



MASTER THESIS

Presented to obtain the Master Degree of
Master en *Sciences et Technologie*, mention Agronomie et AgroAlimentaire
(3A)

Specialisation: *Resources Agriculture Development (RESAD)*

Agriculture beyond the oil palm development in Jambi province Participatory Prospective Analysis



By

Soytavanh MIENMANY

29 November 2013

Report Director: Didier PILLOT

Supervisors: Laurène FEINTRENIE and Patrice Levang

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Abstract

In the recent years, oil palm sector has become a key part of the Indonesian economy. The growth of oil palm has open a debate between conservation and development: some see palm oil as an alternative resource for the mitigation of climate change and for the improvement of people's livelihood. The others see oil palm cultivation as harmful to biodiversity which creates social conflicts. In this research, based on the lessons learnt from Senamat Ulu and Batu Kerbau villages, Bungo district, we discuss the prospective views of the local people who are dealing with oil palm development in Jambi Province, Indonesia. Socio-economic analysis and stakeholder analysis were conducted to support the Participatory Prospective Analysis. The land use profitabilities of rubber monospecific and oil palm plantations are higher than for rubber agroforest and even more than for rice and swidden cultivations. The extension of contracts between local land owners and oil palm companies carries the risk of land grabbing and indirectly impacts the community forests, in spite of their village protected status. Primary Cooperative Credit for Members' scheme contracts (KKPA) are often unclear and long negotiations can take place between oil palm companies, local investors and villagers. Participatory Prospective Analysis workshops with local stakeholders contributed to clarify the benefits and costs of the various scenarios for possible future of the villages. Improved seedlings, road accessibility and improved capacity building are needed, both on the short term and long term, strengthening the future of the people in the next 30 years.

Keywords: Independent smallholders, oil palm, rubber monospecific, rubber agroforest, land grabbing, stakeholders, prospective, Sumatra Indonesia

Résumé

La production et la transformation d'huile de palme est aujourd'hui devenue l'un des piliers de l'économie indonésienne. Mais son développement a suscité d'importantes controverses entre conservation et développement. Ainsi, il y a ceux qui voient le palmier à huile comme source d'énergie alternative pour limiter le changement climatique et, d'autre part, comme une source de revenu pour l'amélioration du niveau de vie de la population. De l'autre côté, il y a ceux qui considèrent son développement comme une menace pour la biodiversité et une source de conflit social. Dans cette étude, à partir d'études de cas menés dans deux villages (Senamat Ulu et Batu Kerbau) situés dans le district de Bungo, nous discutons les vues prospectives de la population locale qui est impliquée dans le développement du palmier à huile dans la Province de Jambi, Indonésie.

Une analyse socio-économique des intérêts des acteurs et parties prenantes a été conduite dans le but de servir de support à l'analyse prospective participative. Concernant la productivité de l'utilisation du sol, les monocultures d'hévéa et de palmier à huile apparaissent plus avantageuses que le système agroforesterie à base d'hévéas sous forêt et encore plus par rapport à la culture du riz et la culture sur brûlis. Le cadre actuel des contrats entre les propriétaires terriens locaux et les compagnies de palmier à huile entraîne les risques de l'accaparement des terres, qui, indirectement a des impacts sur la forêt communautaire, malgré son statut protégé. De plus, les contrats dans le cadre de *Primary Cooperative Credit for Members' scheme* (KKPA) sont rarement clairs et une longue négociation peut avoir lieu entre les compagnies de palmier à huile, les investisseurs locaux et les villageois. Un atelier de travail basé sur l'analyse prospective participative avec les acteurs locaux a contribué à clarifier les bénéfices et le coût de plusieurs scénarios pour le futur possible des villages. Les semences améliorées, l'accessibilité des routes et la formation des capacités sont nécessaires, aussi bien sur le court et long terme, pour renforcer l'avenir de la population dans les 30 prochaines années.

Keywords: exploitation familiale, palmier à huile, hévéa, plantations monospécifiques, systèmes agroforestiers à base d'hévéa, accaparement de la terre, analyse prospective, Sumatra, Indonésie

ABBREVIATION

BAL: Basic Agrarian Law

BFL: Basic Forestry Law

CIFOR: Centre International Forestry Research

CSH: Cinta Sawit Harum

CPO: Crude Palm Oil

CSH: Company Cinta Sawit Harum

DO: Delivery order

FAO: Food and Agriculture Organization

ANR: French National Research Agency

CIRAD: French Agriculture Research Centre for International Development

INRA: French National Institute for Agriculture Research

IRD: French Institute Research for Development

FFB: Fresh Fruits Brunch

GDP: Gross Domestic Product

GAV: Gross Added Value

GFB: Gross Family Benefit

Govt: Government

GP: Gross Product

PPA: participatory prospective analysis

HH: Household

ISPO: Indonesian Sustainable Palm Oil

ICRAF: World Agroforestry Centre

KKPA: Koperasi Kredit Primer untuk Anggota (Primary Cooperative Credit for Members' scheme)

MAP: Melaka Agro Parkasa Company

NES: Nucleus Estates and Smallholders

NAV: Net Added Value

NFB: Net Family benefit

PNPM: National Program for Community Empowerment

NGOs: Non-governmental Organization

NTFP: Non-timber forest products

PMU: Project Management Unit

PIDII: Pusat Informasi Data Investasi Indonesia : Data Investment Information of Indonesia

PT.PML: Prima Mas Lestari

BAPPEDA: Planning and Investment Department of Bungo district

PPKS: Pusat Penelitian Kelapa Sawit

RSPO: Roundtable Sustainable Palm Oil

SHM: Sawit Harum Makmur

SHL: Sawit Harum Lestari

SPOP: Sustainable Palm Oil Production project

UN: United Nations

WARSI: Community for conservation

Indonesian Language

Desa: Village

Dinas Perkebunan-Kehutanan: Department of forestry and plantation

Dinas Husbun: Plantation office

Hutan dada: Village forest

Hutan desa lindung: Village protected forest

Hutan adat : Customary forest

Kampung: Sub-village

Kebun karet: Rubber field

kebun Inti: Company share

Kabupaten: District level

Kecamatan: Sub-district

Kebun plasma: Smallholder share

Ladang: Swidden cultivation

Perkebunan Inti Rakyat (PIR): Nucleus Estate Smallholder Project

pemerintah pusat: Central government

pemerintah daerah: Regional governments

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Introduction

Since the last energy crisis developed in the world, the palm oil industry has been anticipating further expansion to fulfil growing demands for food, and to supply palm oil for the biofuels markets. In 1960s global oil palm area was almost 4,000,000 ha and the yield is 4T/ha. In 2008 it has increased up to 14 million and also the yields have increased 15T/ha. Oil palm is seen as one of the most productive and profitable tropical crop for food and biofuel production. In some regions, such as Southeast Asia and more specifically Indonesia, oil palm is a major driver of economic development. In Indonesia, oil palm plantations have been intensively developed since the 1980s. Indonesia and Malaysia together supply 85% of the global demand for palm oil. Indonesia is the world's largest producer of palm oil since 2008. The amount of biodiesel produced in Indonesia has increased significantly from a mere 24 million liters in 2006 to approximately 650 million liters in 2011 (Pacheco, 2012). Changes in globalise agriculture raise critical questions as rapid agricultural development leads to widespread social and environmental transformation. With increased global demand for vegetable oils and biofuel, in Indonesia the area under oil palm has doubled over the last decade (McCarthy, 2010). The Indonesian State has for three decades used oil palm as a major vehicle of rural socio- economic improvement (Zen, Barlow, & Gondowarsito, 2006). Palm oil contributes substantially to national and regional income. Income and employment generated by oil palm plantations for the rural population can be significant. For instance, in 2010, over 40% of oil palms were cultivated by 3.5 million smallholders (McCarthy, 2010).

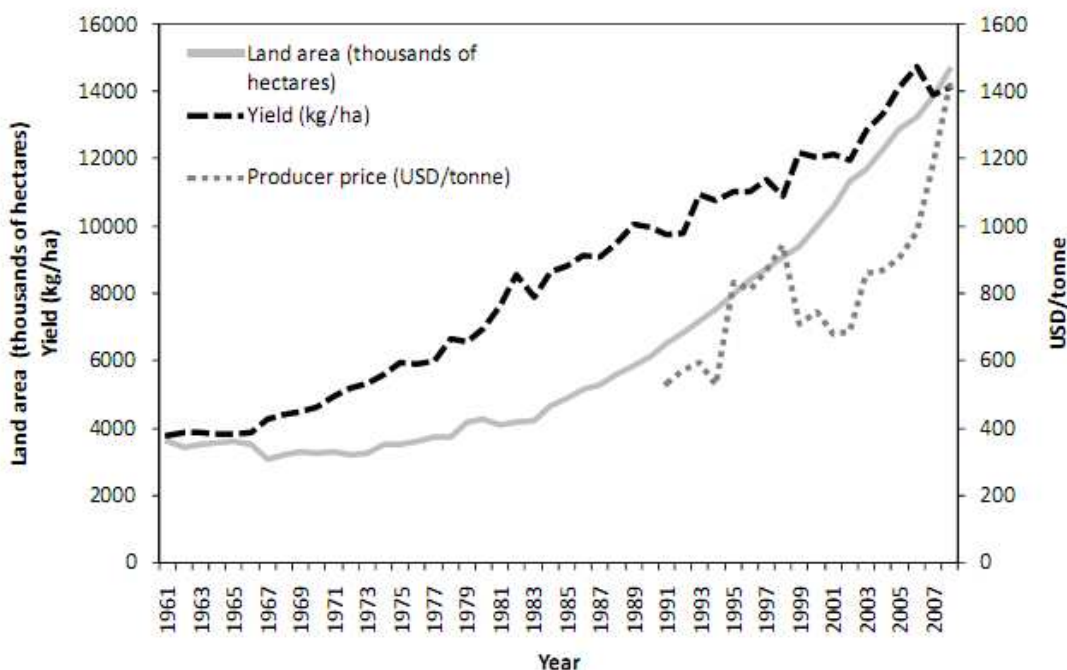


Figure 1: Global oil palm land area under harvested cultivation, yield per unit area, and producer price of palm oil (in US Dollars per tonne produced)(Turner, Snaddon, Ewers, Fayle, & Foster, 2011)

The promise of biofuels and expansion plans for oil palm plantations has become the subject of a strong political and environmental debate in Indonesia with divided opinions. Some see palm oil as a commodity playing an important role in mitigating climate change, providing alternative sources of energy, and contributing to economic development and rural livelihoods. Others are concerned about potentially serious unintended social, economic and environment impacts (Pacheco, 2012). Furthermore, the increasing demand of palm oil for both food and fuel induces expansion of plantations, and raises issues of environment conservation as well as competition for land. This is a significant challenge to the growth of the Indonesian palm oil industry (WorldGrowth, 2011). Facing this global challenge, various palm oil actors from the whole chain of production opened dialogue with representatives from NGOs to develop a globally acceptable definition of sustainable palm oil production. Together, oil palm companies and NGOs created the Roundtable on Sustainable Palm Oil (RSPO) in 2004.

Cultivation of oil palm has become a trade-off between the development and conservation that agriculture commodities are facing. Therefore, how to make oil palm development balanced with “socio-economic and environment” has become a challenge in all production areas. On the other hand, who could say that in the next 30 years all the oil palm development can be sustainable to make a balanced between “socio-economic and environment”. Therefore, the question of the future is the key issue’s today that goes beyond the reacting to changes.

SPOP Project

This study “Agriculture beyond the oil palm development in Jambi province, Indonesia Prospective analysis” is supported by Sustainable Palm Oil Production (SPOP) project. This SPOP research project funded by French National Research Agency (ANR) and has four partners: French Agriculture Research Centre for International Development (CIRAD), French National Institute for Agriculture Research (INRA), Centre International Forestry Research (CIFOR) and French Institute Research for Development (IRD). The project field is in Indonesia and in Cameroon with the duration from 2012-2015.

The project is designing strategies from improved knowledge on oil palm cropping systems. The objectives of the project are:

- i) to investigate the influence of global changes on the various oil palm cropping systems,
- ii) to identify the obstacles, opportunities, and uncertainties for the adaptation of these systems to global constraints, and
- iii) to elaborate strategies and tools designed to facilitate the transition towards sustainable oil palm cropping systems.

Therefore, the project has the research questions on: How to better assess the 3D impacts of oil palm, and make sure that new knowledge and toolkit will effectively be useful and finally adopted by end users?

To reach these objectives and answer these questions above SPOP Project will follow three main lines:

- 1) Providing new scientific-based knowledge and tools in order to assess the 3D impacts of the oil palm cropping systems, allowing to confirm the sustainability of existing systems or to implement new sustainable systems;
- 2) Involving stakeholders in the process by using participative methods all along the project such as multi-agent modeling, reflexives, or participatory prospective analysis;
- 3) Identifying the obstacles and analyze whether they are related to some inherent incapacity of cropping systems to adapt or/and to some insufficient effort or success in making knowledge and tools accessible to the stakeholders.

Objective of the study

The general objective of this study is to define scenarios of evolution of the oil palm sector (possible futures) to help the local stakeholders to solve any issue they are interested in regarding oil palm. The specific objectives are:

- To understand historic and current situation of oil palm development sector and organization in Bungo district, Jambi province;
- To analyze technico-economic outcome of cropping systems;
- To analyze scenarios on oil palm development based on participatory prospective analysis workshop.

Research questions

- In the villages, farmers are not doing the same things to support their livelihood. Some are doing farming and the other have off-farm activities.

What are the reasons behind their practices? What are the farmers' strategies?

- Each cropping systems have different practices and different inputs, some request more inputs and labour but less return to land profitabilities and labour. The other request less labour but high return to land and return to labour. Therefore,

What are the economic results of main cropping systems in this study area?

- Land use has changed from this generation to other generations, ***what are the benefits that local stakeholders get from the recent changes in the land use?*** And ***what are the possible future scenarios regarding the oil palm development and agriculture of the villages?***

The content of the following document is aiming to answering those questions. The first part is presents the general context of Indonesia, history of oil palm plantation, rubber plantation and present the study area. Then following the result of the study, in the result part divides into 4 parts: (1) the result of the villages' landscape analysis and cropping system. (2) socio-economic analysis which based on the landscape and cropping system, (3) the stakeholder analysis which based on the people's perception from each stakeholder and (4) present the result of the participatory prospective analysis (PPA) which is result from the PPA workshop. Finally discussion on the research study is presented.

1 Present of the context

1.1 The Indonesian context

1.1.1 Description of the Indonesia

Total land area: 1.9 million km² distributed in more than 13,000 islands (6,000 inhabited islands).

Agriculture land: 27.3% of land area (2003) and 30 % of land area (2011)

Neighboring countries: Malaysia, Singapore and the Philippines to the north; Australia and Papua New Guinea to the southeast.

Official language: Bahasa Indonesian

Officially recognized religions: Muslim (more than 80% of the population), Catholicism, Protestantism, Hinduism and Buddhism

Population: Total population (in 2012): 246.9 million inhabitants and Population density (people per sq. km of land area): 134.6 (in 2011)

Rural population: 48.6 % of total population (2012) (WorldBank, 2012a)

The economy:

National currency: Indonesian rupiah (Rp.) (1 Euro= Rp.13626.71 on 26/07/2013)

GDP: US\$ 878 billion, GDP per capital: 1731.65 US dollars in 2012 (WorldBank, 2012b)

Main natural resources: mining “Ore” (deposits of nickel, copper, gold, oil and gas)

Main agricultural resources: Palm oil, rubber, timber, rice, cocoa, coffee and tea.

1.1.2 Geography

Indonesia is situated on the equator. It's the largest populated archipelago in the world with a huge archipelagic extending 5,120 kilometers from east to west and 1,760 kilometers from north to south. It is divided into many islands, but only a few are inhabited. There are five main islands (Sumatra, Java, Kalimantan, Sulawesi, and Irian Jaya). The main archipelago was created through volcanic activities, and there are many volcanoes on the islands. The volcanic origin has a great impact on the terrain and the characteristics of the soil. Figure 1 shows a large mountain range along the west coast of Sumatra and the south coast of Java as shown in the figure1. (Bonnart, 2008)



Figure 2. Topography of Indonesia

1.1.3 The Indonesian Forest

In during 1950s state-forestry land covered almost 70 percent of Indonesia's total area. In 2005 forest in Indonesia covered 88 million hectares or 48.8% of Indonesia's total area. Indonesia lost more than 1 million hectares of forest each year during the 1980s and 1.7 million hectares annually during the 1990s, mainly in Sumatra and Kalimantan which link to on the arrival of transmigration programme which move to population from the Java and bali to the island less population. In 2000 to 2005 the area deforested reached 1.87 million hectares (Bonnart, 2008). Furthermore, according to Indonesia country report on forest area has mentioned that in 1990, the production forest is 623,420,000 ha and decreased to be 496,800,000 ha in 2010. Protected forest also decreased from 243,010,000 ha in 1990 to be 226,670,000 ha in 2010 (FAO, 2010).

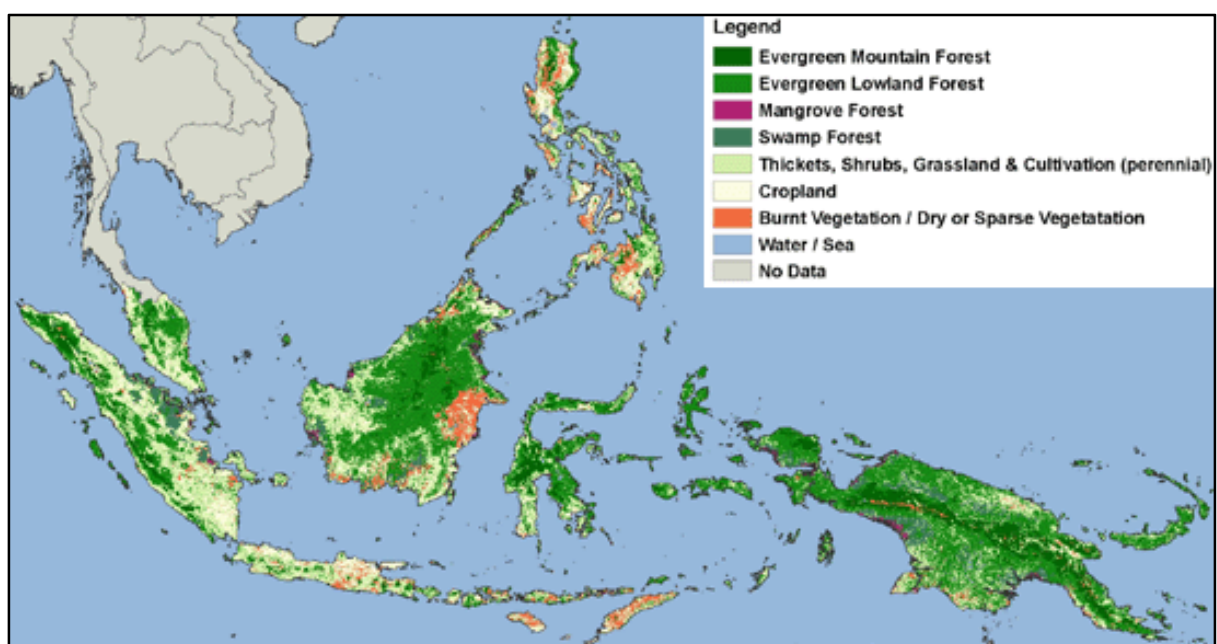


Figure 3 Forest Cover Map of Insular Southeast Asia (1998-2000)

Source: Joint Research Centre, Land Resource Management Unit (Stibig, 2003)

1.2 History of Indonesia

1.2.1 Colonial era

Beginning of the 16th century, successive waves of Europeans (Portuguese, Spanish, Dutch and British) arrived in Indonesia for the spices trade. In 1602 the Dutch established the Dutch East India Company. For two centuries it maintained a monopoly over the spice trade, also trading products such as ivory, coffee, pepper, timber and numerous forest products. After the dissolution of the company in the early 19th century, the Netherlands progressively took over the administration of the archipelago, first through local Sultanates and then by direct administration at the beginning of the 20th century (Bonnart, 2008). The first Transmigration program put in place by the Dutch colonization, based on Nucleus Estates and Smallholders scheme the aim is to move the densely populated areas to less population area of the country (Feintrenie & Levang, 2009).

In mid 19th century there were several different natures on the development of native peasant agriculture. The number of commercial crop produced by native peasant increased after the introduction of other crops, such as cassava, indigo, cotton, coffee, tea, tobacco, and then rubber. The expansion of native peasant export agriculture could be divided into four categories. The first category is the continuation of the export crops agriculture, which already established before the introduction of compulsory cultivation and the development of big plantation. The second category is the cultivation of export crops by local people in heritage to the compulsory cultivation introduced by the colonial government. The third category is the establishment of small-scale export crop agriculture as an impact to the development of surrounding big plantations or government policy. Final category is the creation of small-scale export agriculture in respond of local people to the new economic opportunities and the world market (Purwanto, 2002).

1.2.2 Independence and the Sukarno Period (1945-1965)

This period is the period of no freedom and transmigration centralized from Java to the island less population which is no possibility to refuse for the local people. In 1965, Sukarno as a president of this period had set a target of moving 1.5 million people per year to other island which equivalents to Java's annual increase in population at the time. (Fearnside, 1997)

On the other hand, after independence in 1948 the state still controlled land and natural resources and had the right to allocate land for any purpose. The difference between colonial and post- independence policies was the position of the state. State was the land owner in the colonial agrarian policies. With it opposite in the post-independent policies the state was not the land owner; land was owned by "the nation". The state represented the nation in its control over non-private land only. Therefore, after independence the land was legally divided into private property. Furthermore, state land categorized into two types of land which based on what it was used for such as forestry land and non-forest land (Bachriadi, 2009)

The Basic Agrarian Law (1960)

The Basic Agrarian Law (BAL) in 1960 is considered as a key-step in the implementation of the Indonesian Constitution. This is one of the laws which providing the stronger basis for customary right protection. Furthermore, while recognizing customary right Basic Agrarian Law confirms the constitutional right of the State to control all unclaimed land and resources. Customary right nominated in the law as “*ulayat*” rights under certain conditions. In fact, *ulayat* rights are applicable on the lands that are not owned by the State, as long as they do not interfere with national interests (Clerc, 2010).

1.2.3 Suharto and the New Order (1965-1998)

Suharto’s New Order which was born from the suffering of the mid-1960s leaded in a new era characterized by both depoliticisation of Indonesian society and sharp economy growth which lasted until 1998. The debatably on policies especially those relating to forests during the New order marked the single most important turning point in the history of forest management in Indonesia. New Order offered much greater political stability than the Soekarno regime and enabled the economy to boom. It was further marker on the oil crisis in 1973 which saw oil shoot up in its percentage of Indonesia’s exports from 30% in 1966 to 74% in 1974. Consequently Suharto progressively increased his control over Indonesia’s oil industry as he did other main economic sectors of the country (Singer, 2009)

The Basic Forestry Law (1967)

During the period of New Order the Basic Forestry Law (BFL) placed all recognized forestry land (approximately 75% of all land) under the planning and regulation of the state. Officially this law is removing the customary rights. This created the National Forest Estate which divided the forested land into 3 categories: conservation, protection and production forest. The land administration under the authority of the Ministry of Forestry and the other is under the National Land Agency (Singer, 2009).

Indonesia’s “Green Revolution” and Rubber Project

The main achievement of the Green Revolution in Indonesia as well as Asian countries has been increase in grain production especially rice production. During the green revolution the experts attributed to seeds and chemical inputs only. Increase in production is not sustainable over a long period. Therefore, Indonesia achieved only for ten years during 1979–1989 on the real increase in production of up to 3.52 percent per year. Since then, total rice production growth has declined to 1.04 percent per year. Indonesia was acclaimed by the Food and Agriculture Organization of the United Nations (FAO) for attaining rice self-sufficiency in the 1980s but the country has had to import rice again since 1994 (Jhamtani, 2010)

Primary Cooperative Credit for Member (KKPA)

Indonesia followed a joint venture scheme between companies and smallholders called a Nucleus Estates and Smallholders (NES) scheme. In the late of 1970s this scheme introduced

in Indonesia as Perkebunan *Inti Rakyat* (PIR) by the transmigration program. The first PIR were based on rubber plantations, followed by oil palm schemes in the 1980s (Levang, 1997). The PIR scheme was perfect for large oil palm companies to benefit both from low cost labour composed by transmigrants and huge areas of state forest approved by the government. At the end of the 1980s, a new policy emerged with the creation of the 'Primary Cooperative Credit for Members' scheme, *Koperasi Kredit Primer untuk Anggota* (KKPA) which is involved a similar structure as the PIR scheme, including a partnership between a company and smallholders grouped in cooperative and bank under supervisor from the government. Farmers entrust their land to company which plants management and harvest the crops. The landowners are paid a percentage of harvest revenue after deduction of plantation installation costs. The local government participate on the process of facilitation on the discussion between farmer and company. The banks keep land titles as collateral and the company is responsible for collecting the repayment from the farmers. All charge of services adds to the farmers' debt. The land taken over by the company constitutes the Nucleus of the plantation in the opposite to the plasmas made up by all the smallholdings participating in the revenue. The proportion of this system in term of land area is commonly to characterize the type of NES contract. Furthermore, the KKPA is not only the local villagers participated it's associated with a transmigration project. The KKPA made local population and transmigrants benefit from a scheme (Feintrenie, Chong, & Levang, 2010).

1.2.4 The *Reformasi* era (1998-present)

The developments which occurring during the Suharto rule were often unfavorable to local smallholders and communities. The fall of Suharto in 1998 and following '*reformasi*' period changed significantly in Indonesia with build up community's rights and the ability to resist land development (Feintrenie & Levang, 2011). On the other hand, decentralization is one of the main *reformasi* era which begin in late 1990s. Three levels of governments (state, province and district levels) now share authority over natural resources in a complex legislative framework. There is a constant debate over who has the authority and responsibility to manage natural resources, especially forested land and forest products (Feintrenie & Martini, 2010). Moreover, political change in *reformasi* era brought a wave of independence sentiments to many of the forest areas and a return of the concept that local communities should benefit more from the use of local natural resources (van Noordwijk, Mulyoutami, Sakuntaladewi, & Agus, 2008).

In 2000, the concept of regional autonomy was adopted following the pass laws 22/1999 and 25/1999 which based on these laws the *Kabupaten* (district level) is the main level of the decentralized government and have more authority and responsibility to manage natural resources. The country is divided into several administrative levels: State, province, district (*kabupaten*), sub-district (*kecamatan*), village (*desa*) (Feintrenie & Martini, 2010). In 1999 is end of transmigration national program. Nevertheless, there still have transmigration projects in some areas which coordinated under new regional management (districts or provinces). As a consequence, several transmigration project sites have been selected since 2000. The system still follows the Nucleus Estates and Smallholders model, mainly under KKPA

scheme with rubber and oil palm plantation. Some case the Migrants come alone and the other case they arrangement between two provinces for example Jambi and a province from Java, which they share the costs of their travel. (Feintrenie & Martini, 2010).

1.3 Oil palm and rubber development in Indonesia

1.3.1 History of oil palm in Indonesia

The oil palm (*Elaeis guineensis*) originates from the tropical rainforest of West Africa. In 1848, the first oil palms were planted in the Kebun Raya Botanic Garden in Bogor, south of Jakarta. In the beginning of the 20th century the first palm oil plantations has developed in the east coast areas of Sumatra and smaller extent on Java under Dutch administration, while the tree was cultivated successfully in this area in large plantations, the native population did not replace their coconut palms with this new palm species. They planted it only for decorative purposes (Budidarsono, Susanti, & Zoomers, 2013). From 1914-1942 Indonesia dominated the world market for palm oil, with 44 % of the total global production, and exporting 90 % of this amount. However, during the Japanese occupation in 1942-1945 the number of product units was decrease and the share of the international market fell to 24 % (Johansson, 2008).

After WWII restoration of destroyed plantations began, but the oil palm plantations stagnated during the struggle for independence 1945-49 and the years following, when politics of isolation would not allow foreign investment into the industry. In 1967 the total area used for oil palm plantations was still 106 000 ha. During the rule of the Suharto-regime changes in regulation and policy were made the expansion of palm oil industry and the areas subjected to plantations. In 1979 the Nucleus Estate and Smallholder (NES) program was taken into account of development (Johansson, 2008). The national transmigration programme was officially closed in 1999, with the end of the Suharto regime (Feintrenie & Martini, 2010).

1.3.2 Oil palm development in current situation

Indonesia is taking advantage of current situation of emerging global market for biofuels, as are many developing countries. The country has extensive oil palm plantations and now is the world's leading producer of crude palm oil (CPO). In 2009, Indonesia produced 20.9 million tonnes of CPO and in 2012 the country produced 28 million tones of CPO (Figure3). On the other hand, as a consequence of high demand on palm oil products, both domestic consumption and abroad markets such as China and India has encouraged the Indonesian government to support oil palm plantation expansion in various parts of Indonesia. In 2009 the Indonesia government estimated that oil palm covered 7 million ha which means that 60% is in the form of large-scale plantations, and 40% is owned and managed by smallholders. In 2010, the total plantation area reached 7.8 million ha. The most plantation concessions have been given out in Kalimantan and Sumatra. By 2011, nearly 11 million ha of land had been allocated for oil palm estates on these islands (Caroko, Komarudin, Obidzinski, & Gunarso, 2011)

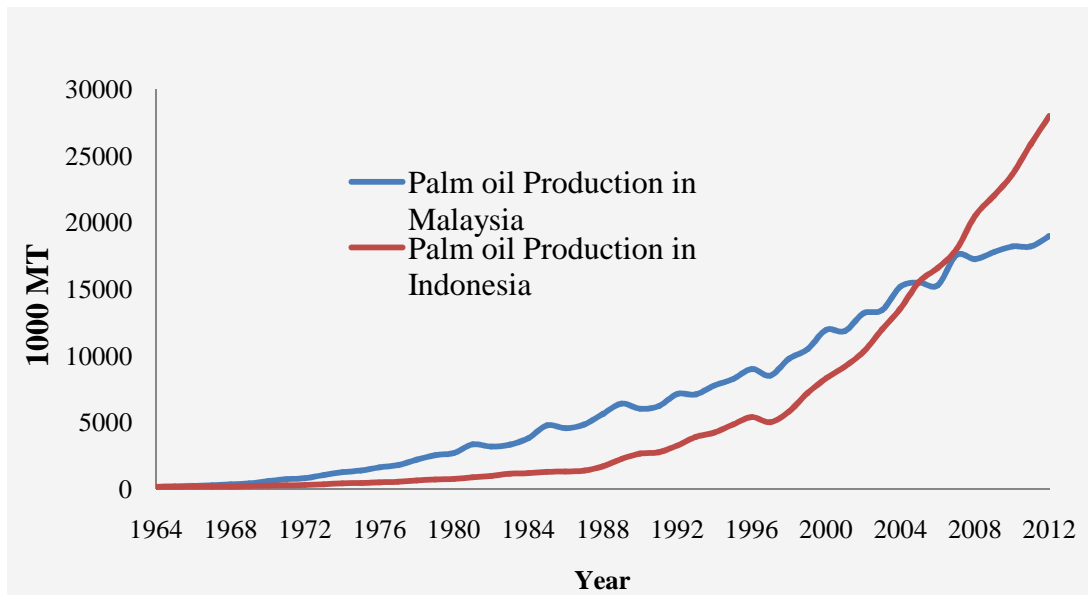


Figure 4: Palm oil production in Indonesia and Malaysia from 1964-2012

Sources: United States Department of Agriculture

On the other hand, because the oil palm is a controversy for sustainable development in March 2011, Indonesia government officially launched the Indonesian Sustainable Palm Oil (ISPO) standard which put forward into the degree No.19/Permentan/ OT.140/3/2011 of the Ministry of Agriculture's degree. The standard is designed to make palm oil production sustainable which agrees with the Indonesian laws and regulations. ISPO standard comprise 7 principles, 39 criteria and 128 indicators covering licensing and plantation management, cultivation and processing, environmental monitoring and management, labor, social and economy empowerment, and business. Some of these aspects may overlap with the RSPO's standard comprising 8 principles, which focus on transparency, compliance with applicable laws and regulations, economic and financial viability, best agriculture practices, environmental and conservation of natural resources and biodiversity, labour and nearby communities, responsible development of new plantings and continuous improvement in key activities. There are several reasons that Indonesian government established this new standard because RSPO is quite a large organization and it is a voluntary organization, the achievement can be slow. Moreover, industry representatives expressed disappointment over the inability of RSPO to assure the international market of Indonesia's commitment to sustainability (Caroko, et al., 2011). At the present, there is only the big company can get the RSPO certification so how can smallholder participate on this? The way to make smallholder participate on the sustainable and be able to reach the RSPO's certificate is to set up the specific criteria for the smallholder. Therefore, RSPO has set the criteria for the smallholder and start from a "group certification" (RSPO 2010).

