Assessment of Land Use Changes and Implication to Diversification of Income Sources and Environment
(Case Study at two Indigenous Dayak Ethnics in Miau Baru and Pampang Village)

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Abstract

One of the largest tropical island Kalimantanis originally very abundance of forest and biodiversity. Until the late 1980s, forest and land mostly in excellent condition and the surrounding communities enjoyed forest and forest product for both self-consumption and for sale. However, since the last 25 years the tropical forests in Kalimantan have been severely degraded by various human activities, among others: logging, timber plantations, coal mining and large scale oil palm plantation. The emerging of the activities have also affected the land usage of the farmers. The objective of this research were to examine the changes on land usage, source of income and preference for future land usage. For data collection, 30 respondents in MiauBaru and 20 respondents in Pampang were interviewed in July 2017. Data was analyzed using descriptive quantitative approach. Results show that in the Traditional Phase, the land use was dominated by Swidden agriculture. In the Contemporary Phase the land use has shifted and is dominated by the Oil Palm Cultivation, which began to be adopted by the local farmers in 2008 – 2010.The land use plan for the future in MiauBaru and also in Pampang village, will still be mostly for Oil Palm cultivation, because the scheme has been supported by the availability of Crude Palm Oil (CPO) Factories. The trend for the land use allocation in the future will be dominated by the Oil Palm cultivation, reaching 53.33%, followed by Dry Rice Field cultivation and Rubber Garden.

Keywords: indigenous Dayak, land use, oil palm, MiauBaru and Pampang

A. Background

Kalimantan island, in particular East Kalimantan is part of the tropics, that belongs to the Heart of Borneo area plays important roles in protecting our world from the global warming impacts. Kalimantan forests belonging to the customary areas of a number of Kalimantan *indigenous people* have significant roles in the global climate system. The tropics are rich in forest resources comprising faunas and floras used by the communities living in and around the forests, such as the varieties of Dayak ethnic groups :Kenyah, Kayan, Punan, Bahau, Tunjung, Benuaq and Lundayeh.

However, in the last 25 years, the tropical forests in Kalimantan have been severely degraded by various human activities, among others : logging, timber plantations, coal mining and large scale oil palm plantation. If such activities are not controlable, they would have negative impacts on the ecosystem of bthe tropics.

The forest management practices amongst the Dayak ethnic groups varies. As an example, the forest management practices observed amongst the Dayak Kenyah and the DayakKayan ethnic groups are somewhat different from those practiced by the DayakTunjung and the DayakBenuaq.

For the DayakKenyah ethnic groups, forests are managed by the *LembagaAdat* (Customary Institution). Forests are allocated for a couple of uses, such as Tana' Ulen (the Limited Forest Use Area), Ba'i (the Common Forest Use Area), and the Uma (the Agricultural Land Area). In the realm of such traditional use and management of the forests, which could be labelled as the **Traditional Phase**, the local communities have diversified sources of income, provided by the nature and their uses are considerably sustainable both in quantity and ecosytem balance. According to Inoue and Kawai (2013), some of the income sources and the local community members' income from the surrounding forest areas, comprised : selling lumber of Meranti (*Shorea*spp.), Kapur (*Dryobalanops*spp.), Ulin (*Eusideroxylonzwageri*), and Sengon (*Albizia*spp.) ; NTFPs such rattan, aloe wood, and resin ; hunting deers, wild boars, monkeys and birds ; selling gold and sand. Other incomes come from the communities' agricultural lands : among others perenial crops especially rubber, coffee, cocoa and oil palm ; agricultural products such as rice, fruits and vegetables. Some community members also get their income from trading, labor, and services.

Weinstock and Sunito (1998),and de Jong, et al.(2001) also stated that the benefit of the forest areas for the village communities are among others for hunting and fishing, collecting NTFPs, and medicinal plants. Further Imang, et al.,(2009) mentioned that the Dayak communities living in and around the tropical forests are generally dry rice farmers, with additional income derived from the surrounding forests and from other livelihood activities. The development of Oil Palm plantation in East Kalimantan began in 1982 pioneered by the PIR (Perkebunan Inti Rakyat) Project managed by PTP VI. Until 2013, the total Oil Palm Pantation area size reached 1.115.415 Ha comprising 230.266 Ha of Plasma Plantation, 22.367 Ha of BUMN Plantation and 862.782 belonged to the Private Plantation Companies. The production of the TBS (Palm Seeds) in 2013 reached 7.600.298 ton which were equivalent to 1.672.066 ton of CPO (Crude Palm Oil).

From all Private Plantation Companies which obtained Operational Area Permit (IjinLokasi), in 2013 ± 344 Companies had been in operation. Most of the Plantations were concentrated in KutaiTimur, KutaiKartanegara and Paser Districts (DisbunKaltim, 2014). The Oil Palm Plantation needs vast area of lands, which include the lands traditionally used by the Dayak Community groups.

Therefore the development of the Oil Palm Pantation and other development activities have changed the local land use patterns, impacting the use of the lands by the Dayak Community groups traditionally use the lands for their dry rice farming and rely on the income they get from the land cultivation and from the surrounding forests (Terauchi, et al. 2013).

By the opening of land transportation access to the interior villages, and the emergence of new land use alternatives, local farmers changed their land allocation. At the **Transition Phase**big changes occurred in land uses, traditional agricultural lands and village forests were converted to be the Oil Palm Plantations either by the local famers themselves for their own Plantations, or to tbe sold to the Oil Palm Plantation Companies. The change in the land allocation pattern was triggered by the establishment of CPO Factories and the increase of TBS (Palm Seeds) price, allowing the local Community members to easily gain cash income.

