluku, North Maluku
[7] West Papua, Papua

Source: Kementerian Kehutanan (2012b)

Whereas the average area per licence was about 65 thousand ha in Kalimantan region, the average area was 180 thousand ha in Papua region. Thus, there was a significant difference between the regions. In terms of other IUPHHK licences, many RE licences were issued in Sumatera region (60.0%) and Kalimantan region (40.0%); many HTR licences were issued in Sumatera region (39.3%) and Sulawesi region (36.6%); many HKm licences were issued in Bali and Nusa Tenggara region (36.0%); many HD licences were issued in Sumatera region (70.0%). Therefore, different grant situations of IUPHHK among regions were apparent.

3.2.2 Grant Situation of Wood Products Utilisation Licence

As mentioned earlier, as of November 2012, almost all IUPHHK areas were designated for HA (67.1%) or HTI (27.5%). For IUPHHK licences under review, however, the respective percentages of HA (26.4%) and HTI (56.5%) areas were the reverse of the percentages for issued HA and HTI licences (Figure 1). As of 1993, whereas there were 575 HA licences (approximately 62 million ha), HTI licences numbered only two (approximately 0.1 million ha). However, HA licences have decreased to 292 licences (approximately 23 million ha) by 2011. By contrast, HTI licences have increased to 249 licences (approximately 10 million ha) by 2011 (Figure 2). Unlike with HA licences, foreign capital can enter HTI businesses through investment in Indonesian private companies (Forestry Minister Regulation No. 50 in 2010, Article 3, Section 3).

The Ministry of Forestry set a goal of establishing 2.65 million ha tree plantations by HTI and HTR in a Five-Year Strategic Plan (Forestry Minister Regulation No.51 in 2010). One hundred ninety-nine licences were issued for establishing tree plantations (i.e., sum of HTI and HTR) between 2008 and 2012, of which 112 licences (approximately 0.7 million ha) were allocated to HTR. The number of HTR licences (112) exceeded HTI ones (87). However, HTR licences accounted for only about 16% (0.7 million) of the total allocated area for tree plantations (4.3 million ha). Therefore, it was found that many state forest areas for tree plantations were still allocated to HTI licences (Figure 3).

3.2.3 Transition of IUPHHK area

As of November 2012, there were 296 HA licences (approximately 24 million ha) and 234 HTI licences (approximately 979 thousand ha). Figure 4 shows the holding situation of HA and HTI licences based on classification by area. Seventy-nine percent of HA licences (234 licences) and 89.8% of HTI licences (210 licences) were for areas of less than one hundred thousand ha, but only 7.1% of HA licences (21 licences) and 3.8% of HTI licences (nine licences) were for areas of more than two hundred thousand ha. However, 7.1% of HA licence holders for areas of more than two hundred thousand ha held 26.9% of the total area (about 6.5 million ha). Similarly, 3.8% of HTI licence holders held 25.2% of the total area (about 2.5 million ha). Therefore, it was found that few companies held large-scale forest land.

Figure 5 shows the grant situation of HA and HTI licences before and after the Suharto regime. Most current IUPHHK licences (84.5% of HA licences and 73.5% of HTI licences) were issued in the post-Suharto regime. The earliest HA licence was granted to PT. Karya Jaya Parakawan in East Kalimantan province in 1989, and the earliest HTI licence was granted to PT. Inhutani III Nangapinoh in West Kalimantan province in 1986. In terms of the grant situation of HTI licences based on classification by area, there were no significant changes in the area per licence before and after the Suharto regime. Most HTI licences belonged to holders of licences for areas of less than fifty thousand ha. By contrast, HA licences for areas of more than one hundred thousand ha accounted for approximately half of total HA licences, and HA licences for areas of more than three hundred thousand ha also accounted for 15.2%

in the Suharto regime. However, HA licences for areas of more than one hundred thousand ha have significantly decreased (from 47.8% to 16.0%), and 84% of HA licences belong to the category of one hundred thousand ha areas in the post-Suharto regime, representing a significant change from before the Suharto regime.

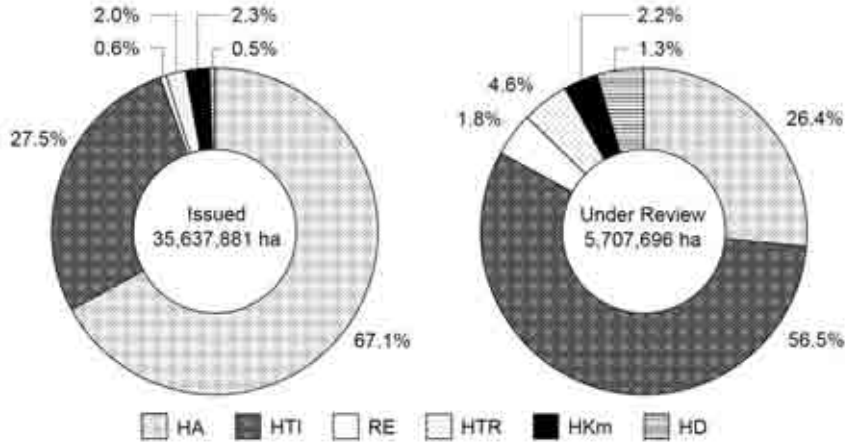

Figure 1: Percentage of IUPHHK area (Source: Kementerian Kehutanan (2012b))

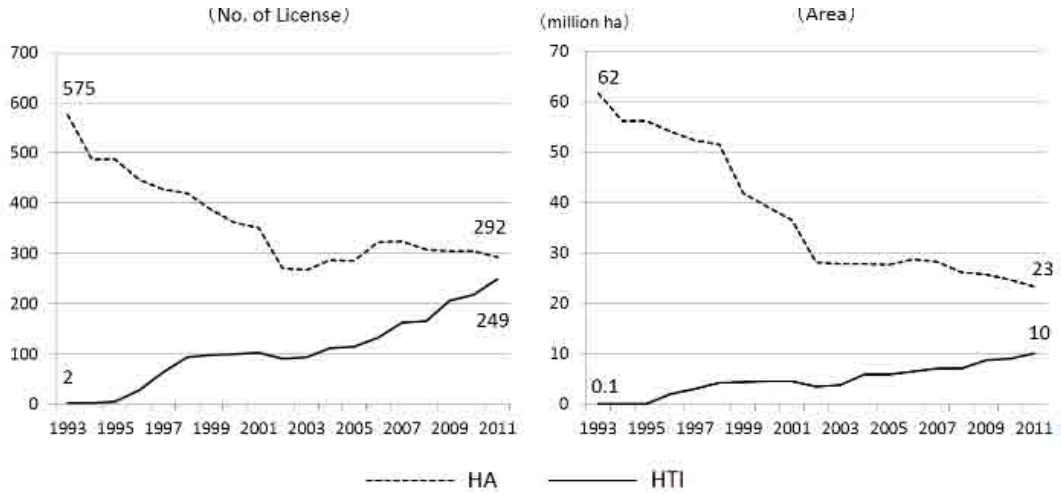

Figure 2: Transition of HA and HTI licences (Source: Kementerian Kehutanan (2012a))