1.3.3 History of rubber development in Sumatra

Rubber (*Hevea brasiliensis*) was brought from Malaysia to North Sumatra, in Indonesia, by the Dutch at the end of the 19th century. It was originally planted in private estates and

following the British example in western Malaysia. Rubber was first introduced into estates in North Sumatra in 1910 and later 1920 Chinese traders spread it into the south. The first seedlings were introduced to Borneo in 1882. The trees spread quickly into the Kapuas basin, the main river basin in West Kalimantan.

Rubber management estates in the Dutch administrative were very intensive, with fertilizer applications and continuous weeding, requiring much labour and capital. Therefore, local farmers rapidly recognized the opportunity offered by rubber production and began to collect seeds from nearby estates to plant in their own fields. This technique is low labour request and capital. Farmers cultivate rubber interrupted with their upland rice and their swidden field. They ended up with between 300 and 500 productive trees per hectare. Later on the cultivation system of the Indonesian farmers soon became known as *jungle rubber*, because they considered it as basically a swidden fallow enriched with rubber trees. Agroforests introduced a new concept unknown in swidden cultivation. it is concept of productive capital. With the introduction of perennial crops all the plots near villages were converted to agroforests. This expansion consequences increase labour needs. Therefore, migration from Javanese and Chinese were hired for the rubber tapping. This boom was until 1928 the global financial crisis. Even the farmers and labour were facing with the problem of financial crisis but they still keep continue plant their rubber.

In 1979 and 1980, the government launched two new projects. The Nucleus Estate Project (PIR in Indonesian language) this projects were developed for transmigration areas where migrants were being settled in virgin areas as Sumatra island, and the other project is Project Management Unit (PMU) such as Smallholder Rubber Development Project. These projects were designed for established local farmers. In this period farmers began planting rubber trees in rows within jungle rubber to make tapping easier and to improve returns to labor. Since the mid-1980s, farmers have been selectively slashing weeds once a year, conserving timber, fruit trees, and other valued species such as rattan. Farmer weeding 6-12 times per year therefore this makes the rubber trees be able to tap in the sixth to seventh year instead of waiting until 9-10 years which is normal in Sumatra (Penot, 2007).

1.4 Study area “Bungo district”

1.4.1 Overview

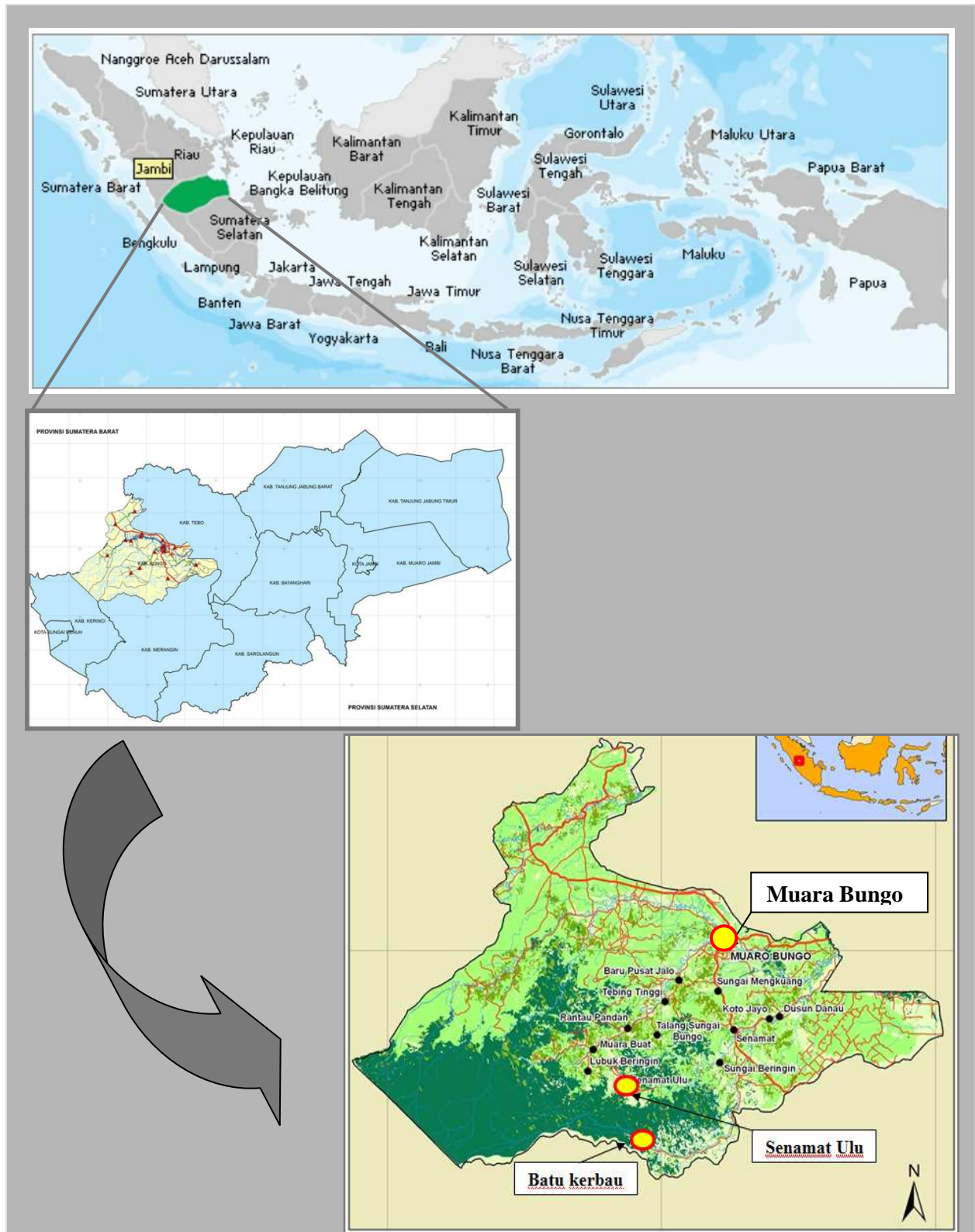


Figure 5: Location of Bungo district and studied villages

Several national parks of high biodiversity conservation value surround the district: Kerinci Seblat National Park in the south, Bukit Duabelas National Park in the southeast, and Bukit Tigapuluh National Park in the north. Rubber agroforests and secondary forests along the riparian zone offer a potential connection between protected areas in the region, but forest and rubber agroforest are not the most profitable land covers and are threatened as people seek better livelihoods (Feintrenie & Levang, 2009)

The first valorization of natural resource in Bungo was hunting and gathering, followed by swidden cultivation of upland rice. The forest was converted into rice swiddens, alternating with bush fallows. The industrial revolution in Europe and North America in the beginning of the 19th century created a demand for rubber. Therefore, to supply the demand of the this new market opportunity, farmers introduced rubber seedlings in their swiddens fields. Moreover, farmers progressively converted their swiddens into rubber agroforests in the beginning of 20th century. Increased demands for rubber and reduced access to forests make the farmer to intensify their practices and to convert their agroforests into rubber monospecific plantations. During the past 30 years, the forest cover in Bungo decreased from 70 % to less than 30 % of the district's surface area. The rubber improving seedling such as the clonal rubber and rice improved seeds have distributed by the public development programmes.

1.4.2 Geography

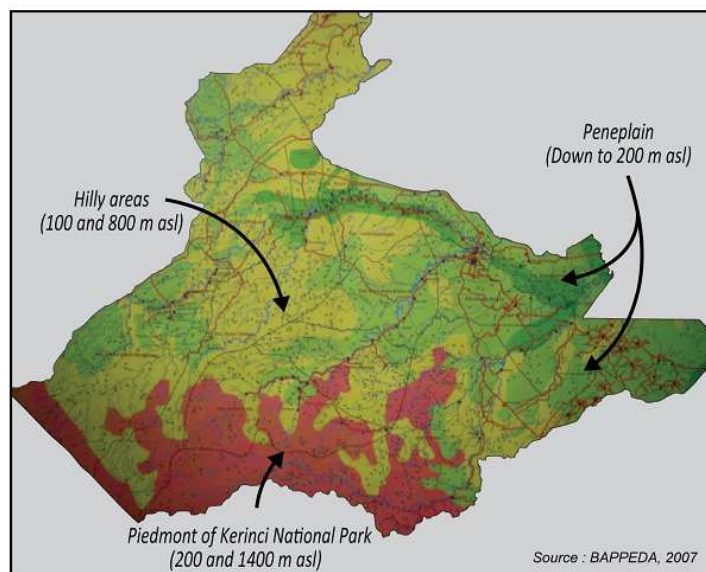


Figure 6: Topography of Bungo district

Bungo district is located in the western part of Jambi province, geographically between 101°27 – 102°33 east longitude and 1°08 – 1°55 south latitude. The area is 716,000 hectares in the lowland area in the centre of Sumatra Island. The topographic condition comprises plain land and hilly areas in some places. This condition is suitable for cultivation and agriculture, animal husbandry, fishery, trading and industry as well as tourism sector (PIDII, 2005). The district was formed in 1999 when Bungo-Tebo district was divided into two administrative units. Bungo district is divided into 17 subdistricts and 124 villages.

1.4.3 Geology

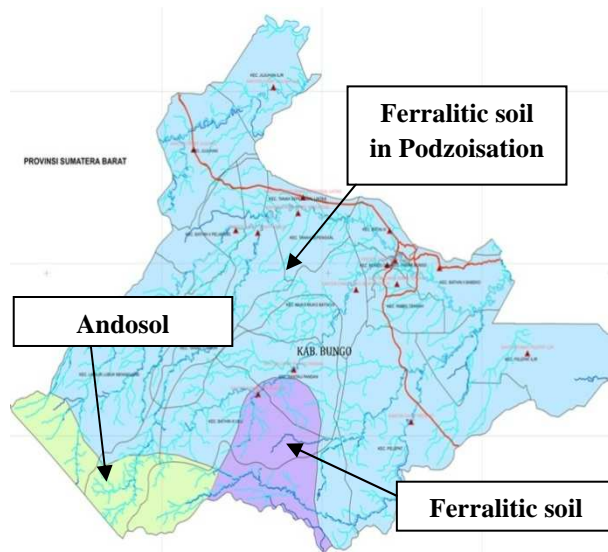


Figure 7: Main soil type in Bungo district

Bungo district has three different soil types (Figure 6). The main type is ferralitic soils it's also called ferralsol. Ferralitic soils are well-developed soils with a large amount of kaolinite and oxides (iron and aluminium). Ferralitic soils are classified as moderately differentiated. This kind of soil develops in strongly weathered parent materials such as granite. On sloping land, this type of soil is sensitive to erosion. Andosols are highly porous, dark-coloured soils developed from parent material of volcanic origin, such as volcanic ash. In the Bungo area this soil type is located of the Kerinci Seblat National Park.

1.4.4 Climate

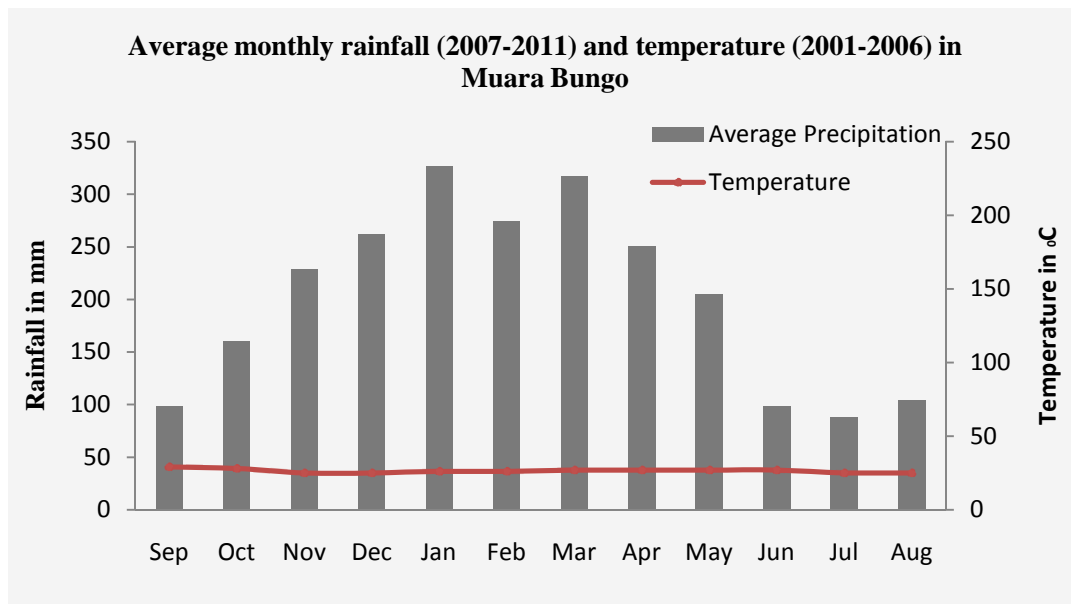


Figure 8: Rainfall and temperature data in Bungo district

Source: Rainfall data from ICRAF, 2013 and Temperature from Bonnart, 2008

Bungo district has tropical climate where weather temperature ranges between 25.8°C to 26.7°C. Rainfall intensity reaches 3,000 mm/year with total number of rainy day 176 days or 15 days/month. In average rainfall is 200 mm/month. Therefore, water supply is not a limiting factor for vegetation growth. Two seasons can be defined: a “wet season” with higher rainfall (250 to 500 mm/month) between September and February, and a “dry season” with lower rainfall (less than 250 mm/month) between March and August.

1.4.5 Forest cover in Bungo district

The quality of timber and non-timber forest resources in Bungo District has continued to decline. According to the analysis of satellite imagery by a team from Indonesian Conservation Community – Conservation Information Centre of Jambi and the World Agroforestry Centre (ICRAF) in 2005 showed that forest cover in Bungo District was only 30.63% in 2002 compared to 42.78% in 1990 (Yuliani, 2006).

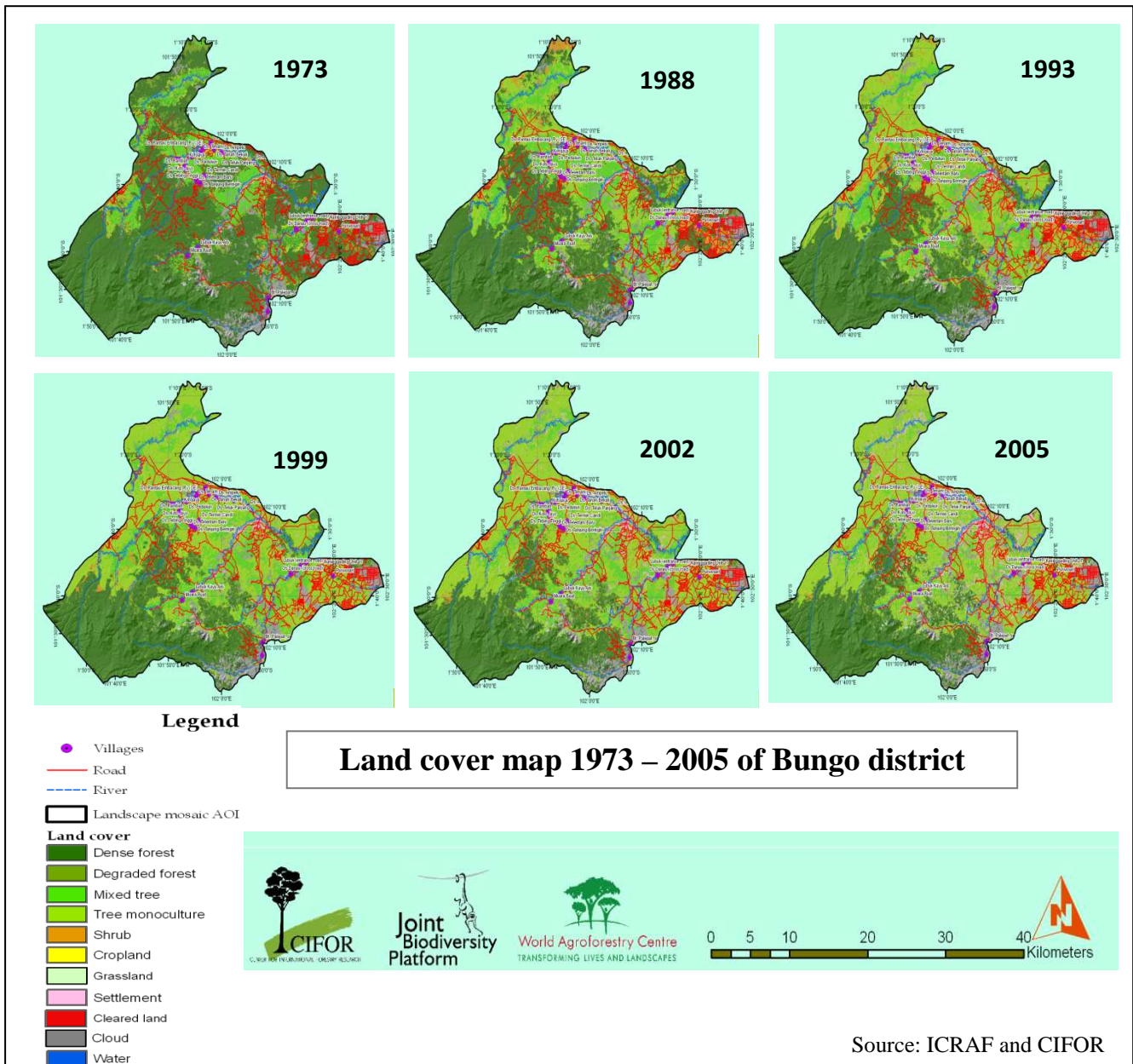


Figure 9: Land cover map 1973-2005 of Bungo district

Land cover maps in figure above clearly show that the landscape of Bungo district is currently dominated by monoculture tree-based plantation. From 1999, monoculture rubber had largest areas followed by oil palm plantation.

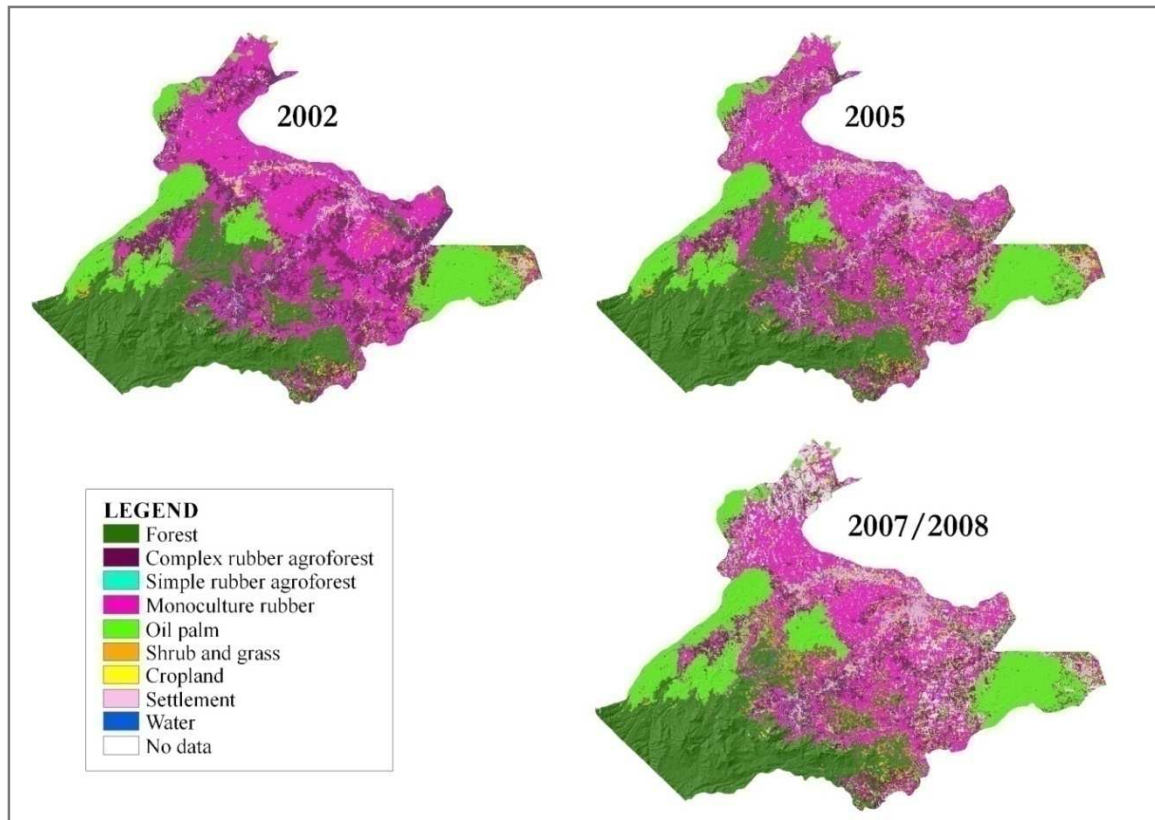


Figure 10: Land cover focus on the expansion of rubber and oil palm plantations

Source: (Yuliani, 2006)

Rapid expansion of oil palm took place in 2005 and 2007/08, whereas expansion of rubber monoculture seems to be slowing down. In 2007/08, most areas in the west and eastern parts of Bungo are dominated by oil palm plantations. Since most of the oil palm plantations are managed by large scale companies. The landscape configuration is dominated by a compact homogenous area, mostly located in significant distance to settlement. Furthermore, large area of forest in the southern part of the district is mainly stable because that area is the under the Kerinci Seblat National Park. Nevertheless, smaller plot in the peneplain area are clearly degraded. Land cover that replaced forest includes bush and grass, which can be an indication of logging activity or an initial stage of conversion to tree-crop mono plantation.(Yuliani, 2006)

In Bungo district, as in many places in Indonesia, most forested lands are state owned, despite long-term historical use of the land by people and traditional customary tenure rights. According to the customary rights, forests are under common property tenure. Cultivated lands, including agroforests and plantations, have private status in the customary law. The customary law on land tenure states that ownership of a plot belongs to the first person who has planted this land with trees or cultivated it with annual crops. If the planted land is on a riverside, then all the land from the river to the summit of the hill above the river is reserved to the owner, others can harvest forest products until the land is planted but can no longer slash and plant it.

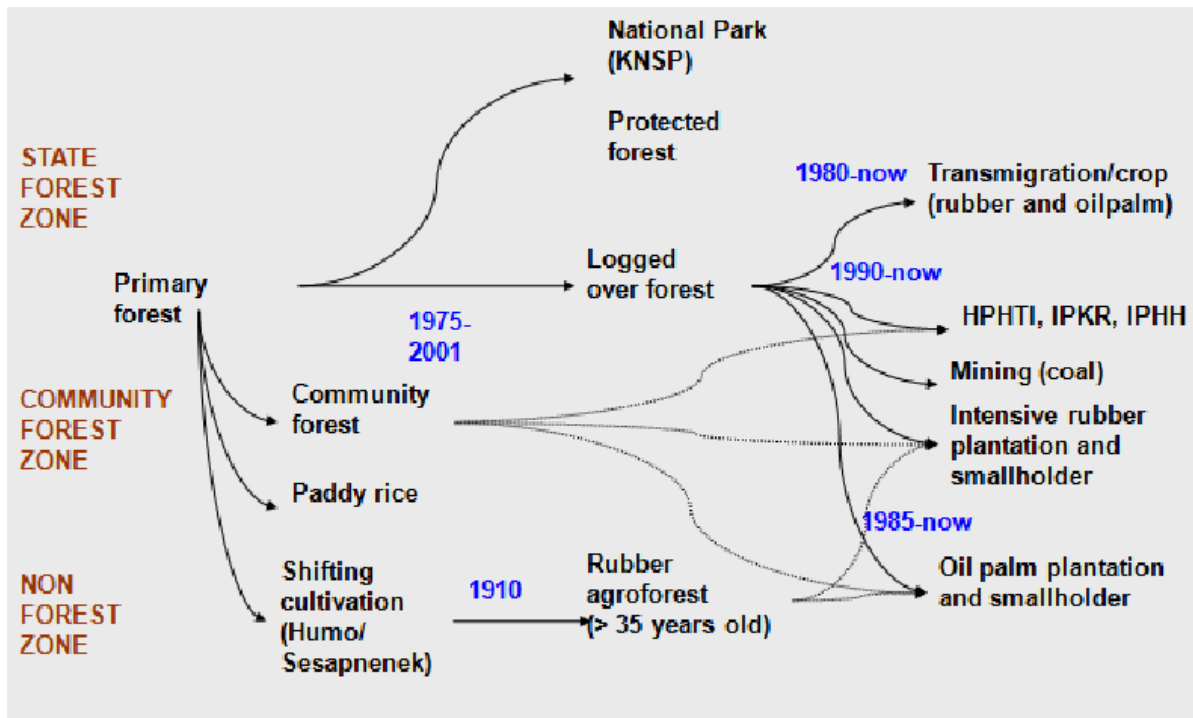


Figure 11. Land-use/-cover trajectories in Bungo district, Jambi province based on focus groups at the BAPPEDA office in Muara Bungo

Source: (Martini et al., 2010)

The evolution of the land-use and forest management in Bungo district had divided in three stages: state forest zone, community forest zone and non-forest zone. The status of use started from the primary forest to be community forest and paddy field at the status of the community forest zone and shifting cultivation as the swidden field in the non forest zone. Since 1975 the state forest zone had status as the National Park and protected forest. In the 1980s this zone has change to be crops plantation rubber and oil palm for transmigration programme. On the other hand, the non forest zone changes to rubber agroforest in 1910s and later to convert the land to be the oil palm plantation and rubber monospecific plantation and smallholder.

2 Theoretical framework and Methodology

This part is going to presents the theories and concepts that this study has based on for the analysis. First, presents theory on the socio-economic analysis then following by the stakeholder analysis and the participatory prospective analysis. Furthermore, methodology of conducting the survey and analysis of three parts socio-economic, stakeholder and participatory analysis are presented.

2.1 Theoretical framework

2.1.1 Socio-economic analysis

The socio-economic is based on the theoretical of agrarian system diagnosis as the methodology for analysing cropping system and family farm agriculture. To understand the farmers' strategy, socio-economic analysis has raised questions to understand reason behind their practices, what do farmers do? How do they do? Why do they do? Why farmer combine several activities together. Why do they change from this crop to other crops? the interaction between various interests and farming never stops changing. because of those interaction is permanently evolving often faster than one would imagine (BARRAL, TOUZARD, FERRATON, RASSE-MARCAT, & PILLOT, 2012).

Mazoyer said that: *"a mode of exploiting the environment historically created and sustainable; adapted to the bioclimatic conditions of a given space and responsive to the social conditions and needs of that moment"* Several production systems together and the interactions between them make up an agrarian system. (FAO, 1999)

Therefore, to understand the farmers' strategy the landscape analysis and historical approach was identified in this study. This landscape analysis is described the farm's biophysical environment, forest, soil and local geology. These criteria compare with the socio-economic factors which can help to understand why farmer practices and choose certain kinds of crops and also understand why the farmer in the same area do the agriculture in different practices.

Furthermore, *James Gustav Speth*, administrator of the United Nations Development Programme and chair of the U.N. Development Group in 1993 to 1999 also has mentioned that:

"Sustainable agriculture development will not merely come from introducing better crops, new cattle breeds, more credit or rural cooperatives, as important as these may be. Rather, it is achieved by farmers working in very specific farm-household system. It must be based on the tasks, need and aspiration of the farmers themselves and on the dynamics and constraints they face, not only in their farming but also their domestic and non-farm activities"

Therefore, based on two theoretical above this study is follow the step of agrarian system and understand the farming strategy which farmers manage and diversity their farms.

2.1.2 Stakeholder analysis

A word “stakeholder” has assumed a prominent place in public and nonprofit management theory and practice in last two decades. R. Edward Freeman, a professor who is work Strategy Management: A stakeholder Approach in 1984 have defined s stakeholder as “any group or individual who can affect or is affected by the achievement of the organization’s objective (Bryson, 2004). Furthermore, in the stakeholder analysis the power versus interest grid are needed to help determining which players’ interest and power must be take into account of agriculture development. This power and interest grid must show that who is playing the important rule in the agriculture development in the study area.

2.1.3 Participatory Prospective Analysis (PPA)

What is “forecasting” and “foresighting” what is PPA?

Forecasting is prevision and is usually work to estimate what would happen to a given issue over time or to make predictions about differences among people, firms, or other objects. **Foresighting** is the consideration of alternative futures and the design of related actions to achieve a preferred goal. Furthermore, foresighting is almost always associated with a joint process where different people work together either in the production of the outcome (participatory action) or in the discussion of the results (participatory reaction).

According to (Bourgeois & Jesus, 2004) which have mention states of prospective analysis is “A method applied to the problems of systems where specialists can join with decision makers in order to regroup in concerned way different available approaches” Therefore, in this sense prospective analysis is a tool used to generate a new kind of knowledge. This is not what the future will be, It is about the possible future based on the present situation. This kind of knowledge can be as the foreknowledge which it’s about how and why the future may take various aspects and what these aspects are. This foreknowledge plays two roles: first is used to prepare strategic actions for instance, what should be prepared if this or that happens? The other role is it can be used to discover whether changes are necessary today? And what might be improved regarding to the current situation?

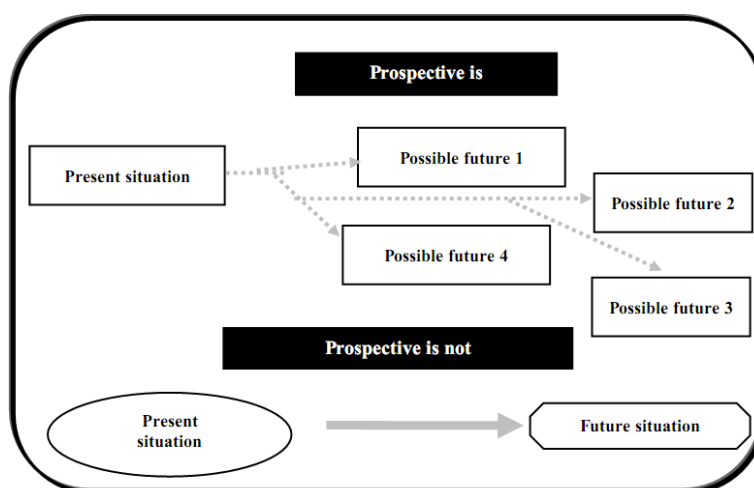


Figure 12: Prospective is not the prediction (Bourgeois & Jesus, 2004)

The objective of the workshops is to open the chance for the local experts to discuss and share their issues and find out their possible future. On order to have a good result on the PPA workshop, choosing the participants is one of the main factors because participants as a local expert are the person who decides the possible future.

2.2 Methodology

This study “Agriculture beyond the oil palm development in Jambi province, Prospective analysis” has divided methodology into four 4 parts: (1) preparation of the field survey, (2) landscape and historical analysis to understanding of cropping system and farming strategy, (3) stakeholder analysis and (4) Participatory Prospective Analysis (PPA).

2.2.1 Preparation of field survey

Learning the Indonesian language was needed. A 60 hour course in the Indonesian language was taken to enable communication with villagers in the district; this was followed by the ‘learning by using’ approach. Due to this training, it was possible to interview local stakeholders without an interpreter in two villages and communicate with line agencies in Bungo district.