In the **Contemporary Phase**, where the local Commmunity have converted their lands and forest areas from their traditional uses to be the large scale Oil Palm Plantations, the impacts of such practices on the local environment and the Community's livelihood are not consciously being awared. This reality is the background of why this research is urgently conducted. With the large scale conversion of lands and forested areas from their diversified traditional uses to the new relatively homogenous uses, the Communities living in the interior villages may not fully aware of its impacts and consequences of the vanishing of their families' income sources, damages of their tropical ecosystem, limitation of their access to the surrounding natural resources, and even lost of such access.

Responding to the new condition, each Dayak ethnic group develops its own variation of land and forest uses, having different cash income sources, and different reasons for their agricultural lands and forests conversion. Then the problem is whether the changes in the agricultural lands and forests allocation would guarantee sustainability of their income sources, the sustainability of the ecosystem and provide income security for the concerning farmers. The urgency of this research is implicitly motivated by the condition of stragnan rubber sheet price, which cause reluctance amongst the local farmers to harvest their ready to tap planted rubber trees. The changes in the land allocation by the local farmers from their traditional use to Oil Palm Plantation allowing them to easily gain cash income because of the increase of TBS (Palm Seeds) price, has to an extent attracted the local

farmers to convert their agricultural lands and local forests without suffiently considering the impacts and consequences of the conversion on their ecosystem and livelihood.

As an example, the DayakKenyah and the Dayak Kayan who have the traditional forest areas such as Ba'i (the Common Forest Use Area) and Tana' Ulen (the Limited Forest Use Area) for hunting and collecting NTFPs, and also vast Uma (the Agricultural Land Area) for farming, have converted or sold some their land areas to the Oil Palm Pantation and or to the Mining Companies for getting immediate cash income. If such practices continuously going on, the sources of income for the local communities would considerably decrease and the tropical ecosystem which previously functioned as natural sources of local traditional income would be gradually damaged.

Therefore, the urgency of this research is to know as soon as possible whether the on- going changes in the land use pattern would bring positive or negative impacts on the local farmers as well as on the village environment in the long run. Further urgency of the research is to remind local farmers to wisely allocate their lands for more appropriate uses. The aims of this research are to : (1) examine traditional land and forest tenure amongst the Dayak Kayan and Dayak Kenyah communites in MiauBaru and Pampang Village ; (2) examine patterns of the changes in land allocation and causes of the changes in two different phases i.e. the Transitional Phase and the Contemporary Phase ; (3) to know the changes in diversification of family income sources in those two different phases ; and (4) examine the future trend of or preference for the land allocation amongst the two Communities.

B. Method

The research was conducted from July to October 2017, in two villages in different Districts and as well representing different characteristics of the communities such as ethnicity and access to town. The first research site was Miau Baru village representing the Kayan - BahauDayak forest communities and whose area ia currently under the expansion of Oil Palm Plantation. This village is located upriver of theWahau, around 350 km from East Kalimantan provincial capital, Samarinda. The second research site is Pampang village, representing the Kenyah Dayak Ethnic groups, living in an urban village established in 1984, and is currently under the pressure of coal mining, settlement, infrastructure and oil palm plantation expansion. This village is located just 30 km from the capital city, Samarinda.

Data and iformation were collected by interviewing key informants and farmers/villagers. The main Key Infromants were village chief, customary chief, former customary chief, oil palm businessman and forest product collectors. They were selected purposively by considering their experiences and knowledge in forest and traditional land management, as well as in our research focus related matters. The respondents were selected from the local farmers who are still active in farming. They were selected using simple random sampling method. The number of selected respondents in MiauBaru village were 30 respondents, and in Pampang 20 respondents.

Data and information collected were related to : traditional forest management, land uses / land allocation before the introduction of oil palm (Traditional Phase), land uses/land allocation after the introduction of oil palm (Contemporary Phase), the data of oil palm cultivation in the village area, sources of non-timber forest products, sources of household income, the practice of swidden agriculture, preference in land use in the next 5 years (2017-2022), the reasons of land use changes, and the environmental impacts of the massive expansion of oil plantation to the farmers.

The data analysis used descriptive qualitative method through inductive approach. The approach was begun with empirical facts instead of prescriptive theory. The researchers conducted a combination of field survey, observation, and interviews. The data and information were recorded, systemized and analyzed to get the logical conclusions from the phenomena contexts observed in the field, to meet the intended aims of the research, focusing on the land use changes and the implication to the diversification of the communities' income sources.

C. Results and Discussion

(1) Traditional Land Management

Traditional land management amongst the Dayak Kayanin Miau Baru Village Miau Baru village was established in 27 April 1964 by the Dayak Kayan Community group, after their four year long journey from their original village Data Dian, in the interior of Apau Kayan (the area now belongs to Kecamatan Kayan Hilir of Malinau District, North Kalimantan Province). Miau Baru is located on the bank of the Wahau river in East Kutai District, East Kalimantan Province.

Traditionally the Village has customary rules and regulations concerning the use of lands and forests within the Village area, comprising : (1) *Tana' Jakah* (Prohibited Land Area), which is customarily prohibited to be use either for rice cultivation or for other purposes. This type of land area remains as perpetual forest, conserving both forest floras and faunas, and has very positive impacts on the ecosystem ; (2) Tana' Aang (the Limited Forest Use Area) equivalent to the Dayak Kenyah Tana' Ulen, used with strict rules and regulation imposed by Lembaga Adat (the Customary Institution). The forest resources are used only for public interests. As the example, the timber taken from the forest areas can only be used for BalaiDesa (Village Meeting Building) or RumahIbadah (Village House of Worship). The Tana' Aang is maintained as primary forest by Lembaga Adat (the Customary Institution) with strict sanctions for violators of the forest use rules and regulations. (3) Lepu-un (the Mixed Fruit Garden), which is a common practice in all Dayak Ethnics tradition. People have the habit to plant a variety of fruit trees and rattan around their dry rice field huts. During the fallow period the fruit trees and rattan grow, mixed with other natural trees and plants of various species forming old shrubs and young secondary forests. The fruit trees and rattan function as traditional "land certificate" for the owners of the land.