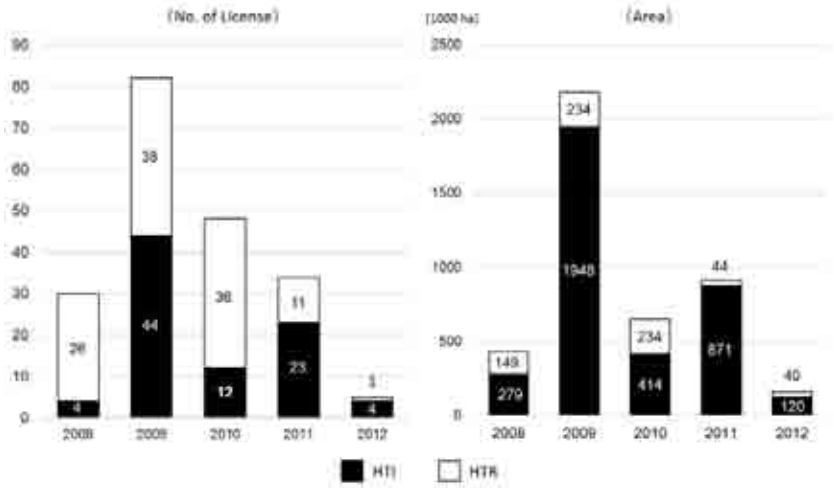

Figure 3: Trend of grant of HTI and HTR licences between 2008 and 2012 (Source: Kementarian Kehutanan (2012b))

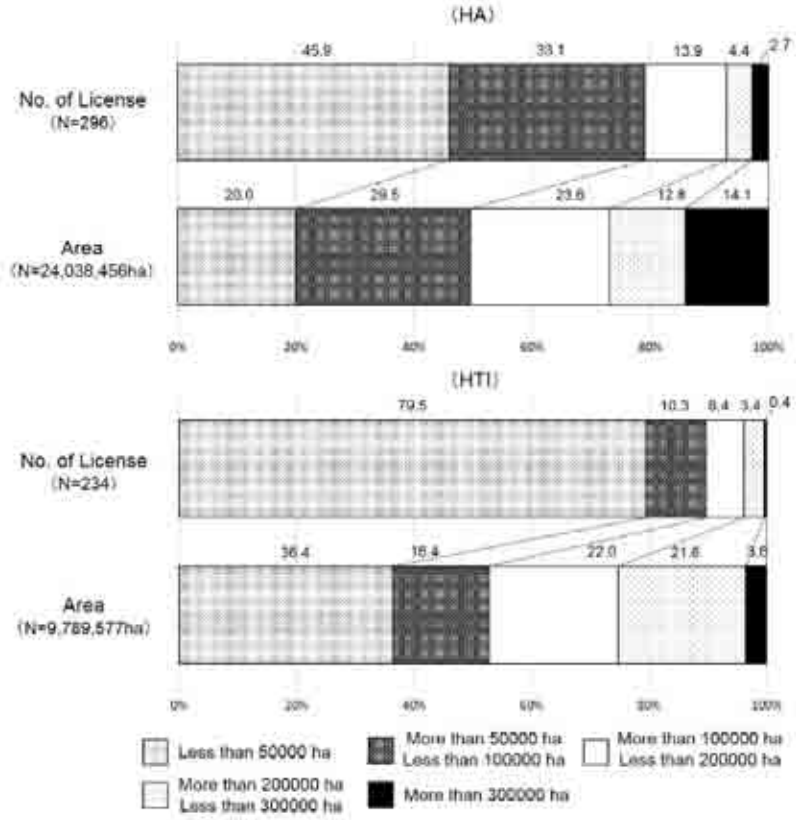

Figure 4: Holding situation of HA and HTI licences based on classification by area (Source: Kementerian Kehutanan (2012b))

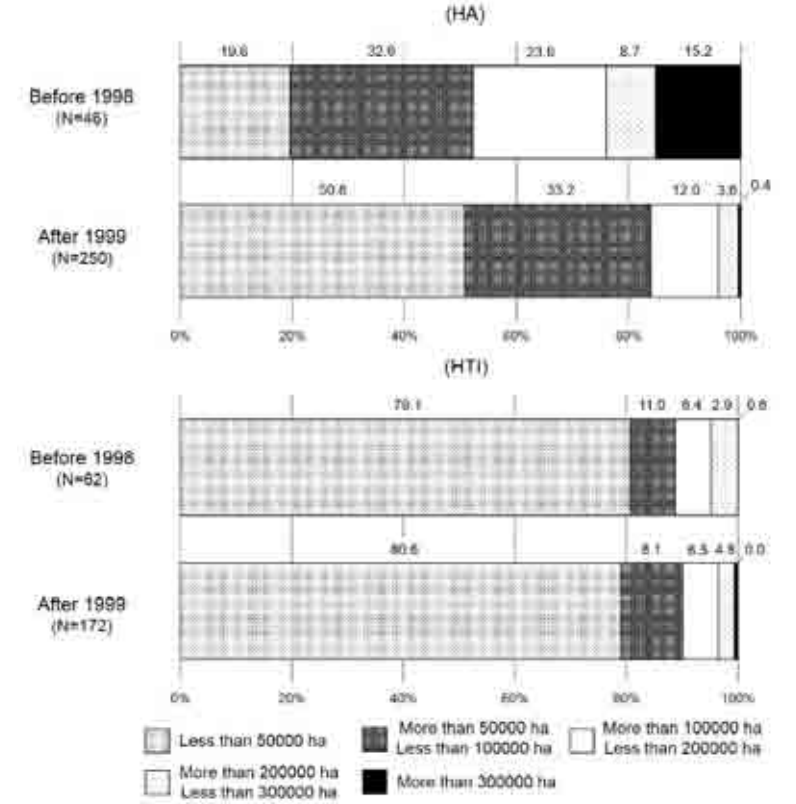

Figure 5: Grant situation of HA and HTI licences before and after the Suharto regime (Source: Kementerian Kehutanan (2012b))

Table 2: Ten largest HA and HTI licence holders (as November 2012)

(ha)