Literature review: A literature review of Indonesian agroforests, oil palm plantation (smallholder and companies), land use change and forest managements was reviewed, with particular reference to Jambi province in Sumatra which have been conducted since 1990s by CIRAD, IRD, ICRAF and CIFOR For example, the articles written by Laurene Feintrenie “*Sumatra’s rubber agroforests: advent, rise and fall of a sustainable cropping system*” and “*Why do farmers prefer oil palm? Lessons learnt from Bungo district, Indonesia*” and other article written by ICRAF team “*Improving smallholders’ rubber quality in Lubuk Beringin, Bungo district, Jambi province, Indonesia*”.

2.2.2 Landscape and historical analysis

Landscape: this step is necessary to know the environment in order to understand how it is used and transformed by local societies and understanding on the cropping system and farming strategy. This landscape analysis aims describe the farmer’s biophysical environment, identify the unit that make up the landscape and describe the ways that farmers adapt with their environment. There needs to be an interactive process, a back and forth between two levels of observations: (1) overall observations made by walking to a high point and map readings to get an overview of the area; and (2) localised observations made by travelling through the area to collect detailed field data in many different locations (rubber, oil palm, cocoa, lowland rice and upland). This should enable the observer to:

- identify the main units in the landscape, homogenous areas in terms of environmental conditions and land use;
- carry out detailed observations that allow the different elements of each landscape unit to be described.

These information can then be presented transect of the villages.

Historical analysis: from one generation to the next, farmers have shaped the lands where they work and how can they managed? This historical analysis based on interview the oldest farmers who are long term settle in the village the interview is focus on land use and agriculture of the village change. Later, interviews with younger farmers who can also prove essential to obtaining finer understanding of more recent events which older farmers are less in touch and don't remember. Focus on the land use change, it's important to focus on the type of land use, the species and variety were used in the field, location in the landscape, tools that farmers used and soil fertility maintained. Furthermore, try to get the information on the farming structure, diversify of the farm, and access to the land and also the relationship of the people in the village such as labour, land ownership.

The typology: this based on farming system and cropping system (the diversity of their farm). The sampling is chosen for representing the variety of agriculture practices such as oil palm, rubber and rice. Furthermore, groups discussions were conducted in two villages.

Household interview: before doing the deep individual interview the focus group discussion were conducted, one group discussion in each village which discuss on the land use, agriculture practices and the arrival of oil palm companies. There are 7- 9 participants in each village (2-3 women participated). After the group discussion the individual interviews were conducted which based on the household characteristic and cropping system (oil palm, rubber agroforest, rubber nonospecific plantation and rice). The data collection in the field took three months. Socio economic have done the interview 47 households which 17 interview for the first village (Senamat Ulu) and 24 interviews in the second village (Batu Kerbau) and 6 interviews oil palm plantation smallholder in Baru Pelepat villages (village nearby) due to the two villages are still new for the oil palm plantations. Therefore, it's necessary to get the information of the oil palm long time development in village nearby.

Due to the fact that communication during the interview in local languages is difficult to understand therefore the interviewer has to go back to the farmers 2-3 times to get clear information and understanding. However, staying with local villagers is the best way to better understand and build a good relationship with the local villagers.

The socio-economic analysis which can help to understand the farming strategy was done by comparing cropping systems such as oil palm, rubber and paddy field. The calculation of oil palm and rubber mono specific plantation are calculated on partial cycles, not full cycles. The cycle starts from plantation until the mature stage at 12 years because these plantations are still new in the study area. So it isn't possible to have full cycle.

The plots that were surveyed to model perennial crops profitability:

Age of the plantation	Number of plots											
	1	2	3	4	5	6	7	8	9	10	11	12
Oil palm	21	21	19	16	13	12	10	9	7	5	4	3
Rubber monospecific	5	5	5	5	5	5	5	4	4	4	3	3
Rubber agroforest	25	25	25	25	25	25	25	14	14	14	14	14

The socio economic result aims to compare benefit returns to land and return to labour in the four different main cropping systems (oil palm, rubber agroforest, rubber monospecific plantation and rice). Economic analysis is based on cropping system and farming strategy which based on the function as follows:

Economic analysis Based on cropping system

The **Gross Added Value (GAV)** equals the total value of the given production, minus the costs of all the inputs or intermediate consumption such as seeds, seedling fertilizer, pesticide, gas and etc. that are used in one cycle of production (haiti, 1990).

$$GAV = \sum Pi - \sum ICI - \sum Di$$

With:

- $\sum Pi$ which represents the total value of the production of one plot , one commodity, one activity in general
- $\sum ICI$ which represents the total value of all intermediate consumptions used and destroyed for the production of the said plot , commodity, or activity in general.
- $\sum Di$ representing the sum of the depreciation of the various investments that were needed for undertaking that activity, each of them being calculated with regard of its life expectancy.

$$Depreciation^1 = \text{current purchasing price} / \text{number of years of actual use}$$

The **Net Added Value (NAV)** equals the GAV minus the depreciation of all long term investments that were necessary for achieving this activity. The NAV represents the wealth created in one cycle of production or the real value that is added to the pre-existing values by the mobilization of production factors during one cycle of production.

¹ In this study depreciation for the cropping is: 25 years for oil palm and 40 years for rubber.

NAV=GAV - Depreciation

The Added Value is used to compare the economic outcomes of different human activities with each other. This added value is then related to the land area or to the labour amount that have allowed that given production.

In this study we use this term as “**Return to land**” and “**Return to labour**” and which is hence calculated corresponds to:

$$\text{Return to land} = NAV / \text{land surface}$$

$$\text{Return to labour} = NAV / \text{total labour}$$

Return to labour: this criterion indicates the value added created by a specific cropping system. It allows comparing the economic efficiency of the labour factor between various cropping systems².

Net Added Value is a measurement of the wealth produced, but it is not the producer's income. The wealth produced is shared with other stakeholders such as tax, labour, land rent, money lenders (interests for the loans) therefore this study make the calculation which based on the farming strategy as follow:

Economic analysis based on the farming strategy

Economic analysis based on livelihood strategy is for a particular farming system, the gross remuneration of family labour or gross profit devoted to one activity is: Gross Family Income (GFI) minus the wages paid to employees for the work done on the cropping system.

$$GFI = (GAV - \text{wages paid to employees})$$

Similarly, Net Family Income (NFI)

$$\text{Net Family Income} = (GFI - \text{depreciation})$$

Family income: The added value is then decreased by the salaries distributed to the hired labourers. This criterion allows comparing the net return that families or stakeholders get from their investments, while taking into account the way the production was organized, by using more or less family labour or external wagers. It does not measure the efficiency of the cropping systems, as it is partly the results of social and economic choices external to the cropping systems. But it indicates the economic output resulting from farmers' livelihood strategies.

The Net Family Income can be related to the land or to the family labour used to produce the commodity.

² In this calculation the hired labour is not included in the costs. The added value is divided by the total number of days of work.

The **Net family Income per hectare** which is hence calculated corresponds to:

$$NPh = NFI / \text{land surface}$$

The **Net Family Income per working day** which is also calculated corresponds to:

$$NPw = NFI / \text{Family labour}$$

The income is usually composed of both monetary income (from the produce sold) and income in kind (which corresponds to home-consumption).

When the activities of a whole family are considered, the farm income can be supplemented by income from off-farm activities to build the **household income**

$$HhI = \sum AI_i$$

With: HhI = Household Income

AI_i = Activities Income

This income is therefore the remuneration for the labour invested by family members in the farming system. It must cover the biological and social needs of the entire people dependant on the working members of the family. Any surplus earned can be used to increase the family's standard of living or increase the farm's productive capital, or increase the family's capital by investing in things that are not immediately productive but will be when the farmers get older or when their children inherit the farm (Stephanie BARRAL, 2012).

2.2.3 Stakeholder analysis

This analysis is to understand the interaction and the role of each stakeholder play on the oil palm development such as 4 middlemen (1 in Batu Kerbau, 2 in Baru Pelepat and 1 middlemen in Muara Bungo), 4 seedling producers (3 in Baru Pelepat and 1 in Muara Bungo) 3 oil palm companies: PT. CSH, PT. PML and PT. SAL 2&3 were interviewed. The stakeholder analysis also uses the perception survey method. Interview were done with the local villagers in two villages, and the civil servants in Muara Bungo such as Planning and Investment Department (Bappeda), Statistic office and Plantation office (Dina Hutbun), three middlemen in the villages and one middleman in Muara Bungo. Furthermore, companies' managers of oil palm company also were interviewed. This people's perception survey divides in different ages 15-25, 26-45 and 46-60 years old and gender. Civil servants in Muara Bungo and academic at Bogor are interviewed. The perception survey is focus on the oil palm development with rise two questions: "who have the power in the oil palm development" and "who is interest or wish to have oil palm?" these questions have risen during the interview each category of stakeholder by give the value 0 means no interest and power to 4 means the most power and interest. The analysis is using Chi-test to test the significative of the samplings.

The category of stakeholder are based on the household characteristic in the villages as (1) household who are rich, (2) household in the medium and (3) household who are rang as poor

and new household. The government level divides into (4) central government level and (5) district government level, (6) head of the villages, (7) middlemen, (8) NGOs, (9) local investor, (10) seedling producer and (11) the oil palm company are included.

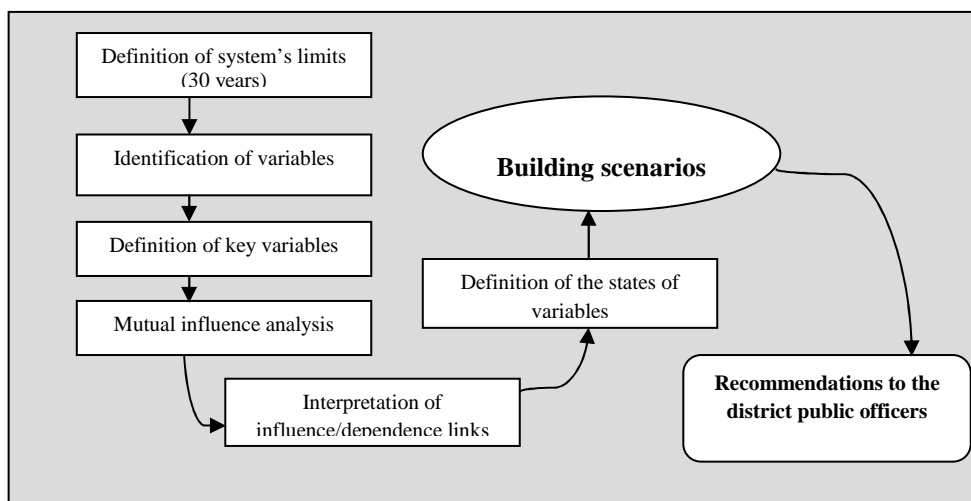
Category	Female	Male	Total
Senamat ulu	19	20	39
Batu Kerbau	18	20	38
Civil servant	12		12
Academic	15		15
Total			104

Table 1: Number of interview on people's perception survey

2.2.4 Participatory Prospective Analysis (PPA)

Participatory Prospective Analysis has held the workshops in two villages. The workshop was conducted in 4 working days in each village. The workshops invited the farmers as local experts to participate and discuss in their possible future. The way to select the farmers or local experts is based on the farmers who were interviewed during the economic analysis. The participants are representative of each stakeholder such as farmers who have oil palm, farmers who is a plasma smallholder, farmers who have rubber plantations, middlemen, head of the villages and women are also involved and I was a participant as a local expert in the workshop. However, the workshops have invited the representative of the public services such as Planning and Investment Department of Bungo district (BAPPEDA) and the Plantation office (*Dinas Husbun*) and the representative from the oil palm companies but all of them didn't come to participate in this workshop. The questions have risen during the workshop "what is the main issues regarding oil palm development in Bungo? and what might be improved? and how to improved it? What is the possible future for the oil palm development in Bingo district?

The workshop was followed the PPA method which started with definition of system's limits, then identification of variables, definition of key variables and so on which follows the flowchart (step of the PPA workshop) below:



After the system was defined and the situations was brainstormed to local farmers then it starts with the listing of the variables that have an influence on the constitution and evolution of the system, from their retrospective, present and future point of view.

After listing variables that local experts have raised, then they chose which variables to keep for discussion? The next step is to discuss the relevance of these variables then continue with the mutual influence analysis of direct influence/dependence links among variables. In the workshop local experts are invited to analyze the direct influence/dependence (I/D) links of each variable on the others, using a consensual valuation approach. The structural analysis method relies on direct influence assessment as a way to classify variables. Practically, influence assessment consists in a valuation of the direct influence of each variable on the others using a scale from “0 = no influence” to “3 = very strong influence”. (Bourgeois & Jesus, 2004)

Values are discussed among participants and, once agreed upon, they are immediately entered in the Influence/Dependence (I/D) matrix in the worksheet “Variables’ influence” already mentioned above and as indicated. Variables are scattered in four-quadrant space by two axes: “drivers”, “levers”, “marginal” and “output” variables. This figure is based on the weighted of the value of each variable. The results consist of the selection of a limited number of variables. The position of variable on figure shows that the upper-left quadrant (1) is the area of the driving variables where most of the strongest variables are present. The upper-right quadrant (2) corresponds to leverage variables, both influent and dependent. Some of them can be considered also as strong variables. The lower-right quadrant (3) corresponds to the output variables, very dependent and little influent. This In the lower-left quadrant (4) one will find the marginal variables. Little influent and little dependent, these variables behave rather independently from the system.

PPA workshop defined the scenario into 3 scenarios in each village. These three scenarios there is one scenario is the prefer scenario possible limit. The other two scenarios are the most difficult scenarios. After defined three scenarios the villagers as the local experts open the discussion to raise the recommendation to the public authorities.

3 Result

In this part presents the landscape and history analysis and cropping system of two villages. Then following by the economic results which show the land profitability analysis which based on the cropping system and farming strategy then presents the stakeholder analysis and people's perception. Finally, participatory prospective analysis (PPA) on building the scenarios of the village's economy in 30 years are presented.

3.1 The studied (villages)

The studied villages (Senamat Ulu and Batu Kerbau village) is including: landscape, history and evolution of the village, then presents the forest and land management and agriculture system of the villages.

3.1.1 Landscape

Senamat Ulu is located in the catchments area of the River *Bukit Panjang*. The river comes from the southern mountain next to the Kerinci National Seblat Park. *Bukit River* is a source of the river name *Batang Senamat* that runs through Senamt Ulu and flows to the Aur Cino village. The attitude of the village ranges from 500 to 1000m asl. In the northern part Senamat Ulu borders with the village Lubuk Kayu Aro, in the south with Pelepat, in the west is Laman Panjang and in the east Aur Cino village.

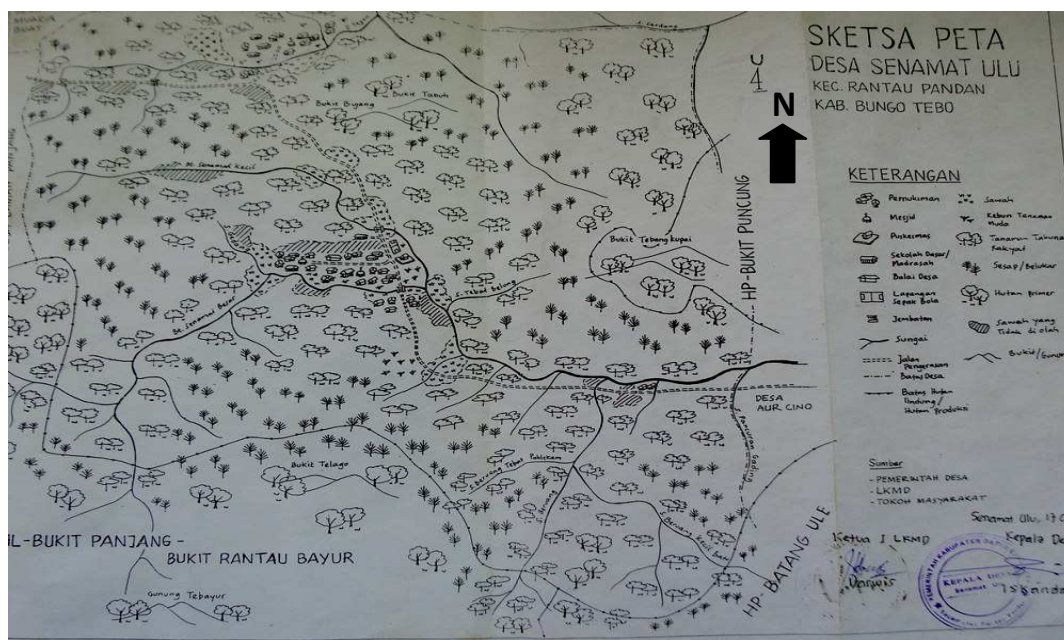


Figure 13: Senamat Ulu Map

Source: Narrative village conservation agreements, 1998 by Kerinci National Seblat Park.

There are 278 households in the village divided in 3 sub-villages which called in Indonesian language “*Kampung*”. The first *Kampung* is *Senamat ilir*, which is the main *Kampung* of this village. The second is *Saramat Mudik* which is not far from the main *kampung*. It is a 5 minute walk. The last *kampung* is *Tagan* and it's three kilometre away from the main *kampung*.

The village is settled in the flat plain area (lowland area) close to *Sungai Batang Senamat*. The river serves for sanitation, fishing and irrigation for the paddy fields. Moreover, the river is a good potential for the hydropower to generate the electricity through waterwheels.

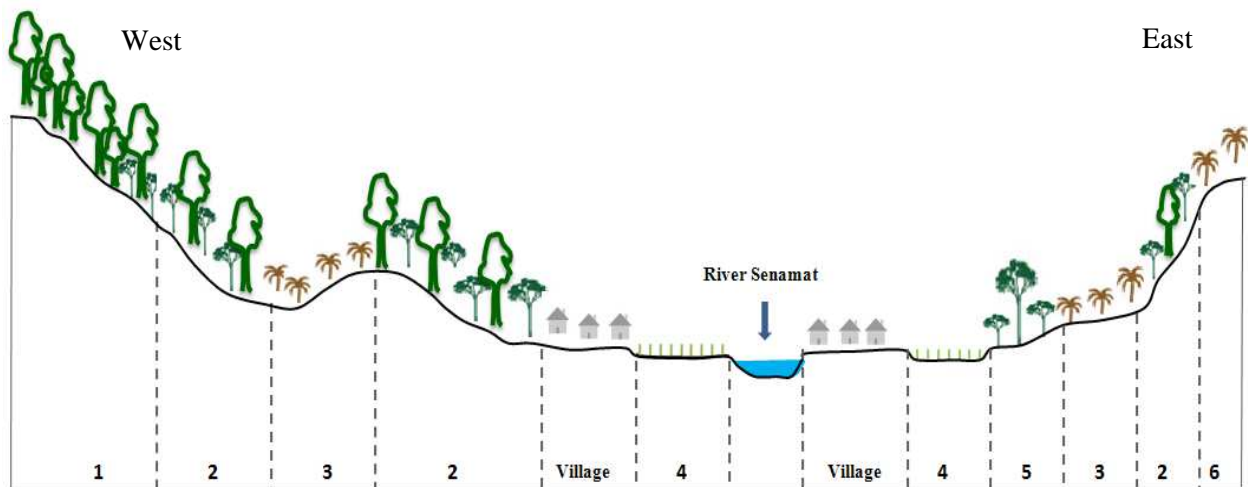


Figure 14: Transect of Senamat Village

	1	2	3	4	5	6
Name	Customary forest Hutan Adat dan Hutan Desa	Rubber agroforest	Oil palm smallholder plantation “Kelapa sawit pebadi”	Lowland rice	Rubber Mono specific plantation “clonal rubber” “Karet Kolasi”	Oil palm Company PT. CSH + SHM
Species		Rubber local seedling (Hevea brasiliensis) Durian Parkia Mangostan Sweet cinamon	Oil palm species: Malihat Intercropping : Cassava Sweet potato Chili Bananas	Variety “Laout” cycle for 6 months and the other is “Bawan” cycle of 4 months.	Clonal rubber and local seedling	Malihat Sopindo Tobad
Manage ment of fertilizer and weeding	Property of the villages	Organic fertilizer manual weeding+ herbicide	fertilizer Manual weeding + herbicide	Organic fertilizer manual weeding	Intensive Fertilizer and herbicide weeding + manual wedding	Intensive Fertilizer and herbicide weeding

Table 2: description of transect

Batu Kerbau is an old village located in the upstream of the Jambi River and Kerinci Seblat National Park buffer zone in Jambi Province. It is relatively isolated area because the dirt road is often impassable in the rainy season. The village is situated on the banks of the Pelepat River, the largest river in the region. The sources of this river come from *Danam Bento* at the National Kerinci Seblat Park. Attitude of the village is 500-1000m asl.

Batu kerbau has total area 45 000 ha. West limit of this village is National Kerinci Seblat Park (25 km far from the village). East limit is Baru Pelepat village and north limit is Desa Muara Buat Kecamatan Rantau Pandan and south limit is Merangin. The village is surrounded by the two oil palm companies.



Figure 15: Map of Batu Kerbau village

Source: Red Cross, Batu Kerbau Village's office,

There 350 households 800 men and 700 women in Batu Kerbau. Before the year 2002, Batu Kerbau village included only 3 hamlets: kampung Lubuk Tebat, Balukar Panjang and Batu kerbau. Since the year 2002, the administration of the village was reconstructed and divided the village into 6 *kampung*: Telaka Gunung (Main Kampung Batu Kerbau), Sukaramai, Lubuk Tebat, Tanyoung Mani, Belukar Panjang and Cinta Damai.

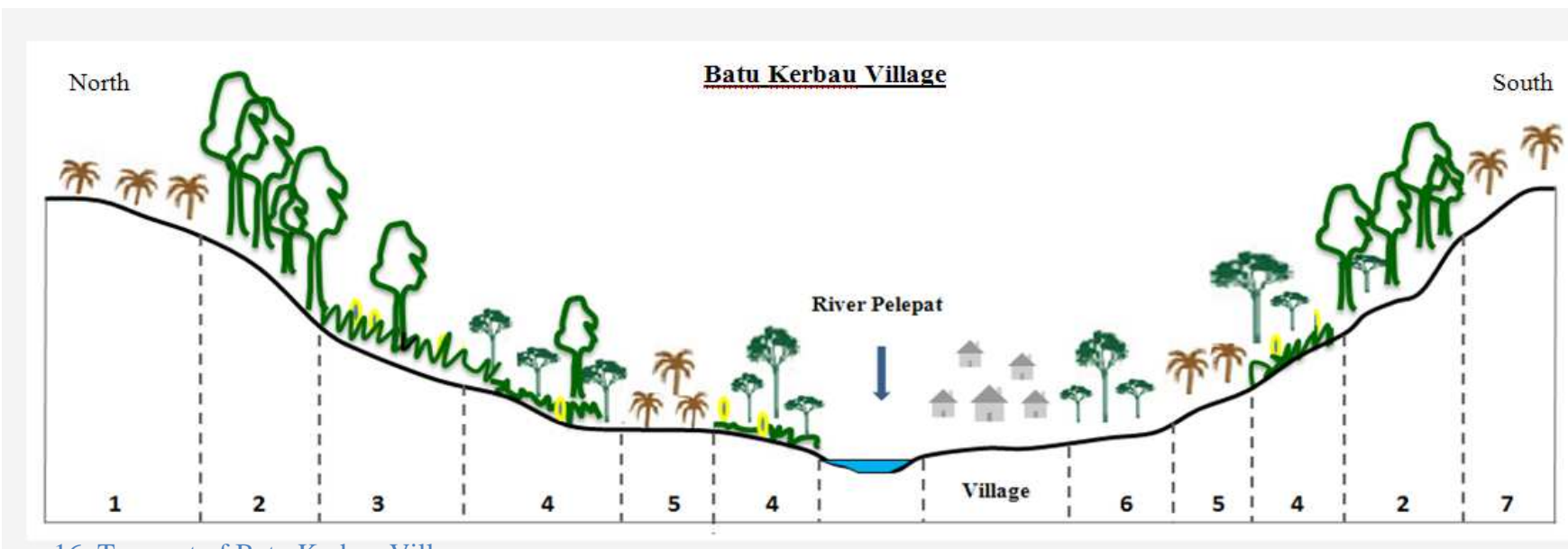


Figure 16: Transect of Batu Kerbau Village

	1	2	3	4	5	6	7
Name	Oil palm Company PT. CSH	Customary forest and protected forest “Hutan Adat” “Hutan lindung”	Upland rice “Landang”	Rubber agroforest	Oil palm smallholder plantation	Rubber Mono specific plantation “Karet Kolasi”	Oil palm Company PT. PML
Species	Kostarika Malihat		Rice Cassava Sweet potato Chilli Bananas	Rubber local seedling (Hevea brasiliensis) Durian Parkia Sweet cinnamons	Malihat	Clonal rubber and local seedling	Kostarika Malihat Sopoindu
Plant Mana- gement	Fertilizer and herbicide weeding	Property of the villages	Organic fertilizer Manual weeding	Organic fertilizer Herbicide and manual weeding	Fertilizer and no fertilizer + herbicide weeding + manual wedding	Intensive Fertilizer and herbicide weeding	Fertilizer and herbicide weeding

Table 3: Description of transect

3.1.2 History and evolution

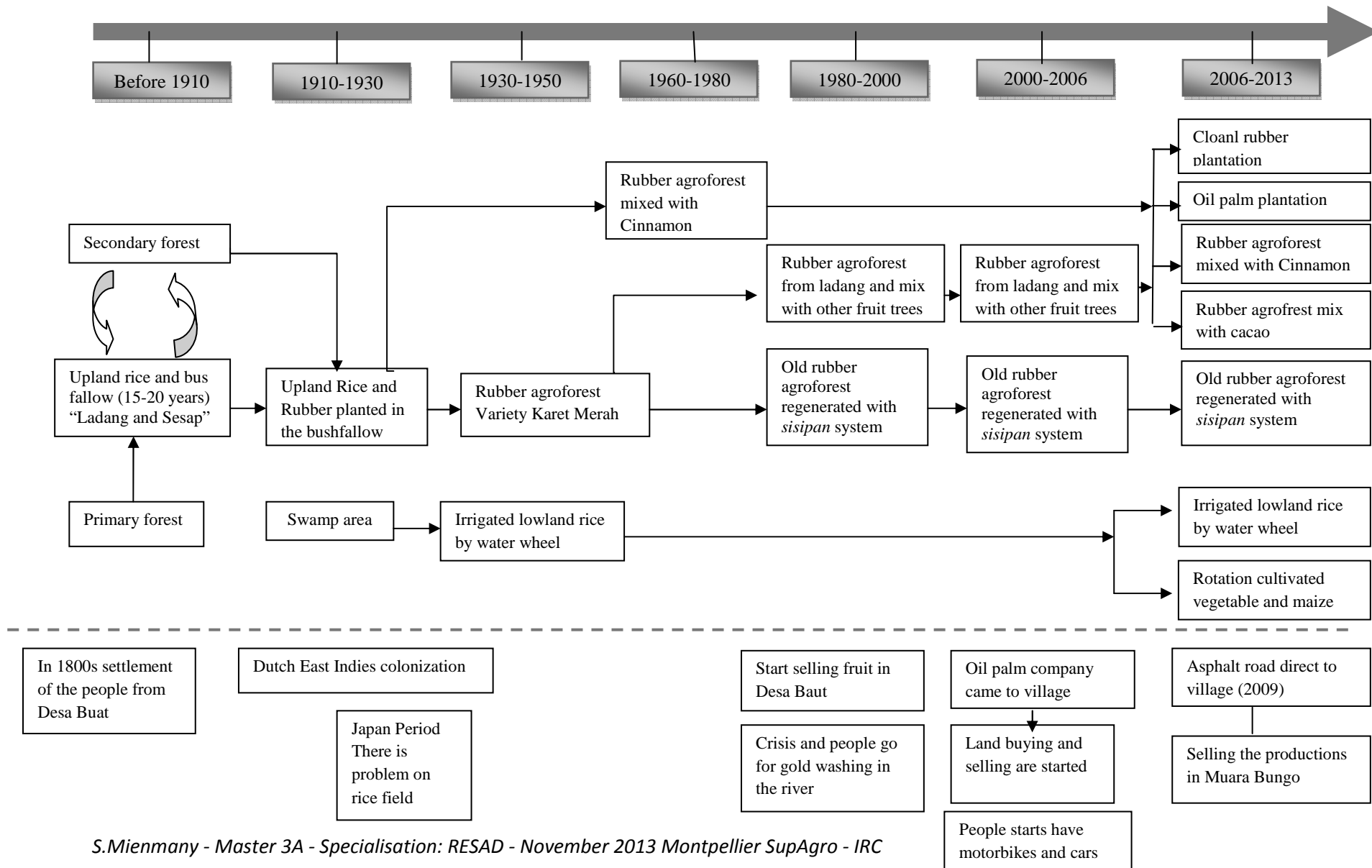
Senamat Ulu: In the period of the 1800s, the area where Senamat Ulu is established was covered by the primary forest. People started to come from Desa Buat (12-13 km from SenamatUlu) to cultivate upland rice *Ladang* and catch fish in the Senamat Ulu. Then they decide to settle in this village. In the 1930s, hamlets and rice fields were established next to the Buat River where the lowland area is larger. Some villages in the northern part of the valley, such as Muara Buat, already had more population. Young families who wanted to have a rice field started to migrate to Selamat Ulu and built their house where the settlement is now located. In the north of the settlement, they created a lowland paddy area which was irrigated using a waterwheel on the Buat River. Also further to the south, next to the river called *Balakang Rumah*, new families settled down.

The settlement increased the rubber agroforest area, against the communal forest. In 1970, the communal forest still covered large areas in the southern part, upstream the small rivers. In 1970s, villagers began to favour the species; *Cinnanonum Burmanii* (Batavia Cinnamon) in their rubber agroforests because the latex gave less incomes. The cinnamon bark was sold out of the village. In 1982, durian, petai and jackfruit started to be bought by brokers from Muara Bungo. Previously, these fruits were only consumed in the households or sold locally. In 1976, the road was built until Muara Baut market. Local villagers got then more opportunities to transport their products and sell them outside their village.

In 1997 there was the crisis. A lot of farmers went for gold washing in the river. The price of rubber during the crisis was Rp. 3000/kg. After the crisis, the price of rubber increases again to Rp. 4000 to 5000/kg. In 2005, oil palm companies arrived in the village and started to buy the land. A lot of farmers sold their land at the price of Rp. 2,000,000 per hectare. Land selling and buying still continued until the Oil Palm Company Cinta Sawit Harum (CSH) started to invest in oil palm plantations in the village in 2008. A lot of villagers decided to work for the Company. Some farmers left their rubber agroforest and took a permanent job in the oil palm company.

In addition, even the village have already the road accessibility to the town but Senamat Ulu there still have a ethnic minority group (approximately 15 people) who lives in the forest. These people have no permanent houses they just move and change the place to stay in the forest. These people are working on the field for the local farmers such as opening the land, cutting wood and weeding.

History of village and evolution and involution of different types of cropping systems in Senamat Ulu



Batu Kerbau: In 1918, a small group of people came from Padang. They were looking for the place to cultivate. When they have arrived in Batu kebau and found that this area is appropriate for them to settle down because there is the big river which they can do fishing and swidden or *Ladang*. They started settle with a hamlet made from bamboo and rattan, along the river. Transportation in the villages was through the pelepat river.