In Pampang village on the other hand, since this village was established in 1982, all of the surrounding forests and lands were still free of claim. That time nobody in the village had claimed the forests and lands ,neither did the local village customary institution. This was because most of the villagers were new comers to the village, and because Pampang is located near urban area so it was also difficult to impose traditional forest management for the village. In this case, everyone has the rights to clear and the claim the forest lands for their households so that no forests and lands were treated as customary forests or customary lands.

(2) Land allocation

In the beginning, when the villagers began to settle in Miau Baru village, it was surrounded by excellent primary forests. The forests were still abundant with both timber products, and non-timber forest products such as eagle wood (gaharu), shoots, wild pigs, fish, mushrooms, resin, etc. The respondents explained that at that time it was very easy to catch fish and hunt wild pigs. It was easy to fulfill the need for meat and fish and also many other non-timber forest products. Respondents claimed that it took only two hours to catch fish and around to three hours to hunt wild pigs because the local habitats were still suitable for wild animals to live and the access to the forests was very near to village area. The land allocation in the Traditional Phase in Miau Baru village was as described in the following Table.

Table 1.Size and land allocation in the traditional phase in MiauBaru village

No.	Land utilizations and size	number	average
1	Amount of all plots of land	145	4.83
2	All plots af land (ha)	218.5	7.28
3	Swidden agriculture	43	1.43
4	Wetland paddy/rice (ha)	5.95	0.20
5	Rubber garden (ha)	19.2	0.64
6	Vegetables garden (ha)	0	0.00
7	Fallowed land (ha)	136	4.53

Source: field survey (2017)

Data on the above Table indicate that every household had 4.83 plots of land with the average size for every household is 7.28 ha of land. The range of the land ownership for every household was around 2-10 ha. Based on the customary rules, the person who first cleared an area for swidden agriculture or for other land utilizations, he/she has the rights over the land. This rule had triggered people to clear forested lands for swidden agriculture as many as they could in order to have the rights over the lands. The plots of land owned by every household as shown in the above Table, are mostly situated in two or more different locations. At the beginning, the allocation of land for the households were used for their dry rice fields, with the average size of 1.43 ha per household. The accumulation of the land allocated for every household to cultivate reached 4.53 ha. So the remaining land which are not used by the households for their dry rice fileds every year are fallowed and reserved to be used in the following years. Such practice is very common in the shifting cultivation system, where farmers always prepare a couple of fallowed plots of land to use for their rice fields in the following years because by doing so, the land have been sufficiently fertile.

D. Conclusion and Recommendation

1. Income and Income Sources at the Traditional Phase

The so called Traditional Phase here was the period before the existence of the large scale Oil Palm Plantation in Kecamatan Kongbeng (Kongbeng Sub-district). That time the forest areas were still abundant, and the rivers within the Village area were not polluted as they are now. The main livelihood of the Community members were dry rice field farming, mixed with growing marketable vegetables in the same field with the rice. In that condition, the local communities still relied on harvesting NTFPs, hunting wild boars and deers, as well as river fishing.

Then the Oil Palm Plantation were open in the area by the Oil Palm Plantation, followed by the transmigrant farmers, and further also by the local traditional farmers after they saw that the income from the Oil Palm cultivation was considerably promising.

Table2.Income and Sources of Income in the Traditional Phase in MiauBaru village

No	Monthly Income and Income Sources	Income Average per Month (Rp)
1	Swidden Agriculture	1,670,400
2	Wetland paddy/rice	752,222
3	River fishing	832,500
4	Hunting wild pigs, deers, etc	718,667
5	Selling aloe wood and rattan	56,667
6	Trading	90,000
7	Salaries and wages	769,000
8	Selling vegetables	131,867
9	Oil Palm	50,000
	Total	**5,071,322**

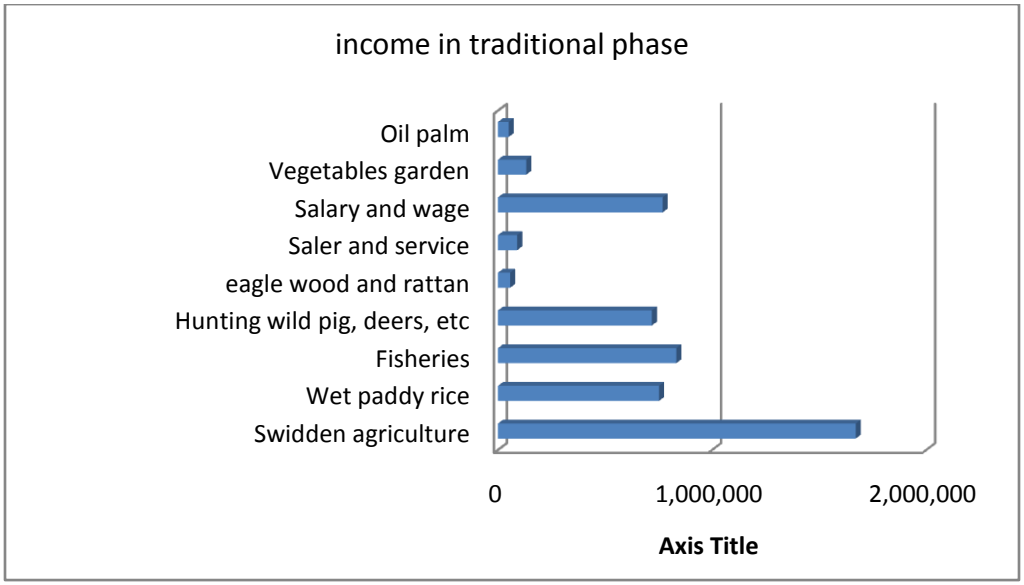
Source: field survey (2017)

The Table shows that at the Traditional Phase, the biggest income source (29.71%) was from dry rice field cultivation. The respondents of this research mentioned that at the beginning the size of their dry rice fields could reach 2 – 4 ha per household, depending on the availability of labors working for the households. The productivity of the dry rice fields could reach 2.0 – 2.5 tons of rice, as the lands were still considerably fertile. The yields were used for their own consumption, and also to be sold to the Companies in need or to other Villages.