Rank	Name of Company	Province	Year	Area
	HA			
1	PT. Membramo Alas Mandiri	Papua	1999	677,310
2	PT. Bade Makmur Orissa	Papua	1993	462,600
3	PT. Hanurata Coy Ltd Unit I, II dan III	West Papua	1994	417,570
4	PT. WAPOGA. III	West Papua	1997	407,350
5	PT. Wapoga Mutiara Timber Unit III	Papua	1997	407,350
6	PT. Essam Timber	East Kalimantan	1992	355,800
7	PT. Digul Dayasakti	Papua	1997	347,000
8	PT. Damai Setiatama Tbr	Papua	1991	305,000
9	PT. Bina Balantak Raya Utama	Papua	2011	298,710
10	PT. Bangun Kayu Irian	West Papua	2012	282,620
	Total			3,961,310
	HTI			
1	PT.Riau Andalan Pulp and Paper	Riau	2009	350,165
2	PT. Arara Abadi	Riau	1996	299,975
3	PT. Finnantara Intiga	West Kalimantan	1996	299,700
4	PT. Musi Hutan Persada	South Sumatera	1996	296,400
5	PT. Wirakarya Sakti	Jambi	2004	293,812
6	PT. Hutan Rindang Banua	South Kalimantan	2006	268,585
7	PT. Bumi Mekar Hijau	South Sumatera	2004	250,370
8	PT. Merauke Rayon Jaya	Papua	2008	206,800
9	PT. Adindo Hutani Lestari	East Kalimantan	2003	201,821
10	PT. Bumi Andalas Permai	South Sumatera	2004	192,700
	Total			2,660,328

Source: Kementerian Kehutanan (2012b)

Table 3: Holding situation of HA and HTI licences by company group (as of December 2010)

(ha, %)

Company Group	No. of License	Percentage in Total	Area	Percentage in Total
	HA			
Kayu Lapis Indonesia	7	2.3	1,445,300	5.9
Alas Kusuma	10	3.3	1,157,700	4.7
Barito Pacific	12	3.9	1,036,032	4.2
Jati	4	1.3	965,410	3.9
Korindo	4	1.3	951,120	3.9
Sumalindo Lestari Jaya	4	1.3	515,000	2.1
Hanurata	2	0.7	339,600	1.4
Dwima	4	1.3	290,031	1.2
Kayu Mas	3	1.0	269,915	1.1
Mujur	2	0.7	97,110	0.4
Total	52	17.1	7,067,218	28.6
	HTI			
Sinar Mas Forestry	35	16.1	2,309,511	25.7
Riau Andalan Pulp and Paper	28	12.8	1,192,387	13.3
Total	63	28.9	3,501,898	39.0

Source: Kementerian Kehutanan (2010), Kementerian Kehutanan (2012a)

Table 2 shows the 10 largest HA and HTI licence holders. PT. Membramo Alas Mandiri in Papua province was the largest HA licence holder with 680000 ha, while other large HA licence holders also operated in the Papua region. Turning to the year when those licences were issued, seven HA licence held by the large holders were granted in end of the Suharto regime between 1991 and 1997. PT. Riau Andalan Pulp & Paper in Riau province was the largest holder of HTI licences with about 350 thousand ha. More than half of other large HTI licence holders also operated in the Sumatera region. Seven HTI licences were issued after 2000. As with PT. Musi Hutan Persada, which is the fourth-largest HTI licence holder, some

HTI companies are held by foreign capital. Furthermore, some companies have held plural licences as a group. For example, PT. Arara Abadi, PT. Finnantara Intiga, and PT. Wirakarya Sakti, which are large HTI licence holders, all belong to Sinar Mas Forestry group. Table 3 shows which company groups hold HA and HTI licences. As of December 2010, Sinar Mas Forestry group accumulated about 2.3 million ha (35 licences) of HTI area; subsequently Riau Andalan Pulp & Paper group accumulated about 1.2 million ha (28 licences). Kayu Lapis Indonesia group accumulated 1.45 million ha (7 licences) of HA area; subsequently Alas Kusuma group accumulated 1.16 million ha (10 licences). According to the Indonesia Forestry Statistics (Kementerian Kehutanan, 2012a), as of 2010, there were 304 HA licences (approximately 24.69 million ha) and 218 HTI licences (approximately 8.98 million ha). Based on this data, as of 2010, 28.6% of total HA area (about 7.06 ha) was accumulated by 10 company groups, and 39.0% of total HTI area (3.5 million ha) was accumulated by only two company groups (i.e., Sinar Mas Forestry group and Riau Andalan Pulp & Paper group). It was also apparent that accumulation of forest land by company group progressed more in HTI areas than in HA areas.

4. DISCUSSION

Almost all IUPHHK licences were granted in the Outer Islands, and those areas were mainly designated for HA and HTI. The HA areas in Kalimantan region (particularly in East Kalimantan province) and Papua region (particularly in Papua and West Papua province) collectively accounted for 80% of the total HA area. Meanwhile, the four provinces of East Kalimantan, West Kalimantan, Riau, and South Sumatera collectively accounted for 70% of the total HTI area. The reason why the licences in Papua (HA), Kalimantan (HA and HTI) and Sumatera (HTI) region are issued differently is because the progress of forest transition of each region are different. Papua region has undistributed forest, Kalimantan region has forest frontiers and Sumatra region has forest and agriculture mosaics (see Kanninen *et al.*, 2008).

Currently, although HA licences account for 70% of the total IUPHHK area, those HA licences are on a declining trend. By contrast, HTI licences are increasing. It is expected that this trend will continue and that Indonesian forestry structure will convert from harvesting forestry in natural forests to plantation forestry with artificial reforestation. Unlike with HA licences, foreign capital can enter the HTI business through investment in Indonesian private companies (Forestry Minister Regulation No.50 in 2010, Article 3, Section 3). Thus, it is also assumed that entry of foreign capital into state forest areas will further increase. On the other hand, there are also concerns that those transnational capital flows lead to less than optimal land tenure and land-based production systems. Therefore, it is important that the Ministry of Forestry establish new regulations to prevent the bad impacts of transnational capital flows on land tenure and land-based production systems. Many convertible production forests are located in Papua province and Riau province. Therefore, it is expected that agriculture, forestry (HA and HTI), bio-energy production, and REDD+ will compete with each other for land use and that land grabs will continue in Papua province and Riau province.

Classified by area, most HA and HTI licences were for holdings of less than one hundred thousand ha; the licences for more than two hundred thousand ha represented fewer than 10% of holdings. However, it was found that few companies were holding large-scale forest land. Furthermore, there was no significant change in the area granted per HTI licence before and after the Suharto regime. However, HA licences for holdings of more than one hundred thousand ha that were issued under the Suharto regime have significantly decreased, and the licences for holdings of less than one hundred thousand ha have become a majority. Therefore, it is assumed that political regulation has applied to issuance of large-scale HA

licences. On the other hand, some companies have been holding plural licences as a group. As of 2010, 28.6% of total HA area licences were accumulated by 10 company groups, and 39.0% of total HTI area licences were accumulated by only two company groups. The accumulation of forest land by company group progressed more in HTI than in HA holdings. HTI licences tended to see greater accumulation by company group than HA licences because HTI companies own capital-intensive pulp and paper mills in their company groups. It is assumed that securing stable supply of raw materials to mills is one of the factors why HTI companies acquire forest land.