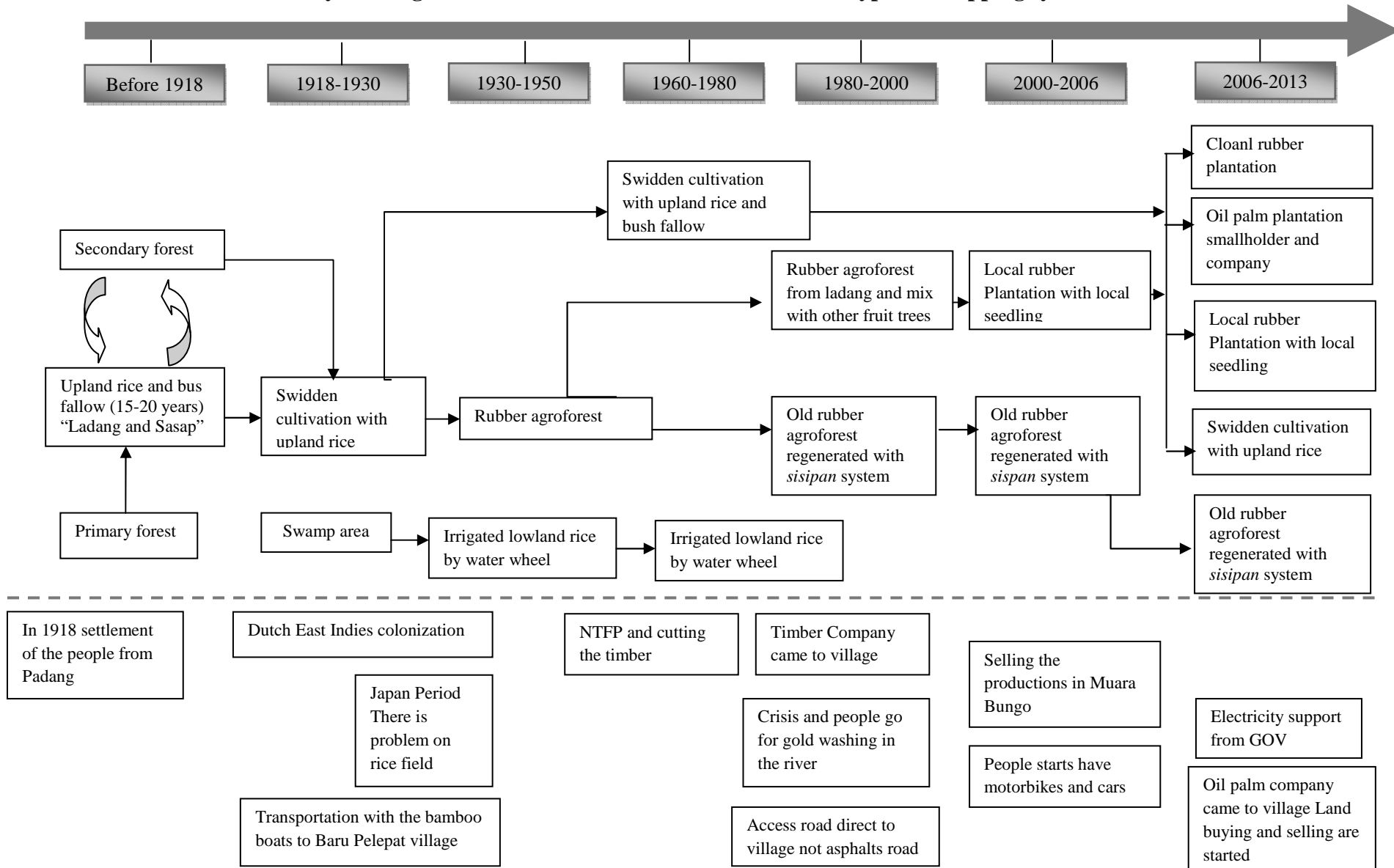
Agricultural patterns are still very traditional in this village. At first, farmers cleared land to slash and burn for swidden or *ladang*. After planting a few cycles, the farmland was abandoned until a certain time limit. This agricultural system is still practiced, even though it underwent several changes. Since the 1950s, rubber agroforests and wetland rice have been the main sources of income for the local communities. Rice cultivation in the lowland areas is close to the village and it uses irrigation from the river thanks to a waterwheel. In 1973 the lowland rice disappeared because farmers wanted to cultivate rice only in upland areas *Ladang*. The reason behind of stopped the lowland rice is because Batu Kerbau villages the flat area is limited. Therefore, villagers change from the rice field area to be the resident area.

Another activity of villagers in Batu Kerbau lived from cutting and selling timber from the forest around the village, clearing fields or working as farm labourers, traders. Before the arrival of logging companies, collecting non-timber forest products (NTFP) such as rattan, manau, jernang, resins and fruits brought an additional income for the community, especially at critical moments. To meet the needs of animal protein, people hunted deers and other wildlife animals. However, this condition could last only until the 1970s. Since then, due to the operation of the timber companies PT. Alas Kusuma and PT. Mugitriman, until last PT. Karya Indah Jungle in 1998, public access to the forest has become very difficult, because almost all the land and state forest was contracted to the company. The public is forbidden to enter the forest for non-timber forest products, and even more to clear the land. (Adnan et al., 2008). Even though cutting and selling timbers is considered as the illegal logging, until present there still have some villagers cutting and selling the timbers, even it illegal but they still can do it. The villagers said that “yeah...It’s illegal to get the timbers but we still can do it we just have to hide from the authority”.

In 1997-98 the economic crisis hit the village, the prices of goods increased and the rubber price dropped down to Rp. 300 per kilogram, so some farmers had to earn money by gold washing in the river. During this time farmers not only facing with the economic crisis, there is also the drought at that period makes the village facing with the situation of insufficient food (Adnan, et al., 2008). In the last decade villagers used the electricity from the generator and in 2012 government supported the construction of hydropower plant powering 45000 KW. This system can be used for 130 households and the fee is Rp. 7000/KW³.

³ Example, one household can be pay from Rp. 20,000 - 150,000 per month, depending on their use

History of village and evolution and involution of different types of cropping systems in Batu Kerbau



3.1.3 Land and Forest management

The traditional transmission of land propriety in Senamat Ulu and Batu Kerbau was from parents to children. Parents transmitted their land to their children based on the gender. For example, the paddy field “*Sawah*”, the rubber “*Kabun Karet*” and the house were for the daughters. Sons got only the savings in cash and animals like cows, buffalos and goats. Therefore, when young men got married, they became the new heads of household, so they had to build a source of wealth by opening a new agroforestry plot, slashing and burning natural forests. Daughters cannot normally sell the land they got from their grandmother “*nenak*”. If they really wanted to sell the heritage land, they had to discuss with their sisters first. The traditional heritage of transmission of the land property has changed now the properties are divided equally between daughters and sons.

Land use and economic of Senamat Ulu and Batu Kerbau remains strongly in agriculture, more than half of the land is used for agriculture.

Land use	Areas (ha)
Village forest (Hutan Lindung)	1,661
Customary forest (Hutan Adat)	223.69
Rubber Agroforest	2000
Rubber mono specific	10
Rice field	60
Oil palm independent grower	40
Oil palm with company	16,000

Table 4: Land use and village protected forest in Senamat Ulu (2012)

Land use	Areas (ha)
Village forest (Hutan Lindung) Batu Kerbau	776
Village forest (Hutan Lindung) Bulukar Panjang	361
Customary forest (Hutan Adat) Bulukar Panjang	472
Customary forest (Hutan Adat) Lubuk Tebat	360
Customary forest (Hutan Adat) Telaka Gunnung	388
Rubber Agroforest	600
Cinammon	125
Ladang	610
Residential area	75
Oil palm company	6,300

Table 5: Land use and villages protected forest Batu Kerbau (2002 and 2013)

Source: Head of the village and secretariat, 2013

In these villages, the forests can be defined into 3 different categories with regard to their management:

- The first one is the village protected forest “*Hutan Lindung*”. It was defined in 1993 by the government. Harvesting timber is forbidden in this forest status.
- The second one is customary forest “*Hutan adat*” which was defined in 1991 at Batu Kerbau and 1999 at Senamat Ulu as “village customary forest”. It is located in traditional jurisdiction areas and harvesting timber is permitted only for the village uses, such as the construction of school, Masjid and other public place;
- The last one is the village forest “*Hutan desa*” which was defined in August of this year and only in Senamat Ulu village by the department of forestry and plantation (*Dinas Perkebunan-Kehutanan*) cooperated with the NGO community for conservation names WARSI and international research centre names World Agroforestry Centre (ICRAF). Collecting Non-Timber Forest Product (NTFP) is allowed to it in this area.

The rule of the forest status

The rules of the *Hutan adat* are cutting timber and other products is not allowed for buying and selling, but that it possible to take them only for the constructions in the village. If villagers break the rule and take the timber from Hutan adat they will be fined: 1 goat, rice 20 gantang (50 kg), 100 coconut and the timbers that the villager took from the Hutan adat will become the property of the village.

The rule of the *Hutan lindung*: taking out timbers is not allowed. Fruits, honey and medicine herbs can be used when this does not destroy the plants. Villagers cannot open the new land “sasap” If the villages don’t respect the rules they will be fined: 1 buffalo, 100 gantang of rice (250 kg) and 100 coconuts.

Then the entire product which the villagers took from the Hutan lindung will become the property of the village.

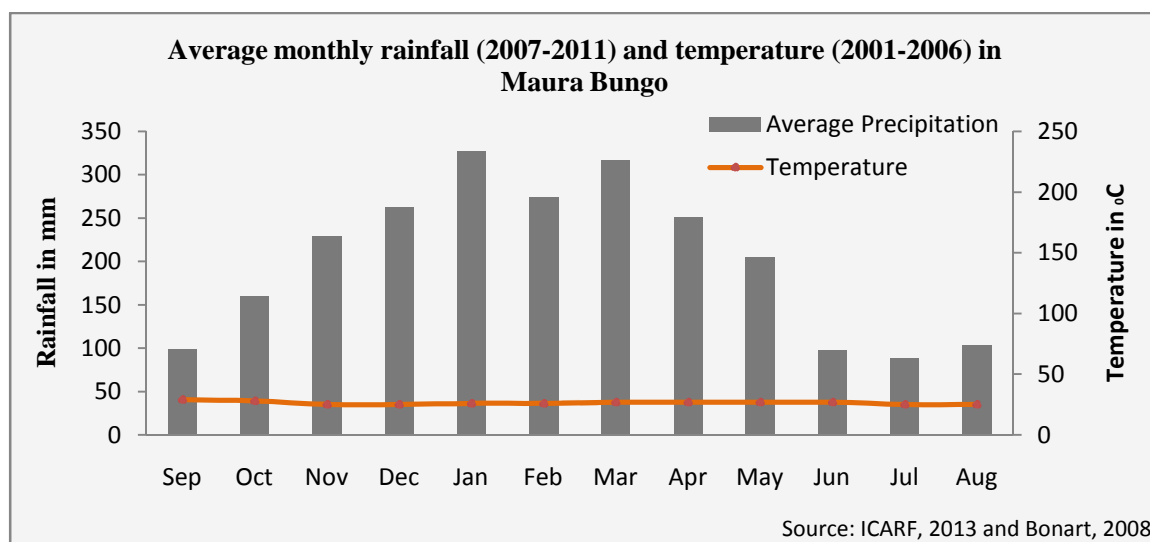


Photo 1 Rule of villages protected forest

On the other hand, before these forests have defined and farmers can open the land in the forest whenever they have enough capacity of labour. Where land is scarce and forest considered mainly as a land reserve, as soon as a new economic opportunity appears which needs land, people would convert their forest. Whatever their attachment to traditional livelihoods and beliefs, if they have to choose between economic development and forest conservation, they rarely choose the conservation.

3.1.4 Cropping system in the village

Agriculture in two villages has similar cropping system. There is rice, rubber and oil palm plantation. Rice and rubber agroforest are the traditional cultivation of the local villagers in this area. Rubber monospecific and oil palm plantation are the new comer crops in the village.



Crops	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug
Lowland rice				←→	←→	←→	←→			←→		
Upland rice	←→	←→				←→				←→	←→	
Rubber agroforest				←→	←→			←→	←→	←→		←→
Clonal rubber	←→			←→	←→			←→	←→	←→		←→
Oil palm	←→			←→	←→	←→		←→				←→
Legends: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> ←→ Prepare nursery ←→ Transplanted or Planting ←→ Put fertilizer </div> <div> ←→ Slash and Burn ←→ Weeding ←→ Harvesting </div> </div>												

Figure 17: Cropping calendar

Rice

In two villages, rice cultivation is different there is lowland rice and upland rice. Senamat Ulu is cultivating lowland rice and Batu Kerbau is cultivating upland rice *ladang*.

Senamat Ulu The paddy field is located in the flat area which closes to the village and river. Traditionally, rice is cultivated for home-consumption and rarely sold. Normally farmers can get the production from 600-800 kg/ha. There are two varieties of rice. One is “Laout” which has the cycle of 6 months and the other is “Bawan” of which has the cycle of 4 months. For the variety "Laout" the seedling are transplanted after 40 days in a nursery (20 days for “Bawan” variety). After transplanting, farmers put the fertilizer directly, the day after.

At all steps of rice cultivation, men and women work together on the field except for the harvest, where men rarely participate. After harvest, farmers keep the paddy in the rice stock “*Bilik*” closed to house. They will mill paddy and get the rice “Bras” when they need. The cost for milling is 1 kg of rice for the miller for 15 kg of rice milled.



Photo 2: lowland rice close to village



Photo 3: Women and man work during harvesting

Operation	Period	N. people	N. hour/day	N. working days
Paddy Nursery	January	2	6	1.2
Roundup	January	1	7.5	18
Prepare soil plot	January	2	7	35
Make fences	February	1	4	4.7
Water the field	February	1	5	1.4
Plough with Tractor	February	1	2.5	11
Transplant rice	February	2	7.5	16
Fertilisation	March	2	7.5	8
Weeding	June	2	7.5	27
Harvesting	June	2	7.5	24
Preprocessing (threshing)	June	1	7.5	9
Total				155

Table 6: Rice operation and amount of labour requested for cultivation

Batu Kerbau: as already have mentioned before on the history and evolution part that lowland rice at this village disappeared since last 30 years. Farmers cultivate only upland rice. There is two system of Ladang. One is intercropping during the first two years of the rubber plantation. The other one is annul cultivation which mixed with cassava, banana, chilli and other vegetables.

A lot of farmers in this village are facing with the problem of wild pigs attraction. Normally farmers can get the rice product from Ladang 900 to 1200 kg/ha but if there is the problem with wild pigs so they can get only 300 – 450 kg/ha. There are two kinds of rice milling in the village. In the last decade, farmers used to mill the rice by hand with traditional method. Since 2001 there are three rice millers introduce in this village which faster than traditional method. Farmers will pay 10 % of the milled paddy to the miller.

Activities	Period	N.people	N.Hour/day	N.Days	Total of working days
Prepare land+ cutting grasses	June	2	7	14	28
Sowing	August	2	7	15	30
Weeding	Sep	4	7	20	80
Harvesting	Jan	2	7	12	24
Total					162

Table 7: Upland rice activity, number of labour request and the day of working per 1 ha



Photo 4: Ladang cultivate mixed with rubber agroforest



Photo 5: Sowing rice in ladang

Rubber

The main activity of the people in two villages is tapping the rubber. The seedling is local traditional seedling. The farmer gets the rubber seeds from their rubber fields. They can also buy the seedling from their neighbours. Farmers cultivate approximately 600 seedlings per hectare with the distance of 4 m x 4 m and mixed with other trees like durians, jackfruit, mangustin, cocoa, etc.

Rubber field “*Kebun karet*” in Senamat Ulu and Batu Kerbau has 4 different types of plantation:

1. *Kebun karet* with a low density of rubber trees and a lot of timber trees, which are located on the high slopes.
2. *Kebun karet* with the new high density of rubber trees mixed with other fruits trees.
3. *Kebun karet* with a medium density of rubber trees mixed with cocoa and other fruit trees.
4. *Kebun karet Unggul* “Rubber monospecific plantation” which can be planted close to the road. It’s quite new for these villages.

In Senamat ulu and Batu Kerbau have different age of tapping rubber. In Senamat Ulu farmer start to tap when the rubber trees age more than 10 years but in Batu Kerbau started to tap at the year 8th after planting, an assumption because the soil of the Batu Kerbau more fertility than in Senamat Ulu. The highest yield of rubber trees is between 15-25 years old, which they can give 15 kg of latex/ha/day. Farmers tap the rubber tree 20 to 25 days per month as they do not work on Friday. Weeding takes place 2 to 3 times per year depending on the access to labour.

Since beginning of 1980s, farmers have used the *sisipan* system as a gap replanting technique. Whenever a dead rubber tree leaves a gap in the plantation, the farmer plants a new one to fill the space. This technique seems to be adopted when some rubber agroforests were aging while farmers wanted to conserve the latex production instead of leaving the land as a fallow. Consequently, a plot managed under the *sisipan* technique presents a large range of ages of the rubber trees, from the immature stage (8-10 years old) to the oldest stage (around 40 years old). Therefore, in this period the upland areas were divided into young rubber agroforest after the *Ladang*, and older rubber agroforest managed by the *sisipan* technique.

There are two type of labour requirement on rubber agroforest. One is family labour and hired labour as sharecropper. Sharecropper is a share benefit between the owner and the taper. The system of sharecroppers is sharing benefit by divide the production into two parts. 1/3 is for the owner and the 2/3 is for the taper. This sharing scheme has changed last two to be an equal share: 1/2 is for the landowner and 1/2 for the taper. This situation indicates a rising tension on land meanwhile that more demands than supply for tapping rubber agroforests. The increase of demand can be linked to the increase of the latex price and also increase the number of landless households who candidate to sharecrop.

Oil palm

Oil palm plantation is still new at Senamat Ulu and Batu Kerbau. One single independent oil palm grower started in 2004 at Batu Kerbau and in 2005 at Senamat Ulu. Nowadays, approximately 16-20 farmers or 6% of total household in the village are growing oil palm. Most of the oil palm independent growers started to grow the oil palm at the rainy season, in August or September. During the first 2 years of plantation, farmers usually add other vegetables to cover the ground and protect the crop (intercropping) such as chilli, banana,

cassava, sugar cane and other vegetables on their oil palm fields. Farmers who are good managers of the cover crop in the first 2 years can gain an extra income which can at least compensate some the investment cost.

Almost oil palms independent growers in these village didn't put the fertilizer, some farmers use the organic fertilizer during prepare the seedling. Oil palm start to harvest at year four and the first yield is 100-200 kg/ha/month. The high yield in the mature stage is year 7th - 9th which farmer can get 800 – 1,600 kg/ha/month. Oil palm harvest every 15 days it means two times per month. Total working day for oil palm is 40 - 60 working days/year/ha. Most of the farmers who cultivate oil palm are facing with the problem on wild pigs attraction, this affect to yield because oil palm three still low and the pigs can eat the oil palm fruit easily. When the trees growths up (6th year up) farmers don't have problem with the pigs.



Photo 6: farmer harvest their oil palm at year 7th Senamat Ulu

There are 90 percent of independent oil palm growers of two villages prepare seedlings by themselves. They buy the seeds with the middlemen from outside the village. such as from Medan, Rantau Pandan and from Muara Bungo. Farmers plant oil palm seedlings at different stages. Some farmer plants 6 month old oil palm seedlings and others prefer to plant one year or one year and half old seedlings. It depends on the capital and the time that farmers available.

The price of seedlings is different. There are 3 classes of the seeds

- Kostarika is the first class and the most expensive one. Price Rp. 10,000 /seed
- Malihat is the second class with the price Rp. 7000-7500 /seed
- Lonsum and Sopindu are considered the third class but at the same price with the second class which Rp. 7000/ seed.
- 8 month to 1 year old seedling is Rp. 15,000 -20,000/seedling
- Seedling aged 1.5 years price is Rp. 25,000-30,000 /seedling

The price of seedling:

- 6 month old seedlings price is Rp.12,000/seedling



Figure 18: FFB Kostarika (left) and Malihat (right)

Cocoa

The other tree that people are interesting to cultivate is cocoa trees. It's almost 4 years already that cocoa tree has been introduced in the village Senamat Uluby not yet in Batu Kerbau. Farmers cultivate cocoa trees mixed with rubber agroforest. There is no mono specific cocoa plantation in this village. Farmer bought cocoa seedling from Padang and in Medan. Farmers prefer to cultivate cocoa trees because cocoa don't need to put fertilizer and they can harvest at 3rd years after plantation. The price of cocoa fruits is Rp. 15,000-30,000/kg. It seems that people are happy to cultivate cocoa and now there are 10 % of total household already cultivated cocoa.



Photo 7: Cocoa mixed with rubber agroforest



Photo 8: Cocoa in 3rd year in Senamat Ulu

Livestock

Livestock in two villages are goats, sheep, chicken and drunk but for cows and buffalos are existing only in Senamat ulu. It's almost 10 years already that buffalos and cows disappear in Batu Kerbau. Farmers said that they don't want to continue feed them because there is no lowland rice in the village to feed them. Farmers leave their animals in the field during the day and during the night they have to tie or keep them in the stable close to house or the field. Farmer can't leave all kind of their livestock outside during the night because animals attract to farmer's field, if it happened the owner of the field have all right to takes the animals. It opposites during the day the owner of the field have to make the fence to protect their cultivation. If the animal eat/damage the plantation this will not be the problem to the animal owner because they don't protect their field well enough.



Photo 9: Goat stable in Batu Kerbau



Photo 10: Cow stable in Senamat Ulu

3.2 Socio- economic analysis

Three parts are going to be presented in the economic analysis. Firstly, it presents the land profitability analysis return to land and return to labour based on the cropping system and farming strategy. Secondly, it is going to present the KKPA system and farmer's debts. Then present typology of households of two villages. Finally, evolution of land prices and labour prices as well as the oil palm and rubber prices are presented.

3.2.1 Land use profitability analysis

The land use profitability analysis consisted in the comparison of economic indicators (return to land and return to labour) and labour calendars of the main crops: rice, rubber agroforestry, rubber monospecific plantation, and oil palm independent growers. This part is going to present comparison on land profitability analysis of different plantations based on cropping system and farming strategies.

Analysis based on cropping system

Land use profitability analysis based on the cropping system shows the comparison of different crops such as rubber agroforest in full cycle⁴. The rubber monospecific plantations as oil palm plantations are still new in these villages therefore the analysis is possible only up to 12 years after planting. Upland rice has shown the maximum and minimum production because of the boar attraction.

The return to land or land profitability is the sum of the yields of all the products of the plantation. Monospecific plantation land productivity = yield; agroforest land productivity = yield of rubber and return to land is the monetary value of the land productivity. It expresses and compares the capacities of the different cropping systems to create economic value, without considering whether this added value is created by the producer himself or by the laborers that he employs.

The calculation includes the depreciation of the plantation investments for oil palm and rubber monospecific plantations. This depreciation is carried by a full cycle of production 40 years in total for the rubber, and 25 years for the oil palm plantation.

⁴ The gross Added Value of the rubber agroforest is calculated by considering only the rubber productions, and not Non-Timber Forest Products like durian and cinnamon which are supposed as negligible.

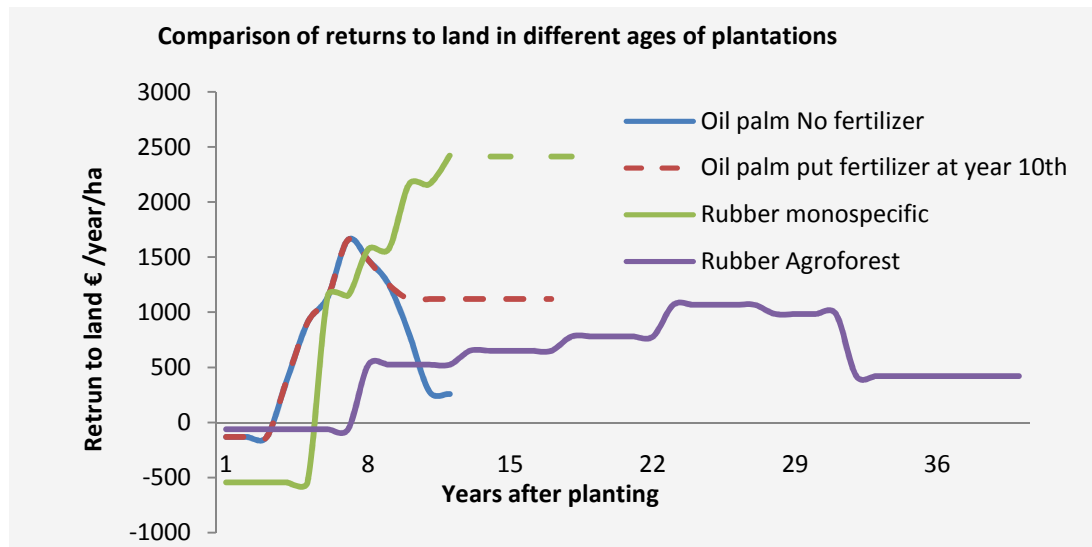


Figure 19 : Comparison return to land of different crops

The figure above shows the return to land of both rubber and oil palm plantations at different ages of plantation⁵. Farmers consider that the good mature stage of rubber is at year 18th-30th. It's different for oil palm. Oil palm get high benefit/high product in the mature stage at year 7th to 9th. They consider that the yield of oil palm normally decreases from year 10. This is indeed the case of the local farmers in the study area who are not working with the oil palm company. An assumption was formulated that this early decrease of oil palm production is caused by the lack of fertilization.

The figure 19 shows that from year 9th oil palm gets return to land 1252 €/ha/year and 806 €/ha/year at year 10th and 278 €/ha at year 11th. There are two hypotheses on the drop of oil palm FFB. First is no fertilization and the other is poor quality seedlings, most probably of Dura type, which doesn't respond well to fertilization. If the farmer puts fertilizer the return to land should be at least 1120 €/ha at year 10th, 11th, 12th and forward. This yield might be continuing until the life span of oil palm tree lasts between 22 and 25 years (pratica, 2012) this assumption has been confirmed by a Malaysian oil palm expert met in Bogor, and also by further data collected and analyzed by a PhD student of the SPOP project – Margot Moulin (INRA) in Bungo after the data collection of this present study has been finished (pers. com.)

Focusing on the rubber plantation, the investment during the first 5 years is higher than other plantations. It's 540 €/ha compare to oil palm for first three year of installation is 133 €/ha and 61 €/ha for rubber agroforest. This performance is because the rubber plantation requires high labour and fertilizer. Farmers put fertilizer on their rubber field later than oil palm plantation. Therefore, the return to land is higher than other crops it starts from 1000 €/ha at year 6th and continue to increase up to 2400 €/ha at year 12th compare to oil palm the maximum mature stage at year 7th gives the return to land 1600 €/ha and went down after year

⁵ In the case of rubber agroforests, all types of rubber agroforests have been considered together at the same ages. Indeed, one plot is considered at one age when a large majority of the rubber trees are from this class of age. The other factors of differentiation are considered as less impactful than the age.

10th. Normally with the rubber monospecific plantation the life span is possible until 30 years (Hoong, 1997).

Therefore, based on the figure 19 the most profitable for the return to land is the rubber monospecific plantation because it has a fast return compared to rubber agroforest which has to wait for 8 years and the profitability is the lowest compared to oil palm and rubber monospecific plantation. When focusing on oil palm the advantage is that oil palm takes only three years to installation and during the first 2 years of plantation farmers can put the cover crops and make the investment cost for oil palm less than rubber monospecific plantation.

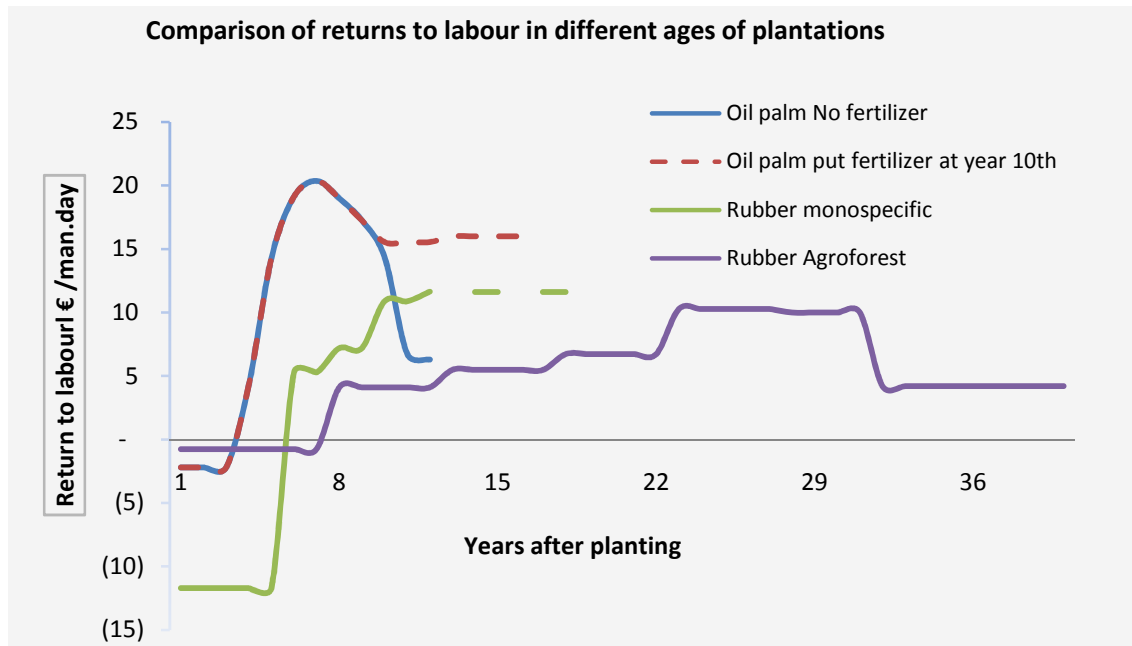


Figure 20: Return to labour of different age of crops

This figure presents the same plantation as the previous figure (figure 19) but focuses on the return to labour. The return to labour is the net added value (NAV) divided the total number of labour days (including both family labour and hired labour). It expresses the capacities of the different cropping systems to give value to the labour applied to them. This figure shows that the highest return to labour is oil palm 12 €/working day, rubber monospecific 9 €/working day and 7 €/working day for rubber agroforest. Rubber monospecific plantations consumed a lot of labour during the installation (first 6 years) because it needs a good management of weed control. Traditionally, farmers in this area tap their rubber 3 to 5 days a week whereas oil palms FFB are harvested every two weeks this is the reason why oil palm give return to labour higher than the other crops.

Therefore, when focusing on the return to labour oil palm is the most profitable to farmers. As mentioned before that oil palm and rubber labour requirement on harvesting are different. The return to labour of oil palm is high to farmer as a consequence farmers can have more time to work on the other field. However, even the oil palm is the most interesting crop (regarding to low labour requirement) farmers still think about the access to oil palm seeds

and seedling because oil palm seeds and seedlings are expensive (see the detail in stakeholder part on “seedling producer”). Therefore, the farmer’s decision to have oil palm is depends on the household situation and access to the land because oil palm needs to have good road accessibility for the transportation and because oil palm FFB have to deliver to the mill in 48 hours which it not the same as rubber latex which can be kept a long time and can be transported in weekly.

In addition, land profitability analysis based on cropping system has a summary comparison return to land and return to labour for the first 12 years of difference plantations and for one harvest of paddy as follows:

	Rubber Agroforest (1 st -12 th years)	Rubber Monospecific plantation (1 st -12 th years)	Oil palm plantation (1 st – 12 th years)	Upland rice cultivation		Low land rice
				Max (no wild pig attack)	Min (with wild pig attack)	
Return to land (€/ha)	232.46	1461	802	768	236	235.4
Return to Labour (€/working day)	1.7	9	11.9	6	2	3.24

Table 8 Average return to land and return to labour for the first 12 years of plantations and for one harvest of paddy

The comparison shows that the most profitability of the different cropping systems in the first 12 year is rubber monospecific plantation swchich give the return to land 1461 €/ha, second is oil palm 802 €/ha. Rubber agroforest gives very lowreturn to land 232 €/ha. It’s almost the same return to land of the upland and lowland rice200-240 €/ha/year. This comparison is only for the first 12 therefore rubber agroforest is going to increase the profitability after 12 years seen in the previous figure 18 and 19 that rubber agroforest gives high benefit during the lifespan of 22-30 years. The comparison of return to labour shows that the most profitability for the farmer is oil palm It’s 12 €/working day and 9 €/working day for rubber, and 1.7 €/working day. This performance is based on the harvesting labour requirement which was mentioned in the previous figure.

Rice cultivation gives very low return to land and labour compared to other crops but some farmers still keep this system even they know that they get less return. The reason why they still keep it because rice is secure source for consuming in their family, during the asian financial crisis in 1997-98 the price of the rubber dropped and one resource that they still have is rice. Therefore they still keep it because farmers still pay attention to prices. The other farmers who are not concerned just left their rice field or convert it to other crops.