Other sources of income, as above mentioned were hunting and fishing. Before the existence of the Oil Palm Plantation, the potency of fish at the local rivers was still in abundance, and only 2 – 3 hours were needed to catch the fish in large amount. Similar condition also applied for hunting, as the wild boars and deers were also still in abundance. The fish caught and the wild boars or deer shunted, were mostly used for their own consumption and only a small parts were sold.

The following Figure shows the Sources of Income at the Traditional Phase, before the existence of the Oil Palm Plantation, and the Income of the households, using the selling price in Rupiah, at the time this research was conducted.

Figure1.Graph of Income and Income Sources before Oil Palm Cultivation



Source: field survey (2017)

2. **Land Use at the Contemporary Phase**

Land Use at the Contemporary Phase is the Land Use beginning at the period when the local Communities began to plant the Oil Palm on their own initiative in a large scale, i.e. from 2008 – 2010 up to nowadays. Local people took the intiative to plant the Oil Palm on their own initiative, because they were not satsfied with the Company – Community Partnership Program. As an example, for 1 Ha the participants of the Program at that time got only Rp.200,000 – Rp.300,000 per month, which was different from what the Company promised to the local Community during the socialization of the Program. The Company said that the participants will get Rp.500,000 per month for 1 Ha Oil Palm Plantation they shared.

Tabel3.Land Use Allocation in Contemporary Phase in MiauBaru village

No	Land Usage Allocation and Size	Amount	Average
1	Number of land plots owned	116	3.87
2	Total Land Size (ha)	254.25	8.48
3	Swidden(ha)	19.5	0.65
4	Wetland paddy/rice (ha)	15.45	0.52
5	Rubber Garden (ha)	3.2	0.11
6	Vegetables cultivation plot (ha)	0	0.00
7	Uncultivated Agricultural Lands (ha)	126	4.20
8	Oil Palm Plantation (ha)	109.3	3.64
9	Cocoa cultivation plots (ha)	1	0.03

Source: field survey (2017)

The data in the above Table show the increase of the number of the land locations and the size of the lands owned by the local farmers. The increase of the number of the land locations and the size of the lands owned by the local farmers was triggered by the trend to voluntarily plant Oil Palm. At the Traditional Phase, the local farmers only owned 7.28 ha cultivated lands, and in Contemporary Phase the size increases to 8.48 ha per household. The above data also show that in Contemporary Phase, the biggest portion of the land allocation is for the Community Voluntary Oil Palm Plantation, i.e. 3.64 ha in average per repondent's household, compared to the condition before the existence of the Community Voluntary Oil Palm Plantation. In this Phase there is also a decrease in the average size of the Community Rubber Gardens, from the average of 0.62 ha to 0.11 ha per household.

In MiauBaru village the trend for the land allocation in the future, would still be in the Community Voluntary Oil Palm Plantation trend. The trend is triggered by the farmers' reaction to the continuing decrease in the price of the Raw Rubber Sheet which for instance at the time of this research was only Rp. 5,000/kg. Even the worst situation was that the Raw Rubber Sheet buyers frequently restrained to buy Raw Rubber Sheets from the farmers. That is why the local farmers prefer convert their cultivated land to other profitable uses, including for their Voluntary Oil Palm Plantation.

3. Income and Income Sources in the Contemporary Phase

The data obtained from our field observation discloses that the MiauBaru farmers began to plant Oil Palm voluntarily in 2008 – 2009. As has been mentioned in the previous description, the farmers planted the Oil Palm in their own cultivated lands because they were disappointed with the Company – Community Partnership Program. At first the Company promised to allocate the plots of land within the Company's Plantation Concession for the participant farmers, and the Company would assist the farmers to manage their plantation plots, in accordance with the Company's standard operation in the Company's Nucleus areas. But in reality the participant farmers got their plots of land outside the Company's Plantation Concession with complicated tenure and ownership problems.

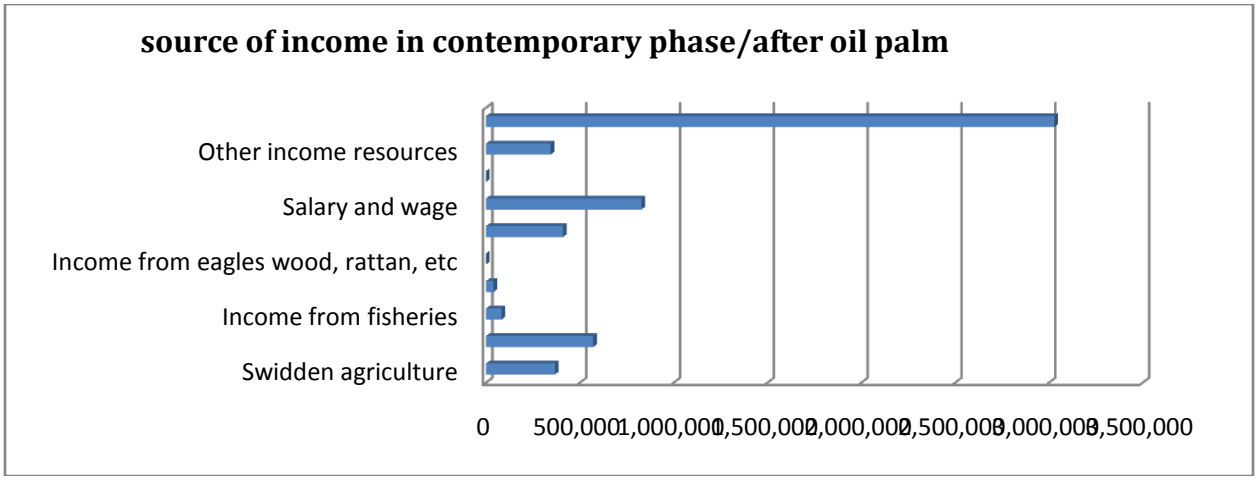
The following is the description of the Income and Income Sources of the local farmers in MiauBaru in the Contemporary Phase of their land use and management.