5. CONCLUSION

This study focused on IUPHHK, clarified the holding situation of HA and HTI licences through analysis of statistics and related law, and discussed the current situation of land grabs in the state forest area in Indonesia. Almost all IUPHHK areas were designated for HA and HTI. Moreover, the Ministry of Forestry set a goal of establishing 2.65 million ha tree plantations by HTI and HTR in the Five-Year Strategic Plan, but most state forest areas designated for tree plantation were still allocated to HTI. After the Suharto regime, as parliamentary resolutions on reformation of land and natural resource management (parliamentary resolution No. 9 in 2001) were adopted, there was active discussion of agrarian reform, which could not be realised by the Basic Agrarian Law (Law No. 5 in 1960) (Lucas and Warren, 2003; Peluso *et al.*, 2008). However, the reality is: (1) about 70% of Indonesian land is owned by the government as state forest area; (2) almost all IUPHHK areas are designated for HA and HTI; and (3) many HA and HTI areas are held by few companies and further acquired by company groups. IUPHHK areas for HTR, HKm, and HD licences, which are mainly designated for use by local people and communities, are only 2.7% of the total IUPHHK area. What percentage of the state forest area should be allocated for production, conservation, and livelihood? Who has responsibility for production and conservation? Equitable and optimal allocation of state forest areas for production, conservation, and livelihood among governments, companies, and local communities remains a big challenge for forest policy in Indonesia.

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NOTE

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PAPER A19 - Reinforcing agroforestry to meet the need for timber, fruits and food into HTR scheme-based on land suitability and necessary policy: A case study in Riau

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ABSTRACT

Some weakness of agroforestry practices in Riau Province consist of: 1) the patterns of species mixing were not based on the characteristics of soil, climate and physiography;2) limited access of community to get land for planting;3) lack of policy supporting. Those weakness cause in low agroforestry production. Reinforcing those weakness to optimize the production in order to meet the need for timber, fruits and food in agroforestry model in mixed plantation forest can be preceded by analyzing the land suitability classes (LSC) of the site to be developed. This LSC analyzed by Simple Limitation Method for seven species. The results showed that the actual LSC in Bintan for *Swietenia mahogany* (SM), *Artocarpus integra* (AI), *Nephelium lappaceum* (NL), *Areca catechu* (AC), *Musa sp* (M)., *Zea mays* (ZM) and *Capsicum sp* (C) are belong to: S_{2w} (moderate suitable); $S_{2c,f,w,lp}$ (moderate suitable); $S_{2f,w,lp}$ (moderate suitable); S_{2f} (moderate suitable); S_{3f} (marginal suitable); S_{3cf} (marginal suitable) and S_{3cf} (marginal suitable) respectively. In Kuok, those species are belong to: S_{3wf} (marginal suitable); $S_{2c,f,w}$ (moderate suitable); $S_{2f,w}$ (moderate suitable); $S_{2f,w/flood}$ (moderate suitable); S_{3f} (marginal suitable) ; S_{3cf} (marginal suitable) and S_{3cf} (marginal suitable) respectively. The actual LSC in Bintan can be increased to potential LSC for SM from S_{2w} (moderate suitable) to S_1 (suitable) by drainage improvement (DI), for AI from S_{2f} (moderate suitable) to S_1 (suitable) by liming(L) and for M from S_{3f} (marginal suitable) to S_1 (suitable) by L. Meanwhile, the actual LSC in Kuok can be increased to potential LSC for SM from $S_{3w\ f}$ (marginal suitable), to S_1 (suitable) by DI and L; for NL from $S_{2f,w}$ (moderate suitable) to S_1 (suitable) by DI and L; for AC from $S_{2f,w/flood}$ (moderate suitable) to S_1 (suitable) by DI and L and for M from S_{3f} (marginal suitable) to S_1 (suitable) by L. The optimum species combination in Bintan is a mixing of SM, AC and M, meanwhile in Kuok is a mixing of SM, AC, M and NL. Both combinations can be developed in the scheme of community plantation forest (HTR) at suitable sites with sufficient area.

Keywords: agroforestry, species mixing, suitability, drainage, liming, optimum and combination

1. INTRODUCTION

In general, agroforestry practices in Indonesia are still rely on traditional or local knowledge, therefore the production are not optimum. The patterns of species mixing only executed by conventional, not based on innovation or management of soil fertility. Improving that pattern can be started by study of land suitability classes.

This study based on analyzing physical-chemical properties of the soil, climate condition and other field conditions. Land suitability analysis can be done for different species of wood plants, agriculture plants species, food species and energy firewood species. Agroforestry

practices based on land suitability classes will give the optimum results. Besides, agroforestry ecosystem also provides services such as water and micro climate. The variations in soil type will give the difference the production of a species or a combination of several species, as well as in potential for water production.

Agroforestry development in Riau province is still limited; mostly consist of rubber with a mixture of white teak wood (*Peronema canescens*) and animals like buffalos, goats and cows. In Bintan island, agroforestry model consist of mixed of crops such as sweet orange (*Citrus sinensis*), cashew (*Anancardium occidentale*), *Acacia mangium* trees and fruit trees such as mango (*Mangifera indica*), avocado (*Persea americana*), banana (*Musa sp*) and others. Those species mixing above were based on conventional way, therefore the productivity is not maximized. To increase its productivity can be done by site- species matching. Some places in the Riau mainland and Riau islands are potential for agroforestry development, such as in Bangkinang and Bintan island. In addition to the site factor limitation, the limited area of agroforestry also because its production is not optimal. The government needs to provide the access for the settlements nearby forest to get the forest areas for agroforestry development.

This study was located in two (2) sites, namely; (1) the experimental plot of Kuok and (2) the experimental plot in Bintan. The aim of this study was to analyze the land suitability for food, fruits and horticultural species. Those species consist of corn, mahogany tree, nut, jackfruit, rambutan, banana and red pepper. The policy analysis was related to community plantation forest (HTR) that can be used for the location of agroforestry development.

2. EXPERIMENTAL METHOD

2.1 Research Site

This study was conducted in two (2) sites, firtsly in the experimental plot in Kuok, Riau mainland and secondly in Tanjung Uban experimental plot, Bintan island. Those plot belong to Environment and Forestry Research and Development and Innovation Agency.

2.1.1 The experimental plot of Kuok

The first plot situated in the village of Kuok, District Bangkinang West, Riau Province. Geographically, the area is located at latitude $0^0$19'06 "North Latitude and $100^0$57'53" East Longitude with elevation 87 meters above sea level. Distance from city Pekanbaru 70 km to the West Sumatra. The type of soil belong to Kandiudults, Dystropepts and Hapludox, association with parent material of fine and course rocks, acid, slope slightly (3-8%) and very dissected (Land Unit and Soil Map, sheet of Pekanbaru, Sumatra, scale 1: 250,000). Based on climatology data of 1992-1999 from Simpang Tiga station, Pekanbaru; total rainfall per year in district of Kampar, Riau of 2103.6 mm; 138 rainy days per year, while the maximum and minimum an average air temperature of $34,8^0$C, 20.14^0 C and $26,5^0$C respectively. The experimental plot planted with mixed species of *Shorea sp*, *Acacia mangium*, *Eucalyptus sp*, Agarwood (*Aquilaria sp.*), Mulberry, *Nephelium lappaeum* and others (Butarbutar, *et al.,* 2002).