Most of the farmers who cultivate the rubber monospecific plantations are putting fertilizer as a result it makes rubber monospecific giving high return to land. Farmers prefer to put the fertiliser on rubber more than on oil palm because the rubber price is higher than oil palm price. Therefore, farmers have different strategies to manage their farm they can diversify their farm based on access to land and the prices of both rubber and oil palm. The comparison above gives the suggestion to the farmer that it's would be more beneficial to have both crops, rubber monospecific and oil palm plantation because farmer have to think about the market price.

Analysis based on farming strategy

This land use profitability analysis compares different farming strategies, using the family income as the criterion for evaluation. The family income is what is left to the family after taking off the gross product all the costs including the hired labour⁶.

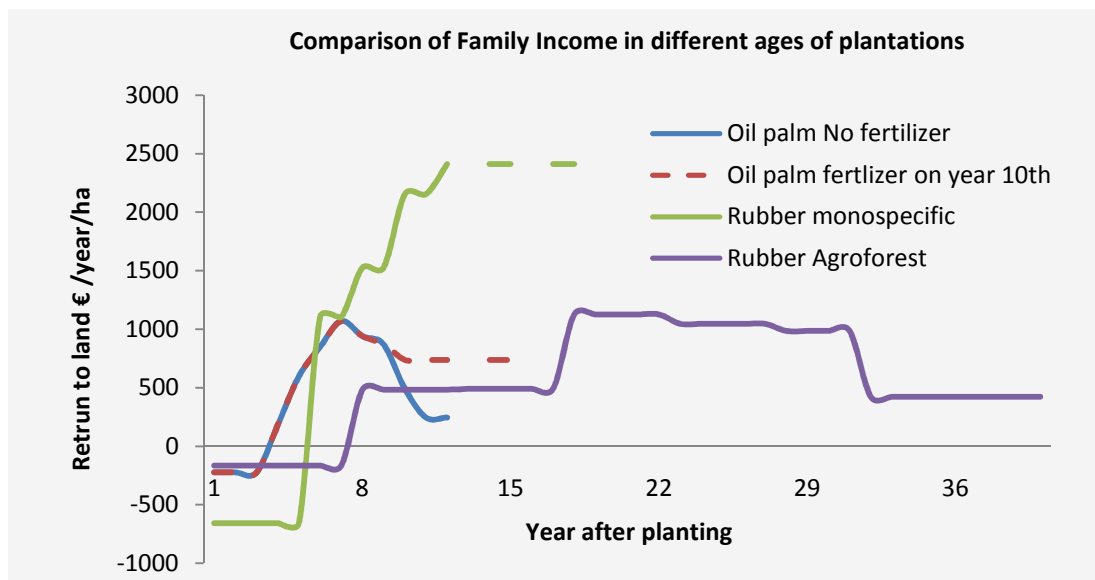


Figure 21: Family Income in different age of plantations

The figure above compares the family income per unit of land of both rubber and oil palm plantations at different ages of plantation. When the hired labour as production cost is taken into account, the NFI are lower than the NAV return to land for oil palm plantation NFI at 12 years is 526 €/ha to compared with the net added value is 802 €/ha. The GFI and NAV for Rubber agroforest and rubber monospecific are close because traditionally people in the study area don't hire much labour for the rubber. They prefer to do it by themselves and sharecroppers if they don't have enough time and labour.

Oil palm NFI is lower the NAV is because farmers in this village hire labour for planting and weeding in their oil palm field. Therefore, the result from the comparison shows that the most

⁶ We underline that the calculation of the Net Added Value does not consider the costs of the hired labour (see the calculation method in [chapter2](#)).

profitability for the farmer is rubber monospecific plantation because farmers don't hire labour more than oil palm.

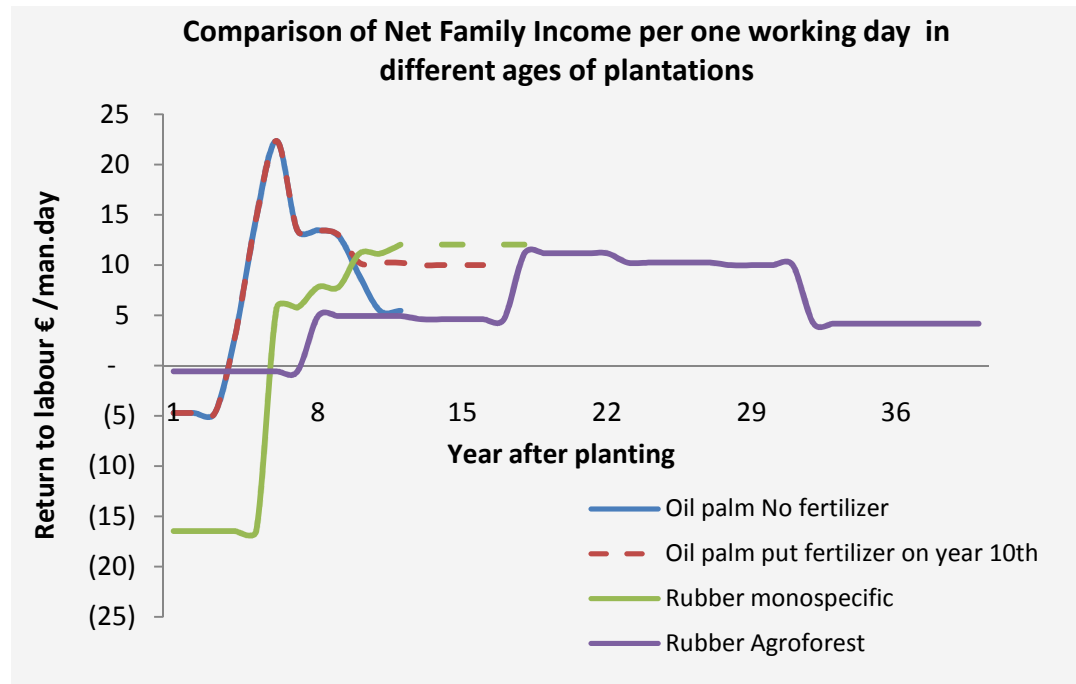


Figure 22: Net family income per one working day for one ha in different ages of plantation

The comparison of oil palm net family income per one working day for one ha in different ages of plantation shows a peak of return when the production starts, with high levels of yields which quickly compensate the investments made. After the tenth year however, when farmers do not put fertilizers, the strong drop of the yield decreases the GFI/labour. As there are no plantations older than 12 years in the villages, it is not possible to say how far this drop of profitability can go. In the case of rubber monospecific, the initial investment is much higher but the GFI stabilizes at levels double of those obtained in agroforests.

	Rubber Agrofore st (1 st -12 th years)	Rubber Monospecific plantation (1 st -12 th years)	Oil palm plantation (1 st – 12 th years)	Upland rice cultivation		Low land rice
				Max (no wild pig attack)	Min (with wild pig attack)	
Net Family income (€/ha)	102	1440	526	768	236	62
Net family income per one working day (€/man-day)	1.9	9.2	11	6	2	0.2

Table 9: Land profitability of different crops

In the case of including hired labour as a productions cost the most interesting crop for landowner to investment is rubber monospecific plantation because net family income is

1440 €/ha and 526 €/ha for oil palm. The rubber plantation is higher than oil palm almost 3 times and even higher than rubber agroforest and rice more than ten times. On the other hand, regarding the net family income per one working day, oil palm still has high value.

Rice cultivation gives very low benefit when including the hired labour as the production cost. Family income is 62 €/ha compare to NAV is 235 €/ha, this is because farmers using the hired labour almost each step of cultivation, starting from preparation the soil until harvesting farmers hired labour.

Therefore, the interesting crops for farmer to do the investment are both crops rubber monospecific and oil palm plantation because oil palm requests less labour than rubber plantation. They can manage their working hours, some farmers in the village already did it for example, farmers tap the rubber in the morning and in the afternoon they go to their oil palm field because traditionally rubber tapping only lasts half day from 7:00 – 11:00 in the morning and tapping three to five days a weeks.

However, when focusing on the capital and access to the land. It is not all farmers can have enough capital to access to improved seedlings and fertilizer because seedlings and fertilizer are costly for investment. Furthermore, access to the land is also one reason that farmers choose the cropping system because farmers think about the transportation. Oil palms have to be delivered to the middlemen or the mill in 48 hours. Otherwise they will get low prices or refuse to buy from the middlemen or mill.

In addition, the economic result based on two types indicators (based on cropping system and farming strategy) shows that in the indicator based on farming strategy which includes hired labour is the real profit that farmers get from their cropping system. Farmers can manage to have hired labour and family labour is based on the labour available in their family. The other indicator which is not based on cropping systems shows the real profit of the cropping system whatever labour from family or hired this is the total return to the land if farmers cultivate this kind of crops. Therefore, this technique of comparison with two indicators is the good way to understand farmer's strategy and the reasons behind their practices on their farms.

Based on these results rice is very low return labour, return to land and net family income. If the farmers still continue practicing like this it is better to change to cultivate other crops or convert the land to oil palm and rubber. Then use the income from rubber and oil palm to buy the rice to consume in the family. Rubber monospecific plantation gives higher return to land and net family income than oil palm but lower return to labour and net family income per working day. Therefore, this study suggests having both oil palm and rubber together. Farmers should think about the market price because when one drops they still have another one secured. Rubber agroforest have the low return compared to oil palm and rubber monospecific. However rubber agroforest should continue to be cultivated because the location of the field is different. Rubber agroforest is possible to grow in the slope areas but it's not for the rubber monospecific plantation (clonal rubber). Farmers in these villages already know about the location where they should grow and what kind of crop they are going to have but they have different household's situation.

3.2.2 KKPA system and farmer's debt

To understand on the KKPA system and farmer's debt information about the companies which are running the business in two villages are presented.

Oil palm and rubber companies

Melaka Agro Parkasa Company (MAP), the company who runs the rubber and oil plantation business in this study area. In 2009 company came to negotiate with the village to start an oil palm plantation and rubber plantation in 2010. The total of land concession for the rubber was 230,000 ha of former state forest which covered three villages (Senamat Ulu, Ratau Pandan and Aur Cino). In compensation, the company offered only 5 % of the total annual benefit drawn from the 230000 ha to the 3 villages. This contract was mostly rejected by the local people. Therefore, not many farmers accepted to work with this company.

The MAP company has three sub companies for the oil palm: namely Sawit Harum Makmur (SHM), Sawit Harum Lestari (SHL) and Cinta Sawit Harum (CSH). Two sub companies, SHM and CSH, are running a business in Senamat Ulu. the company got the permit to start oil palm plantation with The land concession is 16,000 ha on the old fallow "*Sasap*" and "*Lahan tidur*" of the village.

PT. CSH also runs the business in Batu Kerbau. The company came to village since 2008 in 2010 they started to plant. This company didn't come to discuss or negotiate with the villagers. The negotiation was done in the Bungo district with head of district (Bupati) and only representative from the villager as a head of the village for sign the contract. The contract condition of the company PT.CSH and SHM is 70:30. It means that 70% of the productions for the company (Kebun Inti) and 30% of the production for the farmers (Kebun Plasma) and the farmers also have a loan 41 million for the initial investment of oil palm plantation as seedlings, fertilizer and labours. The contract duration is 30 years.

Another oil palm company who also runs the business in Batu Kerbau is PT. Prima Mas Lestari (PT.PML) negotiated in the village in 2007 with the first condition of the divide the production 80:20 it means 20 % of the production for the farmer and 80% of the production for the company. This condition was refused from the villagers. In the 2008 the company came to negotiate in the village again with the new contract condition as 70:30 but the villagers still refused that condition again, villages want to have 60:40. At the same year 2008 the company return to the village with all agree of the condition that villagers have proposed before as 60:40 of benefit share and 50:50 of land sharing. So company accepts with 60:40 condition of share benefit on the 50 % of land. 60% of the production is for the company (*kebun Inti*) and 40% is for farmers (*Kebun plasma*) in this condition farmer have no loan. The company will responsible for all the investment on the plantation installation. The contract is for 30 years (detail at the table below).

Company	Scheme	Description	Debt	Mill
PT. PML	50:50 (land share) 60:40 (production share)	This scheme the land will divide in 50:50 (50 % of the land is for the company and the less is for farmers) but the divide of the productions of the plasma is 60:40. Meanwhile, the company will bear for the cost of installation in the first 4 years and the parting the production is 60 % for the company and 40% for the farmers. In addition, farmers get the consolation fee Rp. 700 000 - 1 million per hectare of the land submitted.	No Debt	No mill on the site. Delivery FFB to the Mill in Tebo.
PT. CSH	70:30	Under the most common arrangement in Bungo district farmers are entitled to 30% both of land and revenue. In addition, farmers get the consolation fee Rp. 700 000 - 1 million per hectare of the land submitted	Debt 41 million per hectare (the period for repayment is 9 years)	No mill in the site. Sell FFB to the middlemen in Muara Bungo.
PT. SAL	0:100 (land share, no estates) 30:70 (production share)	The company provides capital such as seedlings and fertilizer. Farmers have to sell all their products to the company. Meanwhile, the farmers will get 70 % of the product and 30% company will get it.		Mill capacity 60 tone FFB/hour

Table 10: Type of oil palm scheme (KKPA system) in study area

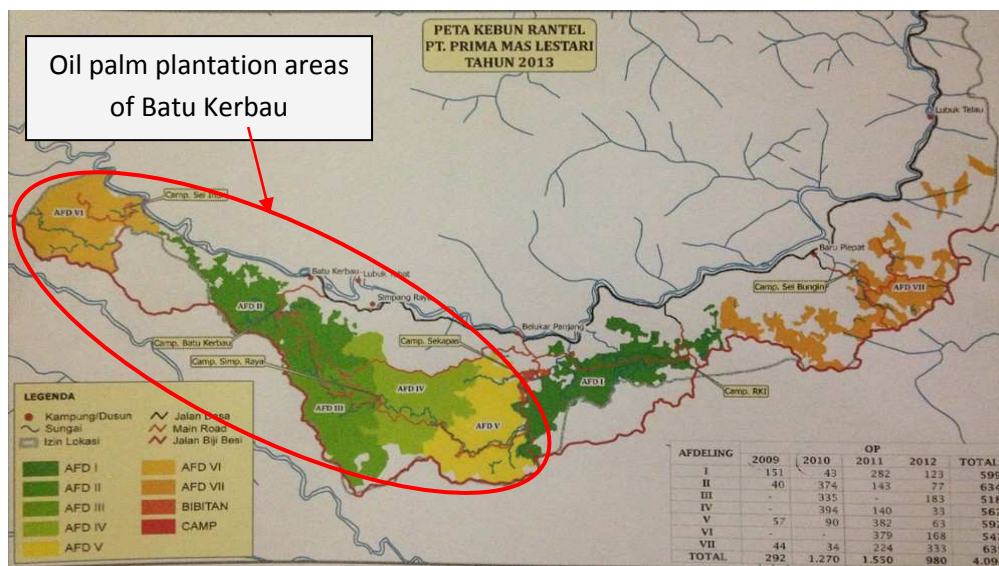


Photo 11: Map of oil palm plantation of PT. PML

There are differences conditions in KKPA schemes of sharing benefit and pay back to company such as initial of the loan and the percentage of productivity to pay back to the company.

Items	Condition 1	Condition 2	Condition 3
Land share	70/30	70/30	70/30
Plasma production share	0/100	0/100	0/100
FFB price (Rp./t)	Rp.1,5 million	Rp.1,5 million	Rp.1,5 million
% monthly income to pay back	60%	30%	60%
Bank interests rate	14 %	14%	14 %
Initial loan per hectare	Rp.7,5 million	Rp.41 million	Rp.41 million

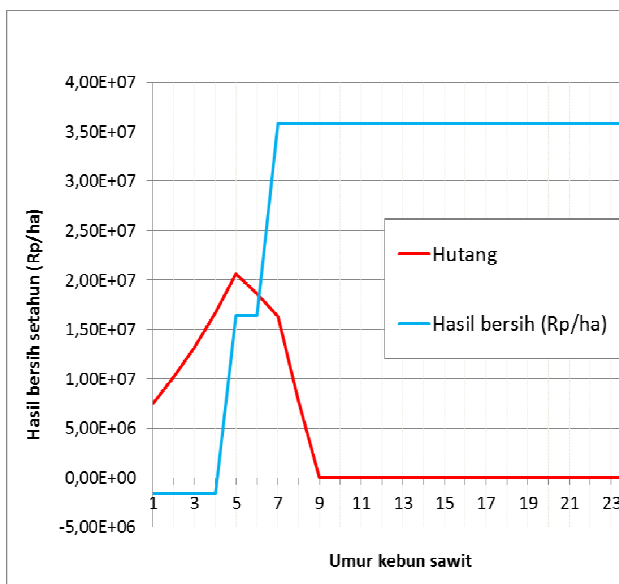


Figure 23: KKPA condition 1

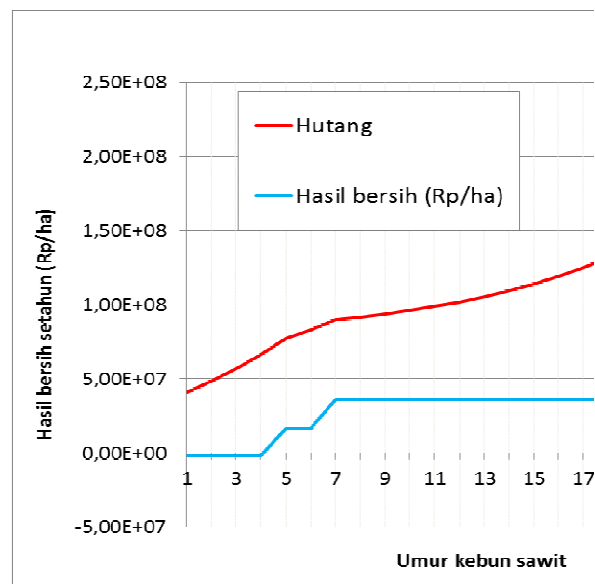


Figure 24: KKPA Condition 2

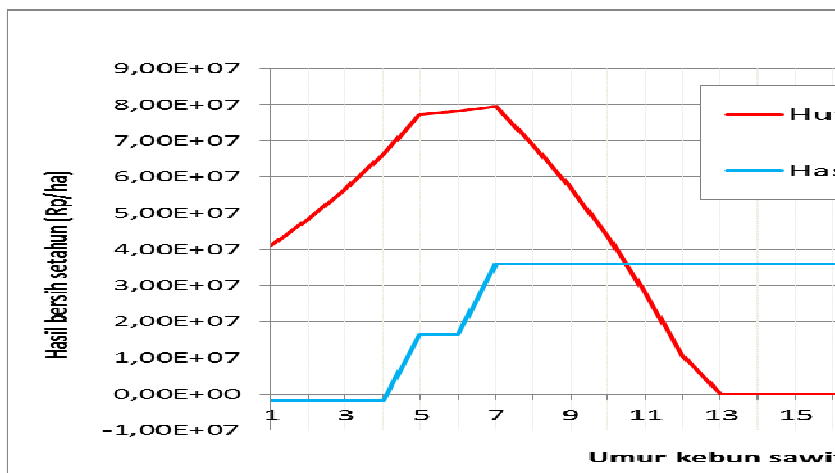


Figure 25: KKPA Condition 3

Source: Feintrenie, 2013

The figures and table above have shown the different condition of KKPA system and the way of farmers pay back their loan to company.

As shown in the table 18 on the types of KKPA scheme, the company will invest and make the oil palm plantation on the total area concerned by a contract. At the moment of the production, the land is shared between the company (generally getting 70%) and the initial owner of the land (generally getting 30%). From the production of its land, the farmer has to pay back a share of the investment to the company. This initial loan carries an interest rate (most generally 14%) In the model of debt situation, we have considered two scenarios, (i) one with paying back with 30 % of the production monthly or (ii) paying back with 60% of the production monthly, and two levels of initial loan.

The first scenario is based on a real case described by Feintrenie et al. (2010), with a plantation established in the 1990s. The conditions include an initial loan Rp.7,5 million. Farmers decided to put high percentage of pay back for the loan as 60% of monthly production to the company. Therefore, in this case farmers can finish their loan in 9 years after planting (figure 22).

The second scenario is based on PT.CSH case. The initial loan per hectare is Rp.41 million. Farmers put 30% of the annual production to pay back for their loan. In this case farmers cannot finish pay back their loan and at the same time farmers increased their loan because of high interest. Therefore, in this case farmers will be in debt (figure 23).

The last scenario is also based on PT CSH, the initial loan per hectare is Rp.41 million, but here we test the results for farmers putting 60 % of the monthly production to pay back their loan. In this case farmer can finish their loan in 13 years after planting (figure 24).

In KKPA system there are many ways to pay back the loan, it depends on the initial conditions set up in the contract, on the farmer's strategy and manages their plans and it depends on the price of the FFB. If the FFB price is high and farmers put all their annual products (100%) to pay back for their loan, they can finish their loan early possible 2-3 years after harvesting. Therefore, in the KKPA system show that farmers who have good strategy dealing with the system pay back and be able to wait for the long benefit will gain benefit from this system. But farmers do not always see the long-term benefits and not well aware of the conditions of the agreement with the company regarding their debt and the conditions to pay back are easily frightened by the amount of the debt. If an offer of immediate benefit is presented to them through the sale of their still immature plasma plantation, lots of them do not resist and sell their plantation. The direct consequence for them is the loss of their land. Some farmer regret on this after they understand about the benefit from KKPA system and they want and waiting to have such kind of investment come to their village again.

Farmers can gain the benefit from this system if the farmers know how to play or deal with it. Only the people who have the capacity to see the long-term benefit they can will win in this system. On the other hand, farmers who are low education cannot understand and trust this system willing to sell their plasma which encourages people outside the villages, especially the rich people and civil servants to buy the plasma plantations.

3.2.3 Typology of households

The typology of household in Senamat Ulu and Batu Kerbau has defined into three main groups based on the wealth of the villagers and the ability to diversify their farm, off-farm activities and also the labour in the household.

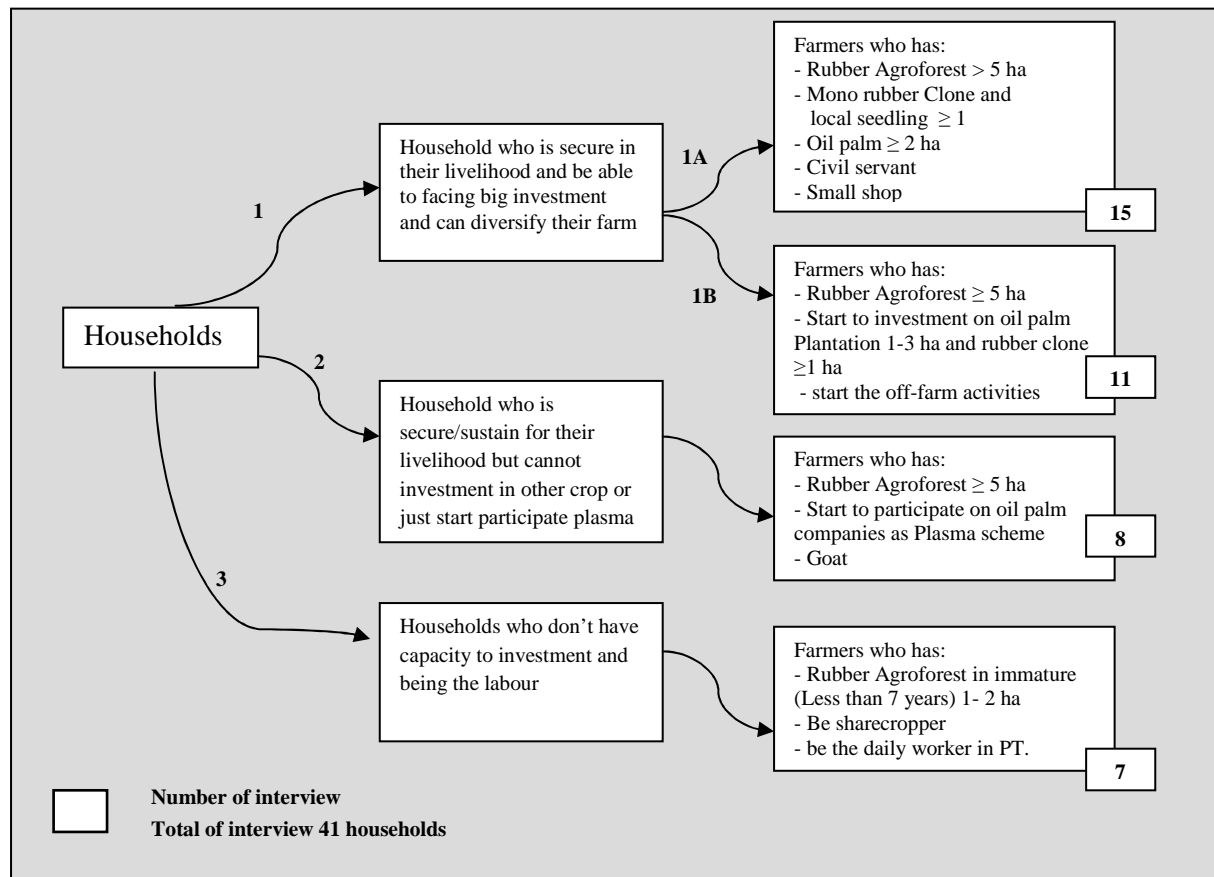


Figure 26: Typology of households

Type of household	Social characteristic			Cropping characteristic			Economic
	Age group of household (years)	Education of their children	Level of facilities	Age and areas Rubber agroforest (year) (ha)	Ages and areas oil palm (year) (ha)	Age and areas Rubber monospecific (year) (ha)	Family's income per year (Euros)
1A	40-50	1-2 children at high school and university, 1 in secondary school	Very good + car	Mixed ages >5	4-8 years and ≥ 2 ha	12 year and ≥ 2 ha	3800
1B	25-35	1 child secondary school, 1 in primary school	Good + car	Mixed ages and ≥ 4	1-3 years and ≥ 1 ha	3 year and 1-2 ha	2000
2	30-40	2 children in secondary school and 1 primary school	Medium + motorbike	Mixed ages and ≥ 4 ha	—	—	2000
3	25-30 50-60	1 baby No children or 1 child in the primary school	Low+ no motorbike	Not yet tap and 1 ha Mixed ages and 2 ha	—	—	1000

Table 11: Characteristic of each household group

Three main household are:

- (1) Households who are rich and can invest in the intensive farming who have already secured a living. They have a good practice in the rubber agroforest field, paddy field and can invest in oil palm plantation, rubber monospecific plantations and other crops. They can diversify on off-farm activities. This kind of households would be teachers, village chiefs, people who have a position in the villages and other households who have enough capital. They have more than 5 hectares of rubber agroforest + clonal rubber 1-2 hectares and/or oil palm independent grower 2-3 hectares and/or 1-2 hectares of the rice field. Moreover, such kinds of households also have a high social status. this household is divided in 2 sub-households:
 - (1A): Those who started to invest a long time ago. For example, Oil palms ages already 8 – 12 years and have land close to the village and road accessibility. This household participates on the plasma scheme and be able to buy the land and other plasma with their neighbors (they have more than 5 ha). Furthermore, they have rubber mono specific plantation already tapping.

- (1B): Those who just started investment in oil palm. For example, oil palm ages 2-4 years, there are road accessibility to their land. The other land which located far from the villages they decide to participate on the plasma scheme (this is their own land heritage from their family) they have 1 - 3 ha to participated.

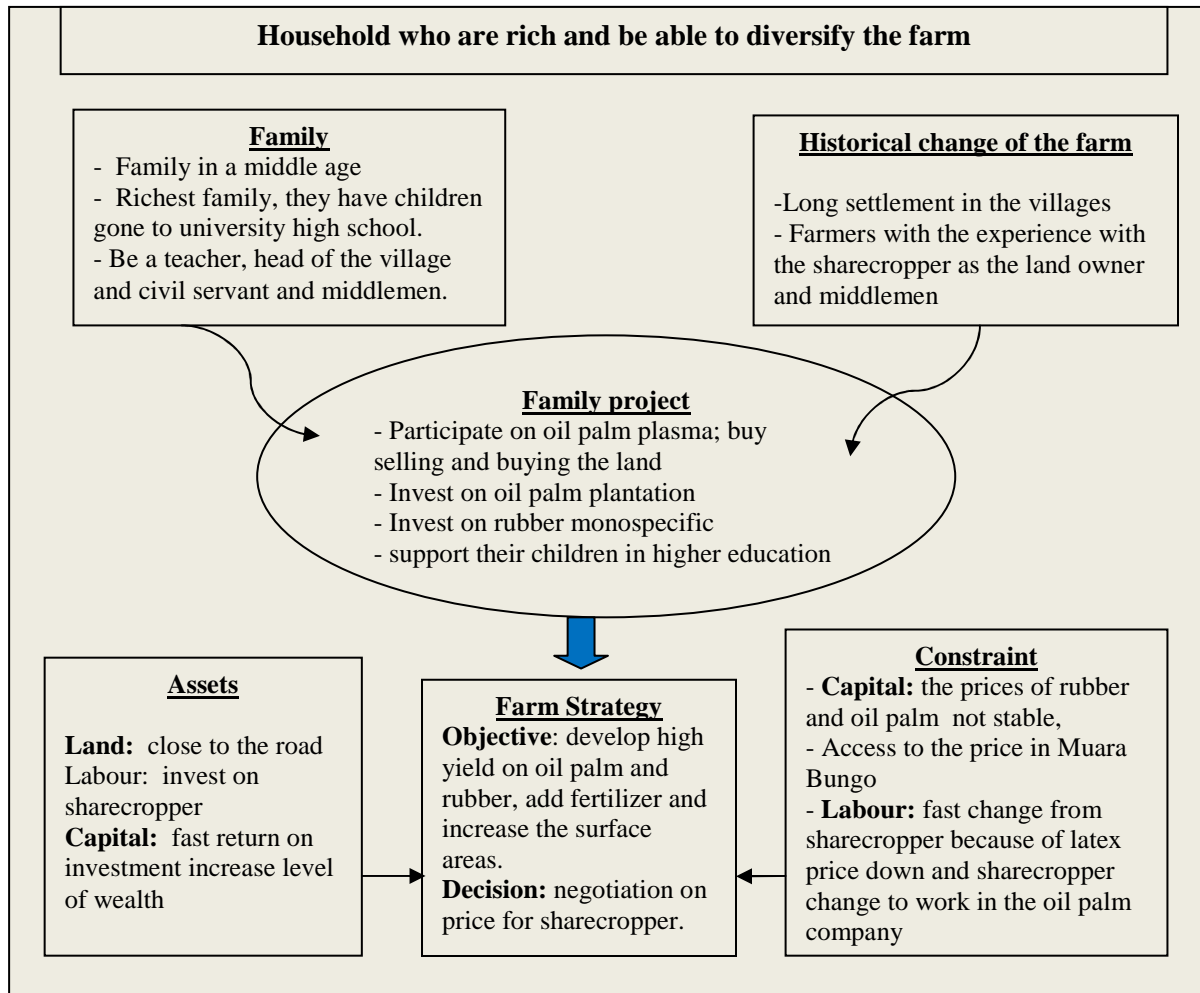


Figure 27: Schematic analysis of household who are rich and be able to diversify their farm and off-farm activities

- (2) Medium income households is a household who have agriculture as a basis for their livelihood (paddy field and rubber agroforests) they can sell and buy labour on a sharecropper scheme. This kind of households is already secure in their living. They don't want to take the risk to invest in other activities like oil palm plantation, clonal rubber and off-farm activities and also they don't have land which good accessibility of the road but they use the land which far from the village participate on the oil palm plasma scheme 1-2 ha. They have 2 - 4 hectare of the rubber agroforest and/or 1-2 hectares of the rice field. They have a good practice of their rubber agroforest and get high yield from that.