Tabel4.Income and Income Sources in Contemporary Phase in MiauBaru

No	**Monthly Income and Income Sources**	Average (Rp)	Percentage (%)
1	Swidden Agriculture	367,500	6.47
2	Wetland Paddy / Rice	572,222	10.08
3	Fishing	83,333	1.47
4	Hunting wild pigs, deers etc.	40,000	0.70
5	Selling Aloe wood, rattan etc.	0	0.00
6	Trading	410,833	7.24
7	Salaries and Wages	829,167	14.61
8	Selling Vegetables	0	0.00
9	Other Income	345,000	6.08
10	Oil Palm	3,029,167	53.36
	Jumlah	**5,677,222**	100.00

Source: field survey (2017)

Figure2. Graph of Income and Income Sources after Oil Palm Cultivation



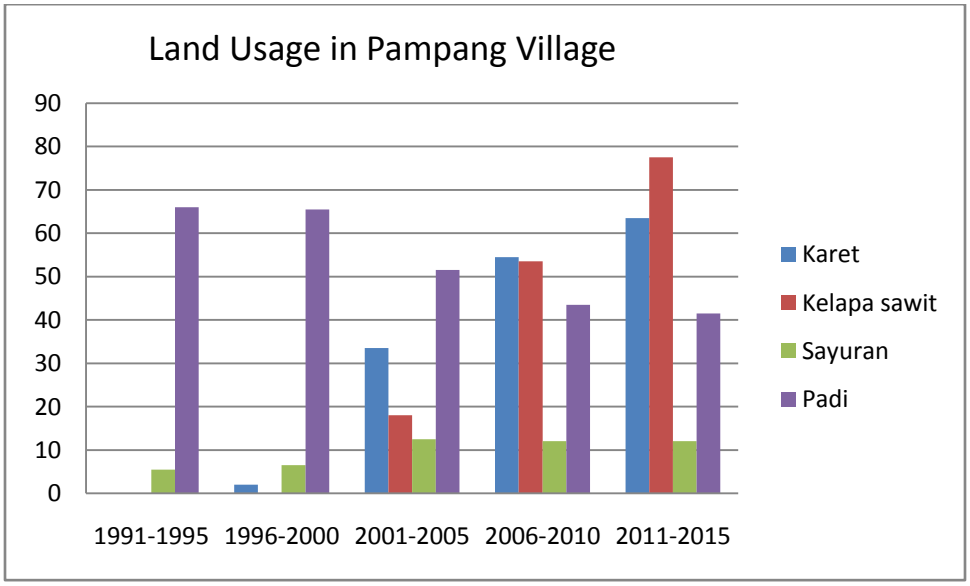
The data show that the main income source for the respondent households is from their Voluntary Oil Palm Plantation, which is 53.36% of their total income. At the time when this research was conducted, the price of Oil Palm FFB (Fresh Fruit Bunch) ranged around Rp.1,500 – Rp.1,700 per kg. The production of 1 ha Oil Palm plot at the age of 6 years, could reach 2,000 kg (2 tons) of FFB, if the plot get appropriate treatments and regular fertilizing. The second source of income is from Wage and Salary which is 14.61% from the total income. The salary comes from the salaries as Teachers, Village Government Offials, and Plantation Company's Employees. While the wage come from the wages as Laborers at various Development Projects.

4. Land Use in Pampang Village

Pampang village is situated in the ecological zone of the northern part of Samarinda, which shows the pattern of rapid changes in the use of existing agricultural lands for other use purposes. Its implication is that the remaining agricultural land size considerably decreases and the agricultural farming scale gradually diminishes. The diminishing agricultural farming scale turns up because of the agricultural involution trend, either through inheritance relation or fragmentation of the remaining agricultural lands as the consequences of the shift in farming cultivation relation and intensive industrial development.

The result of this research confirms that there have been conversions of the agricultural lands which were previously used dry rice fields to be the plantation lands. By the coversions of the dry rice fields to be the Rubber Gardens and Oil Palm Plantation, the size of the remaining dry rice fields consequently decreases from year to year.

Figure3.Dynamics of Land Use in Pampang Village



The result of this research as shown in the above Figure discloses the increase of the land uses for both Rubber Gardens and Oil Palm Plantations in the last 24 years. On the other hand the size of the agricultural lands which are used for vegetables and fruits farming remain the same in the last 8 years. The size of the Rubber Gardens in 1996 – 2001 owned by 35 farmer respondents was only 2 ha, but from 2001 – 2006 the total size increases to 33.5 ha. The size of the Rubber Gardens increased again in 2006 – 2011 to be 54.5 ha. Further from 2011 – present the total size of the Rubber Gardens has been 63,5 ha.

While size of the Oil Palm Plantations in 2001 – 2006 was around 18 ha and increased in 2006 – 2011 to be 53.5 ha. The size of the Oil Palm Plantations from 2011 – present increased again and so far has reached 77.5 ha. As for the agricultural lands which are used for vegetables and fruits farming, in 1991 – 2001 the total size was 6.5 ha and in 2001 – 2006 it increased to 12.5 ha. From 2006 – present the size has decreased to 12 ha.