2.1.2 The experiment plot of Bintan

This plot situated in Sei Jago water catchment area, Tanjung Uban, Bintan island, District of North Bintan. Geographically, located around $104^0$00' East Longitude-$104^0$45' East Longitude and $01^0$00'-$01^0$15 North Latitude with an area of 50 ha at an altitude of 15-50 m. The average of rainfall since 1974-1995 was 2218 mm per year. The type of soil according to Land Unit and Soil Map, sheet Tanjung Pinang scale 1: 250,000, belong to Kandiudults and Hapludox complex, with features of plains, acid plutonic rocks (granite), flat to undulating

with a slope of 0-8% and somewhat **inclusioned (tertoreh**). Profile description show patches and there some precipitation of iron (Fe_2O_3). Furthermore, this soil have many kinds of iron and manganese concretion as a result of high leaching and generally have not flooded with low fertility. Vegetation types consist of two groups of weeds dominated by (*Imperata* cylindrica) and (*Adinandra dumosa)* and group of trees were scattered like *Calophyllum retusa*, *Memecylon pseudoginescen* and *Pouteria firm*. On severals places there are secondary forest species consist of *Dyospiros bornensis* and *Hopea dryobalanoides* (Butarbutar, *et al.,* 2001).

2.2 Method

The study was conducted with the following procedure: (1) Collection of data and information about the description, analysis of physical-chemical properties of the soil of 2 (two) both site above; (2) Assessment of land suitability class by the Simple Limitation Method (Sys, *et al.,* 1992) and Ritung, *et al* (2003) for some species of mahogany (*Swietenia macrophylla*); fruit-trees such as jackfruit (*Artocarpus integra)*, rambutan (*Nephelium lappaceum*), nut (*Areca catechu*) and banana (*Musa sp*) and cash crops species of corn (*Zea mays*) and red chili (*Capsicum sp*). Four classes of assessment were used including S_1 (suitable), S_2 (moderate suitable), S_3 (marginal suitable) and N (not suitable). Each class consists of sub classes that are related to each limitation factor. Meanwhile, each sub class can be related to more than one limitation factor, but the dominant factor is placed first or in front.

3. RESULT AND DISCUSSION

3.1 Description of soil characteristics

3.1.1 The experimental plot of Kuok

Butarbutar dan Sunarto (2001) suggest that soil chemical properties on the site of *Acacia mangium* and *Eucalyptus urophylla* can improve by 3 (three) ways, as: 1) by raising the pH (4.87 to 4.91) becomes > 5.5 by adding 0.792 tons $CaCO_3$/ ha; 2) improved the balance of cations ratio of Ca: Mg: K (ratio of soil analysis 72: 19: 9 to normal ratio 76: 18: 6 performed by adding 134.4 mg CaO / kg soil; 200 mg MgO / kg soil and 9.4 mg K_2O and 3) P-availability can be increased by addition of P_2O_5 with a dose of 30 kg / ha. The results of the soil analysis from the experimental plot of Kuok are summarized in Table 1.

Generalization, fertility of soil in the study area belong to infertile, which were indicated by low pH, the present of exchangeable Al that can be toxic to plants, the exchangeable cations (Ca, K, Mg and Na) were low and low base saturation. The physical properties of soils was heavy class that characterized by clayey texture. Yet, the biological properties including relatively good soil, which is indicated by the value of the C/N is low (7.09). The species that selected for analyzing is a combination of timber, fruit trees, cash crops such as corn and red chili.

In general, for agroforestry model with mixed of trees and cash crops should begin with improved properties such as neutralizing chemical content of Al-dd with liming, regulate the balance of cations and increase the availability of phosphate. Space arrangement for this mixing species based on the micro relief condition of the site and the crop rotation pattern.

3.1.2 The experimental plot of Bintan

Butarbutar, *et al.* (2001) mentioned that the results of the analysis of physical and chemical properties of soil showed the need to improve soil fertility prior to planting with various

species to accelerate land rehabilitation efforts in Bintan Island. The physical and chemical properties of soil in the location of observation are listed in Table 2.

Table 1: Soil physical and chemical properties in Kuok experimental plot, Riau

Parameter	Horizons		
	A	AB	Average at
thickness (cm)	0-10	10-30	0-30 cm
pH			
H_2O	4,87 (acid)	4,91(acid)	4,90 (acid)
KCl	3,92 (very acid)	3,94 (very acid)	3,9 (very acid)
C.org (%)	3,00 (medium)	0,61 (very low)	1,41 (low)
N.org (%)	0,27 (high)	0,12(low)	0,17 (low)
C/N	11,11(medium)	5,08 (low)	7,09 (low)
C.E.C (me/100g soil)	18,97 (medium)	10,55 (medium)	13,36 (low)
CEC/100 g clay (CECx100/clay)	86,22	26,375	46,32
K (me/100 g soil)	0,08 (very low)	0,07 (very low)	0,07 (very low)
Mg (me/100 g soil)	0,24 (low)	0,12 (low)	0,22 (very low)
Ca(me/100 g soil)	1,03 (low)	0,41 (low)	0,62 (very low)
Na(me/100 g soil)	0,18 (low)	0,27 (low)	0,24 (low)
sum of cation *	1,53	0,87	1,09
KB (%)	8,06 (very low)	8,25 (very low)	8,19(very low)
Al-dd. (me/100 g soil)	0,80 (low)	0,08 (low)	0,32
P Bray-II (ppm)	4,81 (low)	1,14 (very low)	2,36 (very low)
Texture			
sand (%)	54	36	42
silt (%)	24	24	24
clay (%)	22	40	34
texture class	sandy clay loam	clayey loam	clayey loam

Remarks: * = calc.

Table 2: The physical and chemical properties of soil in the experimental plot of Bintan, Riau

Parameter	Site of secondary natural forest (0-30 cm)
pH H_20	5,10 (acid)
C-organic (%)	2,11 (medium)
N organic (%)	0,13(low)
C/N	16,23 (high)
Exch. Cation (me/100 g soil)	
K	0,13 (low)
Ca	0,61 (very low)
Mg	0,12 (very low)
Na	0,36 (low)
sum of ex. cations *(me/100g soil)	1,4
Al-exch. (.me/100 g)	0,50
CEC (me/100 g soil)	9,14 (low)
CEC /100 g clay	22,85 (without organic matter)
P. av. (ppm)	4,93 (very low)
BS (%)	13,35(very low)
Texture	
sand (%)	50
silt (%)	10
clay (%)	40
texture classes	sandy clay

Remarks:*=calculated

In general, the physical properties of soil chemistry on both site including infertile, which is indicated by low pH, the present of Al-dd that can be toxic to plants, CEC and KB were

very low. Reinforcing agroforestry model in both locations can be started by assessment of land suitability classes for the selected species in both site.