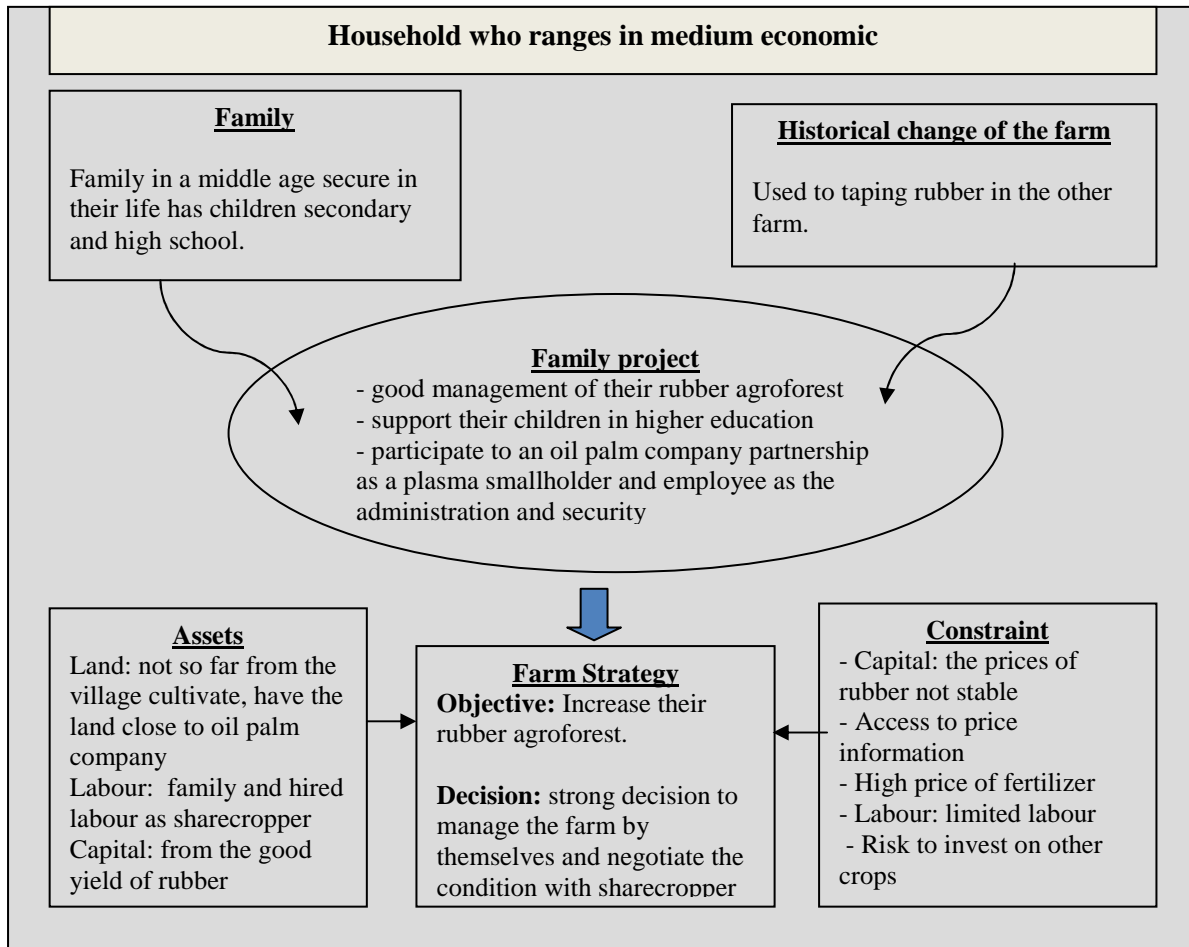


Figure 28: Schematic analysis of household who are in medium economy

- (3) Household who are classified as poor households such as old people and young households who just married who cannot invest more on other crops. They have a low capacity of investment and cannot diversify their farm. This type of households only has 1-2 hectares of the rubber agroforest which can only serve their daily life and is sometimes not enough. Therefore, they have to complement by working on other farms. This kind of household cannot invest on the oil palm both plasma and independent because of the capital and accessibility to the land.

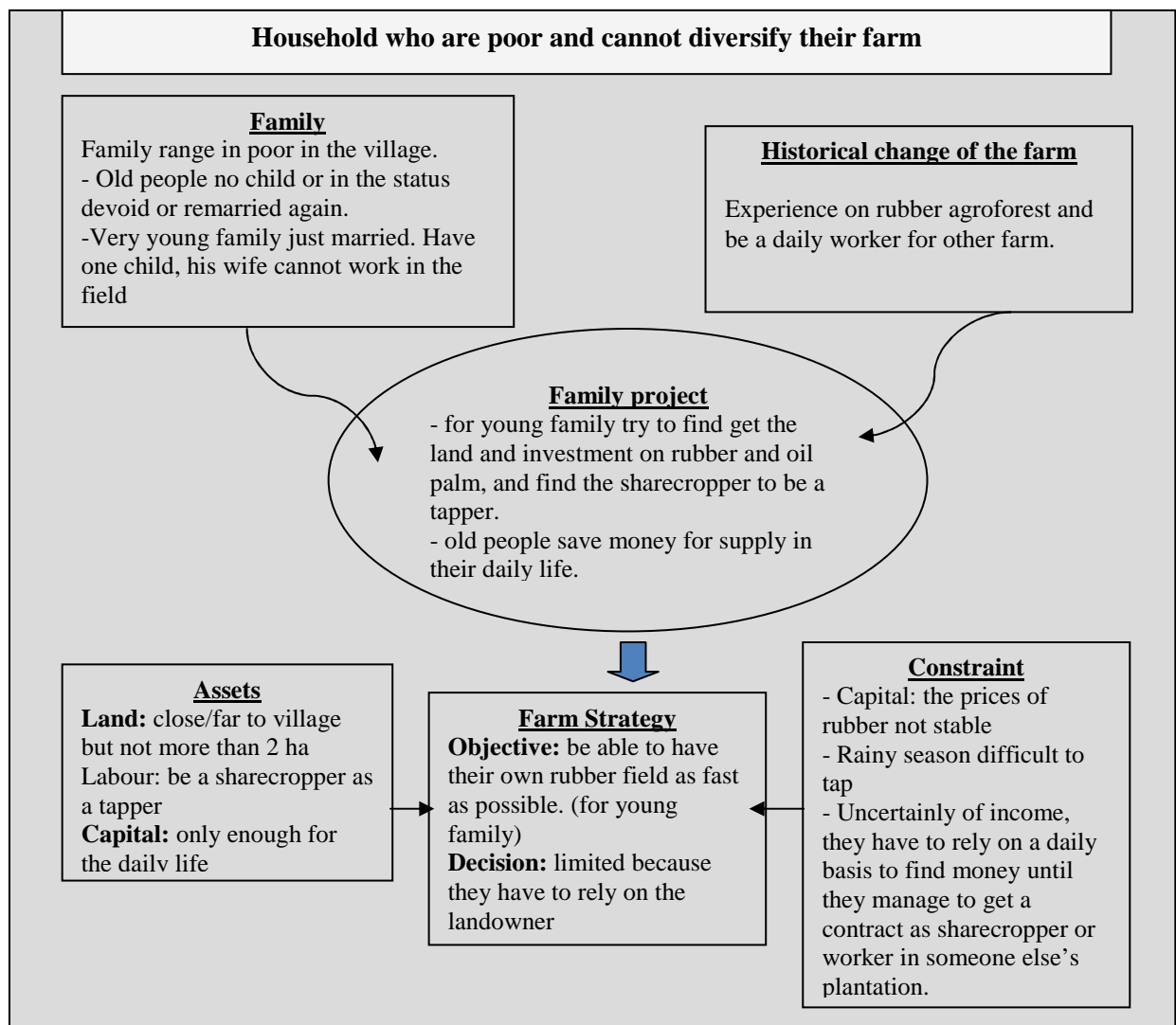


Figure 29: Schematic analysis of household who are poor cannot diversify the farm

Three types of household in this study area had difference successful history on their life and difference relationship in each stage which shows in the figure below (figure 30). Farmer has different strategy to manage their farm and their activities. Therefore, the way of successful is can start from the poor stage move to the medium stage, finally they can be get to the rich stage which it happen with the young household who just married and start their field with the 1-2 ha of rubber agroforest and while they are waiting for their rubber ready to tap they are working as sharecropper and gain the money from this business. When their rubber in the mature stage they can work both field and earn more income. Later on they can invest on other crop or increasing the fields such as oil palm and rubber monospecific plantation or invest on off-farm like small shop. Finally, they can diversify their farm, this is the way to get the successful if they don't have the big problem along the way. However, it takes long time to reach the rice stage.

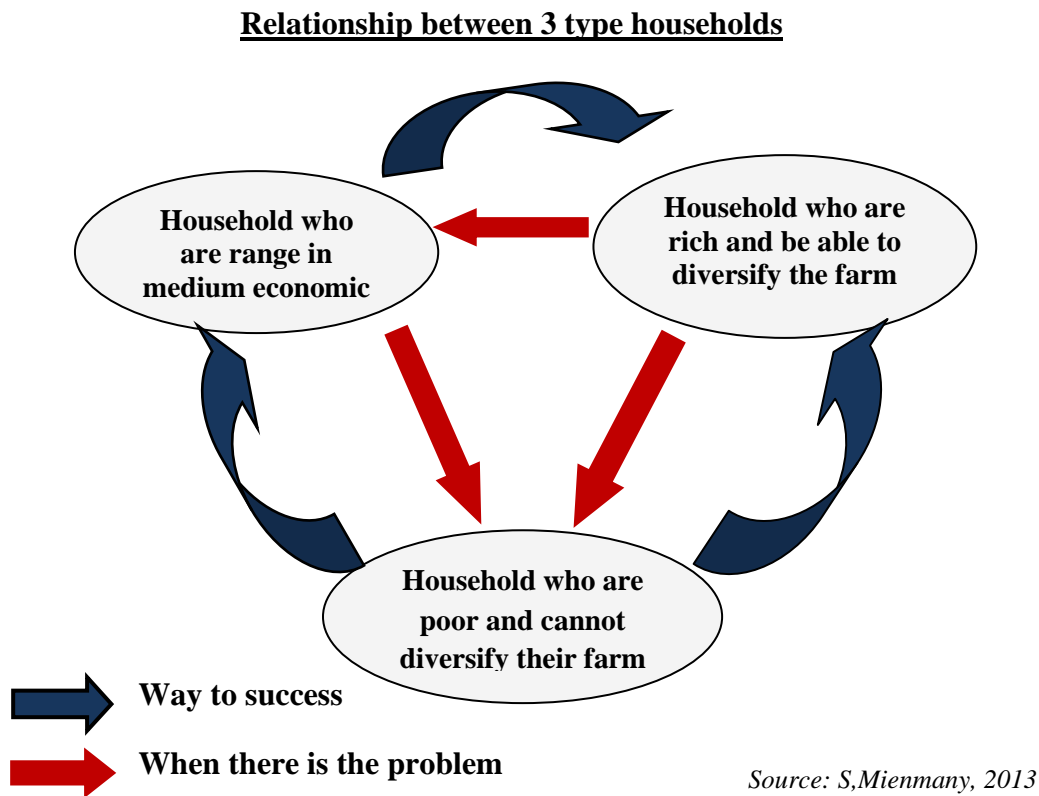


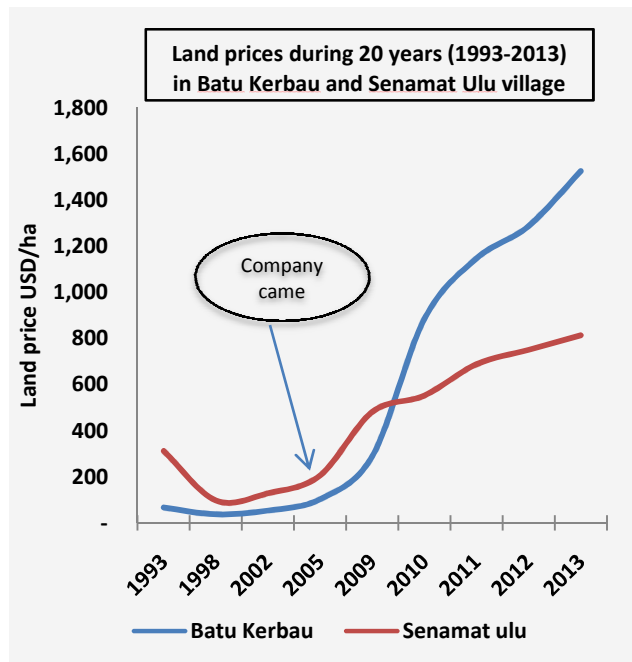
Figure 30: Relationship of households

The way to reach the successful stage is not always started from the poorest stage. It could be start from the household who are range in medium economic and move to the rice stage. For example they have a lot of land and fields transfers from their heritage. Therefore, they did not take long time to looking for the land for investment, they just continue their heritage business and just install the new business when they have a opportunity so this household can move to the rice stage fast. Although, poor household also have a possibility to jump from the poor stage to the rice stage if there have good practice on their farm for example, rubber agroforest high productivity and the latex price increase.

On the other hand, there also have the way to go down from the rice to be medium or possible to back to the poor household stage if they have the problem for example, they have problem with health, or member in the family or head of the family pass away so they lack of main labour in the family, another problem is farmers in debt with their business.

3.2.4 Land and labour prices

Land price



Source: Survey data, 2013

Figure 31: land price in Senamat Ulu and Batu Kerbau village

In the last 30 years, until the years 2005-2008, land in these villages had little value and in some case villagers can give the land to each other for free (local farmer said). This figure shows the land price for 20 years from 1993-2013, calculated in \$/ha to erase the effect of the 1997 financial crisis. In this figure shown that Batu Kerbau villages 1993 the land price was 300 \$/ha.

In 1998 land price fell down to 100 \$. The land price started to increase after the company came to the village in 2005 Starting from 200 \$/ha and 300 \$/ha in 2008 and after the company settled only one year the price of the land move from 300 \$/ha to be 800\$/ha in 2010 (Batu Kerbau village). The price grew up until 1600\$/ha in 2013. And it's the same as Senamat Ulu village land price has increased when the oil palm company come to socialization in 2008 from 200\$/ha to be 800\$/ha in 2013.

The land prices of two villages are different. This can be the assumption that in Batu Kerbau before the arrival of company, there still have a lot of lands and now high demand of land than supply which consequences to increase land price. The land price in Senamat Ulu is lower than in Batu Kerbau because of villagers still have land a lot. Therefore, supply still higher than demand. Another assumption is the land in Batu Kerbau more fertility than in Senamat Ulu. For example the mature stage of the rubber can tap in Batu Kerbau earlier (in year 8th) than in Senamat Ulu (in year 10th).

Because of the land price are very interesting. Therefore, 90 % of villagers in both villages have sold their land. Villagers are sold their land to the oil palm company and their plasma plots to people from outside the village. The other people from outside the village came from Jambi, MuaraBungo, Bangko and Java. The most people who bought the land is come from the Bupati office, police office, Husbun, kecamatan and kehutanan in Bungo.

Therefore, the current situation of the village is high demand on land. There is no available land which closes to village. Although there still have available land called “tanah kosong” or “sesap” (old fallow) which there is no road accessibility. The land which still available in Batu Kerbau is 1000 ha, it means at least one hectare per household, some don't have this land and other can have more than one hectare this depends on their heritage or their own

property because farmers open this land since long time ago and left it to be old fallow. Therefore, the farmer who don't have that land or even have but only one hectare are facing with this situation of landless because the forest status already approve since 1991 and 1993 that farmer cannot open the new forest, all the forest status is belong to the state. With this situation of landless, farmers request to open the land with the status of *Hutan desa lindung* for cultivation. But they don't have the permit to open it yet. Farmers are trying to find the solution. This solution will discuss more detail in the scenario part that farmer create their possible future.

Labour price

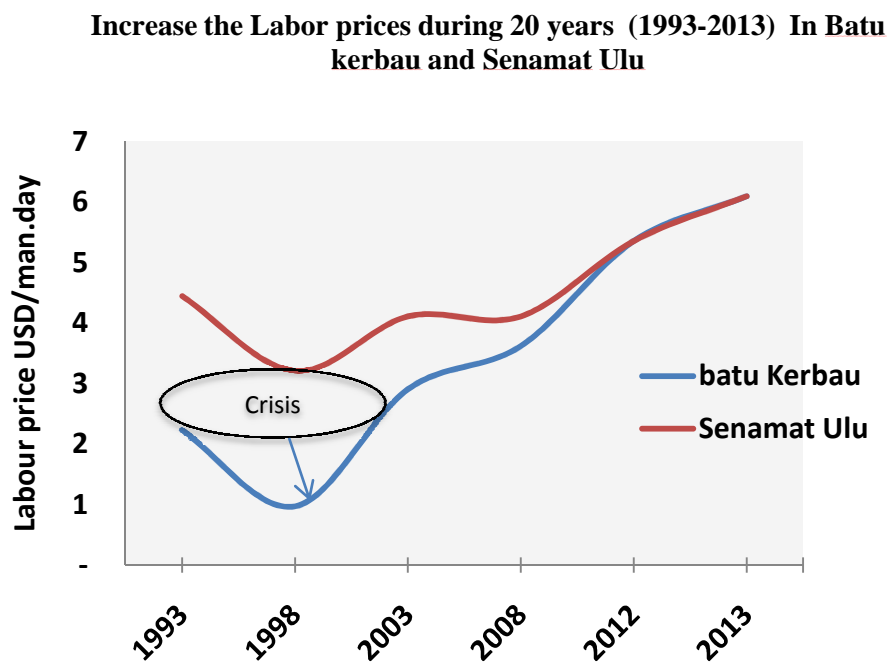


Figure 32: Labour price in Senamat Ulu and Batu Kerbau during 20 years (1993-2013)

Similarly, labour prices also increased in the last 20 years (1993-2013). The labour price went down during the Asian financial crisis 1997-98. After the crisis, the labour price in 2003 came back to the level of 1993. When the oil palm companies started their activity in the villages the price started to rise also.

The price was half in Batu Kerbau, where rare opportunities existed, the price was half what it was in Senamat Ulu. The economic opening of the area after the financial crisis, and then arrival of the oil palm companies, led to the equalization of the price in a little bit more than ten years. Now the labour price in the two villages is 6 \$/working day. In the figure 32 show that the price in Batu Kerbau was lower than in Senamat Ulu the assumption is because labour supply is higher than demand.

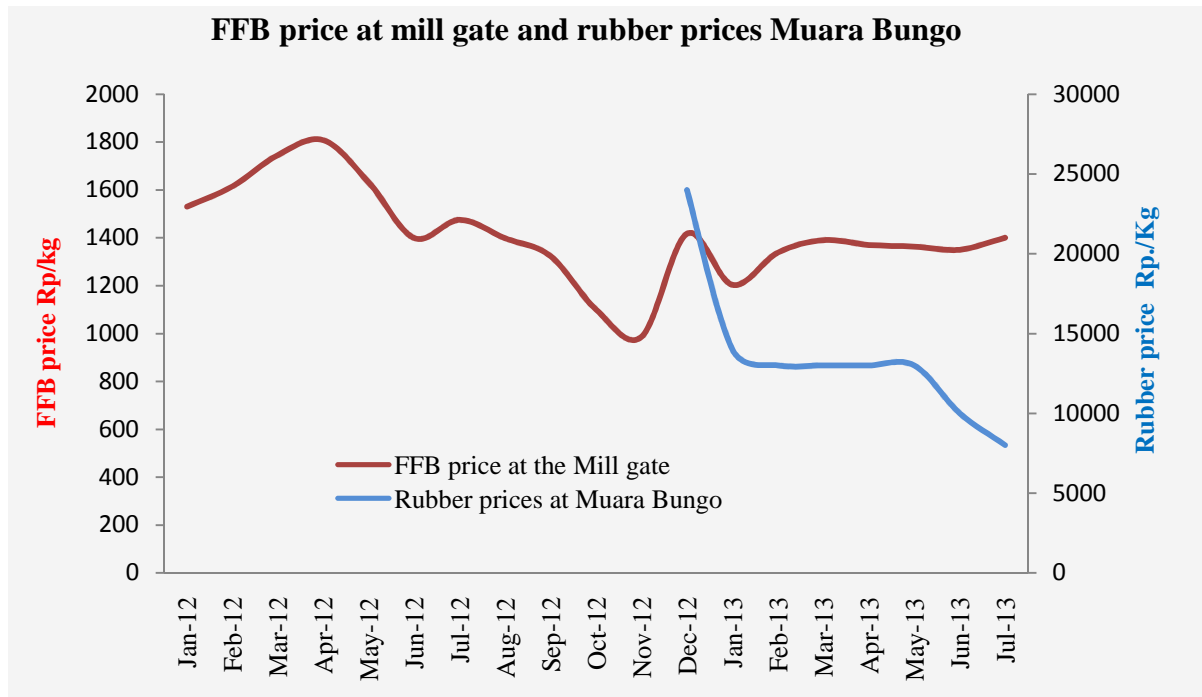


Figure 33: Price of FFB at the Mill gate in Bungo from January 2012 to July 201

Oil palm FFB⁷ price at the mill gate was up to Rp. 1800/kg in April 2012. It dropped at Rp.1000/kg in November 2012, and then rose to Rp. 1500 in December the same year. Now the FFB is around Rp. 1300/kg. This is the price at the mill gate, which only middlemen can get. Farmers would get a price lower by Rp. 200-300/kg.

Similarly, rubber has dropped three times between Dec 2012 was to July 2013 from Rp. 24,000/kg to only Rp. 8000/kg. This situation makes farmers stop tapping their rubber and prefer to work at oil palm companies.

⁷ Oil palm Fresh Fruit Brunch

3.3 Stakeholder analysis

To understand the interaction of stakeholders who play different roles in oil palm development identifying stakeholders is needed.

3.3.1 Stakeholders

Government (Local and central government)

The Government group includes the sub-district, district, provincial and national governments, which all influence proceedings within a plantation in a variety of ways. The national government creates much of the macro-legal environment in which plantations operate in Indonesia. The national legislation fundamentally affects how smallholders interact with plantations, their options, agencies and means of the recourses.

The provincial government is less prominent, although it is currently playing an important role of monthly overseeing of the plantations operating costs and hence of the income smallholders are entitled to receive. Officials at the sub-district level of government are particularly influential, both with their overseeing role of plantations in terms of the distribution of benefits and how plantation companies adhere to obligations imposed upon them by legislation (Gillespie, 2011)

Furthermore, regardless of international agreements, on the land, only national or decentralized governments have the authority on their natural resources. They have to deal with local and regional constraints, people's needs and demands and the interests of groups, external or internal, that have claims on the resources or their management. Governments may affect natural resources with different tools, such as legislation and regulations, land-use planning and public programmes of rural development or of environmental conservation (Colfer & Pfund, 2010). The main activities of the district government that influence the economic development and landscape dynamics are conducted under public sponsored development programmes. These programmes are implemented by the district offices of each department, under the coordination of Planning and investment department (BAPPEDA).

Community groups

Community groups include oil palm smallholders, farmers with plasma, plantation workers and other forms of employment as security staffs, mechanics, paid cooperative members with the ability to earn income from a variety of sources. The other members of the community group are the farmers who don't have enough land to surrender to company. In this study community also based on has different group of households, this is based on their activities and their strategies to organize their farms⁸.

⁸ Group of household have identified in the chapter 4 "Typology of households"

NGO's

Several NGOs are present in Bungo, and more broadly many NGOs are involved in the issues of deforestation for the oil palm plantations expansion. NGO are mainly involved in the issues of forest and biodiversity conservation as WARSI (Warung Konservasi). They have a long term involvement in the conservation and have success in the creation of village forests or *hutan desa* status, which authorizes villagers to manage the protected forest around their village under sustainable constraints.

Middlemen

The middlemen are very important people for farmers. Their rule is the delivery of oil palm fresh fruits bunch (FFB) from the local farmers to the mill. The profit that middlemen make is Rp. 200 – 300 per kg. For example, they buy from farmers Rp. 1050/kg. Then they sell in the mill gate Rp. 1350/kg. But they have to pay Rp. 25-30/kg to the money lender.

In this study (SenamatUlu, BatuKerbau and BaruPelepat) there are different kinds of middlemen.

- Middlemen who buy the FFB from farmers then sell FFB to another middleman in other villages. It's not selling direct to the mill gate.
- Middlemen who are selling direct to mill gate.

In this situation, farmers are free to choose their middlemen because there is normally no contract between the middlemen and farmers. This makes the price of the FFB on the local market quite competitive. In practice, however, the majority of small-scale producers must sell their fruit to the middleman to whom they are bound because of loans that they receive from these middlemen to invest in the establishment of the plantation.

Money lender

The money lender or in Indonesian oil palm market known as Delivery order (DO). The DO system is the purchasing system for raw materials used by oil palm processing units (oil palm mills). It is based on a contract made between the mill and the raw material supplier (the fresh bunch fruit supplier), who states the amount of raw materials that will be delivered by the supplier to the mill in a year. The amount of fresh fruit bunch deliveries can vary from one supplier to another. Suppliers have to pay a deposit to the mill which is estimated as the total value of fresh fruit bunch they should deliver. For this reason, most individual small-scale producers (farmers) are not able to access the DO directly from the mill. Therefore, DO holders are mostly those who have sufficient money to pay the deposit and the transportation means to deliver the fresh fruit bunch to the mills. These middlemen connect the

small-scale farmers and the oil palm mills. They send their trucks to the farms and buy the fruit directly from the farmers. Depending on the harvest, a truck can go to several farms to fulfil its transporting capacity. It then goes to the mill to deliver the raw material, then paying the farmers using the deposit money.

Middlemen can get money direct from the *DO* after they sell the FFB in the mill. For the *DO* they will get the money from the mill through the bank the day after the farmers sell FFB to the mill. There is diversity *DO* in Bungo. Middlemen will choose *DO* as they feel comfortable to get the money direct and depend on the prices that *DO* take per kg of FFB. The price of *DO* takes is Rp. 25-30/kg of FFB.

Local investors

Local investors are the people who come from outside the village to buy the land and investment in the villages. These kinds of people are investing in the rubber monospecific plantation, oil palm plantation and participate in the plasma scheme. Local investors are well known in the oil palm plasma scheme. These kinds of people are rich people and have a high position in the society. These people come from Muara Bungo, Rantau Pandan, Jawa. Some of them are civil servants.

Oil palm seedling producers

The *Pusat Penelitian Kelapa Sawit* (PPKS) in Medan is the company producing the oil palm seeds and seedlings which are already of good quality. The system to get the seeds from the PPKS is first, the producer must have the certificate permit from the company to buy the seeds. Not every farmer can buy direct from the PPKS. The other seedling producer is the in transmigration villages as in Baru Pelepat and in Muara Bungo. In this study area there are not yet getting the support the seedling from the public services.

Oil palm companies and mill

Oil palm companies in the Bungo district range from 100% farmers owned (*kebun plasma*) to 100% company owned (*Kebun inti*), the majority of oil palm plantation are company-farmers partnership (*inti-plasma*)

There are two oil palm companies in this study area “PT.PML” and “PT. CSH”. These two companies have no mill therefore the study chose the oil palm company “PT. SAL 2&3”⁹

⁹ More information on the company and plasma scheme have mentioned in chapter4 “stakeholder of the villages”.

3.3.2 Stakeholders' relationship

The relationship of each stakeholder shows in the figure below

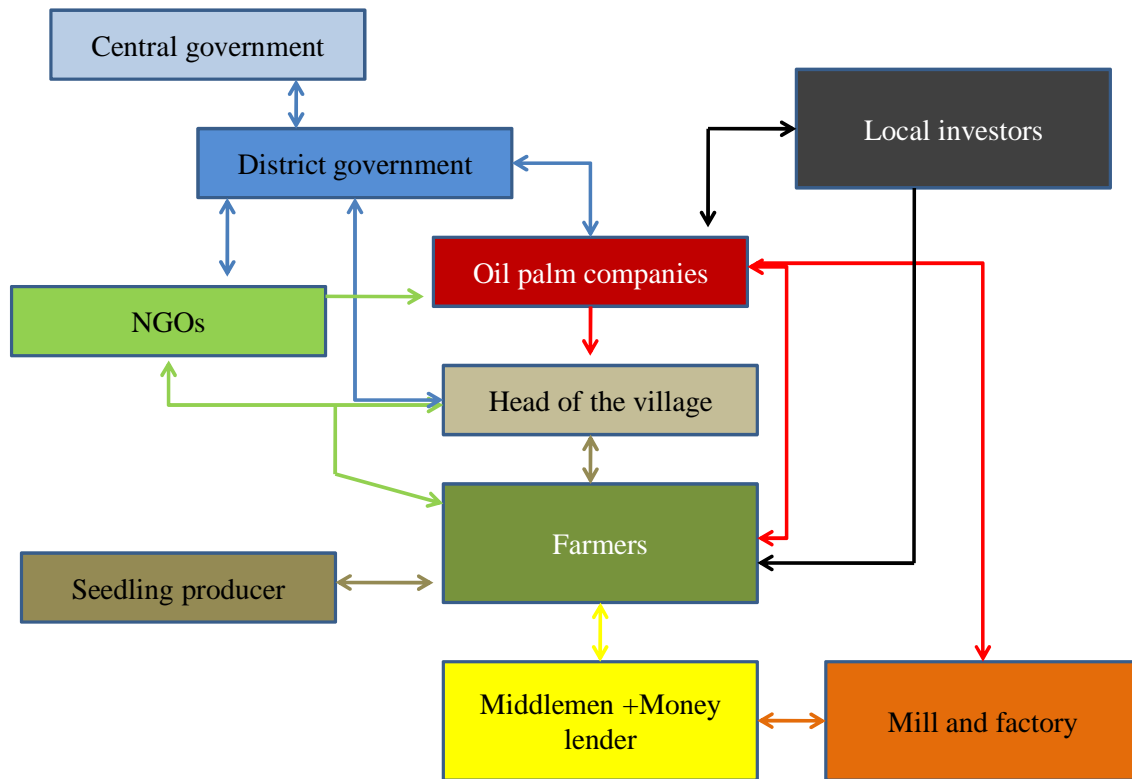


Figure 34: Stakeholders' relationship on oil palm development

Each stakeholder have difference relationships this figure above shows the relationship of each stakeholder in the study area. Farmer extension is the most interested from other stakeholder in term of land which shows that many arrows direct to it. There are government level, companies, local investor, middlemen, seedling producers and NGOs have relationship with farmers. Central government and district government have direct relationship with farmers on the land status and territory. District government performs as the advisors and give information for the farmers during the socialization. District government as public services also plays a role support the training for the local villagers.

District government and oil palm companies have relationship in term of investment permit process which companies have to follow (see in annex...) and relation when the civil servant bought the land from local village then this people have relationship as the plasma business.

Regarding to buying and selling the land, the local investor also have direct relationship to farmer and oil palm company because local investors buy the land direct from farmers then they became the plasma smallholder of the company.

Relationship between oil palm companies and farmers

Oil palm companies have the direct relationship to the farmers, one is during the socialization and other is relationship land selling and buying because farmer's lands are interested by oil palm companies. Therefore, how do the companies play with the farmers and the interaction of these stakeholders? There are two relationships between farmers and oil palm companies one is employer and employee. Farmers or villagers are working in the company as the daily worker and the annual contract as administrative position. The other relationship is buyer and seller the land.

The example regarding to land tenure is farmers don't want to sell the land and companies don't stop demand on villagers' land. By doing that the company is trying to get the villagers' land without the permit from the villagers. There is the case in Senamat Ulu village, company start to clear the farmers' land without the permit when the farmers know about that so they just negotiate by offer two options to the farmers. One is participate on the plasma and the other option is sell that land direct to company. Therefore, how do the reaction from the farmers to the company? First, farmers have to sell their land to company as they don't want to do that at the beginning.

“I don't want to sell my land and I don't want to join the plasma, I just want to keep my land but the company try to clear my land little by little, I went to my field on weekend but the company are clear my land during the weekday, when I go to my field they stop working but when I'm back home they continue. Finally, I found that they already cleared my land without any permit from me” (dai tidak puyang izin sama kita, dia lunsung buka tanah kita) local farmers in Senamat Ulu.

The other case, company PT.CSH already clear the farmer's land and planted the oil palm in the farmer's land without permit, when farmers know about that farmers don't accept any condition of the company offer (Selling their land or participate on the plasma scheme) Farmers just asked the company to get out of their land by uprooting the oil palm seedling that company already planted. And now the farmers planted the rubber.