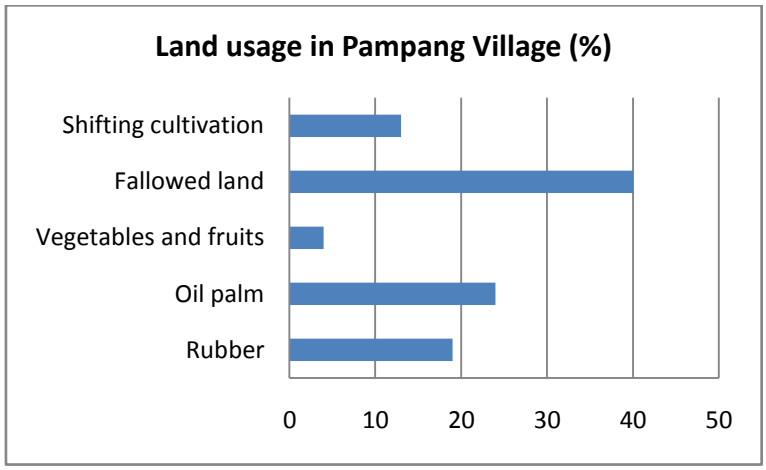
The data in the above Table show that generically the size of the lands used for the Rubber Gardens and Oil Palm Plantations is bigger than the size of the lands used for the dry rice fields and the vegetables and fruits farming. The shift of the traditional land use in Pampang, began with the adoption of the Rubber Tree planting by the local farmersin 1996. Some of the local farmers bought seedlings of Rubber from BadakMekar village and planted the seedlings in their ex dry rice fields.

The Rubber Tree planting developed rapidly in 2001, suppoted by the assistance from the Government through the Municipal Plantation Service which distributed the Rubber seedlings to the TangenTuyang Farmers Group in Pampang. The assistance was not only in the form of Rubber Seedlings distribution, but also in the form of cash for clearing the Rubber Garden plots and buying the fertilizers for the plants.

While the Oil Palm planting was introduce by the Municipal Plantation Service in 2005 by distributing the seedlings through the PemungTawai Farmers Group. By observing the availability of potential agricultural lands in Pampang village, some extension services concerning Oil Palm planting was provided by the Municipal Plantation Service for the farmers. Being supported as well by road upgrading by the Government to enable easy transportation of the Oil Palm yields to the nearest market. The assistance was not only provided by the Municipal Plantation Service but also by a privateOilPalm Plantation Company which provided seedlings for the interested farmers on the condition that they would sell the yields to the Oil Palm Plantation Company mill.

The vegetables and fruits cultivation are the last choice for the farmers which as well marks the size of agricultural lands owned by the farmers. The result of this research shows that the factors influencing the conversion of the agricultural lands by the local farmers were the intervention of Government policy and the asssitance provided to the farmers.

Figure4.Land Usage Percentage in Pampang Village



Other factors, first the level of the farmers' market knowledge had been broader than before, so they could confidently take the decision to convert their agricultural land use to be the plantation. The second factor was the psychological factor, where the farmers realized the success of the pioneer farmers who had shifted from producing non-plantation commodities which were subsitent-commercial to the plantation commodities which were modern capitalisticin nature.

4.1. Response to the Land Use Changes in Pampang

The social, economic, technological and environmental changes at the local level are responded diversely by the local farmers. The result of this research shows that in Pampang village, the farmers apply the diversification pattern. Caution should be taken on the application of diversification in agricultural field, because the pre-condition needed for the application is limited by time and space. First, diversification could be done by planting various plants yielding varieties of commodities, in the same plot at the same time (utilizing the available space) ; second, planting various plants yielding varieties of commodities, in different plots at the same time; third, planting various plants yielding varieties of commodities, in the same plot at the different times (utilizing span of time or shifting schedule).

The agricultural practices at the research site have changed toward adjustment to the wider environment dynamics of the commodities market. As in the cultivating arrangement pattern, although most of the farmers are still practicing their traditional cultivation pattern, some of them have developed cultivation planning and applied some changes to meet the market demand for quality, quantity and continuity of their agricultural commodities supply. The dynamics are not apart from the partnership relations between the farmers and the government, agribusiness companies, suppliers and products processing industries, such as particularly in the Oil Palm cultivation. Indirectly therefore, such dynamics emerged because of the increasing demand from the modern markets and products processing industries.

The dynamics also apparent in the varieties of the commodities produced by the local farmers. In the last 15 years the farmers not only cultivate local rice as has been hereditarily practicedin their tradition, but also begin to grow marketable plantation plants demanded by the market.

The dynamics in at the research site also show the decrease in the land ownership and land cultivation amongst the local farmers, as the consequence of the land conversion for non agricultural purposes. Internally, the agricultural sector has faced the labor deficiency, because some of the existing farmers have been quite old and not all of the farmer young people prefer to continue their livelihood as farmers. To keep their farming activities going on, some of the farmers have to recruit farm laborers at least for helping the farmers during the land clearing, tree cutting and harvesting periods. As the consequence some farmers also prefer to limit the size of their cultivated lands and intensify the use of the land by growing marketable vegetables and handy fruits.

4.2. **Negative Impacts of Oil Palm Plantation on the Environment**

In our field observation we saw that Oil Palm Plantation both the plantations opened by the big Private Plantation Companies and those opened voluntarily by local farmers had dominated local lands which had been opened for agricultural cultivation. From the information given by the farmer respondents, local farmers has converted their agricultural lands to be Oil Palm Plantations since 2008 till now. From time to time those who have lived for generations in MiauBaru village for example, have observed the negative symptoms of the changes in their environment.

For consideration, we provide data in the following Tables showing the respondents' responses to the questions on the impacts of the Oil Palm Plantation existence. Every respondent was free to express more than one opinion about the impacts of the Oil Palm Plantation based on what he/she observes or feels. Therefore the total percentage in the Tables is more than 100%.