3.2 Land Suitability Assessment

Land suitability for tree species of mahogany, nut, and fruits (such as , rambutan and jackfruit) and horticulture crops(corn and chili) were analyzed by Simple Limitation Method (the land suitability criteria in Appendix 1). The results of analyzed were summarized in Table 3. Furthermore, the actual land suitability, potential land suitability and the species combinations were presented in Table 4.

Based on Table 4, the actual land suitability classes for SM in Bintan island belong to S_2w (moderate suitable) with limitation factor of drainage and this will increase to potential land suitability classes of S_1 by treatment for drainage by terrace or by circular pit. The actual land suitability classes of AI (jackfruit) belong to $_{S2\ c,\ f,\ w,\ lp}$, but this classes difficult to increase to S_1, because of the climate limitation factor is difficult to change. The actual land suitability classes for NL (rambutan) belong to $S_{2f,w,lp}$. This classes is also difficult to increase, due to that implementing three treatments in the same time (liming, drainage treatment and land preparation) are expensive. The actual land suitability classes of AC (nut) belong to S_{2f} and to this classes can be increase to potential S_1 by liming and drainage treatment. While the actual land suitability classes for MS (banana) belong to S_{3f} , this classes can be increase to potential of S_1 or S_2 by liming. For ZM (corn) and CS (red chili) belong to actual land suitability class of $S_{3cf,}$ but these are difficult to increase, because of the climate limitation factor is natural.

Then the actual land suitability in Kuok for SM (mahogany) belong to S_{3wf} and this classes can be increase to potential land suitability classes of S_1 by drainage treatment and liming. The actual land suitability classes for AI (jackfruit) belong to $S_{2c,f,w}$, and this classes is not possible to increase because of climate factor is natural. The actual land suitability classes for NL (rambutan) belong to $S_{2f,w}$ and this classes can be increase to potential S_1 by liming and drainage treatment. The actual land suitability classes for AI (nut) belong to $S_{2f,w/flood}$ and this classes can be increase become potential $S_1$by liming and drainage treatment or by prevention denudation. The actual land suitability classes for the MS (bananas) belong to S_{3f} and this classes to increase become potential S_1or S_2 by liming. The actual land suitability classes for ZM (corn) and CS (red chilli) are belong to $S_{3c,f}$ and these classes difficult to increase, due to the climate limitation factor is natural.

Based on the actual and potential land suitability classes above the optimum mixing species in Bintan consist of SM (mahogany), AC (nut) and MS (banana), mean while in Kuok were SM, AI, MS and NL.

Table 3: Assessment of the land suitability class for each land characteristics in the experimental plot of Kuok and in the experimental plot of Bintan based on the method of assessment in Djaenuddin, *et al.* (2003)

Land Quality	Land characteristics	Suitability classes				Species	
		Site		Site		Site	
		A= Bintan	B= Kuok	A= Bintan	B= Kuok	A= Bintan	B= Kuok
Temperature	Mean temperature	27,2	26,2	S1	S1	3,4,5,6	3,4,5,6,7,9
				S2		7,8,9	8
				S3			
				N			
Water availability	Rainfall	2218	2103,6	S1		3,5,6,7	3,5,6,7
				S2		4	4
				S3		8,9	8,9
	Air humidity			S1			
				S2			
				S3			
	Length of dry season (month)	4		S1		3	
				S2		7	
				S3			
Oxygen availability	Drainage	Good	Moderate	S1		3,4,5,6,7,8,9	4,5,6
				S2			3,7,8,9
				S3			
Rooting condition	Texture	F	Mf	S1		4,5,6,7,8,9	4,5,6,7,8,9
				S2			
				S3			
	Coarse material (%)	-	-	S1		4,5,7,8,9	4,5,7,8,9
				S2			
				S3			
	Soil depth (cm)	100	100	S1		3,4,5,6,7,8,9	3,4,5,6,7,8,9
				S2			
				S3			
Nutrient retention	CEC clay (me/100 g clay)	22,85	46,32	S1		4,5,7,8,9	4,5,7,8,9
				S2			
				S3			
	BS (%)	13,5	8,19	S1			
				S2		4,5,7,8,9	4,5,7,8,9
				S3			
	pH	5,10	4,90	S1		4,5	
				S2		6,3	4,5,6
				S3		7,8,9	7,8,9,3
	C-organic (%)	3	1,41	S1		4,5,6,7,8,9	4,5,6,7,8,9
				S2			
				S3			
Toxicity	Salinity (ds/m)			S1			
				S2			
				S3			
Sodicity	Alkalinity Or ESP (%)or (Na.exc.x100/KTK) =	3,94	1,80	S1		3,4,5,6,7,8,9	3,4,5,6,7,8,9
				S2			
				S3			
Sulfidic material							
Erosion hazard (eh)	Slope (%)	8	3	S1		3,4,5,6,7,8,9	3,4,5,6,7,8,9
				S2			
				S3			
	Erosion hazard	very low	very low	S1		3,4,5,6,7,8,9	3,4,5,6,7,8,9
				S2			
				S3			
Food hazard (fh)	Denundation	Slight	Slight	S1			
				S2		3,4,5,6,7,8,9	3,4,5,6,7,8,9

Land Quality	Land characteristics	Suitability classes				Species	
		Site		Site		Site	
		A= Bintan	B= Kuok	A= Bintan	B= Kuok	A= Bintan	B= Kuok
Land preparation (lp)	Stoniners (%)	<15%	-	S3			
				S1			4,5,7,8,9
				S2		4,5,7,8,9	
				S3			
	Rock outcrop (%)	-	-	S1		4,5,7,8,9	4,5,7,8,9
				S2			
				S3			

Remarks : A = Soil mineral in Bintan; B= Soil mineral in Kuok; * = Based on Brack (1928) : 26,3^{o}C - (0,01 x elevasi x 0,6^{0}C) or weather data availability; 3=Mahoni (*Swietenia mahogany*) ; 4= jack fruit(*Artocarpus integra*); 5= rambutan (*Nephelium lappaceum*); 6= nut (*Areca catechu*);7= banana (*Musa sp*); 8= corn (*Zea mays*) dan 9 = red chilli (*Capsicum sp*) .