“I have 4 hectares and company offers the prices 7 million per hectare after, but I refuse that offer. Later on I found that my land already planted the oil palm by company without any permit from me. I have asked them to uprooting the oil palm seedling out from my land. I don't want to sell my land or participate on plasma, I want to keep this land for my children I have 3 children and if I sold this land what are my children going to do/live in the future?” Local farmers in Senamat Ulu

Relation between farmers and middlemen

The relationship between farmers and middlemen is the relationship of buying and selling benefit, farmers have a good relation with middlemen and they never negotiate the price with the middlemen. There are two type middlemen one is rubber latex and the other is oil palm.

The latex products are commonly sold to middlemen. There are middlemen in the village and also from other villages. The fees the middlemen take from selling the products depend on the quality of the latex. If the good quality (dry latex) the farmer will pay 4-5 % of the total price to the middlemen while if the latex not good quality (too much water), farmers can have to pay 10% of the total price. In case the farmers have a loan with the middlemen the price will be lower than for the other people who don't have the loan. For example, the price of the latex in June 2013 is Rp. 8000/kg then the farmers who have debt with the middlemen will get only Rp. 7500/kg. Almost all farmers in two villages are selling their latex through the middlemen in the village to avoid transportation costs. Only a few farmers sell directly to the middlemen in Muara Bungo because they have the capacities for transportation. This figure below summarises the latex flow from villages to the factory in Muara Bungo (detail in figure below).

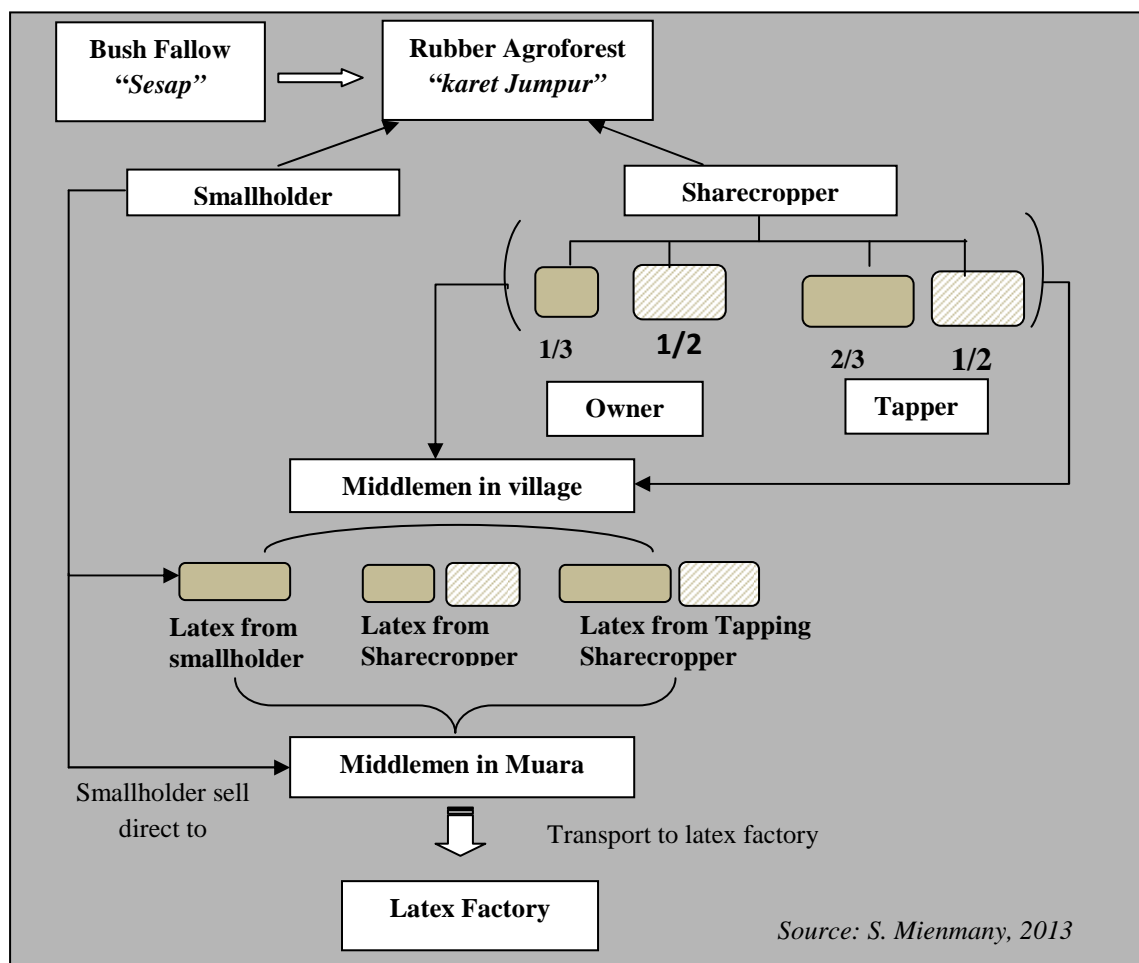


Figure 35: Market chain of rubber

Oil palm

Farmers sell their oil palm FFB with the middlemen in the village and also with middlemen in Muara Bungo. The price of selling with the middlemen in the village is Rp.700/kg (Price in June 2013). If they sell in villages nearby is as Baru Pelepat they will get Rp.900–1000/kg. Mostly people prefer to deal with the middlemen in village (only in Batu Kerbau) because they think about transportation cost and they get very low yield so it better to sell in the village.

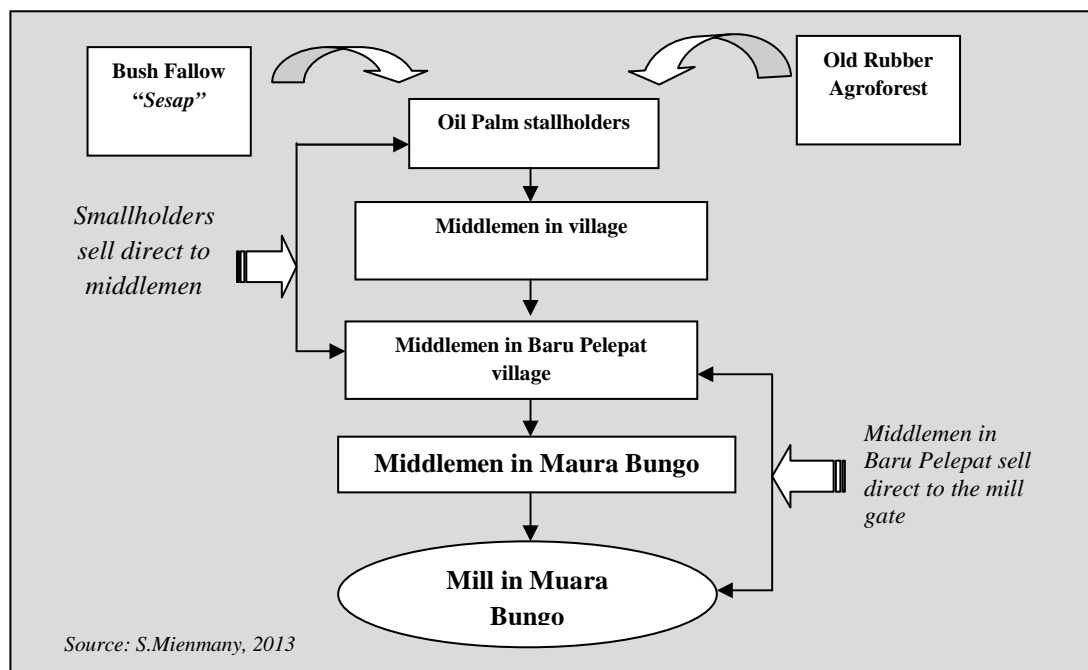


Figure 36: Market chain of oil palm FFB

The relationship between farmers and middlemen still continue like this because farmers have the factor limit on the transportation. In two villages farmers still trust the middlemen therefore, there are no conflict have noted in these villages.

Relationship between village and NGOs and publics services

NGOs are one stakeholder which also plays an important rule on the conservation in Senamat Ulu and Batu Kerbau. There is one project which promotes women handicraft. This project is supported by Indonesia Conservation Community in local name *Warung Konservasi* (WARSI) and another project is an Eco-tourism project and Women handicraft with support from The National Program for Community Empowerment (PNPM). This is a national program within the overall policy framework established to implement poverty alleviation programs. These projects start this year in Senamat Ulu. Furthermore, WARSI also supports cocoa and rubber monospecific plantations and training of local farmers. In 2012, there is one local farmer who already cultivates cocoa has participated to a Cocoa training in Bali.

In addition, the World Agroforestry Centre (ICRAF) also supports conservation; one project is thus working on forest status *Hutan Desa*. This project also works collaboration with WARSI.

3.3.3 People’s perception on oil palm development

Identify stakeholders and their interest, clarifying stakeholders’ views on the agriculture development and identify the key strategy issues. Therefore, the perception survey have conducted by posted the questions “who is the most power (influence) and interest in oil palm development?” to the villagers, civil servants and academics. This part presents people’s perception in oil palm development which has conducted in two villages, civil servant and academic in Bungo and in Bogor. First is present the averages value of village’s perceptions then the averaged value of academic and civil servant, following by the comparison value of two villages with civil servant and academic. Finally, the relationship figure with the axis on interest and power on oil palm development are presented.

Average value of two villagers’ perceptions

No.	Stakeholder	Interest	Power
1	Rich HH ¹⁰	0.65	0.62
2	Median HH	0.54	0.42
3	Young HH	0.50	0.20
4	Central Govt ¹¹	0.58	0.57
5	District Govt	0.56	0.54
6	Head of village	0.57	0.42
7	NGOs	0.21	0.20
8	Middlemen+ money lender	0.62	0.56
9	Local investor	0.48	0.51
10	Oil palm seedling producer	0.53	0.49
11	Oil palm company	0.75	0.73

Table 12: Average value of villagers' perceptions

People answered two questions by giving the value 0 - 4 then the total score was calculated and the average divided by the total number was taken. The maximum value is 1 which means the most power and interest in oil palm development. The analysis using the Chi-test function is to see the different meaning between each category depending on ages, gender, and between two villages and the civil servants and academics. Therefore, results show that Chi-test value is 0.999 means that there are no significant difference between male and female and the ages between two villages and also between civil servants and academics and villagers.

¹⁰ Household

¹¹ Government

- Average value of civil servant and academic's perceptions

No.	Stakeholder	academic	civil servant
1	Rich HH	0.72	0.73
2	Median HH	0.33	0.33
3	Young HH	0.15	0.16
5	Central Govt	0.65	0.66
7	District Govt	0.61	0.62
8	Head of village	0.41	0.42
9	NGOs	0.27	0.28
10	Middlemen+ money lender	0.49	0.50
12	Local investor	0.51	0.52
13	Oil palm seedling producer	0.40	0.41
14	Oil palm company	0.78	0.79

Table 13: compare civil servant and academic's perception.

There are no significant differences between civil servants and academic's perception of oil palm as shown in the table13 that oil palm company in the academic's perception got the value 0.78 of total score and perception of civil servant is 0.79 of total value.

- Comparison two villages, academic and civil servant

No.	Stakeholder	Interest	Power
1	Rich HH	67%	67%
2	Median HH	53%	38%
3	Young HH	42%	18%
5	Central Govt	60%	61%
7	District Govt	64%	58%
8	Head of village	56%	42%
9	NGOs	19%	24%
10	Middlemen+ money lender	66%	53%
12	Local investor	56%	52%
13	Oil palm seedling producer	61%	45%
14	Oil palm company	78%	75%

Table 14: average value of perception in percentage

Finally, the comparison of all categories such as ages, gender, civil servant and academic perception are give almost the same value, there are no significant differences as shown in the table 14 that the most interest and power is the oil palm company with the value of interest is 78% and 75% for the power.

The result shows interest and power on oil palm development of each stakeholder.

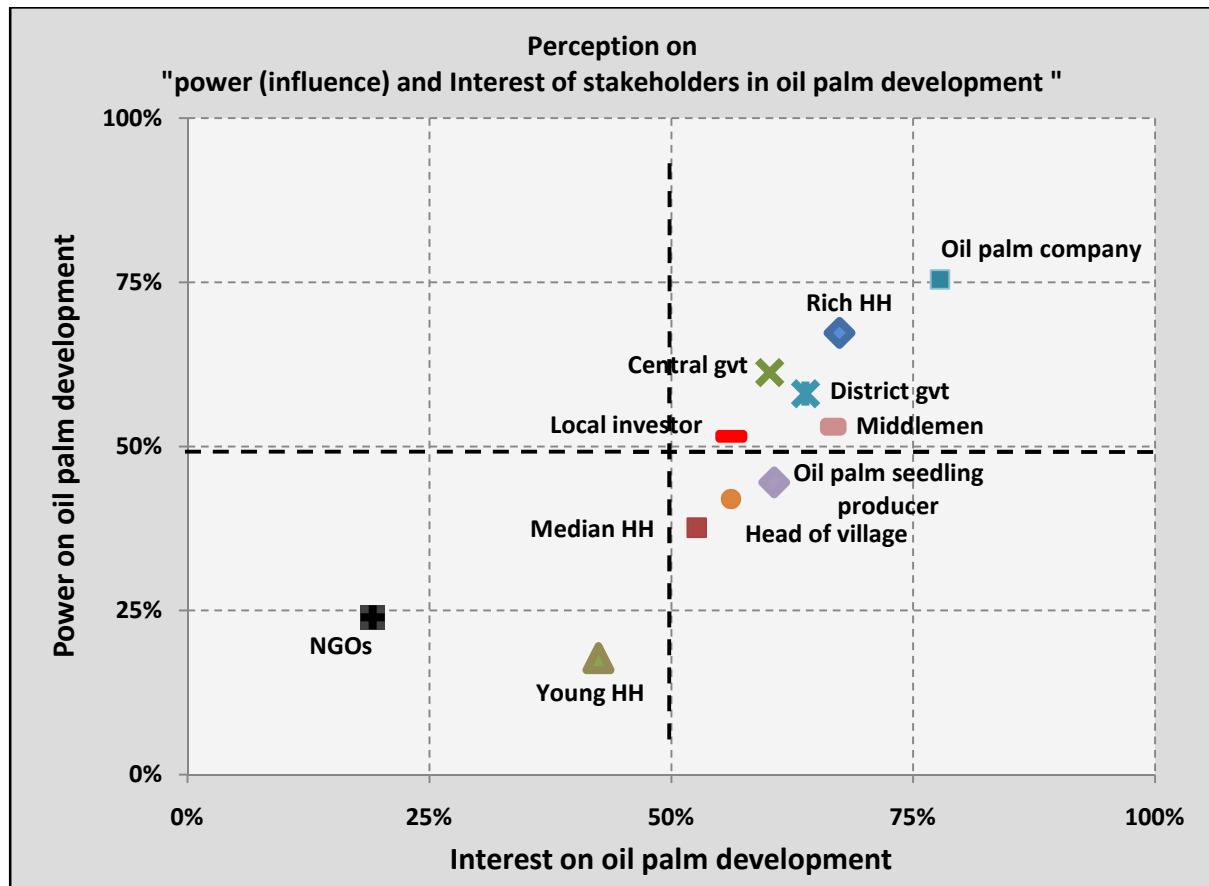


Figure 37: Interest and power (influence) in oil palm development

Each stakeholders has a different level of power and interest it depends on who they are this figure shows that the most powerful and interest in oil palm development is the oil palm companies. The second range of interest in oil palm development are rich people and middlemen because in the people's perception think that rich people have a lot of capital and can invest whatever they want and have power. The middlemen also have high power and interest because middlemen are the person who deals direct between farmer and mills. Local farmers trust the middlemen and have good relationships. Farmers didn't negotiate with the price because they believe that middlemen are transparent with them.

The other high interest and power is on the district government level. They have had high interest and power since the enactment of Indonesia's decentralization laws, 22/1999 and 25/1999, administration has been divided into a central government (*pemerintah pusat*) and regional governments (*pemerintah daerah*, i.e. provinces and districts) Provinces and districts have similar government structures but with different types of authority. Therefore, oil palm investment the district government level has higher authority than the provincial level. (Feintrenie & Martini, 2010).

Head of the villages are also one of main stakeholder and have power to accept and refuse the offers from the companies. Therefore, heads of the villages play an important role for the oil palm development. The point of view from oil palm company managers is said that "the head

of village is the key person to make the process of negotiation and to achieve the step of socialization. The system will go smoothly and there will be more participation from the villagers if the head of the village satisfies the company”.

On the other hand, poor people and young household who just married are also have an interest in oil palm and they want to have oil palm plantations but because the lack of capacity to invest. Therefore, the perception in the figure shows that poor people have lower interest and low power than other stakeholders. Nevertheless the conservation side as non governmental organizations (NGO) is the lowest interest in oil palm development but they still have the power even if little but they still have power against oil palm development.

In summary each stakeholder has different power and interests in the oil palm development. This depends on how they are presented in the society and how they use their resources. In the situation of the oil palm development and expansion, the companies are the most interesting on the farmers’ land and now farmers are the main decision-makers regarding their lands. They have the right to refuse and accept to the conditions of company because now farmers are not isolated.

Nearly no difference was made by the respondents between power or interest. One average value of the two indicators can thus be used as the most accurate perception of the respondents. This figure below shows more on the range of the most interest and power the less interest and power of each stakeholder.

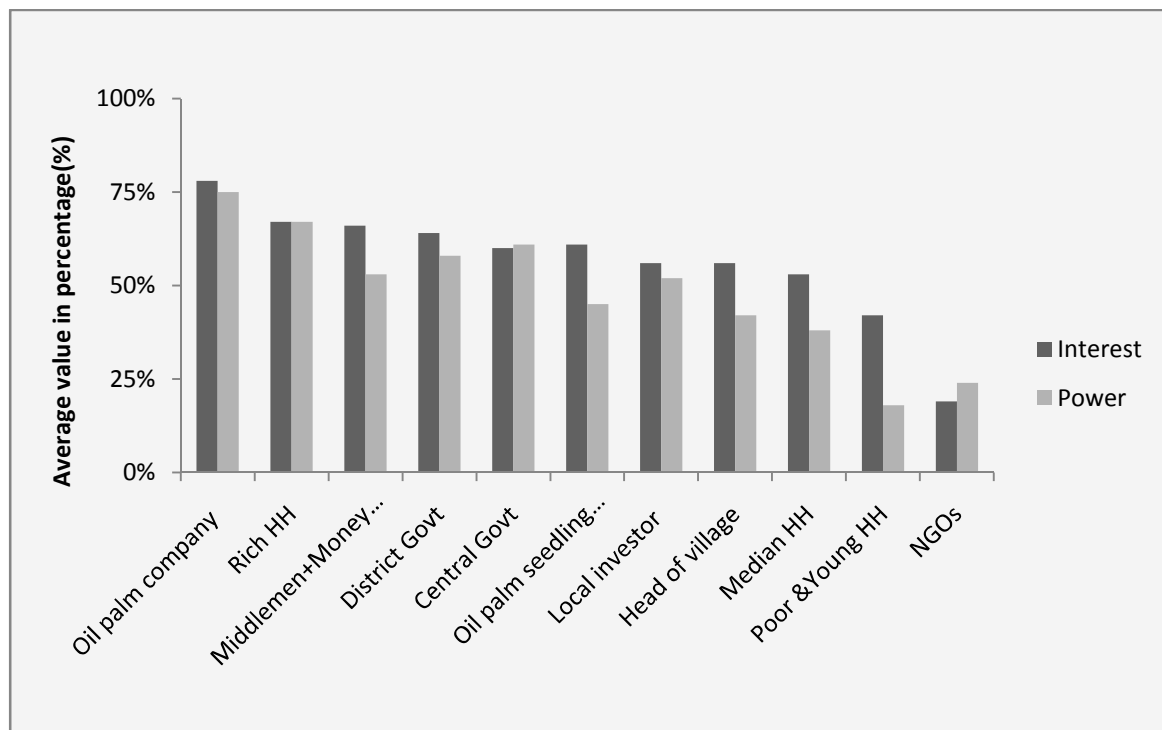


Figure 38: Average value of the interest and power on oil palm development of each stakeholder

3.4 Participatory Prospective Analysis (PPA)

PPA workshops brought satisfaction to the local community as well as public services in Bungo district. In this part is going to present the result of the each step of PPA, first the defining system and key variables of each village then follow by the influence and dependence of each variable and finally example scenarios are presented.

3.4.1 Defining system and analysis variables

The systems of workshops at both villages have defined “**Community economy in 30 years**” with main point “what might be changed and improved regarding to oil palm development and agriculture development in the villages?”

Therefore, the brainstorming session helped to freely list all variables that, according to the experts, have influenced, are influencing or could influence the role and importance of the workshop of the “community economic in 30 year” Then the proposed variables were discussed until a consensus was reached about which variables to keep, to eliminate, or to modify. Each variable was also reviewed to make sure that all participants understood them uniformly. Finally 25 variables (Senamat Ulu) and 27 variables (Batu Kerbau) were defined. For example, access to capital, land prices, price of seedling, quality of seedlings, access to information of commodity prices, improve roads and so on.

3.4.2 Influence and dependence of each variable

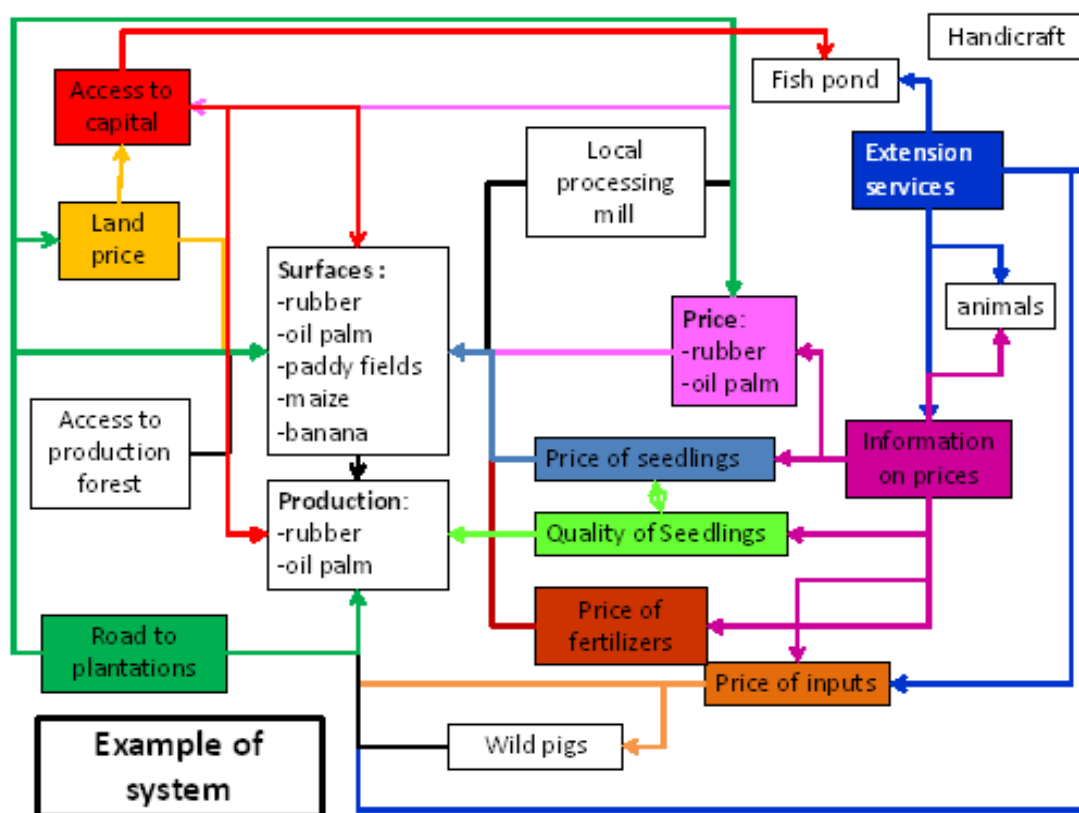


Figure 39: Diagram influence and dependence of variable of Senamat Ulu village

This figure arrows show the direction of the influent of each variable. The main variable is the most arrow connected/direct/link to it. For example, information on prices is an influence on price of rubber and oil palm, price of seedlings, quality of seedlings, price of fertilizers, price of inputs and animals. Furthermore, the extension service such as training is influent on the production of the farmers, opening the roads to plantations and creating fish ponds and animal production in the village. Access to capital is also the main influence which makes farmers able to invest more and diversify their farms. Moreover, the quality of seedlings is the direct influent on production extension and the training service is an indirect influent on the production as well. Another big influent is land price. It's the direct influent on an access to capital extension and the same land prices are indirect influent on increasing surface of rubber, oil palm and other crop commodity because when farmers sell their land, they have capital therefore they can invest in their farm.

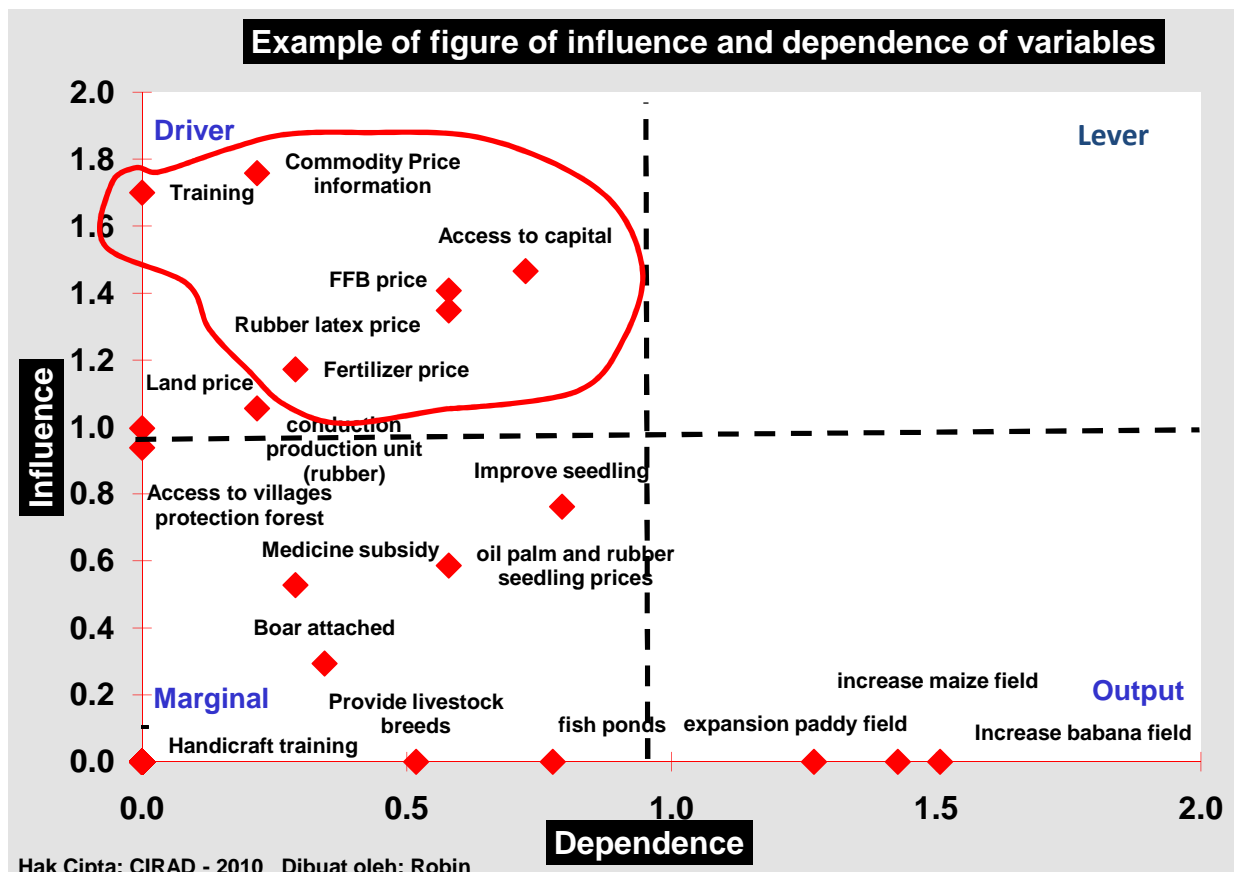


Figure 40: Example of Influence and dependence of variables

The position of variable on figure shows that the upper-left quadrant (1) is the area of the driving variables where most of the strongest variables are present which is shown in the red circle. It's the main influence and independence variable such as “**capacity building (training)**”, “**information of commodities prices**”, “**access to capital**”, “**oil palm fresh fruit brunch prices**”, “**rubber latex price**” and “**prices of fertilizers**”. These six main variables have influent to increase the lower-right quadrant (3) “**output**” variables such as

“maize field”, “paddy field” and “bananas field”. In the lower-left quadrant (4) which is Marginal are the less influence and dependence there are handicraft training, the “access medicine subsidy”, “livestock breeding” and “boar attracted”.

3.4.3 Building Scenarios on “Community economy in 30 years”

The scenarios are based on the key variables which were mentioned in the figure 39 (Training, commodities prices, access to capital, FFB and rubber latex prices and prices of fertilizer) these are the key variables which take into account building scenarios for the “Community economy in next 30 years”. For example, “capacity building (training)” in the current situation farmers in both villages are lacking increase capacity building, this corresponded to very strong and significant changes in the agriculture development in this area. Secondly, “information of commodities prices” farmer lack information of product prices, farmers trusts the middlemen. They are not sure whether they will get the good price or not, therefore, in the near future if the villages have good access to information of the commodity prices, farmers can choose where they can deliver their product to. Another key variable is rubber and oil palm prices, in the next 30 years this price will influence the economy of farmers, farmers will be able to open the new areas of plantations and intensive on the their field.

This study will give two examples of scenarios.

Scenario 1: “Towards a village business”

- Local Government transmigration project opened in the area of Production Forest:
 - This will include 50% of transmigration households and 50% of Indigenous households
 - Villagers want to open the land with a status of Production Forest of the village for the transmigration project.
 - Villagers open new fields such as rubber and oil palm.
 - Capacity of human resources development has increased thanks to the outside entrance of the village
 - Land prices rise.
- Population increased and also infrastructure and facilities have improved.
- Farmer’s capital has increased
 - Farmers who have oil palm plantations
 - Farmers can earn money by being daily workers besides tapping rubber



Photo 12: Local experts Batu Kerbau are describing the scenarios. (Photo by Margot Mulin)

Scenario 2: Landowners and daily labourers

Current trends

- Asphalt road
- Oil palm prices rise
- Rubber and other commodity prices are not stable

These criteria above are consequences to villagers who are less able to sell their land therefore they become workers in oil palm companies in villages or move to be labour in the city. Furthermore, other people outside the village (local investors) are replacing original people and farmers will work just only enough for their daily life. On the other hand, people who are able to buy more palm oil plantations and the rich people will be richer and the poor still remain poor.

Therefore, only the children of rich people are able to attend school and the children of the poor people will be looking for a job as daily workers or be farmers.

This scenario is the current situation of two villages and it will continue like this if the local villagers still keep selling the land and don't have good practices for their farming.

Photo 13: Local experts Senamat Ulu are describing the scenarios. (Photo by Laurene Feintrenie)



3.4.4 Defining recommendations

After defining three scenarios the villagers as the local experts open the discussion to raise the recommendations to the public authority for example the main recommendation are the creation of the farmers groups and common projects in the villages to get advantage on request for the help from the public services like access to improved seedling for oil palm, rubber, vegetables and fish ponds (detail in annex).

The scenarios have raised villager openness to the discussion and given the recommendations as follows:

- The road to the field
 - Farmers who have land or the field in one location should create the “farmer s groups” to build the road together.
 - Group cooperation working together or “gotong-royong” in Indonesia language to improve road even if it's not the big road but it's the road access to the field by motorbike.

- Farmers create the Village Unit Cooperatives (KUD)
- Access to improved rubber seeds and seedling
 - Create groups of farmers to get the advantage on the access seedlings from the public services.
 - Buy the seeds by themselves to make sure that they can get the real improved seeds and seedlings.
 - Create the groups of seedling producers in the villages by requesting support training from the public service.
- Find information on commodity prices
 - Information price from public service (Perindakop in Indonesian language) each week.
 - Information through newspapers
 - Assess to market as opening auction



Photo 14: Participants present their recommendations

for example the main recommendation are the created the farmers group and common project in the villages to get advantage on asking/request for the supports from the public services like access improve seedling for oil palm, rubber, vegetable and fish pond (detail in annex). On the other hand, at the beginning discussion to give the recommendation the villages are asking all support from the public services. They think that they cannot do it by themselves. when they are more discussed during the workshop they realize that some part they can solve it by themselves for example, open the road which access to the field which they can open by themselves no need to wait for the government to support it. Some local experts especially head of the villages are aware and move active on participate to design their possible future.