Table 5.Positive Impacts of Oil Palm Cultivation in MiauBaru

No	Positive Impacts of Oil Palm Cultivation	Number of Respondents	Percentage (%)
1	Increase in Income	17	56.67
2	Availability of business opportunity	2	6.67
3	Employment opportunity	9	30.00
4	Others	2	6.67
	Total	30	100.01

Source: field survey (2017)

Table 5 shows that the most positive impact of the Oil Palm Plantation according to the respondents is the increase in income (56.67 %). The second positive impact is the availability of employment (30.00%). While the minor positive impacts are business opportunity (6.67%) and others (6.67%). They are the sub-suppliers of fertilizers, food materials, and other daily need of oil palm company and also for villagers.

Beside the positive impact, people also concern about negative impact of oil palm plantation which already taken over most of their agricultural lands. Some about 30 respondents were interviewed and they could express their answer to each aspect of negative impact. Their response is shown on Table 6 below.

Table 6 .Negative impacts of oil palm plantation

No	Negative Impacts of Oil Palm Cultivation	Number of Respondents	Percentage (%)
1	River water pollution	29	96.67
2	Rapid dry up of River Water	18	60.00
3	Surrounding Plants become Unfertile	17	56.67
4	Others	11	36.67
		75	250.01

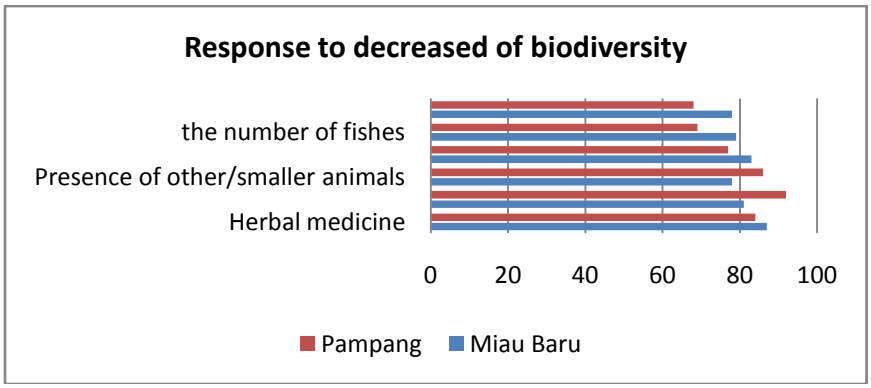
Source: field survey (2017)

Table 6 shows that the most negative impact of the Oil Palm Plantation according to the respondents is the river pollution (96%). Followed by the rapid dry up of the river water in the dry seasons (60%). The respondents explained that before the existence of the Oil Palm Plantation, even in a long dry season, people could still catch fish from the river because the river water level was still considerably high. In current condition, the river water tends to dry off more rapidly, and it is hard to catch fish from the river as the river water looks very dark brown. The fish population also decreases drastically because the river has been polluted and the water quality is not supported for fish habitat.

4.3. Response to the biodiversity issue in oil palm plantation

Land clearing for any purpose may impact to the biodiversity. The impact to biodiversity may short term or long term depending on what kind of commodity is cultivated on the land. The biodiversity aspect in this case is not only in-site impact, but also consider the impact of the expansion of oil palm plantation to surrounding areas that affected by the oil palm activities. Table below shows the response of two different Dayak ethnics in Pampang and MiauBaru regarding the "decreased" of biodiversity in some aspects.

Figure 5.Response of respondent to biodiversity due to oil palm plantation



Source: field observation (2017)

Table 5 above shows that most of the respondents (more than 65%) thinking that the biodiversity has already decreased because of the expansion of the oil palm plantation. Table above also indicates the similar pattern of response of respondents of each aspects in both villages. It means that the respondents have the same concern about the biodiversity. Of course, there's also other factors the affect biodiversity for example other agricultural activities and rubber. However, it is admitted that the decreased in biodiversity not only caused by oil palm alone even though the mayor factor is considered by oil palm expansion because oil palm plantation dominated the area.

4.4. Land Use Plan for the Future

In MiauBaru village the farmer respondents own at average 14.07 ha agricultural lands. The lands mostly situated in the NehesLiah Bing Customary Village Area, and there are also some in other neighboring villages. As there is still trend of Oil Palm Plantation expansion in the region, in this research we also investigated the land use choices by the local people for the future. The respondents could give more than one choices for their future land use plan, without mentioning the size they would allocate for the land use they chose. The following Table shows the respondents' choices for their future land use in MiauBaru village.

Table 7.Future land use plan in MiauBaru Village

No	Land Usage Choice	Number of Respondents	Percentage (%)
1	Oil palm cultivation	16	53.33
2	Swidden Agriculture	5	16.67
3	Rubber garden	3	10.00
4	Cocoa cultivation	0	0.00
5	Vegetables farming	0	0.00
	Total	**30**	**100**

Source: field survey (2017)