Table 4: Actual and potential land suitability for each species and combination of optimal mixing species in Bintan and Kuok sites

Species	Land suitability classes				Remarks		Species combination	
	Actual		Potential*					
	Site		Site		Site		Site	
	Bintan	Kuok	Bintan	Kuok	Bintan	Kuok	Bintan	Kuok
Swietenia mahogany (SM)	S_{2w}	S_{3wf}	S_1	S_1	Water logging prevention with terrace	Water logging prevention with terrace and increasing pH	SM,AC, MS	SM,AI,MS ,NL
Artocarpus integra (AI)	$S_{2c,f,w,lp}$	$S_{2c,f,w}$	-	-	Rainfall, BS, water logging, rock outcrop	Rainfall, BS, pH and water logging	AI	AI
Nephelium lappaceum (NL)	$S_{2f,w,lp}$	$S_{2f,w}$	-	S_1	BS, water logging, rock outcrop	BS, pH, water logging	NL	NL,MS,AI ,SM
Areca catechu (AC)	$S_{2f,w}$	$S_{2f,w}$	-	-	pH, water logging	pH water logging	AC	AC
Musa sp. (MS)	$S_{3,f}$	$S_{3,f}$	-	-	pH	pH	MS	MS
Zea mays (ZM)	$S_{3c,f}$	$S_{3c,f}$	-	-	Rainfall, pH	Rainfall, pH	ZM	ZM
Capsicum sp (C)	$S_{3c,f}$	$S_{3c,f}$	-	-	Rainfall, ,pH	Rainfall, pH	C	C

Remarks: * = potential land suitability classes determination **based** on the possibility to change the nature of the limiting factors (Djaenuddin, *et al.,* 2003).

3.3 Policy Intervention

Legal base for community's plantation forest (HTR) development begins with PP No.Tahun 2007 stated that HTR is a plantation forest in production forest, developed by community groups to improve the potency and quality of production by applying silviculture systems to ensure the preservation of forest resources. Further, there are 3 patterns of HTR namely: 1) HTR-self (*Mandiri*) developed by the family head as the permit holder; 2) HTR-Partnership (*Kemitraan*), HTR which was developed by the head of the family with the partner based on consensus and 3) HTR-Developer, HTR which was developed by the state-owned enterprises (BUMN) or private-owned enterprises (BUMS). Hereafter handed over by government to the holder of IUPHHKHTR and the construction costs become the responsibility of the permit holder and refunded in installments since the decree was issued. HTR development in Riau mainland and Riau Islands are listed in Table 5.

Table 5: Development trend of plantation for social forestry (HTR) in Riau mainland and Riau island Provinces in 2013

Location	Area (ha)	
	reserved	Realization
Riau mainland province	54,948.00	2,169.00
Riau island province	21,530	21,530
Total	76,510	23,699

Source: Ministry of Forestry Statistic (2014)

The others policy that related to development of HTR, among others: 1) Permenhut : No.P.55 / Menhut-II / 2011 / concerning the procedure for application IUPHHK-HTR in plantation forest; 2) Permenhut: No.P3 / Menhut-II / 2012 on the Work Plan on Forest product utilization of HTR timber; 3) Perdirjen: No.P.04 / VI-BUHT / 2012 on guidelines people plant forest cultivation and 4) of Regulation No.P.05 / VI-BUHT / 2012 on the procedure for the Selection of Assistance People's plantations. The latest P.14/Kemenhut-II/2014 related to regulation for mixing species that more flexible.

The progress of HTR development was not maximum, the some reason such as financing, the area and the capacity of community and government. In Riau province HTR development were not according to site assessment, this is due to the by financing factor. The permit holder had trouble on getting a loan, because the development of plantation forests can't be used as collateral, the long-term nature of forestry production (non bankable) and high business risks. To overcome this problem the government has established the Agency for Forest Development Funding by applying pattern financial services Public Service Agency (BLU). The task of BLU consist of facilitation the provision of revolving fund for forest development and looking for and manage grants from donor countries and institutions associated with the development of plantation forests (Obidzinski and Dermawan, 2010). Financing is an important factor in achieving successful development, such as HTR lending disbursement procedures are not clear (Herawati *et al.,* 2010).

According to Regulation No: P.18 / Kemen LHK-II / 2015 on organizational structure and work procedure of environment and forestry ministry, management Forest Plantation being part of the duties and functions of the Director General of Social Forestry and Environmental, the partnerships and area of HTR specifically included in the area of social forestry as referred to in article 1041 of above regulation which assigns responsibility of sub directorate preparing people for forest plantations; carrying out the preparation formulation and implementation of policies, technical assistance, and evaluation of the implementation of the technical guidance and supervision over the conduct of the affairs in the field of empowerment and increase the capacity of actors, as well as verification of people's working area plantations. With that special unit the expectation for provision of community plantation forests could be easier. On financing, based on the present of Public Service Agency with the task of analyzing the financing, revolving refund, profit sharing and syariah. To accelerate the successful development targets people's forest plantation, financing the construction of forest plantations Center and Director General of Social forestry able to form a working group for the achievement of development targets forestry. Another point of concern is the technical manual mixing plant species that can be used as the base to asses the economic evaluation. Those documents were important to get loan financing.

4. CONCLUSION AND RECOMMENDATION

The actual land suitability classes in experimental garden / arboretum Bintan for mahagony, jackfruit, rambutan, nut, bananas, corn and red pepper belong to: S_2w; S_2c,f,w,lp; S_2 f,w,lp; S_2f;S_3f; S_3cf and S_3cf respectively. In Kuok experimental plot, those plants are belong to : S_3wf; S_2c,f,w; S_2 f,w; S_2 f,w/flood; S_3f; S_3cf and S_3cf respectively. To increase the actual land suitability classes to potential land suitability classes in Bintan can be done for mahogany from S_{2w} to S_1 by drainage treatment; for nut from S_{2f} to S_1 by liming and for banana from S_{3f} to S_1 by liming and for the others are not possible. Meanwhile to increase the actual land suitability classes in experimental plot Kuok for mahogany from $S_{3w,f}$ to S_1 by drainage and liming; for rambutan from $S_{2f,w}$ to S_1 by drainage and liming; for nut from $S_{2f,w}$ /flood to S_1 by drainage treatment and liming and for banana from S_{3f} to S_1 by liming and for the others species are not possible.

The optimum mix of species in Bintan consist of mahogany (SM), banana (M) and nut (AC), meanwhile in Kuok are mahogany (SM), nut (AC), banana (M) and rambutan (NP). Two important things to develop appropriate agroforestry in HTR by communities or forest dwellers are training for the mixing of species-site matching and fundraising by the Public Service Agency.