3.4.5 Sharing result from the workshop with the district public services in Muara Bungo

The workshop at the district public services level bring the good opportunity for the village to share their situation and their demands to the public services because local village have less chance to talk and inform their situation in the public stages. The aim of this workshop is to present the results and the recommendations which are discussed in the villages. Representative of the villages as a head of the villages present their situation and issues of the village then follows by the recommendations to the public services. The main discussion are the road, training for farming group, access to the seedling of rubber, oil palm and vegetables and the contract condition with oil palm companies. The feedback of the workshop from the civil servants who are participated on the workshop mentioned that “this is a good opportunity for us to know about the villagers’ issues and the recommendations from the villager directly and we are ready to help and support the villagers”. Therefore, during the workshop there are the seedling plantation office propose to head of village to contact them to get support from the vegetable seedling. On the other hand, the contract issue with the oil palm company (PT PML) will be more discuss again if head of the village come back to contact the public services for the advise and prepare for the re-negotiation. Furthermore, after the workshop head of the village of Senamat Ulu get the contact from the transportation office to discuss on improve the road. These are the direct impact of the PPA workshops which have been done in the two villages.

4 Discussion

4.1 Land use issue: land prices and land grabbing

Land grabbing¹² in this study area is between local villagers and oil palm companies, and local villagers with the local investors who come from outside the village. 90% of the farmers in both villages sold their land to oil palm companies and their plasma plantation to local investors since the oil palm company arrived in villages in 2005. Farmers want to get money in the short term. Farmers who sold the land and their plasma regret their decision because the current of land price has increased almost tenfold.

The reasons why farmers sold their plasma (after participating in plasma schemes only few months or few years) to companies as well as other people outside the village are:

- The company doesn't tell the farmers about the detail of the condition and contract especially the credit/loan. This is because the final loan will include the management costs of the plantation during the first four years, which are not known in details by the company beforehand. Thus plasma smallholders don't know exactly how much they will have to pay back. As a consequence they don't feel secure to keep this business with the company.
- They don't want to wait for the long term benefit. The company told them that at the year 5 they will get the benefit from the company, but if they are offered an immediate benefit through the sale of their plantation, smallholders don't hesitate long.
- The company and other people outside the village offer high prices for the land (interesting prices). For example, Rp. 15-17 million per hectare year 2013 at PT. PML at Batu Kerbau and Rp. 8 million per hectare at PT. CSH in Senamat Ulu). If compared to the price in 1994 in Senamat Ulu is only Rp. 700,000 per hectare and in 1993 in Batu Kerbau is only Rp. 150,000 per hectare.

The example between villagers in Senamat Ulu and oil palm company PT. CSH, even the villagers who still keep the contract with the company as plasma they don't know exactly how much the loan that they have is worth and in how many years they will need to pay back. They try to ask the company but the company doesn't tell them directly.

“I have asked the company many times already about the credit/loan how much that I have loan with you? And what are the conditions of repayment? The company just told me “we don't know yet, you will know after the company divided the benefit production of the oil palm”. So I just try to participate with PT. CSH only one hectare first. *Saya sudah betayan PT banyak kali tapi dia bilang belum tahu, belum tahu, dibagi hasil dulu nanti tahu. Jadi saya cobah satu ha dulu*” farmer in Batu Kerbau village.

¹² “Land grabs” is a term coined by the media to describe large-scale purchases or leases of agricultural or forest land on terms that do not serve those already living on the land. (Murphy, 2013)

Comparing two companies PT.PML and PT. CSH: villagers are satisfied with the way of working and managing from the PT. PML because of the contract condition 60:40. However, farmers don't understand clearly the contract benefit 60:40 of the divided benefit of the production. In the reality if the farmer understands well the contract 60:40 of device the benefit from the 50 % of the plasma land is very low benefit than the contract 70:30 because the 70:30 scheme is the contract sharing of both land and revenue (Detail at table 10). Therefore, the condition to a successful KKPA system is the transparency of the proposals of the oil palm companies to the villagers. For this, it should be needed to have clear information about the contracts which could be written in a book of requirements signed by all the parties: the company, the villagers and the district authorities.

Another issue about the land is local villagers request from the government to open the villages protected forest *hutan desa lindung* because the villagers are facing land shortage now. One example in Lubuk Tebat (one Khampung in BatuKerbau village) asked the government to open the *Hutan desa lindung* two times already but they haven't got a permit yet. The reason behind this request is in the past (before 1999) the forest did not yet have a status as the forest state. Now all the forests belong to the state. According to (Feintrenie & Martini, 2010) The Indonesian legislation gives authority over unforested land to local people but grants the majority of forests to the central government, under the status of state forest. On these state forests, the central government is undeniably the most powerful stakeholder, with full authority on their use or conservation. Farmers have no right to access to the land by opening the forest.

The status of "village protected forest", farmers understand that this land might be requested back from the state when they need it therefore farmers give the land to be forest state for the conservation term. Recently farmers realised that with this land they have no right to get it back again. The current situation of land shortage forces the local farmers to request this land back. This request is still on the way of hope that they can open the *Hutan desa lindung*. This situation never happens in Bungo before. Now farmers need more land to cultivate their rubber and their oil palm, farmers aren't aware of the conservation term. Therefore this issue happened in this study area. (Therville, 2011) mentioned that perception survey of people's opinion in Bungo district about land uses, landscape and forest conservation, conducted in 2007, clearly showed that all villages were willing to accommodate an oil palm company on their premises. People believe that their future lies in oil palm and rubber and do not imagine alternative livelihoods. This is the same case in two villages Senamat Ulu and Batu Kerbau that farmers prefer to have these kinds of cropping systems as a main income for them. Farmers didn't mention to have the conservation side for their village, the important thing for them is how can they find more land to open their agribusiness.

Another point that this study want to discuss is (Feintrenie, et al., 2010) have mentioned in the research that:

(Marti, 2008) said *"oil palm development can be tantamount to land grabbing, uprooting of the communities, unfair deals extorted from helpless farmers, and poorly paid jobs"*

Therefore(Feintrenie, et al., 2010) have verified that:

“Oil palm development are much more positives than negatives. Since 1999 the end of the centralized transmigration program, there have been no cases of communities forced to sell their land to a company in Bungo. Whenever people sold their land, they did it on a voluntary basis, and as participants in a NES scheme”.

This research conducted in the villages Senamat Ulu and Batu Kerbau, moderate Feintrenie et al. (2010) results. Indeed, these authors based their statement on data collected in 2008 and 2009 in Bungo district. But since 2008 new oil palm companies have entered the area and come to the villages. If villagers have not been forced to sell their land, they have been, and still are in 2013, pushed to sell by local and urban powerful elites. Poorly informed and easily impressed villagers are not in a position to negotiate an offer of immediate cash for the sale of their land. Land grabbing have occurred between local villagers and local investor outside the village which this study shows that 90% of people sell the land. Now the villagers are facing land shortage/land scarcity, farmers are looking for new land as village protected forest *Hutan desa lindung*.

Therefore, land grabbing in these villages still continue if the farmers get the permit to open the land and they still continue to sell this new land. What is going to happen in these villages again? Therefore, PPA workshops have been held in two villages to see their possible future.

This PPA method might be nice, but the impact is only at a village scale as the study has only been done in two villages. Therefore, how can the other villages facing the same issue on land grabbing will have a chance to see their possible future which would be different to what is going to be their future? This is the challenge for the PPA workshop to up-scale to the district level.

In the challenges it is still possible therefore, to up-scale levels to district or to the national levels which is possible to happen as well. according to (Bourgeois & Jesus, 2004) already have done the PPA in the regional level on the “Case of Secondary Crop Research and Development Prospects in Asia and the Pacific”.

Therefore, the next research for the upscale should be first start from the sub-district (Kecamatan). For example, sub-district where the oil palm company covers two sub districts like Bathin III Ulu and Pelepat Ilir where the oil palm company PT.CSH were settled then up-scale to the district level. Yves Laumonier (CIRAD - CIFOR) has recently led some PPA at district scales, with urban and rural elites. The participation of higher-education local experts modifies the activity, especially on the fact that participants need more time to discuss to reach an agreement (pers. com.).

4.2 The advantages and limitations of the method

4.2.1 Socio-economic analysis and sample

The Size of sampling is small for the economic analysis. The reason why this study took small samples is because the economic part are not the main point of the objective of this internship. The economic result is a part to support and prepare for the PPA workshop. This economic result is to understand the farmer's strategy on managing their farm. The economic results of this study were also based on the economic results which have been done from the previous research of Laurene Feintrenie in 2007-10 and others especially Chong and Bonnard in 2008. The other reason is because of time consuming in the field. Therefore, this study can only have the small samplings. Even if it is a small sampling the result was validated with the local villagers and the experts in CIFOR during the presentation in the village and at CIFOR office. Because of this small sampling, the economic results cannot be used for statistics, and cannot be up-scaled to the district. They are only representative of some activities in the two studied villages. However, analysed as part of a long-term research conducted in the district since 1994 by CIRAD, CIFOR, ICRAF and IRD, this small sample add new information and a new perspective to the knowledge of the district economic organization.

4.2.2 Stakeholders analysis

The stakeholder analysis is quite a difficult part because of the communication in the local language. During this internship there was no interpreter during the interview and the collecting of data because without an interpreter we can get the real information from the villagers. When we use the interpreter we miss some information and the information that we got is not the real answer from the farmers, sometimes interpreters will transform the farmers' answers and give their opinion or their point of view. Therefore this internship did not use an interpreter .The other difficulty in stakeholders' analysis was a lack of well-structured method and conceptual framework.

In order to avoid this difficulty first, have to well prepare and be ready to communicate in local language. The other one the structure method and conceptual framework should be clear understanding and well organize on the conceptual framework before conduct the interview.

As a consequence of difficulty on the stakeholder analysis the perception survey was created to check the point of view as the perception of the villagers, farmers, civil servants and academics on who has the most power and interest in oil palm development. However, there still is the difficulty on the perception survey because the questions which were chosen for perception survey were quite similar, the two indicators were too close one to another for respondents to give different answers. Therefore, to improve this situation indicators chosen should be more different one from another.

4.2.3 Participatory Prospective Analysis (PPA)

The participatory prospective analysis (PPA) is the good way to give the opportunity for the local villagers to talk and open group discussions at the village level. It's a good chance for

them to listen to each other on the current issues and how can they work out the solutions together. Furthermore, they were offered a chance to present their situation and their thinking to the public authority in Bungo district. This is the direct outcome for the villagers.

Thanks to the PPA workshops farmers understand better their situation and give the scenarios for their possible future (next 30 years). In the evaluation of the workshops, they have told the moderators that the workshops have helped them to better understand the future consequences of their current choices. The exercise made the participants think on the long-term. Participants proposed a number of activities in order to improve the future of their village, most of which should begin by activities conducted by the villagers themselves without any outside support. Therefore, this has the recommendation for the next research it would be good to have the evaluation after one year to see what is the reaction after the PPA workshop? Are they going to sell their land again, will they apply their own recommendations?

In my points of view PPA workshop is the effective method to help the farmers understand their current situation and their possible future. Moreover, the prospective analysis method goes beyond the elaboration of scenarios. This is a full process that expert participants who are at the same time stakeholders are led to view their environment and their resources from a very different perspective, to share this information for the next generations.

However, there is still a difficult point about the PPA, at first, how to get farmers (local experts) to participate in full four working days because farmers prefer to work on the field and they cannot leave their farm activities. The other is the language and the technical word which use in the PPA make the local expert don't understand clear enough for example: the word "variable". Most of the participants have barely finished primary school and had difficulties to write. The level of conceptualization demanded by the method is very challenging for low-educated participants.

Another difficulty is for the facilitators. First, it's difficult to explain the work without giving answers to the participants. If the facilitators give examples or answers, then the participants are influenced and might repeat the same things. The other is how do the facilitator make sure that everyone participate for example women and shy people should talk as much as the head of village.

Therefore, in order to bring the farmers to participate on the workshop is should well explanations with the head of the village about the important to participate on this workshop because this is the real impact to local community so this will motivate them to be active to participate. For the facilitator, it should be good to limit their influence by give the explanations more not the answers or their opinions. To make sure that everyone participate is would be based on the selection the participants. Therefore, should select the villagers who are not shy and be ready to talk together.

Nevertheless, this PPA has satisfied the local experts and gets good result. Therefore, it would be good to have such kinds of workshops in another villages to make them have an opportunity to tell their situation and find the solution together. However, up scaling of conducting the workshop in another level would be the challenge for the PPA.

Conclusion

Most of the local villages' economies are still based on the rubber agroforest and rice cultivation only for home consumptions. Only 6% of total households from the villages surveyed cultivate monospecific rubber and private oil palm plantations. These plantations are still new in the village and little intensified. Economic results enlighten the reasons behind farmers' practices. Rubber monospecific plantations perform as high levels of return to land, but, in the meantime with high levels of investment but low return to labour. Traditionally local villagers prefer to put fertilizers on rubber rather than on oil palm fields. Consequences are that return to land of oil palm is moderately high but the return to labour is high. Farmers however lack technical knowledge on fertilization and on quality of seedlings. As a result, after 10 years of plantation, the productivity drops down.

Land accessibility and households' situation are the reasons for farmers to choose the crops and diversify the farm. When they have to choose between oil palm and rubber, they will choose the later.

Oil palm development brings new opportunities to the village, such as road accessibility, labour opportunities, planting techniques and, in short term it improves the people's livelihood. However, oil palm development also brings the land grabbing issue to the villages. Land becomes more valuable and local villagers prefer to sell their land and plasma. On the long term, the highest benefits from oil palm development are for the local investors from outside the village. Local investors as well as civil servants use their capacities to serve the interests of oil palm development. Farmers with low education can lose their land following unclear contracts conditions and lack of transparency proposals from the companies.

On the other hand, when the land is in shortage, village protected forests *Hutan desa lindung* are the new target for the local villagers, which had never happened in Bungo area before the last two years. The vision and the strategy of local people for their economic future in the next 30 years are to invest on rubber and oil palm plantations and to access to new lands. Improved seedlings and support training from the public services are needed. At the same time, prices of rubber and oil palm fresh fruits have an influence on farmers' decisions to extend their plantations of these crops. One possible future scenario is if the farmers get the permit to access the new land, they will invest more on rubber and oil palm as smallholders rather than participate to the companies. Another possible scenario can be that people still continue to sell the land, which should lead to dividing more the society between rich people who become richer and poor people who still remain poor. Therefore, oil palm development is not a win-win solution in this study area.

However, there is nothing worse than too late. PPA workshop already helped local people and public services in Bungo to design their possible future. With regards to the knowledge generation, PPA method has shown to be an effective tool and effective mean of work for the local experts working together. This method is possible at the village level, district level and even higher level such as the national and regional levels.

The benefits that the villagers get from the plasma scheme have been clarified during the PPA workshop. This was much appreciated by the villagers. Now, renegotiation of the contracts conditions is a main point that villagers are willing to undertake. It's important that district authorities and public officers encourage the signature of MOU on the oil palm development between the companies and the villagers. These are the PPA workshop have contributed to the villages. Now it's the local villages and local government themselves to choose what they prefer for their future.

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Annex1: Scenarios at Batu Kerbau and Senamat Ulu

Batu Kerbau

Scenario 1: “Way to heaven”

- The road extended until the old fallow;
- All commodities prices are high which make communities increase the capital furthermore, training extensions are workout and farmers can access to improved seedling and information on prices.

When farmers increase the capital then they are interest to open a new field on old fallow with 60% of the land is for rubber and 40% of the land is for palm oil plantations.

- Economic of the community has increased which consequence to the children can go to school and improved the livelihood (Have a nice house, motorbike and car)
- Good accessibility of the road and public services support on the irrigation which villagers can have a fish pond and paddy filed with the improved rice seedling.

Senamat Ulu

Scenario 1: “Independent/state development”

- The supporting from the state which the economic road extend until fields and access to all commodities prices information. Moreover, commodities prices are high.
- Farmers are interested in opening a new land (old fallow) which they require to have the road accessibility until the field then they will invest on the oil palm and rubber plantation.
- Created farmer groups which facilitate to access the inputs (seedling, credit, fertilizer, herbicide and etc). On the other hand, this kind of working group also engage the farmer to increase the capacity building and other activities inside and outside of the villages.

Scenario 2: “Not forward, not backward”

- Current trends:
 - The road to the field are not extended;
 - Unstable of the rubber prices and fertilizer is expensive;
 - Limited access to capital and villagers cannot develop new activities.

As a result of these trends communities are less interested on the cultivations because there is no road to transport productions. Furthermore, agriculture plantations are not replanted; farmers will leave the land to be old fallows and move to work in the city or in the oil palm companies.

On the other hand, there are no training come to the villages and improved seedling are not available which consequence to the long term agriculture development of the village that productions have decreased.

Scenario 3: “Move forward”

- Economic road open until to the field, farmers work more easily and interest to open the old fallows. When the road come land prices are increased and farmers can increase the capital when they sell the land. The capital can also from the new field of cultivation.
- Capacity building (training) are supported from the public services which providing:
 - Technical information on the agriculture;
 - Improved seeds and seedlings;
- The government determines the prices of the commodities;
- Subsidy fertilizers for the farmers.

All of these conditions above are consequence to high income and income are stable in the family. Therefore, people have more capital and interest to open a new field and invest in other businesses. In addition, villagers obtain the land certificates which allow them to have the credit from banks.

Annex 2: Questionnaires

Questionnaire

I. History

Family story: *sejarah keluarga*

Name: age:

Marriage year *menikah*: name:

- Date of arrival in the village *tanggal masuk di desa*

- People in your family *orang-orang di keluarga*
.....

1. Could you tell me about the history in the family?

Apakah anda bisa bercerita riwayat /sejarah kk anda?

2. What are the changes in your village in term of the agriculture and forest?

Apa mengubah perkebunan dan hutan di desa anda?

- Rule and political and organization *Aturan, politik dan organisasi*
- Infrastructure and market *pasar, penjualan dan pembelian, dan infrastruktur*
- The landscape of the village *Pemandangan/lanskap/ apa yang anda lihat...*

3. What did you do before oil palm? Why and how?

Apa mata pencarian anda sebelum anda punya kebun sawit?

Sebelum berkebun sawit, ada apa di lahan ini?

Kenapa? Bagaimana?

Labour in family

Name	Age	Relation with interviewed	Work done (%)

Hired labour

.....
.....
.....

Land

Name of plot (location)	Size	Current land use (type of cropping system)	Land tenure (owner, sharecropper, given to sharecropping, renting)	Origin of the land

CS : oil palm, rubber monocropped, rubber in agroforest, cacao + rubber n agroforest, sawa

Machinery

Name of equipment	Purpose to use	Life time	Date (when do they buy)	Price

Animal

Species	Quantity	where are they feed

- Off- farm activities kegiatan yang bukan *pertanian, kegiatan lain*

Income:.....Rp/month

Technico-Economic

Cropping system 1: *kegiatan pertanian*

▪ **Cost of production Technical management of crops** *tanaman pengelolaan teknik*

		Family labour			Hired labour						
Date <i>Tanggal</i>	Activities kegiatan	N. people, orang	N. hours/per <i>Jam/hari</i>	N.day s, hari	N. people, orang	N. hours/pe r <i>Jam/hari</i>	N.days, hari	Tools <i>Alat</i>	Input/output <i>Masukan/pro duksi</i>	Quantity of input/outp ut <i>Berberapa</i>	Prices input/outpu t <i>Harga</i>
	Paddy Nursery										
	Prepare the nursery										
	Fertilize the nursery										
	Prepare the soil plot										
	Transplant rice										
	Fertilizer										
	Herbicide/pesticide										
	Weeding										
	Water										
	Harvesting										
	Preprocessing (threshing, making latex...)										
	Transportation										

▪ **Production/Yield**

Product/cost <i>Produksi, hasil/harga</i>	Quantity <i>berapa</i>	Price	Quantity x Price	Remark

▪ **Investment calculation**

Cost Plantation Installation	Price <i>Harga</i>	Life time <i>Hidup kali</i>	Depreciation (Price/life time) <i>Mencela</i>	Quantity	Quantity x depreciation	Remarks
Clearing the land						
Seedling						
Fertilizer						
Herbicide						
Weeding						

Annex 3: Economic analysis

IV. Rubber clone 1,5 ha age: 7 years

4.1 Investment year 1 to 5

Date	Activities	Family labour			Hired labour			Tools	Input/output	Quantity of input/output	Prices input/output
		N. people, orang	N. hours/perJa m/hari	N.days, hari	N. people, orang	N. hours/perJa m/hari	total N.days				
	Open the land+ Burn	2.00	7	60.00							
	Seedling Plantation	2.00	7	30.00					seedling	1,000.00	700,000.00
	fertilizer	1.00	7	5.00	2	7.00	10		fertilizer	500.00	17,500,000.00
									labour		
	Weeding	1.00	7	800.00	5	7.00	600		labour		
	Total			895.00			610				18,200,000.00
	Total of labour days			1505							
	Total per ha and depreciation			18.8125							227,500.00
GAV/ha	(12,133,333.33)										
NAV/ha	(12,717,083.33)										
NAV/day of labour	(8,449.89)										

4.2 Harvest in year 6

Date	Activities	Family labour			Hired labour			Tools	Input/output	Quantity of input/output	Prices input/output
		N. people, orang	N. hours/perJa m/hari	N.days, hari	N. people, orang	N. hours/perJa m/hari	total N.days				
	Weeding	1.00	3	68.57	20	7.00	80	parang	labour		
	fertilizer	1.00	7	1.00	2	7.00	2		fertilizer	500.00	3,500,000.00
									labour		
	Tapping	1.00	5	171.43							
	Preprocessing + transportation	1.00	4	27.42857143							
	Total			268.43			82				3,500,000.00
	Total of labour days			350.4285714							
	Total per ha			233.6190476							2,333,333.33

Product	kg/month/ha	kg/year	Price	GP
Rubber	266.67	3200	8000	25,600,000.00

From rubber 6 year old

GAV/ha	23,266,666.67
NAV/ha	22,682,916.67
NAV/day of labour	97,112.42
Family income/ha (NAV- cost of the hired labour)	22,682,916.67
Family income/day-family labour (family income per	126,753.92

I. Example of Bapak Mohamas Sakir "oil palm 1 ha"

1. Investment for 3 years

Date	Activities	Family labour			Hired labour			Tools	Input/output	Quantity of input/output	Prices input/output	total
		N. people	N. hours/day/ <i>jam/hari</i>	N.days	N. people	N. hours/day/ <i>jam/hari</i>	total N.days					
July/Aug	Prepare the soil plot+ burn	2.00	7	14.00				parang				
Sep/oct	seedling plantation + making fence	2.00	7	28.00					seedling	250.00	1,000.00	250,000.00
March/Sep	herbicide + cutting grass	1.00	3	15.43					herbicide	3.00	50,000.00	1,350,000.00
	other materials								plastic bags	2.00	12,000.00	24,000.00
	Total			57.43								1,624,000.00
	Total of labour days			57.43								
	Total per ha		0	57.43								1,624,000.00
	Depreciation	-	-	2.30	-	-	-	-	-	-	-	64,960.00

Year 1-3 Gross product /ha/year

Production	quantity/ha	price unit	total GP
Harvest of oil palm	-	1,000.00	0
Total			0

for Oil palm year 1-3

GAV/ha	-1,624,000
NAV/ha	-1,911,960
NAV/day of labour	-33,293
Family income/ha (NAV- cost of the	-1,911,960
Family income/day- family labour (family income per ha / family	-33,292.84

2. cost and production of year 4

Date	Activities	N. people, orang	N. hours/per/ <i>jam/hari</i>	N.days, hari	N. people, orang	N. hours/per/ <i>jam/hari</i>	total N.days	Tools	Input/output	Quantity of input/output	Prices input/output	total
	her bicide+cuting grasses	1.00	3	5.142857143					herbicide	3.00	50,000.00	450,000.00
	Harvesting & transport to truck	2.00	5	37.1								
	Total			42.3								450,000.00
	Total per ha and per year	-	0.0	42.3								450,000.00
	total family labour and hired labour			42.28571429								

Year 4 Gross product /ha/year

Production	quantity/ha	price unit	total GP
Harvest of oil palm	1,430.00	1,000.00	1,430,000
Total			1,430,000

for Oil palm year 4 (2010)

GAV/ha	980,000
NAV/ha	692,040
NAV/day of labour	15,523
Family income/ha (NAV- cost of the hired labour)	692,040
Family income/day- family labour (family	16,365.81

Oil palm: Analysis based on farming strategy (Include hired labour)

Return to Land	Batu Kebau and Baru Pelepat							Senamat Ulu						
Ages	trans3	trans4	trans5	Abit	Samin	Rubina	suhailli	Razi	Lalah	Mulyadi	Ramazi	sum	average	Euros
1-3 years	(1,972,973)	(1,312,920)	(3,321,507)	(1,710,200)	(4,281,200)	(1,194,360)	(5,692,800)	(3,472,376)	(2,643,080)	(368,840)	(7,714,467)	(33,684,723)	(3,062,248)	(225)
4	(2,290,307)	10,135,080	(702,173)	2,239,800	(2,251,200)	1,819,640	4,407,200	4,430,424	-	-	4,198,867	21,987,331	2,443,037	179
5	2,309,693	25,735,080	1,031,160	-	3,598,800	2,339,640	10,582,200	11,340,024	-	-	-	56,936,597	8,133,800	597
6	4,643,027	30,935,080	2,331,160	-	5,938,800	3,639,640	17,164,700	16,228,024	-	-	-	80,880,431	11,554,347	848
7	15,709,693	36,135,080	2,764,493	-	-	3,639,640	-	-	-	-	-	58,248,907	14,562,227	1,069
8	13,709,693	30,935,080	2,951,160	-	-	3,639,640	-	-	-	-	-	51,235,573	12,808,893	940
9	7,709,693	20,535,080	7,284,493	-	-	-	-	-	-	-	-	35,529,267	11,843,089	869
10	6,109,693	-	7,284,493	-	-	-	-	-	-	-	-	13,394,187	6,697,093	491
11	3,709,693	-	2,951,160	-	-	-	-	-	-	-	-	6,660,853	3,330,427	244
12	3,709,693	-	2,951,160	-	-	-	-	-	-	-	-	6,660,853	3,330,427	244
													Sum	5,257
													average	526

Return to Labour	Batu Kerbau and Baru Pelepat							Senamat Ulu						
Ages	trans3	trans4	trans5	Abit	Samin	Rubina	Suhailli	Razi	Lalah	Mulyadi	Ramazi	sum	average	Euros
3-Jan	(15,784)	(12,624)	(13,342)	(16,444)	(39,641)	(5,504)	(97,911)	(149,304)	(89,093)	(19,161)	(220,714)	(679,520)	(61,775)	(5)
4	(44,451)	92,725	(12,788)	46,188	(100,860)	27,645	103,082	204,960			49,333	365,833	40,648	3
5	44,134	235,447	18,779	-	159,199	35,544	319,594	524,613				1,337,310	191,044	15
6	85,982	283,022	42,454	-	262,712	66,912	574,125	750,741				2,065,948	295,135	23
7	300,185	283,022	50,345	-	-	66,912						700,465	175,116	13
8	253,883	285,079	95,474	-	-	66,912						701,349	175,337	13
9	147,319	187,873	221,882	-	-	-						557,074	185,691	14
10	116,746	-	221,882	-	-	-						338,628	169,314	13
11	70,886	-	89,891	-	-	-						160,777	160,777	12
12	70,886	-	89,891	-	-	-						160,777	80,388	6
													Sum	108
													average	11

Oil palm: Analysis based on cropping system (Not include hired labour)

Return to Land	Batu Kerbau and Baru pelepat											Senamat Ulu							
Ages	trans1	trans2	trans3	trans4	trans5	trans6	Abit	mohamas	Samin	Rubina	Stimariam	suhaili	Razi	Lalah	Mulyadi	Ramazi	sum	average	Euros
1-3 years	(223,000)	(1,104,920)	(1,972,973)	(1,312,920)	(2,073,507)	(473,293)	(715,267)	(1,911,960)	(3,865,200)	(1,194,360)	(5,813,000)	(5,480,500)	(3,056,376)	(1,787,080)	(269,000)	2,165,533	(29,087,823)	(1,817,989)	(133)
4	19,137,000	30,223,080	(2,290,307)	10,135,080	(254,173)	1,717,373	2,878,067	692,040	(2,235,200)	1,819,640	(2,003,600)	5,577,200	4,526,424	-	-	4,578,867	74,501,491	5,321,535	391
5	35,457,000	35,423,080	2,309,693	25,735,080	1,479,160	2,167,373	-	3,162,040	4,264,800	2,339,640	-	11,752,200	11,436,024	-	-	-	135,526,091	12,320,554	904
6	40,657,000	40,623,080	4,643,027	30,935,080	2,779,160	4,567,373	-	2,562,040	6,864,800	3,639,640	-	17,164,700	16,324,024	-	-	-	170,759,924	15,523,629	1,139
7	40,657,000	51,023,080	15,709,693	36,135,080	3,212,493	7,717,373	-	-	-	3,639,640	-	-	-	-	-	-	158,094,360	22,584,909	1,657
8	40,657,000	40,623,080	13,709,693	30,935,080	3,132,493	7,717,373	-	-	-	3,639,640	-	-	-	-	-	-	140,414,360	20,059,194	1,472
9	25,057,000	35,423,080	7,709,693	20,535,080	7,465,827	6,117,373	-	-	-	-	-	-	-	-	-	-	102,308,053	17,051,342	1,251
10	-	25,023,080	6,109,693	-	7,465,827	5,317,373	-	-	-	-	-	-	-	-	-	-	43,915,973	10,978,993	806
11	-	-	3,709,693	-	3,132,493	4,517,373	-	-	-	-	-	-	-	-	-	-	11,359,560	3,786,520	278
12	-	-	3,709,693	-	3,132,493	3,717,373	-	-	-	-	-	-	-	-	-	-	10,559,560	3,519,853	258
Sum																		8,023	
average																		802.31	

Return to Labour	Batu Kerbau and Baru Pelepat											Senamat Ulu							
Ages	trans1	trans2	trans3	trans4	trans5	trans6	Abit	Mohamas	Samin	Rubina	stimariam	Suhaili	Razi	Lalah	Mulyadi	Ramazi	sum	average	Euros
3-Jan	(107,212)	(16,249)	(15,784)	(12,624)	(6,983)	(3,114)	(6,878)	(33,293)	(31,856)	(5,504)	(56,437)	(94,259)	(53,755)	(44,308)	(12,902)	36,381	(464,775)	(29,048)	(2)
4	185,395	350,825	(44,451)	92,725	(4,472)	36,813	59,350	15,523	(97,806)	27,645	(71,252)	103,479	82,530	-	-	43,158	779,459	55,676	4
5	343,500	411,186	44,134	235,447	26,028	47,132	-	70,925	83,630	35,544	-	265,561	480,159	-	-	-	2,043,247	185,750	14
6	393,876	471,547	85,982	283,022	48,903	99,324	-	52,735	134,614	66,912	-	418,243	685,390	-	-	-	2,740,547	249,141	19
7	393,876	592,268	300,185	283,022	56,528	165,426	-	-	-	66,912	-	-	-	-	-	-	1,858,217	265,460	20
8	393,876	471,547	253,883	285,079	95,414	165,426	-	-	-	66,912	-	-	-	-	-	-	1,732,138	247,448	19
9	242,747	411,186	147,319	187,873	227,405	131,129	-	-	-	-	-	-	-	-	-	-	1,347,660	224,610	17
10	-	290,464	116,746	-	227,405	113,981	-	-	-	-	-	-	-	-	-	-	748,596	187,149	14
11	-	-	70,886	-	95,414	96,832	-	-	-	-	-	-	-	-	-	-	263,133	87,711	7
12	-	-	70,886	-	95,414	79,684	-	-	-	-	-	-	-	-	-	-	245,984	81,995	6
Sum																		120	
average																		12	