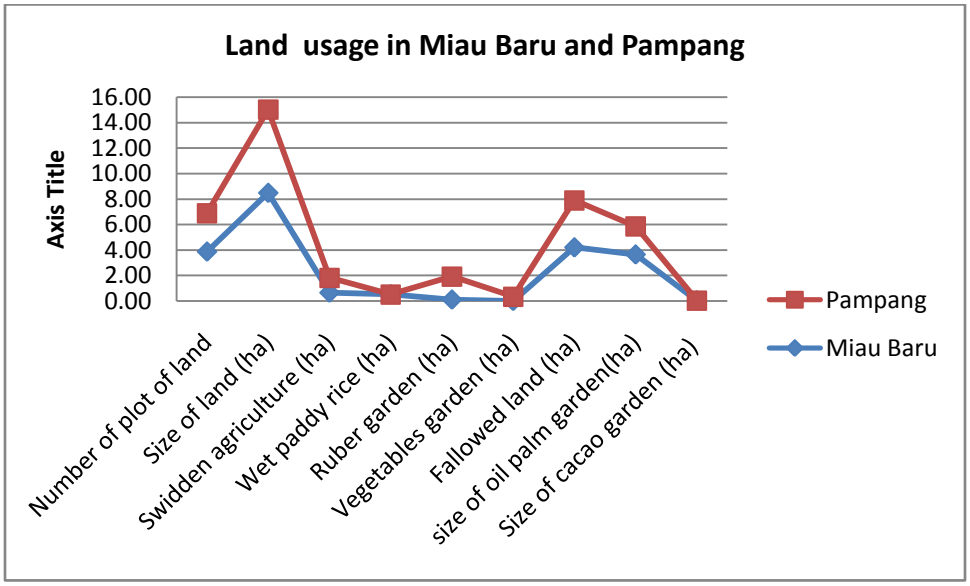
The data still show that the respondents' choice for their future land use is still for Oil Palm cultivation (53.33%). The respondents mentioned that even the size of lands available for the Oil Palm cultivation has decreased, they would still allocate their lands for Oil Palm Plantation. Such choice is understandable, because Oil Palm Cultivation has been the main source of income for people in MiauBaru. The second choice is for Dry Rice Field cultivation (16.67%), followed by the allocation for Rubber cultivation (10.00%).

People still rely on rubber cultivation according to the respondents, because when the Oil Palm trees have been old and high, the harvesting process become more difficult and also dangerous. While rubber cultivation in their experienceis relatively much easier, so they hope that the price for the Rubber Latex and Crumb Rubber will gradually increase and the local buyers will buy the farmers' products at regular basis. According to the respondents, people still want to allocate their agricultural lands for Rubber Gardens because they have realized that Rubber Garden cultivation has less impacts if compared to Oil Palm Plantation cultivation.

For vegetables cultivation, the farmers traditionally do not need special plots, because they always grow the vegetables together with the rice they plant at the same plots in their rice fields. They can harvest the vegetables before harvesting the rice, and or soon after they harvest the rice, they clear the plots for growing the vegetables.

The following is the figure to describe the land uses in both MiauBaru village and in Pampang village for comparison.

Figure 6.Comparison of Land Usage in MiauBaruand in Pampang villages



Source: field survey (2017)

For Oil Palm cultivation, there are 31% of the respondents who mentioned that they would still allocate more lands for Oil Palm cultivation in the next few years. While the rest of the respondents mentioned that the Oil Palm Plantation they have now have enough sufficient for them to manage. Further more they said that they would not want to use more lands for Oil Palm cultivation, because they had realized the negative impacts of the Oil Palm Plantation and cultivation for their environment as has been mentioned above.

E. Conclusion and Recommendation

Conclusion :

(1) The land use patterns at the two research sites are similar, there is no land area which are communally or customarily owned and managed by the local Village or Adat Community. Land ownership and control are by individuals, whoever has the right to clear, own and control lands within the village territory, or even in the neighboring village territory, as far as the lands have not been owned and controlled by other individuals. In the Traditional Phase, the land use was dominated by Dry Rice Field Cultivation (Shifting Cultivation). In the Contemporary Phase the land use has shifted and is dominated by the Oil Palm Cultivation, which began to be adopted by the local farmers in 2008 – 2010.

(2) The land use plan for the future in MiauBaru and also in Pampang village, will still be mostly for Oil Palm cultivation, because the scheme has been supported by the availability of Crude Palm Oil (CPO) Factories, which makes the marketing of the Oil Palm Plantation products much more easier for the farmers to get quick cash income. The shift of the land use towards Oil Palm cultivation, is also supported by the financial assistance scheme from the Government and from the Oil Plantation Companies, while for Dry Rice Field cultivation there is no financial or technical support from the Government. Both the quick cash income possibility and the fanancial and technical support from the Government and from the Oil Plantation Companies, have encouraged the shift of the agricultural land use towards Oil Palm cultivation, although people also realize the negative impacts of such massive land conversion.

(3) In the Traditional Phase, the main source of income in MiauBaru was from the Dry Rice Field cultivation, followed by the income from hunting, salary and wage. In Contemporary Phase on the other hand, the main source of income ia from the Oil Palm Plantation. Similar patterns of the source of income were also observed in Pampang village, both in the Traditional Phase and in the Contemporary Phase.

(4) The trend for the land use allocation in the future will be dominated by the Oil Palm cultivation, reaching 53.33%, followed by Dry Rice Field cultivation and Rubber Garden.

(5) In this research we get an impression that even people realize the negative impacts of large scale Oil Palm cultivation particularly in the form of river pollution, they would still keep allocating their agricultural lands for Oil Palm planting in the future, without caring so much of the negative impacts for the environment where they live in.

Recommendation:

(1) The Government should control the negative impacts of the Oil Palm cultivation by tightly implementing the rules and regulations concerning the Buffer Zone at the left and right of the river banks to be free from any Oil Palm cultivation activities. The area for the Oil Palm Plantation should be at a sufficient distance from both the Dry Rice Field and Wet Rice Field areas to guarantee the availability of enough supply of water, particularly for the Wet Rice Fields nearby.

(2) The agricultural lands for food crops cultivation such as for the Dry / Wet Rice and vegetables cultivation should get proper attention for their sustainability, especially from the Government, by stipulating appropriate Regional (Provincial and District) Regulation concerning the Sustainable Land for Food Crops Production. If not, the lands needed for food crops production will gradually vanish and endanger the national food security.

(3) The Government should keep assisting the farmers to develop their agricultural system in the forms technical assistance, so that their agricultural productivity will significantly increase. In that way, the Rice Field cultivation will not be only practiced for subsistence living, but as part of the local cultural wisdom, which deserves to be maintained.

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