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Appendix 1. Land suitability criteria for several species of tree, fruit tree and the other crops

Land characteristics	Mahogany (*Swietenia macrophylla*)	Jack fruit (*Artocarpus integra*)	Rambutan (*Nephelium lappaceum*)	Nut (*Areca catechu*)	Banana (*Musa sp*)	Corn (*Zea mays*)	Red chilli (*Casicum sp)*
Mean temperature (^{0}C)							
S1	25-30	22-28	25-28	25-28	25-27	20-26	21-27
S2	<30-35	28-34	28-32	28-32	27-30	-	27-28
	21-25	18-22	22-25	22-25	22-25	26-30	16-21
S3	-	34-40	32-35	32-35	30-35	16-20	28-30
N	Td	>40	>35	>35	>35	<16	>30
Water availability (wa)							
S1	2000-3000	1500-2000	2000-3000	2000-3000	1500-2500	500-1200	600-1200
S2	>3000-3500	2000-3000	1750-2000	1300-2000	1250-1500	1200-1600	500-600
	1750-<2000	1000-1500	3000-3500	3000-4000	2500-3000	400-500	1200-1400
S3	>3500-4000	3000-4000	1250-1750	1000-3000	1000-1250	>1600	400-500
	1500->1750	750-1000	3500-4000	4000-5000	3000-4000	300-400	>1400
N	-	>4000	<1250	<1000	<1000	-	<400
		<750	>4000	>5000	>4000	<3000	-
2.Humidity (%)							
S1				>60	>60	<42	
S2				50-60	50-60	36-42	
S3				<50	30-50	30-36	
N					<30	<30	
3.Length of dry seasons (month)							
S1							
S2	<3				3-4		
S3	<3-4				4-6		
N	Td				>6		
4. Oxygen availability (oa)							
S1	well drained	well drained, moderately well drained	well drained, moderately well drained	well drained, moderatel y well drained	well drained, somewhat poorly drained	well drained, somewhat poorly drained	well drained somewhat poorly drained
S2	somewhat execessively drained, moderate well drained	somewhat poorly drained	somewhat poorly drained	somewhat poorly drained	somewhat execessively drained, moderately well drained	somewhat excessively drained moderately well drained	somewhat exeessively drained, moderately well drained
S3	execessively drained, somewhat poorly drained	poorly drained, somewhat execesively drained	poorly drained, somewhat excessiveky drained	poorly drained, somewhat execessivel y drained	poorly drained	poorly drained	poorly drained
N	poorly drained	very poorly drained	very poorly drained	very poorly drained	poorly drained	very poorly drained	very poorly drained
Rooting capacity (rc) 1.soil texture							
S1		fine,moderatel y fine, moderate (h,ah,s	fine,moderatel y fine, moderate h,ah,s	fine,moder ately fine, moderate h,ah,s	fine,modera tely fine, moderate h, ah,s	fine,modera tely fine, moderate h,ah,s	fine,modera tely fine, moderate h,ah,s
S2		-	-	fine,moder ately fine, moderate h,ah,s	-	-	-
S3		somewhat coarse	somewhat coarse, very fine	somewhat coarse	somewhat coarse, very fine	somewhat coarse	somewhat coarse
N		coarse	coarse	coarse	coarse	coarse	Coarse
2.Coarse fragments (%)							
S1		<15	<15		<15	<15	<15
S2		15-35	15-35		15-35	15-35	15-35
S3		35-55	35-55		35-55	35-55	35-55
N		>55	>55		>55	>55	>55
3. Effective depth							
S1	<150	>100	>100	>100	>75	>60	>75
S2	100-<150	75-100	75-100	75-100	>75	40-60	50-75

Land characteristics	Mahogany (*Swietenia macrophylla*)	Jack fruit (*Artocarpus integra*)	Rambutan (*Nephelium lappaceum*)	Nut (*Areca catechu*)	Banana (*Musa sp*)	Corn (*Zea mays*)	Red chilli (*Casicum sp)*
S3	75-<100	50-75	50-75	50-75	50-75	25-40	30-50
N	50-<75	<50	<50	<50	<50	<25	<30
Nutrient retention (nr)							
1. CEC clay (cmol)							
S1		>16	>16		>16	>16	>16
S2		<=16	<=16		<=16	<=16	<=16
S3							
N							
2.Base saturation (%)							
S1		>35	>35		>50	>50	>50
S2		20-35	20-35		35-50	35-50	35-50
S3		<20	<20		<=35	<=35	<=35
N							
3.pH_2O							
S1	5,5-7,0	5,0-6,0	5,0-6,0	5,2-7,5	5,6-7,5	5,8-7,8	6,0-7,6
S2	>7,0-7,5	4,5-5,0	4,5-5,0	4,8-5,2	5,2-5,6	5,5-5,8	5,5-6,0
	5,0-<5,5	6,0-7,5	6,0-7,5		7,5-8,0	7,8-8,2	7,6-8,0
S3	>7,0-8,0	<4,5	<4,5	<4,8	<5,2	<5,5	<5,5
	4,5-<4,5	>8,0	>7,5		>8,0	>8,2	>8,0
N	Td						
4.C-organic (%)							
S1		>1,2	>1,2	>0,8	>1,5	>0,4	>0,8
S2		0,8-1,2	0,8-1,2	<=0,8	0,8-1,5	<=0,4	<=0,4
S3		<0,8	<0,8		<0,8		
N							
Toxicity (xc)							
Salinity (ds/m)							
S1	<4	<4	<4	<12	<2	<4	<3
S2	4-6	4-6	4-6	12-6	2-4	4-6	3-5
S3	>6-8	6-8	6-8	16-20	4-6	6-8	5-7
N	-	>8	>8	>20	>6	>8	>7
Erozion hazard (eh)							
1.slope (%)							
S1	<8	<8	<8	<8	<8	<8	<8
S2	8-15	8-16	8-16	8-16	8-16	8-16	8-16
S3	>15-30	16-30	16-30	16-30	16-40	16-40	16-30
N	>30-50	>30	>30	>30	>40	>40	>30
2.Erosion							
S1	very low	very low	very low	very low	very low	very low	very low
S2	low	low-moderate	low-moderate	low-moderate	low-moderate	low-moderate	low-moderate
S3	very low	high	high	high	high	high	high
N	high	very high	very high	very high	very high	very high	very high
Flooding hazard (fh)							
1. Denundation (fooding)							
S1	Fo(no hazard)	Fo (no hazard)	Fo (no hazard)		Fo (no hazard)	Fo(no hazard)	Fo (no hazard)
S2	f1(slight)	f1(slight)	f1(slight)		f1(slight)	-	-
S3	f2(medium)	f2(medium)	f2(medium)		f2(medium)	f1(slight)	f1(slight)
N	f3(somewhat severe)	>f2	>f2		>f2	>f2	>f1
Land Preparation							
1. Stoniners (%)							
S1		<5	<5		<5	<5	<5
S2		5-15	5-15		5-15	5-15	5-15
S3		15-25	15-25		15-25	15-25	15-25
N		>25	>25		>25	>25	>25
2. Rock outcrop (%)							
S1		<5	<5		<5	<5	<5
S2		5-15	5-15		5-15	5-15	5-15
S3		15-25	15-25		15-25	15-25	15-25
N		>25	>25		15-25	15-25	15-25

Remarks: S_1 = very suitable; S2 = moderate suitable;S_3 = marginal suitable and N = not suitable

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